CLIMATE ACTION PLAN 2019

To Tackle Climate Breakdown

Rialtas na hÉireann
Government of Ireland

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Glossary of Acronyms

ACA	Accelerated Capital Allowance
AD	Anaerobic Digestion
BER	Building Energy Rating
BEV	Battery Electric Vehicle
BIK	Benefit-In-Kind
BIM	Bord Iascaigh Mhara
BMW	Biodegradable Municipal Waste
BnM	Bord na Móna
CAF	Climate Action Fund
CAN	Calcium Ammonium Nitrate
CAP	Common Agricultural Policy
CAROs	Climate Action Regional Offices
CCAC	Climate Change Advisory Council
CCGT	Combined Cycle Gas Turbine
CCS	Carbon Capture and Storage
CGI	Central Grid Injection
CH_4	Methane
CHP	Combined Heat and Power
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
CO_2eq.	Carbon Dioxide Equivalent
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CSO	Central Statistics Office
CSR	Corporate Social Responsibility
DAFM	Department of Agriculture, Food and the Marine
DART	Dublin Area Rapid Transit
DCCAE	Department of Communications, Climate Action and Environment
DCHG	Department of Culture, Heritage and the Gaeltacht
DEC	Display Energy Certificate
DHPLG	Department of Housing, Planning and Local Government
DoH	Department of Health
DoT	Department of the Taoiseach
DTTS	Department of Transport, Tourism, and Sport
EBI	Economic Breeding Index
Ebus	Electric Bus
EEA	European Environment Agency
EEA	European Economic Area
EEOS	Energy Efficiency Obligation Scheme
EI	Enterprise Ireland
EIB	European Investment Bank

Glossary of Acronyms

EMAS	Eco-Management and Audit Scheme
EPA	Environmental Protection Agency
EPC	Energy Performance Contracting
ESB	Electricity Supply Board
ESD	Effort Sharing Decision
ESR	Effort Sharing Regulation
ESRI	Economic and Social Research Institute
ETBs	Education and Training Boards
ETS	Emissions Trading System
EU	European Union
EVs	Electric Vehicles
EXEED	Excellence in Energy Efficient Design
FDI	Foreign Direct Investment
F-gases	Fluorinated-greenhouse gases
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GLAS	Green Low-Carbon Agri-Environment Scheme
GNI	Gas Networks Ireland
GPP	Green Public Procurement
GW	Gigawatt
GWP	Global Warming Potential
ha	hectare
ICAO	International Civil Aviation Organisation
ICE	Internal Combustion Engine
IFS	International Financial Services
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
ISIF	Ireland Strategic Investment Fund
ISO	International Standards Organisation
km	kilometer
kWh	kilowatt hour
LED	Light Emitting Diode
LEOs	Local Enterprise Offices
LEV	Low-Emission Vehicle
LGV	Light Goods Vehicle
LIEN	Large Industry Energy Network
LPT	Local Property Tax
LULUCF	Land Use, Land-Use Change and Forestry
MACC	Marginal Abatement Cost Curve
MAFA	Maritime Area and Foreshore (Amendment)
MPDM	Marine Planning and Development Management Bill

Mt	Million tonnes
MW	Megawatt
N_2O	Nitrous Oxide
NAF	National Adaptation Framework
NBP	National Broadband Plan
NCT	National Car Test
NDCA	National Dialogue on Climate Action
NDP	National Development Plan
NECP	National Energy and Climate Plan
NESC	National Economic and Social Council
NewERA	New Economy and Recovery Authority
NMP	National Mitigation Plan
NPF	National Planning Framework
NPV	Net Present Value
NSAD	National Strategy for Angling Development
NSAI	National Standards Authority of Ireland
NTA	National Transport Authority
NZEB	Near Zero Energy Building
OCAC	Oireachtas Climate Action Committee
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OGP	Office of Government Procurement
OPW	Office of Public Works
OREDP	Offshore Renewable Energy Development Plan
PHEV	Plug-in Hybrid Electric Vehicle
PI 2040	Project Ireland 2040
PPAs	Power Purchase Agreements
PPN	Public Participation Network
PSO	Public Service Obligation
PV	Photovoltaics
RDP	Rural Development Programme
RES	Renewable Energy Source
RES-E	Renewable Energy Source-Electricity
RES-H	Renewable Energy Source-Heat
RESS	Renewable Electricity Support Scheme
RES-T	Renewable Energy Source-Transport
SBCI	Strategic Banking Corporation of Ireland
SDGs	Sustainable Development Goals
SDZs	Strategic Development Zones
SEAI	Sustainable Energy Authority of Ireland
SECs	Sustainable Energy Communities

SEZ	Sustainable Energy Zone
SFI	Science Foundation Ireland
SMEs	Small and Medium-Sized Enterprises
SNSP	System Non-Synchronous Penetration
SPSV	Small Public Service Vehicle
SRFs	Solid Recovered Fuels
SSRH	Support Scheme for Renewable Heat
SUP	Single-Use Plastics
t	tonnes
TCO	Total Cost of Ownership
TWh	Terawatt hour
UCC	University College Cork
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VRT	Vehicle Registration Tax
WAM	With Additional Measures
WEM	With Existing Measures

Executive Summary

Executive Summary

> **What are greenhouse gases?**
>
> A wide range of gases known as greenhouse gases contribute to climate change. The most important greenhouse gases are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Other greenhouse gases comprise so-called F-Gases, a wide variety of man-made gases used in various applications, such as refrigeration and air conditioning. Collectively these greenhouse gases are the subject of international agreements, such as the United Nations Framework Convention on Climate Change and the Paris Agreement.
>
> Different greenhouse gases have different atmospheric characteristics, including Global Warming Potential (GWP). This is a measure of the cumulative warming of a gas over a specified time period, usually 100 years. This is expressed relative to CO_2 which has a GWP of 1. The amount emitted of any greenhouse gas multiplied by its GWP gives the equivalent emission of the gas as CO_2. This is known as CO_2 equivalent. This makes it easier to sum up the emissions and contribution of greenhouse gases to climate change and determine options to address climate change.

The accelerating impact of greenhouse gas emissions on climate disruption must be arrested. The window of opportunity to act is fast closing, but Ireland is way off course. As economic recovery has taken hold, it is clear that the link between prosperity and emissions has not been broken.

Ireland has directly experienced the extreme weather events of flooding, drought and lock down by extreme snow fall. But many countries have experienced much worse. The shift in climate is bringing profound shifts of desertification, rising sea levels, displaced population, profound challenges to the natural world, and economic and social disruption. We are close to a tipping point where these impacts will sharply worsen.

Decarbonisation is now a must if the world is to contain the damage and build resilience in the face of such a profound challenge.

Under the Programme for Government a Citizens Assembly was established to examine the challenge and it has signposted the way for radical reform. An All Party Committee was established, chaired by Deputy Hildegarde Naughton TD, which held lengthy hearings and has issued a comprehensive set of recommendations. This report has since been unanimously endorsed by the Dáil, while at the same time declaring a Climate and Biodiversity Emergency.

This is a strong foundation on which to build a Climate Action Plan committed to achieving a net zero carbon energy systems objective for Irish society and in the process, create a resilient, vibrant and sustainable country. The Government will take the lead on this agenda through this Plan in defining a roadmap to this goal and initiating a coherent set of policy actions to get us there.

Agenda 2030 and the Paris Agreement on climate change require a transformational shift of our economies and societies towards climate resilient and sustainable development. Ireland and the international community is responding to this requirement, setting out a profound change in the systems and practices which support our lifestyle. Every home, every community, every workplace and every farm, must be mobilised to get involved. Every network which supports our lives – energy, transport, telecommunication, public service, waste management – must adapt rapidly. If we

delay the transition, we as a country, shall most certainly face greater costs and fewer opportunities. The reality is that, only by adapting now, can our enterprises remain competitive and our society resilient.

In addition to the contribution of the proposals contained in this Plan to reduce Ireland's greenhouse gas emissions, many of the changes that are required will have positive economic and societal co-benefits, including cleaner air, warmer homes, and a more sustainable economy for the long term. In line with the UN Sustainable Development Goals, climate action must be seen as complementary to other important policy objectives, such as promoting sustainable economic development pathways, improving energy security, and addressing air pollution impacts on human health. For example, a significant shift away from internal combustion engine vehicles in the transport sector, and the retrofitting of existing buildings with electricity-powered heat pump systems, are expected to result in significant improvements in local air quality metrics and health outcomes.

Rising to this challenge is important not just for Ireland's long term economic and societal interests, but also in relation to the attractiveness of Ireland as a location for Foreign Direct Investment, as a tourism destination, and as a source of safe, high-quality agricultural and food products. In addition, a renewed climate ambition will help to secure our international reputation, which in turn will underpin Ireland's ability to promote its international policy objectives. This includes the priorities set out in Ireland's new international development policy A Better World, which explicitly places climate action as a core policy priority for Ireland's global partnerships, in recognition of the adverse and dangerous impacts that it poses to the realisation of the Sustainable Development Goals.

The make-up of greenhouse gas emissions differs in Ireland from most other European countries because of the role Ireland plays in supplying meat and dairy products across Europe and the world. Agriculture (largely through methane associated with our herds) makes up 32% of emissions from sectors in Ireland compared to just 11% in the rest of Europe. However, in all other major sectors (Electricity, Buildings, Transport, and Waste Management) we also have a higher carbon footprint per head of population.

Ireland will miss the target set for the period 2013 to 2020 for renewables by about one eighth and for cumulative emissions by a little under 5%. However, more worrying is the expectation that recent growth in emissions, particularly from Industry, Agriculture, and Transport will put us on a trajectory to be over 25% off target for the next 2021-2030 accounting period. From sectors where Ireland has a binding commitment, i.e. activities outside the Emissions Trading System (ETS), a cumulative gap of 101 MtCO2eq. emissions is to be closed over the period to 2030.

Project Ireland 2040 sets out investments to provide for population growth in a compact, connected and sustainable way. It will deliver important infrastructures and contribute to closing the gap by 16.4 MtCO$_2$eq. Additionally, continued investment in our national forestry strategy will provide approximately 21 Mt of further CO$_2$ removals. However, that won't be enough. We shall only achieve the transition if we make much greater changes in the way we meet our needs for power, heat, travel, land use, and use of resources.

As a basis for policy planning we have sought to design a trajectory to 2030 which would not require any Exchequer purchase of credits nor the sacrifice of revenue due to the Exchequer from credits sold in ETS.

Ireland will support the ambition emerging within the European Union to achieve a net zero target

by 2050, the plan commits to evaluate in detail the changes required to adopt such a goal in Ireland. We have also sought a pathway to 2030 which would be consistent with a net zero target by 2050, considering that residual agriculture emissions will need to be balanced by negative emissions technologies in energy systems and increased levels of afforestation. We have planned cautiously by assuming a low price trajectory for oil.

We have evaluated the options for change to identify those which can, at the lowest cost to our society as a whole, deliver the abatement we need to achieve by 2030. This in turn has allowed us to identify what the range of contribution is that we should expect from different sectors using those options. The greatest savings from known technologies lie in Transport and Electricity, the lowest savings are from segments of the Enterprise sector. The aim is to pursue the pathway with the least burdens and the greatest opportunities.

What is encouraging is that almost three quarters of the adjustments we need to make to 2030, do not impose a cost on the country if we look at the costs over the whole lifetime of the investment. For example, switching to Electric Vehicles (EVs) is set to more than payback the higher upfront costs over their lifetime through fuel savings, and thus delivers emission reductions at a negative cost.

To achieve our 2030 target, we shall have to include some technologies whereby cost per tonne abated will be up to €250. However, adopting those technologies must be seen in the context of the much more acute reductions which will be needed beyond 2030 and the critical value of delivering the global reduction and the benefit that this achieves.

Identifying the best options does not of course mean that they will be taken up. Policy must be carefully designed so that measures are fair and incentives are right. Information and access to capital must be accessible. Supporting infrastructures must be planned and delivered, with communities brought on board. Leadership, innovation, and opportunity in the new methods must be developed. These policy frameworks need to evolve continuously as part of a dynamic policy making process as technology evolves and experience develops.

Delivering such an integrated set of policies will require a deep level of collaboration across Government. The model will be built around ambitious goals, consistent implementation, transparent accountability, and capacity for continuous feedback and learning. The approach adopted will closely follow the recommendations of the Oireachtas Committee and build on the learnings from the success of the Action Plan for Jobs. Key features will include:

- A five year Carbon Budget and sectoral targets with a detailed plan of actions to deliver them
- A Climate Action Delivery Board overseen by the Department of the Taoiseach to ensure delivery
- An independent Climate Action Council to recommend the Carbon Budget and evaluate policy
- Strong accountability to an Oireachtas Climate Action Committee
- Carbon proofing all Government decisions and major investments

While this framework of goals and performance monitoring is crucial, it will be equally important that every public body adopts a Mandate for Climate Action. Accordingly, with leadership from top management, these bodies will be engaged and empowered to be innovative, not just in leading the way by reducing their own emissions, but also by stimulating and inspiring action across Irish

society.

Some of the key measures which will help create a framework across the entire public sector and beyond to support change shall include:

- Consistent development of a Green Procurement Strategy
- Targets of 50% Energy Efficiency and 30% greenhouse gas emissions reduction
- A trajectory for the price of carbon to create incentives which help avoid locking in carbon intensive technologies
- The realisation of the principle underpinning Project Ireland 2040 for compact, connected, and sustainable development
- Competitive funding rounds to promote research and innovation to meet the climate challenge

A detailed sectoral roadmap has been set out, which is designed to deliver a cumulative reduction in emissions, over the period 2021 to 2030, of 58.4 $MtCO_2$eq. outside the ETS, 17 $MtCO_2$eq. within the ETS, and 26.8 $MtCO_2$eq. from land use.

Electricity

- Increase reliance on renewables from 30% to 70% adding 12GW of renewable energy capacity (with peat and coal plants closing) with some of this delivered by private contracts
- Put in place a coherent support scheme for micro-generation with a price for selling power to the grid
- Open up opportunity for community participation in renewable generation as well as community gain arrangements
- Streamline the consent system, the connection arrangements, and the funding supports for the new technologies on and off shore

Buildings

- Introduce stricter requirements for new buildings and substantial refurbishments
- Design policy to get circa 500,000 existing homes to upgrade to B2 Building Energy Rating (BER) and 400,000 to install heat pumps
- Build a supply chain and a model for aggregation where home retrofits are grouped together to allow this level of activity to be funded and delivered
- Deliver two new district heating systems, and implement a roadmap for delivering District Heating potential
- Increase attention to Energy and Carbon ratings in all aspects of managing property assets

Transport

- Accelerate the take up of EV cars and vans so that we reach 100% of all new cars and vans being EVs by 2030. This will enable achieving our target of 950,000 EVs on the road by 2030. This means approximately one third of all vehicles sold during the decade will be Battery Electric Vehicle (BEV) or Plug-in Hybrid Electric Vehicle (PHEV)
- Make growth less transport intensive through better planning, remote and home-working and modal shift to public transport
- Increase the renewable biofuel content of motor fuels
- Set targets for the conversion of public transport fleets to zero carbon alternatives

Agriculture

- Deliver substantial verifiable greenhouse gas abatement through adoption of a specified range of improvements in farming practice in line with recommendations from Teagasc
- Deliver expansion of forestry planting and soil management to ensure that carbon abatement from land-use is delivered over the period 2021 to 2030 and in the years beyond
- Support diversification within Agriculture and land use to develop sustainable and circular value chains and business models for lower carbon intensity farming, including, organic production, protection and enhancement of biodiversity and water quality, and the production of bio-based products and bioenergy through the Common Agricultural Policy and implementation of the National Policy Statement on the Bioeconomy

Enterprise and Services

- Embed energy efficiency, replacement of fossil fuels, careful management of materials and waste, and carbon abatement across all enterprises and public service bodies
- Mobilise clusters regionally and sectorally to become centres of excellence for the adoption of low carbon technologies
- Plan for the delivery of quality employment and enterprise in the new areas of opportunity being opened up

Waste and the Circular Economy

- Develop coherent reduction strategies for plastics, food waste, and resource use
- Increase the level and the quality of recycling, with less contamination and greater replacement of virgin materials by recycling.
- Eliminate non-recyclable plastic
- Reduce the reliance on landfill with sharp reductions in plastics and compostables entering landfill

As part of Project Ireland 2040, we have established a Climate Action Fund, designed to stimulate innovation and pioneer efforts across Irish society. The first allocation of funds leveraged four times the contribution from the fund, and has pump-primed the provision of over fifty high capacity charging points, over 60,000 homes on district heating, motor gas production from anaerobic digestion, and a nationwide Light-emitting Diode (LED) lighting system.

This fund will be used creatively over the coming years in order to foster innovative partnership initiatives in sectors and communities. There is scope now to make our taxi fleets electric, see more farms pioneer low-carbon technologies, and for our take-aways to become compostable. The design and delivery of these calls will support trials and mainstream new thinking. We will also ensure that the three other Project Ireland 2040 funds, for rural and urban development and for disruptive innovation, are oriented towards supporting low-carbon initiatives.

Research funders will also build in more centrally to their programmes the opportunities to influence greenhouse gas emissions.

While sectoral goals and policy roadmaps are vital to progress, at the heart of all these are people and the priorities they adopt and the choices they make. The capacity to deliver a plan, such as this, which reaches so far into our daily lives, will be impossible without support and acceptance of the value of the changes being targeted and the necessity of the key infrastructures which support

them. To underpin this citizen involvement, specific strategies are being evolved:

- Engagement Capacity Building and empowering Local Community Action
- Realising the new economic opportunities in communities and regions
- Just Transition for those facing particular challenges in adjusting through reskilling, energy poverty schemes and community participation
- Empowering the new generation to have their voices heard and get access to the science and the opportunity to lead change

While the plan sets out a major programme of change, this cannot be approached as a call for a new programme of spending for the Exchequer to meet. Already under Project Ireland 2040, €30 billion is allocated to this challenge. We need to integrate change into existing spending plans, create the regulatory requirements, market incentives and innovative space to achieve the objective. Spending priorities will change within existing envelopes. With the arrival of strict carbon budgets, there will be parallel accounts to be met, as well as, the financial one we have been familiar with.

The level of change envisaged in this Plan cannot be avoided, nor can the taxpayer compensate for all the many actions which will have to be taken. However, it is essential that the burdens borne are seen to be fair and that every group is seen to be making an appropriate level of effort. This will be essential to maintaining the high level of political and civic consensus which has been built.

The structural change involved for Ireland is illustrated by the fact that over 25% of public investment over the coming decade is linked to climate action. Similarly the scale of this challenge for the wider public should not be understated. Even though most measures proposed to 2030 pay for themselves over their lives, they nonetheless have significant upfront costs which may make take-up difficult.

Some measures will not fully pay for themselves on their own but are necessary because of the climate threat. This will include measures such as the achievement of higher standards of building fabric and heat pumps, and the increase in the use of biofuels. It involves resetting our priorities.

Achieving 70% renewables will require us to build out significant infrastructures and the capacity to integrate new technologies. This will be a significant challenge. However these changes are necessary if Irish society is to avoid having stranded fossil fuel assets as the transition accelerates in the 2030-50 period.

This Plan also reflects Ireland's commitment to achieving the 2030 Sustainable Development Goals (SDGs). Agreed by the United Nations in 2015, the 17 SDGs address the environmental, economic, and social challenges that the world needs to tackle by 2030 to ensure a sustainable future. SDG 13 calls on countries to 'take urgent action to combat climate change and its impacts', by implementing commitments to the United Nations Framework Convention on Climate Change, as well as by improving public awareness of the need for Climate Action. Crucially, SDG 13 also calls on countries to integrate effective Climate Action measures into national policies. This all of Government Climate Action Plan does that, and places Ireland at the forefront of international efforts to achieve SDG 13.

1 | The Critical Nature of the Challenge

1.   The Critical Nature of the Challenge

Evidence for warming of our climate system is beyond dispute. Observations show that global average temperatures have now increased by more than 1°C since pre-industrial times. The atmosphere and oceans have warmed, the amount of snow and ice has reduced, and sea levels have risen as the concentrations of greenhouse gases have increased. The projections of future global and regional climate change indicate that continued emissions of greenhouse gases will cause further warming and changes to our climate.

These changes will cause extensive direct and indirect harm to Ireland and its people, as well as to other countries more exposed and less able than we are to withstand the associated impacts, which are predicted to include:

- Rising sea-levels threatening habitable land and particularly coastal infrastructure
- Extreme weather, including more intense storms and rainfall affecting our land, coastline and seas
- Further pressure on our water resources and food production systems with associated impacts on fluvial and coastal ecosystems
- Increased chance and scale of river and coastal flooding
- Greater political and security instability
- Displacement of population and climate refugees
- Heightened risk of the arrival of new pests and diseases
- Poorer water quality
- Changes in the distribution and time of lifecycle events of plant and animal species on land and in the oceans

In addition, many of the pollutants responsible for climate change are also damaging human health and have, for example, been shown to increase childhood asthma. The impact of climate change will be felt by every individual, household, and community across Ireland. There is an onus on each of us to mitigate the magnitude of long-term climate change by taking actions to reduce greenhouse gas emissions, and to increase the capacity of carbon sinks such as forests.

There is now a high level of awareness and understanding in Ireland of the impacts of climate change. The work of the Citizens' Assembly, which successfully placed a representative group of citizens at the heart of important legal and policy issues facing Irish society, demonstrated in its report on climate change, that there is a near consensus on the need for strong and early action to reduce Ireland's greenhouse gas emissions and to make Ireland resilient to future climate impacts.

The recent report of the Joint Oireachtas Committee on Climate Action, Climate Change: A Cross-Party Consensus for Action set out a strong menu of recommendations for policy action, building on the work of the Citizens' Assembly. The report of the Joint Committee has been unanimously endorsed, and a climate and biodiversity emergency declared, by Dáil Éireann, providing a very solid foundation on which to build this ambitious all of Government Climate Action Plan.

Against this background, strategies must be devised to reduce and manage climate change risks through a combination of mitigation and adaptation responses.

The Intergovernmental Panel on Climate Change's Special Report, *Global Warming of 1.5°C*, published in October 2018, confirmed that the international community has a limited window for real action to reduce emissions to ensure that current and future generations can live sustainably in

a low-carbon and climate-resilient world. It is, therefore, essential that the international community steps up its efforts towards meeting the Paris Agreement objectives of:

- Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognising 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

The Paris Agreement and Agenda 2030 Sustainable Development Goals (SDGs) recognise that the impacts of climate change will be felt by all, but also that these impacts will be uneven. Vulnerable communities and people around the world – in particular women and girls – face devastating impacts to their livelihoods and greater challenges in adapting to the long-term effects of climate breakdown. As a Party to the Paris Agreement, Ireland recognises the Principle of "common but differentiated responsibility and respective capabilities" within the Agreement, which acknowledges a diverse range of capacities and responsibilities by Parties. Ireland also recognises both the right and responsibility of all countries to pursue low-carbon, climate-resilient development, and is supporting initiatives – within the framework of both the Paris Agreement and the United Nations SDGs – to support less-developed countries in achieving these objectives.

In light of this, our clear ambition is to deliver a step-change in our emissions performance over the coming decade, so that we will not only meet our EU targets for 2030, but will also be well placed to meet our mid-century decarbonisation objectives.

This Plan underpins this ambition by setting out clear 2030 targets for each sector and the expected emissions savings that will result. The analysis presented in this Plan shows that it is not only technically feasible to meet our 2030 EU target, but that it is also economically achievable. The majority of the required abatement to 2030 could be achieved by deploying measures that are, over their life-time, either cost-neutral or result in net savings to society. The climate change mitigation pathways presented in Chapter 4 entail a coherent set of abatement measures across the five sectors that contribute most to our greenhouse gas emissions: Agriculture, Transport, Electricity, Built Environment, and Industry. This Plan builds on the policy framework, measures and actions set out in the National Mitigation Plan, Project Ireland 2040 and the draft National Energy and Climate Plan.

To realise the necessary abatement, we have taken critical policy decisions with the publication of this Plan, including a new commitment that 70% of our electricity needs will come from renewable sources by 2030. Further decisions will need to be made in the next 12 to 24 months. The earlier we act, the less dramatic and costly it will ultimately be for Ireland. Acting now reduces our long-term transition costs, and brings additional benefits such as better air quality and reduced fuel poverty. It will also enhance Ireland's international reputation as a destination of choice for tourism and foreign direct investment, and as an environmentally sustainable agri-food exporter. Early action will also be vital to our ability to pursue other important strategic national interests, and to credibly advocate for urgent climate action globally.

This Plan also proposes a big step-up in our engagement with citizens and communities through

more coherent mobilisation of existing structures and initiatives to inform, engage, motivate, and empower people to take climate action. We recognise that individuals and communities will be at the heart of the low-carbon transition and that not everybody is equally placed to readily respond to the policies and initiatives that will be implemented by this Plan. Therefore, through our work to empower individuals and communities to take action, we will seek to recognise different capacities and starting points so that positive choices can be made for the future that will ultimately bring long-term benefits to communities across Ireland.

Reflecting the central priority that climate change will have in our political and administrative systems into the future, this Plan sets out a series of new governance arrangements that will be put in place, including carbon proofing of our policies, the establishment of carbon budgets with clear sectoral targets, a strengthened Climate Change Advisory Council, and greater accountability of Ministerial performance to the Oireachtas.

We will also publish our performance against the targets and actions we have set for ourselves in this Plan, which has a strong focus on implementation, including actions with specific timelines, clear lines of responsibility, and steps needed for their achievement. The supervision of delivery from the Department of the Taoiseach will ensure the critical coordination across all departments and agencies to focus effectively on timely implementation in their areas and to anticipate any corrective measures needed.

It is impossible to predict how the next decade will unfold. The pace of individual, technological, scientific, societal and economic changes will not exactly match our assumptions today. Therefore we will update this Plan every 12 months, underpinned by consultation with key stakeholders. These updates will be informed by the latest analysis, performance against our targets, and any new or corrective actions that we may need in order to stay on track towards our overall 2030 targets and our ultimate objective of achieving a transition to a competitive, low-carbon, climate-resilient, and environmentally sustainable society and economy by 2050. It is the latter two goals that are the most significant: meeting our overall 2030 target, and being on a trajectory towards a low-carbon, sustainable economy by 2050. Therefore, the individual targets and actions in this Plan will be updated and revised each year to ensure we achieve these goals.

Chapter 16 of this Plan addresses climate adaptation. People throughout Ireland have already experienced first-hand the potential impact of climate change, particularly through floods and storms and the damage that can ensue. Events like these, and the expected increase in their frequency, highlight the need for adaptation measures to help the country cope with the effects of climate change. The National Adaptation Framework, published in January 2018, sets out the actions we are taking to reduce our vulnerability to climate change impacts that are already locked in and will continue to evolve for the foreseeable future.

2 | Where We Stand

2. Where We Stand[1,2,3]

Irish policy began to address reductions in national greenhouse gas emissions from 2005 onwards[4]. The rate of emissions reduction was modest up to 2008, with efforts to decarbonise hampered by strong economic activity. From 2008 there were reductions in emissions. However this was a consequence of the economic recession and the resulting reduced employment, consumption, and travel as against policy design. The improved economic outcomes and outlook in recent years has seen emissions gradually grow once more, demonstrating that Ireland has failed to break the link between emissions and growing prosperity. It is unfortunately the case that the action needed to break this linkage was a casualty of the 'lost decade'. The political and administrative energy that should have been devoted to this was necessarily devoted to resolving the massive unemployment crisis, bringing our public finances back into balance, and restoring our economic sovereignty. Now is the time to take the definitive action needed.

In its approach to decarbonising, the EU has split greenhouse gas emissions into two categories, namely the Emissions Trading System (ETS) and the non-ETS.

Emissions from electricity generation and large industry are in the ETS. These are dealt with at EU level. The EU ETS includes more than 11,000 power stations and industrial plants (stationary installations) in 31 countries, as well as airlines that operate within the EU. It covers about 45% of EU emissions, but only about 29% of total emissions in Ireland. The ETS is a "cap and trade" system where an EU-wide limit, or cap, is set for participating installations. The cap is reduced over time so that total emissions fall. Within that limit "allowances" for emissions are auctioned or allocated for free (outside the power-generation sector). Individual installations must report their CO2eq. emissions each year and surrender sufficient allowances to cover their emissions. If their available allowances are exceeded, an installation must purchase allowances. On the other hand, if an installation has succeeded in reducing its emissions, it can sell any surplus allowances remaining. The EU ETS is designed to bring about reductions in emissions at least cost. To date, it has played an increasingly important role in assisting European industry to implement the type of reductions envisaged within the EU's agreed limit of at least 20% reduction of overall greenhouse gas emissions across the EU by 2020 and 43% by 2030, both relative to 2005 levels.

Emissions from agriculture, transport, the built environment, and small industry are in the non-ETS sector. These are dealt with by Member States through legally binding targets for emissions reductions. Ireland's non-ETS targets are to achieve a 20% reduction in non-ETS sector emissions by 2020 and 30% by 2030 (relative to 2005 levels), with annual binding emissions limits set for each individual year to 2030. In addition, Ireland has legally binding energy efficiency and renewable energy targets for 2020. For 2030, energy targets are legally binding at EU-level only, with all Member States required to contribute to their achievement.

In taking stock of where we stand, it is important to recognise that the relative scale of Ireland's greenhouse gas emissions by sector differs considerably from that of the EU 28, see Figure 2.1. Emissions from Irish agriculture represent 33% of total national emissions, compared with 10% in

1   All EU data from 'Trends and Projections in Europe', EEA, 2018: https://www.eea.europa.eu/publications/trends-and-projections-in-europe-2018

2   All Irish emissions projections data taken from: http://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2017-2035/#d.en.64043

3   All Irish emissions inventories data taken from: http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/#d.en.63244

4   The base year against which compliance with EU targets is measured

the wider EU 28. Agriculture represents 46% of emissions in the non-ETS sector[5], compared with 17% in the EU 28. Recognition of the unusually large contribution of agriculture to our national emissions is important. With a majority of emissions in this sector coming from biogenic sources[6], agriculture presents challenges that are not fully amenable to technological solutions to emission abatement, as may exist or evolve in other sectors. The EU has recognised the limited mitigation potential within agriculture in its climate policy framework for 2021 to 2030, and will also recognise a more holistic approach to land use policies in climate mitigation. This is not to exempt agriculture from making its fair contribution to national emissions reduction efforts, but instead highlights that Ireland's specific emissions profile may influence the cost and potential for emissions reduction in the time horizon to 2030 and beyond.

Figure 2.1 Ireland's Non-ETS Sector CO_2 eq. Emissions per head Compared to the EU, 2016
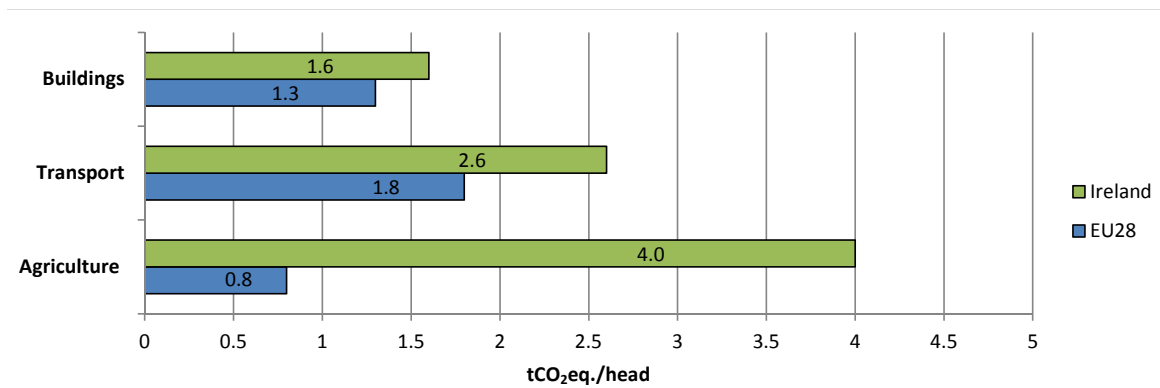
2.1 Emissions Trends 2005 to 2017

As shown in Figure 2.2, total national emissions fell from a high of 69.5 $MtCO_2$eq. in 2005 to 59.7 $MtCO_2$eq. in 2011 (-14.1%). In terms of the non-ETS sectors, emissions fell from 47.1 $MtCO_2$eq. in 2005 to 41.2 $MtCO_2$eq. in 2011 (-12.5%). However, the economic recovery and associated growth in key sectors, such as agriculture and transport, has seen non-ETS emissions rise to 43.8 $MtCO_2$eq. in 2017 (+6.3%). This provides a challenging context for national ambitions to deliver on increasingly stringent annual targets out to 2030.

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5   The non-ETS sector includes emissions from agriculture, buildings, transport, waste, and smaller source of emissions in industry

6   Biogenic emission sources are emissions that come from natural sources

Figure 2.2 Ireland's CO₂eq. Emissions Inventories, 2005-2017

kt CO$_2$ equivalent

Legend:
- Energy Industries
- Residential
- Manufacturing Combustion
- Commercial Services
- Public Services
- Transport
- Industrial Processes
- F-Gases
- Agriculture
- Waste
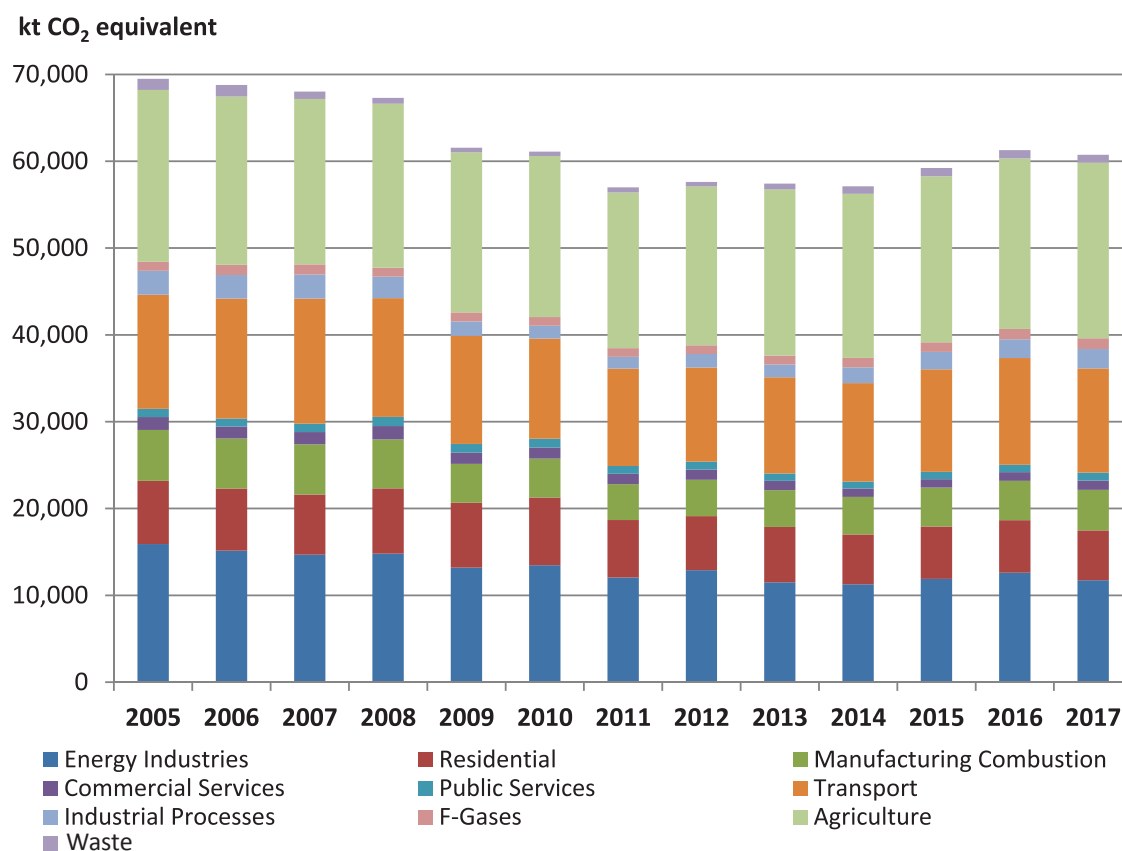
2.2 Ireland's Targets for 2013 to 2020

Ireland's target under the EU Effort Sharing Decision (ESD) is to achieve cumulative emissions over the period 2013 to 2020, that are consistent with a trend leading to a 20% reduction in greenhouse gas emissions by 2020, relative to 2005 levels. There are also annual emission limits for the period 2013 to 2020 to guide Ireland towards the 2020 target. Any over achievement of the emission limit in a particular year can be banked and used towards compliance in a future year. Figure 2.3 shows Ireland's non-ETS sector emissions up to 2017, with projected emissions[7] for the period 2018 to 2020. While emissions were less than the annual limits between 2013 and 2015, emissions exceeded the annual limit in 2016, and over the entire 2013 to 2020 period Ireland is projected to cumulatively exceed its compliance obligations by between 16.3 MtCO₂eq. and 17 MtCO₂eq. Some of these have already been acquired.

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7   Source: http://www.epa.ie/climate/emissionsinventoriesandprojections/nationalemissionsprojections/

Figure 2.3 Ireland's Actual and Projected non-ETS Emissions and Annual Targets, 2013-2020
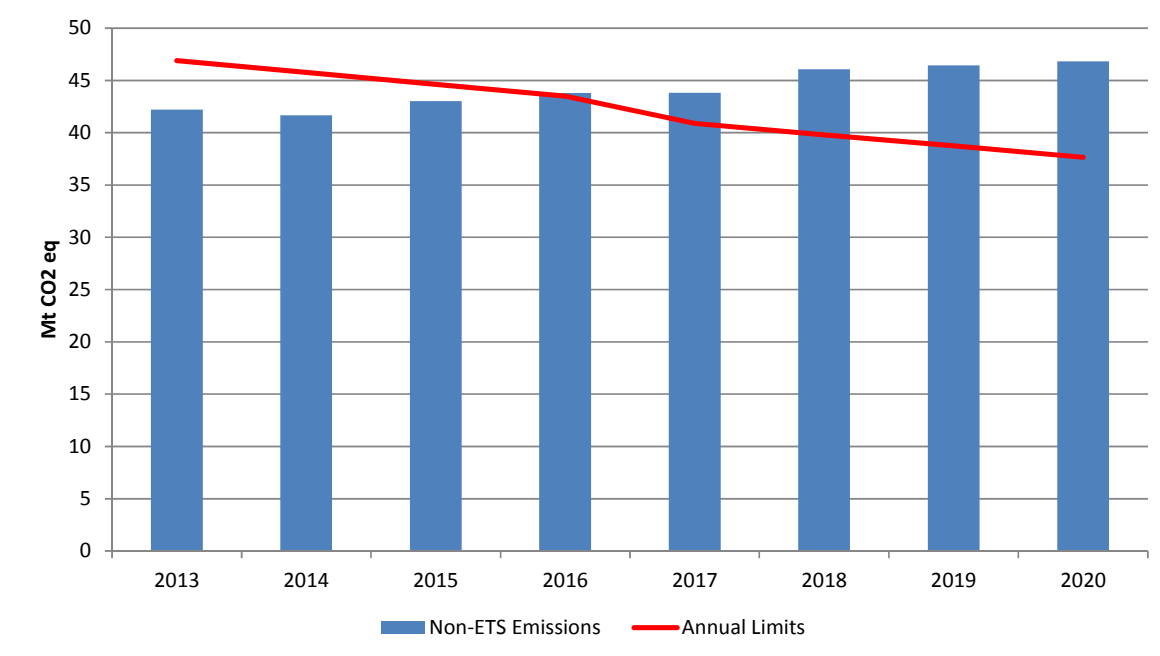
2.3 Ireland's Targets for 2021 to 2030

Our latest projections indicate that a strong surge in demand for electricity, at a rate faster than the introduction of renewables, will mean Ireland's ETS sector emissions will continue to increase up to 2025, after which point policies contributing to fuel switching in power generation will contribute towards stronger emissions reduction to the end of the decade. While annual emission limits for the period 2021 to 2030 will guide Ireland towards the 2030 target, the main binding target will be for cumulative emissions. As previously indicated, Ireland will need to reduce its non-ETS sector greenhouse gas emissions consistent with a 30% reduction by 2030, relative to 2005 levels. Projections indicate, however, that non-ETS sector emissions will continue to increase against the required decarbonisation pathway to meet our targets and this presents a substantial challenge for Ireland. Figure 2.4 sets out projected ETS and non-ETS sector emissions, and the required decarbonisation pathway for non-ETS sector emissions between 2021 and 2030.

Figure 2.4 Ireland's Projected ETS and non-ETS Emissions and Annual Targets
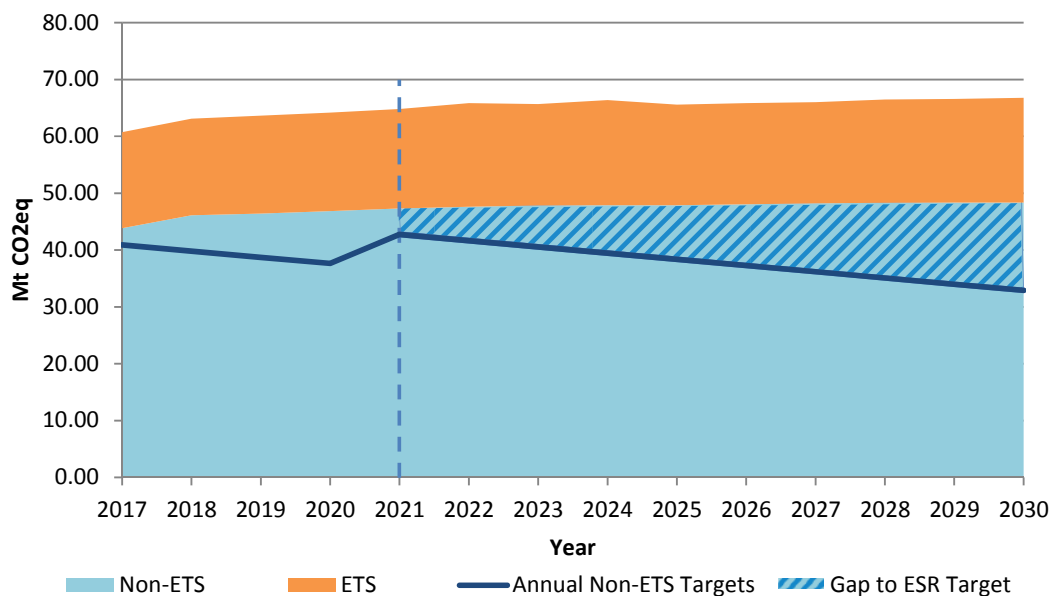
2.4 Ireland's Ambition for 2050

The Government supports the adoption of a net zero target by 2050 at EU level. The Climate Action Plan puts in place a decarbonisation pathway to 2030 which would be consistent with the adoption of a net zero target in Ireland by 2050. The Plan also commits to evaluating in detail the changes which would be necessary in Ireland to achieve this target. In 2014 Ireland adopted a National Policy Position for an 80% reduction in CO_2eq. emissions by 2050 compared to 1990 levels for the electricity generation, built environment, and transport sectors. It also outlines an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise on national capacity for sustainable food production.

2.5 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
1	Evaluate in detail the changes required to adopt a more ambitious commitment of net zero greenhouse gas emissions by 2050, as part of finalising Ireland's long-term climate strategy by the end of 2019 as per the advice of the Intergovernmental Panel on Climate Change and the recommendation of the Joint Oireachtas Committee on Climate Action

3 | Policy to Date and Expected Impact of Planned Policies

3. Policy to Date and Expected Impact of Planned Policies

Project Ireland 2040 contained important measures to make Ireland's development more climate friendly, including achieving the following by 2030:

- A target of 55% renewable power
- Delivery of the full BusConnects programme for all of Ireland's cities
- Retrofit plans for 450,000 homes
- At least 500,000 electric vehicles on the road by 2030 with additional charging infrastructure to cater for planned growth

It plans for a major expansion of 1 million in population, grounded in compact, connected and sustainable spatial development and regionally balanced growth. Achieving this will require careful integration of planning design and implementation.

The 2018 national emissions projections, prepared by the Environmental Protection Agency (EPA), recognise existing and planned policy developments that will contribute to emissions abatement over the period to 2030 and beyond. Based on policies in place prior to the adoption of Project Ireland 2040, the projections anticipated total greenhouse gas emissions of 479.9 $MtCO_2$eq. in the period 2021 to 2030, some 101.6 $MtCO_2$eq. above the budget[8] implied by Ireland's annual non-ETS ceilings.

While Project Ireland 2040 will ensure that past patterns of carbon intensive development and growth will not be repeated, it is not enough to change many of the legacy patterns of carbon use. This will require major changes in some of the systems that underpin our present patterns of living.

The following assumptions, which are set out in the draft National Energy and Climate Plan (NECP), are included in the National Development Plan (NDP) scenario of this Plan, which is estimated to deliver cumulative reductions of 16.4 $MtCO_2$eq. in the non-ETS sector as well as an approximate 20% reduction in ETS sector emissions by 2030 relative to 2017 levels.

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8   The carbon budget represents the cumulative annual emission ceilings within the non-ETS sector in the 2021 to 2030 period.

Table 3.1 Policy Assumptions in NDP Scenario of Emissions Projections

Biofuel Blend	Statutory target at 11.111% from 1 January 2019 and 12.360% from 1 January 2020. Blending levels to reach E10 and B12 by 2030 with statutory blend increasing incrementally Increases in line with the overall Renewable Energy Source (RES) trajectory set out in the Energy Union Governance Regulation The starting level for the purposes of calculating the trajectory is assumed to be the level achieved in 2020 based on policies in place prior to the adoption of the NDP, and the 2030 level is assumed based on achieving E10 and B12
Low Carbon Heating	Support Scheme for Renewable Heat (SSRH) based on 5 years of funding to achieve 1.6 TWh Renewable Energy Source-Heat (RES-H) Biomethane injection of 1.6 TWh by 2030 achieved by incentive and/or obligation. Additional district heating of 0.12 TWh growing linearly from 2023 to 2028 Heat pumps in new domestic and commercial buildings driven by building regulations. 170,000 heat pumps in existing residential buildings
Electricity Generation	Lough Ree and West Offaly stations to co-fire with biomass after the Public Service Obligation (PSO) for those stations expires at the end of 2019, at a higher rate than for the baseline Moneypoint to close at the end of 2025 Wind grows on a linear trajectory Offshore wind is introduced from 2023 Solar Photovoltaics (PV) grows to 1.5 GW of installed capacity by 2030 System Non-Synchronous Penetration (SNSP) increases to 75% by 2020 5 MW of ocean energy demonstration projects from 2023 Additional interconnection added in 2025 and 2026 55% Renewable Energy Source-Electricity (RES-E) achieved in 2030 and maintained
Electric Vehicles	500,000 Electric Vehicles (EVs) on the road by 2030 (¾ BEV, ¼ PHEV) No new non-zero emissions vehicles sold post-2030
Energy Efficiency (Demand-Side)	Most national energy efficiency programmes assumed to continue delivering their 2017 achieved level of savings across the entire forecast horizon Achieved 2017 savings under the Energy Efficiency Obligation Scheme (EEOS) are assumed to be maintained until 2030. No further savings after that Impact of the 2019 domestic building regulations and 2018 non-domestic building regulations included over entire forecast horizon

The step-up which is now needed goes well beyond Project Ireland 2040 in both ETS and non-ETS emissions. Table 3.2 shows that after delivery of Project Ireland 2040 measures and land use credits, i.e. the Land Use, Land-Use Change, and Forestry (LULUCF) contribution, a cumulative 58.4 MtCO$_2$eq. must be found in the non-ETS sector.

Table 3.2 Non-ETS Cumulative Compliance Gap Estimates under Different Scenarios

	Carbon Budget	Compliance Gap
Effort Sharing Regulation (ESR) Ceiling	378.3 Mt	-
Projected Emissions (Pre-NDP)	479.9 Mt	101.6 Mt
Contribution of Project Ireland 2040 NDP Measures	- 16.4 Mt	85.2 Mt
Contribution of LULUCF	- 26.8 Mt	58.4 Mt
Additional Abatement Effort Required	- 58.4 Mt	0 Mt

The allowance of 26.8 MtCO$_2$eq. abatement reflects:

- The carbon absorption from the forestry programme planted over a period of years subject to proper management
- Additional absorption from certain grassland and soil management actions

The targets detailed in this Plan have been set using the trajectory of low oil prices, which is a prudent and precautionary approach. Should oil prices turn out to follow a higher price trajectory, this may speed the pace of transition.

To reach 58.4 MtCO$_2$eq. will require significant reduction in emissions in transport, buildings and agriculture in the period 2021 to 2030. The approximate contribution by sector is 23.7 MtCO$_2$eq. (transport), 18.1 MtCO$_2$eq. (built environment) and 16.6 MtCO$_2$eq. (agriculture). In this Climate Action Plan, each sector has been given a range. The range will be monitored each year to ensure that, overall, we stay on track to meet our climate commitments. Each annual plan will provide an opportunity to add new actions.

4 | Choosing the Pathways which Create the Least Burden and Offer the Most Opportunity for Ireland

4. Choosing the Pathways which Create the Least Burden and Offer the Most Opportunity for Ireland

4.1. Introduction

As detailed in Chapter 2, the EU split emissions into two categories, Emissions Trading System (ETS) and non-ETS. ETS emissions are dealt with at EU level, under a cap and trade system for greenhouse gases, and cover electricity generation and large industry. Non-ETS emissions are dealt with by Member States, through legally binding targets for emissions reduction, and cover agriculture, transport, the built environment, and small industry.

The widening gap between Ireland's projected and targeted carbon emissions from 2021 to 2030 in the non-ETS sector is illustrated in Figure 4.1[9]. Over the 2021 to 2030 period, the projected gap, after delivery of Project Ireland 2040 National Development Plan (NDP) measures and the contribution of Land Use, Land-Use Change, and Forestry (LULUCF) credits, amounts to a cumulative 58.4 MtCO₂eq. and by 2030 annual emissions need to be ~13 MtCO₂eq. lower than they are today. The transition to a low carbon economy and society will create significant challenges as well as opportunities for Ireland. This Plan identifies the pathways that will create the least burden, while also offering the most long-term opportunities and benefits.

Figure 4.1 Projected Total Gap to Non-ETS Target and Annual Gap in 2030

1 NDP figures includes measures from the With Additional Measures (WAM) scenario

SOURCE: UNFCCC 2018 National Inventory Report; 2018 Ireland's Greenhouse Gas Emissions Projections 2017-2035
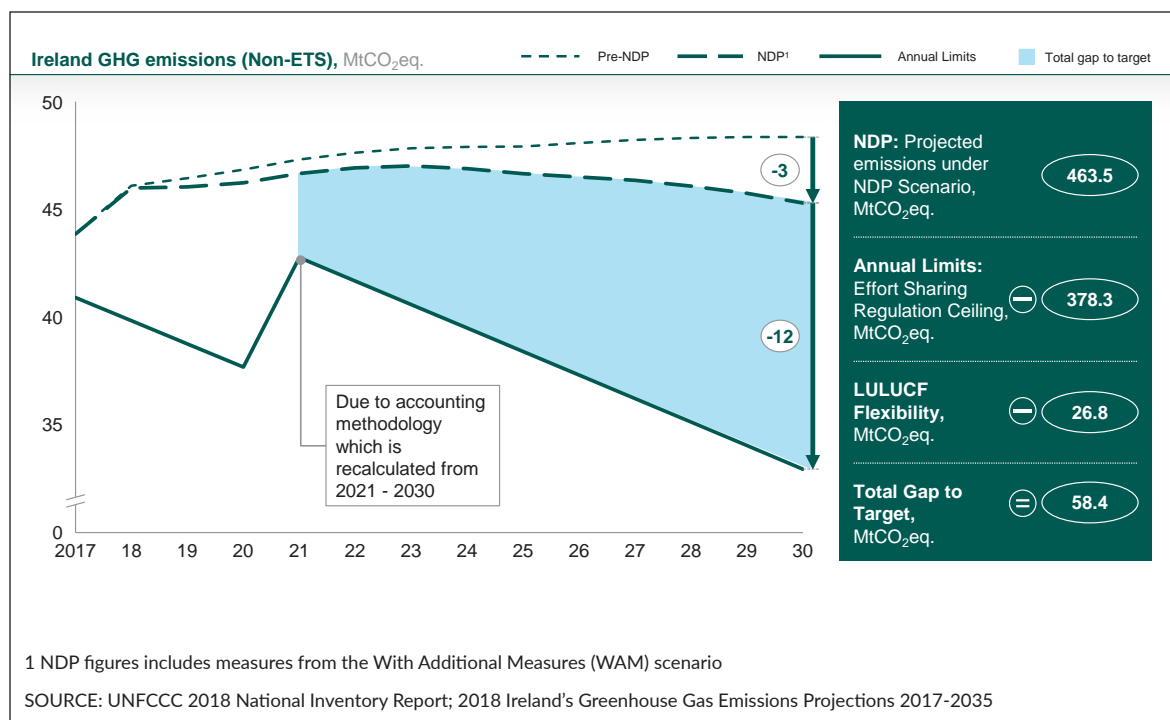
The challenge of closing the gap to our 2030 target, coupled with the broader policy objective of long-term decarbonisation across all sectors of the economy, requires both public and private investment and large societal shifts in technology, attitudes and behaviour, at an unprecedented

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9   ETS covers emissions from power and heat generation and a wide range of industry sectors including oil refineries, steel works, production of iron, aluminium, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals. Non-ETS includes all other sectors

pace. Specifically, Ireland requires a change in its overall emissions trajectory of the order of a 2% decline each year from 2021 to 2030 to meet our EU targets.

The Journey to 2030 and 2050

An important factor in choosing policies to deliver the 2% per annum reduction is a realisation that in the period between 2030 and 2050, a much steeper decline of 7% per annum will have to be achieved based on achieving a minimum 80% emissions reduction by 2050, relative to 1990. One important implication of this for the period to 2030 is to ensure **that all investment choices make sense** in terms of decarbonising by 2050, and we avoid creating stranded assets by choosing what may appear to be cheaper options in terms of our 2030 decarbonisation goal.

4.2 Marginal Abatement Cost Curve for Ireland

A Marginal Abatement Cost Curve (MACC) has been developed to provide a solid analytical foundation on the most cost-effective pathway to reduce emissions in line with Ireland's decarbonisation targets. Using *Ireland's 2018 GHG Emission Projections 2017-2035*[10], associated projections of economic activity, and assessments of over 300 business cases for technology, the analysis seeks to identify the technologies (including fuel switches), and associated levels of adoption, required to meet our 2030 target in the most economical way.[11]

Costs in the MACC focus on Total Cost of Ownership (TCO), which captures the merits of change over the lifetime of the technology.[12] It includes the cost of the initial investment and the costs of operation for the full lifetime of the technology.

The abatement technologies and fuels identified by the MACC are shown in Figure 4.2. Each column represents a technology or fuel switch. The x-axis (i.e. the width of each column) shows the potential reduction of annual $MtCO_2eq.$ emissions in 2030 from the technology or fuel switch. The y-axis (i.e. the height of each column) shows the associated average cost of abating one tonne of $CO_2eq.$ over the 2021 to 2030 period. The columns are organised from the most economical (left side) to the most expensive technology (right side) in $EUR/tCO_2eq.$. The MACC includes measures across all sectors of the economy[13].

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10   http://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2017-2035/#d.en.64043

11   The MACC has been developed by McKinsey and Company on behalf of DCCAE. The underpinning technology business cases are based on McKinsey's globally-sourced data on emissions mitigation technologies, which have been localised for Ireland based on extensive engagement with relevant Government departments, and agencies as part of the preparation of this Plan. Each case includes a perspective on technology evolution over the next 10 years (e.g. on cost and efficiency improvements)

12   The MACC excludes all taxes (including fuel taxes) and all subsidies, but takes account of commodity price changes. The weighted average cost of capital is set to 4% across all technologies as it takes a societal perspective. This means that individual sectors, consumers, businesses, etc. may face different cost levels in practice

13   The agriculture measures are based on the Teagasc GHG Working Group report An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021–2030

Figure 4.2 Marginal Abatement Cost Curve for Ireland to 2030

Note: The horizontal axis shows the abatement potential of the technology switches. The vertical axis displays the average abatement cost as EUR/tCO2 for each switch. The C02 price of the EU ETS is included in the cost of measures for industry and power and heat

1 Measures considered exclude LULUCF and biofuels use in energy/heat production. MACC does not include cost of enabling infrastructure (e.g., EV charging network, transmission & distribution upgrade). Agriculture measures are based on Teagasc Greenhouse Gas Working Group report "An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030"; Total abatement includes abatement for growth in the analysed sectors;

2 The switch to electric light commercial vehicles bring early TCO parity due to low weight vehicles doing long journeys;

3 Biogas/biomethane abatement lever could displace emissions in both industry, buildings and power,

4 B2 BER insulation equivalent: includes wall, roof & window insulation, excludes boiler upgrade

5 Vehicle classes include: A/B - mini, small cars; C/D - medium, large cars; E/F - executive, luxury cars; J - sport utility cars (including off-road vehicles)

The analysis shows that the majority of technologies and measures on the curve result in net lifetime cost savings at system level (i.e. the columns below the x-axis in Figure 4.2). However, if we are to reach our 2030 non-ETS target and our ambition to have 70% of our electricity needs from renewable sources, we will need to take all the measures to the left of the dotted line shown on the curve above, including those with net lifetime costs.

The MACC clarifies the required level of technology adoption to deliver the decarbonisation target, but does not make any assumptions on the type and cost of policies to achieve this adoption. The initial policies and interventions, as well as the accompanying roadmap of actions, required to implement new policies and to accelerate the necessary technological and behavioral shifts are detailed within the chapters that follow.

The most cost-effective measures are seen in road-transport electrification, due to the rapidly decreasing cost of battery packs, with switching from Internal Combustion Engine (ICE) passenger vehicles to Battery Electric Vehicles (BEVs) and delivery vans being the most economical options from the MACC.

In the power generation sector, increasing onshore and offshore wind capacity are the most economical options from the MACC for electricity production. This will include replacing existing coal- and peat-fired plants, as well as installing the new electricity capacity required to meet the increased power demand from transport and residential heating electrification. The cost included in the electricity analysis includes all capital expenditure on generation and storage. In all cases, it is assumed that the two planned interconnectors are delivered.

The MACC does not address the cost of enabling infrastructure (e.g. the Electric Vehicle (EV) charging network, and the electricity infrastructure such as off-shore wind connections, transmission and distribution, and system services), or other barriers to change. Much of this enabling infrastructure is already required to support current decarbonisation targets and has already been identified in Project Ireland 2040. In addition, the cost of infrastructure does not grow in line with increasing decarbonisation ambition.

Furthermore, sensitivity analysis, conducted in preparation of the MACC and targets, confirms that the same scale and pace of technology deployment would be required for targets under this Plan even if the cost of infrastructure was added to the cost of the relevant technologies.

Further key measures to achieve the required reduction in emissions in each sector as indicated by the MACC include, but are not limited to:

- Retrofitting homes with insulation to B2 equivalent Building Energy Rating (BER)
- Replacing oil/solid-fuel boilers with heat pumps
- Introducing zero carbon heating systems in new buildings
- Improving animal production efficiency
- Reducing nitrogen emissions through advanced manure management
- Introducing alternative fuels in key industry sectors

Although the majority of technologies and measures on the curve result in net lifetime cost savings to the economy as a whole, adopting these technologies and measures will still pose a considerable challenge for the whole of society. Even when the TCO becomes cheaper for a specific technology (e.g. when the lifetime cost of an EV becomes cheaper than that of an ICE vehicle), the upfront cost may still be higher for the Exchequer, for individuals or for companies.

Policy Frameworks to Drive Investment Decisions – International Experience

Other countries, facing similar challenges, have used smart financing options to overcome these higher upfront costs. For example, in the United States, the transport company, Proterra, sells e-buses at the same price as the equivalent diesel buses and enters into a 12-year service agreement to convert capital and operational costs, which can be paid for using savings from the eco-friendly buses. In Chile, where 100 e-buses were recently launched, the bus operator has leased the fleet from an investor to overcome the upfront challenge of high capital costs. In the built environment sector, smart financing policies have been implemented to address the upfront costs of retrofitting homes. For example, in the United States, home owners can take out 'Green Mortgages' (also known as Energy Efficient Mortgages) which lets them borrow money to pay for energy efficient retrofits that may be costly up front, but save money over the long run. The European Investment Bank's *Smart Finance for Smart Buildings* initiative allows financial intermediaries, such as banks, to develop and deploy attractive financial products for the energy renovation of buildings, especially homes.

The challenge of how Ireland, individual sectors, and every citizen will achieve these technology adoption rates and behavioural changes, and the implementation of the policies to achieve this shift, is the key focus of this Plan.

4.3 Indicative Sectoral Targets

The output of the MACC also shows the most cost-effective sectoral split of emissions reduction and indicates a significant 'step-up' in ambition across all sectors. As a support to achieving national goals, Figure 4.3 uses the insights from the MACC curve to indicate the level of ambition per sector to 2030. This ambition is based on the best current perspective of the most cost-effective choices available to reach our 2030 target. A decision to adopt a lower level of ambition in any one area of cost-effective abatement will require finding a more expensive alternative. By articulating an ambition range for each sector, the framework provided by this Plan will enable each sector to gauge whether the most appropriate policy tools have been identified and are being correctly deployed, or whether there is a need to reconsider the policy and/or the ambition.

Figure 4.3 Indicative Sectoral Targets for Ireland to 2030[14]

1 Non-ETS emissions are made up of all emissions from Transport, Built Environment, and Agriculture, these summed up to 42 Mt in 2017. In addition, non-ETS includes 0.5 Mt from electricity, 1.2 Mt from industry, 0.5 Mt from waste, 0.2 Mt IPPU (industrial processes), and 0.8 Mt of F-Gases. NDP includes emission reduction of 0.8 $MtCO_2$ by 2030 from these segments

2 ETS emissions are made up of emissions from Electricity and Industry (which summed up to 17 Mt in 2017) minus the Non-ETS components of these sectors listed above

3 Based on provisional estimates from the EPA

4 NDP figures assume implementation of all measures in the National Development Plan 2018-20275 Reduction is based on MACC results, it excludes abatement from biofuels usage in energy/heat production

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14 In addition to the above ambition for agriculture, the sector will aim to deliver a further 2.68 MtCO₂eq. per annum of abatement through the LULUCF abatement measures which are not incorporated in the MACC analysis. This will result in agriculture's total ambition for carbon emissions in 2030 being approximately 15 to 16 MtCO₂eq.

The results of the analysis also allow for a 'dashboard' to be used to manage Ireland's decarbonisation pathway to 2030 per sector as shown in Figure 4.4 below. This dashboard will be regularly updated in line with technology developments to ensure we remain on the optimum pathway within each sector.

Figure 4.4 Ireland's Decarbonisation Pathway Dashboard to 2030[15]

	Technology	NDP 2030	Uptake to meet 2030 targets (Based on MACC analysis) 2025	Uptake to meet 2030 targets (Based on MACC analysis) 2030	
Electricity	**Total RES in Generation mix[4], %**	**55**	**52**	**70**	Solar PV, some electrification of buses, and biofuel blending are identified in 2030 the NDP scenario but are not showing as cost-effective in MACC. Despite MACC analysis these technologies may remain in plan given other factors (e.g., exchequer cost, ease of implementation, need for public sector leadership)
	Onshore wind, GW	~7	~6.5	~8.2	
	Offshore wind, GW	1.8	~1.0	~3.5	
	Solar PV, GW	1.5	~0.2	~0.4	
Transport	**Electric Vehicles, #**	**498,000**	**181,500**	**936,000**	
	Passenger EVs, #	355,000	57,000	550,000	
	Passenger PHEVs, #	118,000	94,000	290,000	
	Electric delivery vans, #	19,000	30,000	61,000	
	Electric trucks, #	n.a	0	34,000	
	Electric buses, #	1,250	500-600	1,000-1,200	
	Bioethanol blend, Volume	**E10**	**E10**	**E10**	
	Biodiesel blend, Volume	**B12**	**B12**	**B12**	
Built Environment	**Retrofitted homes[1], cumulative 2021-30, #**	**450,000**	**300,000**	**500,000**	
	Electric heating sources, total residential, #	**370,000**	**350,000**	**600,000**	
	New buildings, #	200,000	50,000	200,000	
	Existing buildings, #	170,000	300,000	400,000	
	Electric heating sources, total commercial, #	**15,000[3]**	**15,000**	**25,000**	
Enterprise	**Emissions, MtCO₂eq.**	**9**	**8**	**8**	
	Alternative fuels in cement fuel mix, %	N/A	65%	80%	
	CO2-neutral heat generation in food industry[2], %	N/A	~70%	~80%	
Agriculture	**Emissions, MtCO₂eq.**	**21**	**19**	**18**	
	Fertilizers CAN replacement, %	N/A	40%	50%	
	Trailing-shoe slurry spreading, %	N/A	30%	50%	
Other (e.g. waste)	**Emissions, MtCO₂eq.**	**3.2**	**3.2**	**3.2**	

1 Retrofit to B2 BER fabric equivalent
2 Includes biomass and electricity
3 Not specified in NDP, estimated based on residential ratio
4 RESS competitive auction determines the final mix

The timing of changes has an important bearing on the emission outcomes. In simple terms, a house retrofitted with a heat pump today will deliver savings over the entire period to 2030. However, the same action in 2029 will deliver only one year of savings in that period. The uptake rate of technologies is, therefore, particularly important.

15   The uptake figures (based on the MACC) shown in Figure 4.4 are the total numbers required to meet 2030 targets. The NDP 2030 figures are shown as a reference only

4.4 Implementation Timeframes

Figure 4.5 sets out the indicative timing of changes envisaged by the MACC analysis to comply with Ireland's annual non-ETS emissions ceilings over the period 2021 to 2030. The adoption, at accelerated rates, of the technologies and fuel switches identified in the MACC can deliver the CO_2eq. abatement required to ensure this compliance. As certain technologies may develop and become cost-effective along different, potentially more ambitious, trajectories to those assumed in the MACC, this Plan will be updated and refined each year to reflect such changes.

How the MACC Identifies Total Cost of Ownership (TCO) – The Case of EVs

The analysis is based on the TCO of technologies. It includes the cost of the initial investment and the costs of operation for the full lifetime of the technology. For example, to identify the point at which EVs become more economical than ICEs, the MACC takes account of the up-front cost of purchasing a vehicle and the on-going cost of running the vehicle. These costs are then normalised by a common denominator, in this case, by dividing by kilometres driven. According to Bloomberg, "every year, that crossover point gets closer". In 2017, BloombergNEF forecast that the crossover point would be in 2026. In 2018, the crossover point was calculated to be in 2024 and their latest analysis, completed in 2019, predicts that large EVs in the European Union will be cheaper than their ICE equivalents by 2022. As per Figure 4.5, the findings show that EVs will reach TCO-parity with diesel and petrol engines by circa mid-2020s. This means that when a consumer factors in both up-front cost and on-going running cost, it will be as cheap to have an EV as a petrol/ diesel vehicle.

Figure 4.5 Suggested Timeline for Technology Adoption in Ireland to 2030

1 Residential (existing and new build) and commercial
Source: Based on output from the MACC Analysis
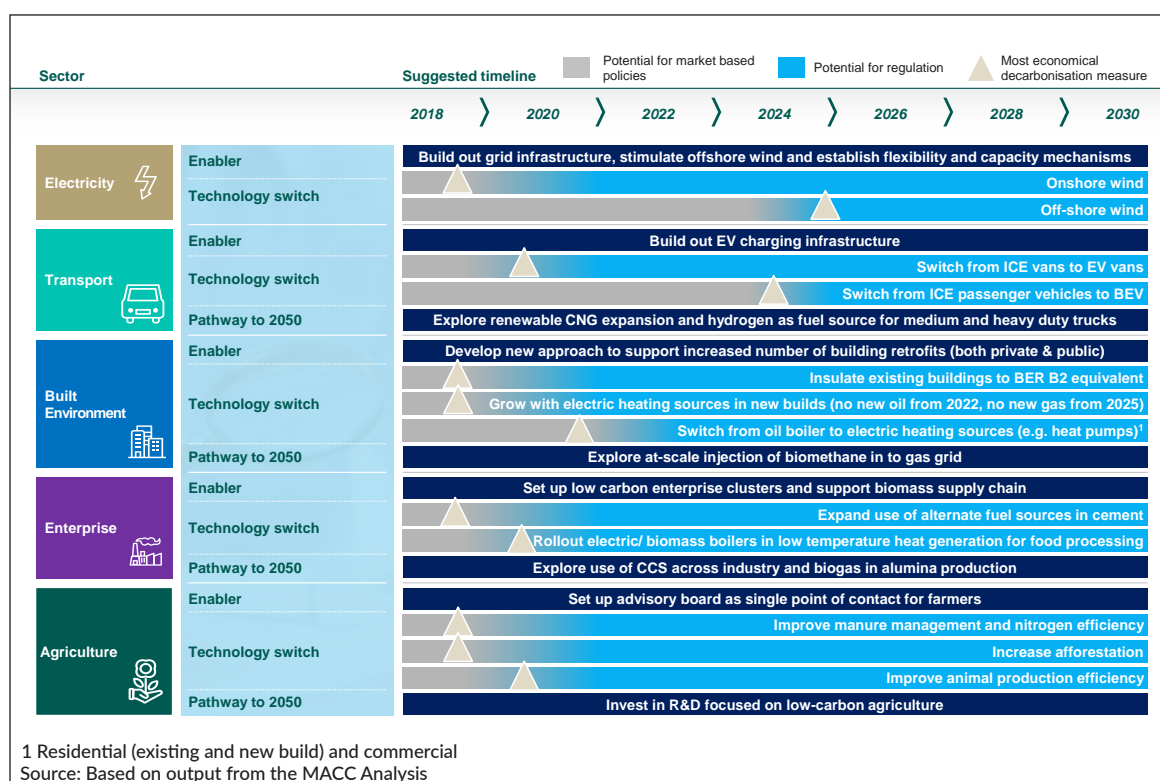
5 | Governance of the Challenge

5. Governance of the Challenge

5.1 Governance Structure

In order to be a leader in responding to climate disruption, it is important that the correct governance structure is established.

5.2 Delivery of the Climate Action Plan

The aim of the **Climate Action Plan** is to make Ireland a leader in responding to climate disruption. This Plan will be monitored quarterly and updated annually, with a Climate Action Plan 2020 published in early 2020. This will ensure that this plan is a living document, with new actions being added each year. This follows the successful approach which was core to delivering the Action Plan for Jobs.

We will establish a **Climate Action Delivery Board** within the Department of An Taoiseach, which will hold each department and public body accountable for the delivery of actions set out in the Climate Action Plan. The Board will be chaired by the Secretary General to the Government and the Secretary General of the Department of Communications, Climate Action and Environment. A delivery report will be presented to the Cabinet Committee and the Cabinet, and will be published each quarter.

The Board will also discuss and review key strategic projects and areas of work, such as establishing a new model for retrofitting, to identify barriers, challenges, and key lessons to date. A progress report will be presented to the Cabinet Committee and the Cabinet, and published each year.

A Just Transition Review Group will be established within the National Economic and Social Council (NESC) under NESC working group structures. Through this group, NESC will review the transition, identify specific needs and challenges, and develop appropriate responses to them. NESC will publish a periodic review and strategic advice on the Just Transition.

5.3 Carbon Proofing of Government Policy

We will also ensure that all Government memoranda and major investment decisions are subject to a carbon impact and mitigation evaluation, for which a template will be developed. This will be incorporated in Cabinet procedures, in regulatory impact assessments, and in project evaluation processes.

5.4 Oversight of Government

We will establish the **Climate Action Council** as a successor organisation to the Climate Change Advisory Council and give them additional powers to, in particular:

- Recommend to Government the appropriate five-year Carbon Budgets
- Monitor the progress of the State in reducing greenhouse gas emissions, based on Environmental Protection Agency (EPA) emissions reporting
- Provide policy evaluation advice to the Government, based on best available science

The report of the Joint Oireachtas Committee on Climate Action recommended the establishment of a Standing Committee of both Houses of the Oireachtas on Climate Action, to hold Ministers and public bodies accountable for their actions to deliver our climate targets. The Government will

support this recommendation. The Government will also support the establishment of a Climate Action Office, within the Oireachtas, similar to the Parliamentary Budget Office, to provide robust advice and evidence to the Standing Committee regarding the impact of particular policy decisions on our decarbonisation and climate action objectives.

5.5 Carbon Budgets and Sectoral Targets

The Government will be politically accountable for both the setting of climate targets and for implementing the policies needed to deliver these. In this Plan, we have set out a number of new climate targets, including for decarbonisation in the periods 2021 to 2025, and 2026 to 2030. Within these periods, the Government has also agreed a target decarbonisation range for each sector.

A System of Carbon Budgeting

To take account of the recommendations made by the Joint Oireachtas Committee on Climate Action, the Government will develop the targets that are set out in this Plan to adopt a system of carbon budgets. To do this, we will propose a new Climate Action (Amendment) Bill, which will introduce a requirement on Government to propose carbon budgets for three five-year periods. A carbon budget will be the total amount of emissions which can be emitted during a five-year period and will be calculated on an economy-wide basis, i.e. the Emissions Trading System (ETS) and the non-ETS sectors.

The first three carbon budgets will cover the following five-year periods: 2021 to 2025, 2026 to 2030, and 2031 to 2035. The procedure for adopting carbon budgets will be as follows:

- In advance of each five-year period, the Climate Action Council will provide timely advice to the Minister for Communications, Climate Action and Environment (the Minister), on the appropriate three five-year carbon budgets: the upcoming carbon budget and the two that will follow
- Following receipt of the advice of the Climate Action Council, the Minister will recommend to the Government the adoption of three five-year carbon budgets
- Following adoption by Government, the Minister will propose a motion in both Houses of the Oireachtas to confirm the carbon budgets
- Where the Government has not followed the advice of the Climate Action Council, the Minister will make a written statement to both Houses setting out the reasons why the Government is not accepting the advice of the Council
- Where either House votes to reject the Government's proposed carbon budgets, it must propose alternative budgets. Where this proposal varies from the advice of the Climate Action Council, the relevant House should justify the reasons for the proposed variation

The Government will commence this system of carbon budgeting on an administrative basis in advance of the Climate Action (Amendment) Bill becoming law.

Sectoral Targets

Once the Dáil has agreed the overall carbon budgets, the Minister for Communications, Climate Action and Environment will propose a decarbonisation target range for each sector within the ceiling of the adopted carbon budgets, as well as an annual trajectory target range for each sector, for adoption by Government.

The Oversight Role of the Oireachtas and the Climate Action Committee

On an annual basis, the Minister with primary responsibility for each sector will report to the Oireachtas as follows:

- Indicate the change in emissions in their sector based on EPA information
- Provide an update on the implementation of actions contained in the Climate Action Plan regarding their sector
- Indicate any significant deviation or any potential future deviation from their sector's planned actions and targets
- Identify future mitigation measures that will be necessary for their sector to achieve its target

This will represent a significantly greater level of accountability than currently provided for through the Annual Transition Statement, which is required by the Climate Action and Low Carbon Development Act 2015.

Where there is any deviation from the carbon budgets set, or a sectoral target range, following a report by the EPA, the Minister with primary responsibility for the sector shall:

- Report any deviation to the Joint Oireachtas Committee on Climate Action, and the reasons for the deviation
- Set out the measures which are planned to rectify the shortfall
- Respond to any recommendation made by the Committee within three months

Accounting for Missing Targets

Where a sector has caused a significant cost to the Exchequer arising from the purchase of emissions allowances from other countries, the costs of purchasing allowances will be shown in that Department's vote.

5.6 A New Climate Action Act

The Minister for Communications, Climate Action and Environment will bring forward a new Climate Action (Amendment) Bill, which will:

- Make the adoption of carbon budgets a legal requirement
- Require the Government to set a decarbonisation target range for each sector, with the Minister with primary responsibility for the sector being accountable for delivering the relevant actions to meet the sectoral target
- Establish the Climate Action Council as a successor organisation to the Climate Change Advisory Council
- Establish that the Climate Action Plan shall be updated annually
- Establish that a Long-Term Climate Strategy, to match the period covered by the three five-year carbon budgets, shall be published:

  o the first Strategy would be published for the period 2021 to 2035, and will also include a longer-term perspective to 2050
  o the Strategy will be updated at least every five years

- Ensure that the proposed governance arrangements retain sufficient flexibility to allow necessary reorientation of policy in the light of changing technologies, circumstances,

challenges and opportunities over the period to 2030 and beyond
- Establish 2050 target in law

It is intended that the Long-term Climate Strategy will be a statutory successor to the National Mitigation Plan.

5.7 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
2	Establish a Climate Action Delivery Board in the Department of the Taoiseach, jointly chaired by the Department of the Taoiseach and the Department of Communications, Climate Action and Environment, to oversee the implementation of the Climate Action Plan. A progress report will be submitted to Cabinet and published each quarter
3	Update Cabinet procedures to ensure that all Government Memoranda are considered against their carbon impact and mitigation potential
4	Publish the Climate Action (Amendment) Bill 2019
5	Commence the process of forming carbon budgets for 2021 to 2025, 2026 to 2030, and 2031 to 2035 ahead of a new Climate Action (Amendment) Bill 2019 being enacted
6	Require budgetary rules to show the Exchequer cost of the purchase of emissions allowances from other countries in the annual estimates process against the Vote of the Department who has responsibility for that sector, where there is a significant cost to the Exchequer

6

Carbon Pricing and Cross-cutting Policies

6. Carbon Pricing and Cross-cutting Policies

6.1 Introduction

While the evaluation of the costs of adopting different technologies has delivered a clear pathway, their successful adoption will require specific policies to remove barriers at sectoral level and a broad national policy framework designed to promote the transition. Government policies on taxation, expenditure, sustainable finance, spatial planning, and research and development provide an important enabling framework for individual, household, community, and company-level climate action. These policies also act as enablers for a wide range of other Government policies and activities within individual sectors.

For most areas of environmental damage, a key problem is that those inflicting the damage do not pay the cost of the damage they inflict. This is the rationale for charging a carbon price for carbon emissions which reflects the growing damage that they are inflicting. This serves to discourage emissions and to make carbon abatement more profitable.

6.2 Targets

To meet the required level of emissions reduction, by 2030 we will:

- Implement a carbon tax rate of at least €80 per tonne by 2030, accompanied by a trajectory of increases over successive annual Budgets

6.3 Measures to Deliver Targets

Our 2030 decarbonisation ambition will require all sectors to step-up a level if we are to achieve our EU targets. For carbon pricing and cross-cutting policies, the following measures will be critical to success:

1. Our Strategy for Environmental Taxation

Taxation policy can play a central role in incentivising the behavioural change necessary to reduce greenhouse gas emissions. We are committed to having in place a taxation framework, which plays its full part in exerting, along with other available policy levers, the necessary leverage to reduce our emissions.

There are environmentally progressive elements to Ireland's taxation regime:

- We have a generous regime of taxation incentives to promote the uptake of Electric Vehicles (EVs), including substantial Vehicle Registration Tax (VRT) relief and Benefit-in-Kind (BIK) exemptions
- We have a carbon tax since 2010 that is one of the most broadly-based carbon taxation systems in the world, applying to approximately 50% of all CO_2.eq
- Since 1 July 2008, both VRT and motor tax on private motor cars have been calculated on the basis of CO_2eq. emissions, so that vehicles with higher emissions attracted a higher tax liability

We will use successive annual Budgets as a means to reforming key environmental tax measures, including detailed analysis through the Tax Strategy Group, to:

- Recalibrate VRT and motor tax for passenger cars to better reflect the emissions impact of individual vehicles
- Examine the introduction of an emissions-based tax regime for Light Goods Vehicles (LGVs)
- Examine gradually equalising the diesel and petrol excise rates
- Introduce environmental criteria into the vehicle BIK regime, with its commencement sensitive to typical fleet renewal timescales
- As an alternative to the current grant regime, consider in 2020 a car-scrappage scheme to promote the purchase of electric vehicles
- Support the use of the Accelerated Capital Allowance (ACA) regime to promote business investment in energy efficient equipment and gas-powered commercial vehicles
- Assess the role for property related taxes such as Local Property Tax (LPT) and stamp duty to promote major renovations to buildings

2. Carbon Pricing

Carbon pricing will have a key role to play in the transition to a low-carbon economy and has been recognised by the Climate Change Advisory Council as an important tool for Ireland to achieve its long-term decarbonisation objectives in a cost-effective manner by 2050.

Ireland is one of a minority of countries globally to have already implemented economy-wide carbon pricing through the EU Emissions Trading System (ETS) and the carbon tax. We are committed to carbon pricing as a core element of the suite of policy measures to reduce greenhouse gas emissions in a sustained manner over time. Recent reforms to the EU ETS are working to increase the price signal in that sector, and will complement our initiatives to reduce emissions in the electricity and industry sectors. We are working proactively with our EU partners to ensure the ETS rules are fit for purpose into the future. We will continue to pay close attention to the evolution of carbon prices in the ETS and non-ETS sectors over the next decade to identify any potential policy implications in the event of price disparity between the two sectors.

Our Future Vision for Carbon Tax

We are committed to implement a carbon tax rate of at least €80 per tonne by 2030, accompanied by a trajectory of increases over successive annual Budgets. Decisions to be taken in a budgetary context on the future evolution of our carbon tax will underpin many of the actions in this Plan. This commitment will send a strong signal to householders and firms of the need to invest in low-carbon alternatives, where possible.

The primary purpose of a carbon price is to change behaviour to support reducing Ireland's greenhouse gas emissions. We will, therefore, ensure that the use of additional carbon tax revenues takes account of the purpose for which a carbon tax was introduced, including consideration of the appropriate balance between a possible dividend-based approach and expanding funding to decarbonisation programmes.

The Economic and Social Research Institute (ESRI) has identified a high degree of responsiveness to carbon price, but it is recognised that policy design will be crucial and that sectoral responsiveness will vary. The ESRI's working paper on Carbon taxation in Ireland - Distributional effects of revenue recycling policies shows that an increase in carbon tax to €50 per tonne and €100 respectively would reduce emissions by 3.94% and 10.24%.

We will carefully examine the impacts on low-income and rural households and those experiencing fuel poverty, as well as broader distributional impacts. We will also examine the interaction between carbon tax rates with other schemes such as the National Fuel Allowance Scheme, the Diesel Rebate Scheme, and the Sustainable Energy Authority of Ireland's (SEAI's) energy efficiency schemes. This will include further consideration of how we can balance the objective of upgrading heating systems with fuel subsidisation for low income households that are using high-carbon heating systems.

Shadow Price of Carbon

As part of project appraisal for all public capital investments, it is essential to avoid expenditure that locks in long-term fossil fuel consumption. To that end, the Public Spending Code will be reformed in 2019 to improve the calculation of a shadow price of carbon. This will result in Government investments valuing carbon at a level which will see the shadow price increase to €32 per tonne by 2020, €100 per tonne by 2030 and €265 by 2050.

The reform of the Public Spending Code will also see a new stage introduced into the project life-cycle – project identification. This will become the first stage of the life-cycle with the purpose of ensuring early consideration of approaches to deal with a policy issue ahead of selecting the preferred option and proceeding to the appraisal stage. Climate considerations will be incorporated in this new life-cycle stage.

Consistent application of these rules will allow decision-makers to better understand and appreciate the climate consequences of their investment options.

3. Spatial and Planning Policy

As part of Project Ireland 2040, we published a long-term spatial planning policy framework, the National Planning Framework (NPF), in 2018. The NPF has clearly-defined National Strategic Outcomes supporting the objectives of this Plan, including Transition to a Low-Carbon and Climate Resilient Society, Compact Growth and Sustainable Mobility. We are continuing our work to fully implement the NPF. The Regional Spatial and Economic Strategies will soon be finalised and, in turn, will provide guidance for updating county-level Development Plans and Local Area Plans.

A top priority of the NPF is for compact and sustainable growth. Ireland's five cities are targeted for 50% of overall growth by 2040, with the four cities Cork, Limerick, Galway and Waterford each targeted to grow by at least 50% within that period. This will mean increasing the proportion of more compact forms of growth in the development of settlements of all sizes, with a focus on urban infill and the re-use of brownfield lands. 'Brownfield' targets are to deliver at least 40% of all new homes nationally within the built-up footprint of existing settlements, comprised of at least 50% of all new homes in the five cities and at least 30% of all new homes in settlements elsewhere.

Changing the pattern of development in this manner will need to be buttressed by new policy tools in the planning system. It will ensure that more people will be living within the existing built-up footprint of cities and towns and will support achieving the objectives of this Plan through:

- Reduced travel distances and greater proximity to employment and services, which will enable a greater proportion of journeys by bike or on foot (zero emissions)
- Greater urban density, which when combined with the point above, will ensure more viable public transport (less emissions per person than by individual vehicle)
- Greater sustainable mode share, which will enable cities and towns to densify, as

development will not be dependent on road capacity nor car parking requirements, and less land will be required for the latter

- Higher density residential development, which tends to comprise smaller units and therefore require less energy to heat. NPF targets require the proportion of apartments to treble, from 13% in 2019, to 39% by 2030
- Closer proximity of multi-storey and terraced buildings, which will require less energy and make renewables-based systems of energy distribution such as district heating, or area-wide technology upgrades, more feasible

Spatial Pattern and Urban Structure

In transitioning to a low carbon and climate resilient society, actions to address the spatial pattern and urban form of development are required in addition to actions that focus on the individual building envelope.

Similarly, actions that integrate land use and transport planning i.e. consideration of spatial pattern, urban form and mobility, are required, in addition to actions that focus on individual transport measures or modes.

These cross-cutting considerations are necessary, because the spatial pattern of development and related urban structure directly influence the need to travel in the first instance. They also determine the pattern of movement, in terms of the frequency and duration of trips and ultimately, behavioural choices regarding modes of transport that may be used.

There is a need to combine measures to influence the spatial pattern of development, urban structure and overall mobility, with low carbon technology measures, such as a significant increase in the EV fleet.

Sustainable Communities

Where different sustainability measures are combined spatially, for example to match urban density with public transport accessibility and/or to focus on reducing energy demand and renewables, with the aim of reducing emissions, these place-related measures are often described as 'sustainable communities'.

There are many different types of sustainable community or sustainable development. Notable examples in Ireland include the Dundalk Sustainable Energy Zone (SEZ) and at a smaller scale, but also integrating ecology and biodiversity, the Cloughjordan Eco-Village in Co. Tipperary.

Large-scale housing-focused developments at Adamstown and Cherrywood in County Dublin, combine higher density urban form with mobility. District heating and other measures have been incorporated into housing and commercial schemes on a localised basis.

Significant examples of where all of these measures have been successfully combined on a large urban scale, include Hammarby-Sjostad in Stockholm, Sweden and both Rieselfeld and Vauban in Freiburg, Germany.

There is scope to support the development of place-based and holistic sustainable communities in Ireland, to showcase possibilities and enable learning that can be replicated elsewhere, to achieve low carbon outcomes.

Development initiatives that can demonstrate a range of innovative and place-appropriate measures and that can accelerate transition to a low carbon and climate resilient society on an area basis, will be supported.

National Planning Framework

The spatial pattern and form of development provides the critical enabling capacity to realise the impact of other component policies within an integrated package, by linking the spatial distribution of population, jobs and other activities within an urban area. Changing the pattern of development and urban structure will take time, but will deliver in the medium to long term.

Implementation

The Census of Population undertaken by the Central Statistics Office (CSO) at five yearly intervals, next due in 2021, provides important data in respect of the spatial distribution of the population, including information on commuting patterns and transport mode share. Integrated measures to influence the spatial pattern of development, urban structure and mobility will have a positive impact on commuting and sustainable mode share.

In summary, the cross-cutting, interrelated measures set out in the NPF to achieve compact growth, sustainable mobility, and a low- carbon and climate resilient society are shared in common with the National Development Plan (NDP) as part of Project Ireland 2040. They will have a cumulatively positive downward impact on greenhouse gas emissions, as well as a range of other environmental, social, and economic benefits.

4. Broadband

The National Broadband Plan will deliver High Speed Broadband services to over 1.1 million people in areas where there is no existing or planned commercial network. The Intervention Area includes 540,000 premises, including 56,000 farms and 44,000 businesses. It will ensure that households and business in rural parts of Ireland will have a similar level of connectivity as households and businesses in urban areas. During deployment of the network, reuse of existing infrastructure and materials (i.e. existing poles and underground ducts) will be maximised. This will increase resource-efficiency and reduce emissions associated with fabrication, transport and installation of new physical network materials.

The High Speed Broadband network will deliver a range of environmental benefits. For each new remote worker, an estimated average net saving of up to 10 kWh per day will be achieved, reducing commuter transport energy use and carbon emissions. Availability of better online conferencing and collaboration tools will reduce the need for business travel and the associated carbon emissions. High Speed Broadband also increases the creation of local employment opportunities, which allows more people to work closer to their homes, reducing the emissions associated with longer commuter journeys. 'Smart Homes' technologies will allow the remote management of domestic energy consumption through smart metering, heating and lighting systems, and enable consumer autonomy over their domestic energy consumption. This will play an important contributory role in decarbonising the residential sector. As opportunities for 'Smart Agriculture' are leveraged, lower

carbon emissions relative to the yield of the national agricultural sector will result, as precision farming generates a higher-yield per animal and hectare through data-driven herd and crop management.

5. Financing the Transition

There is a growing realisation that financial institutions, when they are funding the acquisition of assets, must pay far greater attention to the climate resilience of assets where they risk locking into high-carbon technologies, or other climate vulnerabilities, and in turn, show a greater willingness to fund investment in changes which can make those assets more climate resilient.

There is a rapidly growing appetite in the financial sector to diversify into green activities, no doubt to balance their exposure to fossil investments or other vulnerable assets. However, the transition to a low carbon economy and society also brings significant opportunities for the financial sector. Ensuring success will require technological innovation and investment. The Intergovernmental Panel on Climate Change estimate that the world will need to spend around US$900 billion annually until 2050 on energy-related mitigation investments if global warming is to be limited to 1.5 degrees. This investment will cover a range of activities:

- Developing disruptive innovations, including some that we may not already have thought about
- Expanding new types of infrastructures, including for clean sources of energy, not least given the potential increased cost efficiency of these
- Adapting existing infrastructures, such as retrofitting existing homes and offices to make them more energy efficient

This investment will need to be financed. To meet this challenge, the financial sector will need to innovate – just like the rest of the economy. We need to see rapid development of smart finance packages that recognise the constraints facing individuals and enterprises in making the change, with the Central Bank contributing, via its EU participation, to the creation of a facilitative environment where climate related financial risks can be more efficiently assessed and considered.

Mobilising Private Sector Investment

The low-carbon transition will require significant private investment alongside Exchequer expenditure on a sustained basis over a number of decades. Through the commercial State sector and other public bodies, we will seek to leverage the significant volumes of private sector capital that is available for well-structured projects, including wind and solar electricity generation, interconnection, and major transport infrastructure. NewERA will work with the commercial state companies, Ireland Strategic Investment Fund (ISIF), Strategic Banking Corporation of Ireland (SBCI) and other public bodies, to identify priority opportunities in key sectors to mobilise private investment towards assisting in meeting our climate objectives.

Promoting a Sustainable Financial System

International Financial Services (IFS) are among the most competitive and rapidly changing global industries. We need to be able to maintain and grow our existing IFS sector by exploiting opportunities and meeting any emerging challenges in this very dynamic and very competitive sector. We have published a new IFS strategy, which includes the development of Ireland's sustainable finance sector as a horizontal priority.

Project Ireland 2040 Funds

The four Project Ireland 2040 funds, comprising the Climate Action Fund, Disruptive Technologies Innovation Fund, the Urban Regeneration and Development Fund, and the Rural Regeneration and Development Fund, will have a collective budget amounting to an estimated €4 billion over the ten-year period of Project Ireland 2040. Each of the four funds has been established to pursue distinct objectives, which must also be aligned with the strategic investment priorities and the National Strategic Outcomes of Project Ireland 2040. We will ensure that, within their mandates, the selection criteria for each of the funds will operate to promote low-carbon investments.

The Climate Action Fund will continue to fund initiatives that contribute to the achievement of Ireland's climate and energy targets in a cost-effective manner. It offers the potential for innovative interventions in these sectors which, in the absence of support from the fund, would not otherwise be developed. Seven projects spanning the transport, heat, electricity, and agriculture sectors, with both an urban and rural focus, have been approved for funding of up to €77 million under the first call from this fund. By requiring a minimum leverage for each project, the fund's commitment will leverage a total investment of over €300 million. The next call for applications under the Climate Action Fund, planned for the second half of 2019, will integrate the lessons learned from the first call, will increase the minimum leverage required, and is likely to include an expressions of interest phase with a view to attracting a wider range of public and private projects to apply. We will also use future calls of this fund to support the development of networks and clusters as described in the relevant chapters of this Plan.

6. Research and Development

There is a need to ensure that the best scientific evidence and advice is available to underpin Government policy and support the actions in this plan. Ireland has strategically programmed and built a strong climate research and innovation infrastructure in recent years, with funding provided to Ireland's research producing organisations to carry out science and policy-relevant research, as well as establishing dedicated Enterprise Ireland Technology Centres and Science Foundation Ireland (SFI) research centres. The update to national research priorities for 2018 to 2023[16] reflects the increased urgency of the need to address climate change, with a new research priority theme focusing on Energy, Climate Action and Sustainability, and two priority areas concentrating on decarbonising and sustainable living and also smart and sustainable food production and processing.

The EPA's Research Strategy 2014-2020 is framed by the need for Ireland to transition to a carbon-neutral, low-emission and climate-resilient economy and society by 2050, and will become a source of climate change information and solutions. An interim review of this programme is underway and will inform the remainder of the current programme, as well as the development of a new programme for post-2020. The EPA has established a National Research Coordination Group which will report annually on its activities and provide an assessment and synthesis of key findings from the research programme. It will also report on wider related research activities every five years. In addition, Met Éireann will build on and expand its climate research activities.

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16   https://dbei.gov.ie/en/Publications/Publication-files/Research-Priority-Areas-2018-to-2023.pdf

In 2016, the Government published the Report of the Energy Research Strategy Group, prepared by DCCAE, to frame a national strategy and roadmap for energy research in Ireland. Research and innovation is a core priority of the SEAI's 2017 Statement of Strategy. SEAI will enhance its role as national coordinator of energy research, development and demonstration investments and activities in Ireland over the coming years.

The Department of Agriculture, Food and Marine's Strategic Research and Innovation Strategy 2014-2020 is also framed by the need for Ireland to address national agri-food challenges by improving the competitiveness and sustainability of agriculture, food and the wider bioeconomy, to support sustainable farming and the environment, and to encourage diversification of the rural economy and enhance the quality of life in rural areas. Teagasc also strongly supports investment in climate-related research through their grant-in-aid funding and availing of national competitive research calls; engagement in EU Research and Innovation Framework Programmes; and transnational initiatives such as Global Research Alliance on Agricultural Greenhouse Gases and the EU Joint Programming Initiative on Food, Agriculture, Climate Change and Environment.

We will continue to develop our national climate research capacity through prioritisation of funding opportunities across all public funding bodies, while also ensuring coherence with EU funding for climate-related research and development. In particular, we will seek to further develop economic opportunities for innovation and commercialisation arising from research funding, to ensure that Ireland is favourably positioned to benefit from new and emerging global opportunities in addressing climate change.

Given the long-term nature of the climate challenge, we will also give specific priority to the most difficult decarbonisation challenges that need to be solved so that we can meet our 2050 objectives, including developing the potential for mission-oriented funding through SFI and other research funders.

6.4 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
7	Implement a rolling strategy to reform environmental taxation measures across all relevant tax heads
8	Implement a carbon tax rate of at least €80 per tonne by 2030 and carry out a full assessment of a trajectory of increases over successive annual Budgets
9	Reform the Public Spending Code to increase the shadow price of carbon and introduce more robust consideration of climate impacts in project appraisal
10	Develop a strategy on mobilisation of private sector investment to meet our climate targets
11	Implement the new strategy for international financial services to promote the development of the sustainable finance sector in Ireland
12	Consider how a new requirement could be placed on pension providers to disclose what portion of any fund is made up of fossil fuel assets, and to provide an option to pension-holders to opt for a fund which does not include fossil fuel
13	Ensure that, within their mandates, the selection criteria for each of the Project Ireland 2040 Funds will operate to promote low-carbon investments. Review the selection criteria for each capital funding scheme to ensure that low carbon designs and investments are prioritised
14	Strengthen our delivery of public funding for basic and applied research to meet our decarbonisation objectives and open up new economic opportunities
15	Implement National Planning Framework

7 | Electricity

7. Electricity

7.1 State of Play

Electricity accounted for 19.3% of Ireland's greenhouse gases in 2017, down from 20.4% in 2016. It is important that we decarbonise the electricity that we consume by harnessing our significant renewable energy resources. By doing this we will also become less dependent on imported fossil fuels.

Table 7.1 Electricity GHG Emissions, 2017[17]

Electricity Emissions CO₂eq.	Share of Total GHG Emissions	Electricity Emissions CO₂eq./ head
11.7 Mt	19.3%	2.4 t

To date we have been very successful in deploying renewable electricity, with 30.1% of electricity produced from renewable sources in 2017. The target is to reach 40% by 2020. Emissions for the sector were on a downward trend between 2005 and 2011, but have stayed relatively static since, as a result of rising demand for power outstripping our increased generation from renewable sources. Given our 40% target is based on a percentage of total energy demand, this rising demand makes meeting our 2020 target even more challenging and latest forecasts indicate we may miss this target by 3 to 4 percentage points.

Table 7.2 Trends in Electricity GHG Emissions

Timeframe	Percentage Change	Absolute Change, CO₂ eq.
2005-11	-24.2%	-3.9 Mt
2011-17	-2.6%	-0.3 Mt

Despite our success in deploying renewable electricity and Ireland's share of electricity emissions (as a percentage of our overall greenhouse gas emissions) being less than in the EU as a whole, in 2016 the CO₂eq. emissions intensity of Ireland's electricity emissions per capita was 13% higher than the EU 28 due to greater use of high-carbon fuels, including coal and peat

Table 7.3 Electricity GHG Emissions International Comparisons, 2016[18]

	Ireland	Denmark	Austria	Finland	EU 28
Share of Total GHG	20.4%	28.0%	13.3%	32.6%	27.9%
Electricity Emissions, CO₂eq./head	2.6 t	2.4 t	1.2 t	3.5 t	2.3 t
Change Since 2005	-21.1%	-39.4%	-35.0%	-13.7%	-25.3%

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17   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

18   EEA Annual European Union greenhouse gas inventory 1990–2016 and inventory report 2018

While decarbonising electricity is at the heart of our strategy and we have a good record of renewable deployment, we have to do it against a background of very rapid projected growth in electricity demand. EirGrid recently projected that by 2027 as much as 31% of Ireland's electricity could be powering data centres. Demand for electricity is forecast to increase by 50% above existing capacity in the next decade in line with economic forecasts. Ensuring we build renewable, rather than fossil fuel, generation capacity to help meet this demand is essential. It makes economic sense, but also facilitates decarbonising our heating and transport through electrification.

Case Study – Cost of Renewable Electricity

Renewable sources of electricity such as wind and solar now account for the majority of new electricity generation capacity being built globally. Over the last decade, growth in renewables was aided by supportive public policies and consumer preferences. However, the next phase of growth in renewables is likely to be more driven by economics.

According to advisory firm Lazard's year-end 2018 estimate, the levelised cost of energy – the price per each unit of energy – for utility-scale renewable electricity continues to fall. Lazard's estimate that renewables are now cheaper than combined-cycle natural gas (or indeed coal) for new-build generation capacity. In addition, it is forecast that new-build renewables will outcompete even existing fossil fuel generation in most countries before 2030.

This does not mean that moving to a higher penetration of renewable electricity is easy. Renewable generation is intermittent and often unpredictable. This creates new challenges for utilities, market participants, and policy makers. Intermittency also creates the need for a range of technology solutions which may include large-scale interconnection, storage, and dispatchable capacity (e.g., natural gas plants that can generate electricity at times where there is no wind). There is no one-size-fits-all answer to supporting 70% renewables. However, we are witnessing rapid improvement in some of the technology that could support higher renewable penetration. For example, BloombergNEF estimate that the levelised cost of energy, for lithium-ion batteries has fallen by 35% since the first half of 2018. If this trend continues, a technology which was immature only a few years ago could play a significant role in supporting decarbonisation of electricity.

Source: Mckinsey's Global Energy Perspective 2019; Lazard's Levelised Cost of Energy Analysis; Bloomberg New Energy Finance

Our ability to decarbonise our electricity system will be key to our ability to decouple economic growth from emissions growth. While ongoing action on energy efficiency can help offset some energy demand growth, ensuring the deployment of increasing renewable generation capacity will be fundamental to our success.

Corporate Power Purchase Agreements (PPAs) and Combined Heat and Power (CHP) have potential to grow sectors with high power demand in a climate sustainable manner, with CHP also capable of delivering low-cost heat to industrial processes and district heating.

The renewables sector is very dynamic in nature, with technologies still rapidly evolving. Ensuring increased levels of renewable generation will require very substantial new infrastructure, including wind and solar farms, grid reinforcement, storage developments, and interconnection.

Notwithstanding the financial and engineering challenges that this brings, it is imperative that communities recognise the value these infrastructures bring. A successful strategy must lend itself to such innovation. It will also need to successfully mix the support of small-scale activity, at enterprise and community-level, with larger projects, to ensure a highly efficient delivery of additional renewables.

It is clear that policy measures to date, including those presented in Project Ireland 2040, will not achieve the level of decarbonisation required in the electricity sector to meet our 2030 emissions reduction target. We must reduce our electricity sector emissions to 4-5 Mt in 2030. In 2017, emissions from electricity were 12 Mt and in 2030, despite implementation of Project Ireland 2040 measures, emissions are projected to be 8 Mt. This clearly demonstrates the need for a significant step-up in ambition over existing policy, not only to meet our 2030 targets, but to set us on course to deliver substantive decarbonisation of our economy and society by 2050.

Table 7.4 Impact of Policy Measures in Electricity

2017 [19] Provisional Emissions	2030 Projected Emissions Based on NDP	2030 Required Emissions Based on MACC
12 Mt	8 Mt	4-5 Mt

In the electricity sector, reaching a 70% share of renewable electricity would require 50-55% emissions reduction by 2030 relative to pre-National Development Plan (NDP) 2030 projections, as shown in Figure 7.1 below. The average abatement cost savings to achieve this reduction is circa €-130/tCO₂eq.. This average abatement cost saving is for electricity generation only. This does not include the cost of other expenditure which will be required to reach this target (e.g., infrastructure such as off-shore wind connections, transmission and distribution, and system services).

19   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

Figure 7.1 Annual Emissions and Average Abatement Costs in Electricity
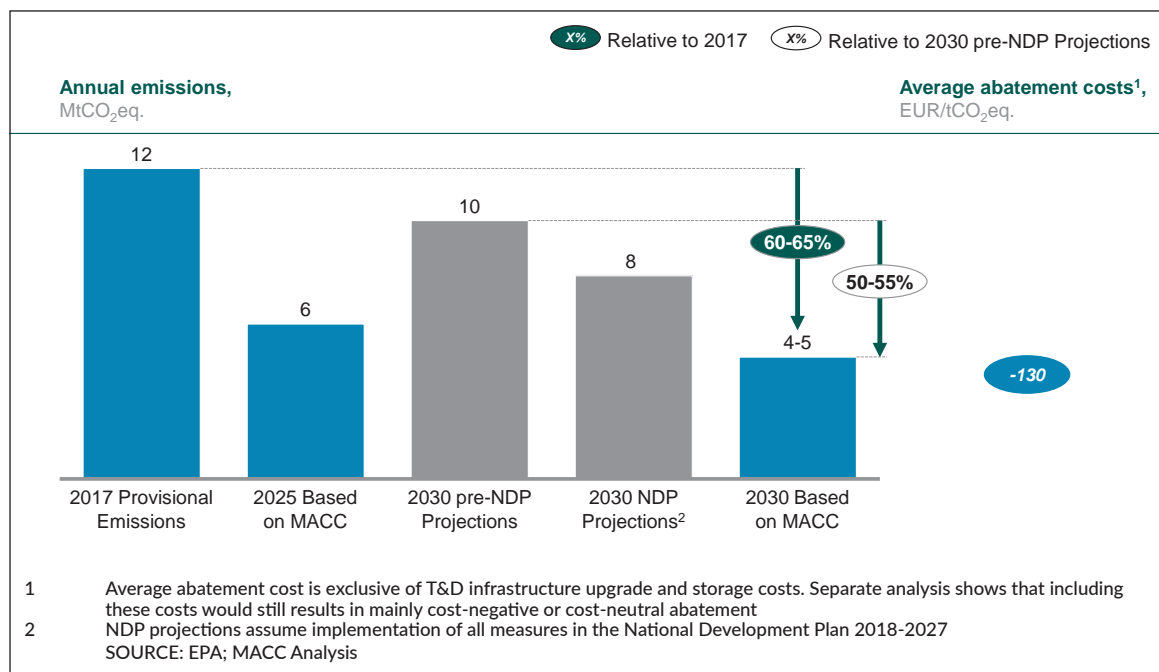
Table 7.5 Potential Metrics to Deliver Abatement in Electricity

Key Metrics	2017	2025 Based on MACC	2030 Based on NDP	2030 Based on MACC
Share of Renewable Electricity, %	~30%[20]	52%	55%	70%
Onshore Wind Capacity, GW	~3.3	6.5	N/A	8.2
Offshore Wind Capacity, GW	NA	1.0	N/A	3.5
Solar PV Capacity, GW	NA	0.2	N/A	0.4
CCGT Capacity, GW	~3.6	5.1	N/A	4.7

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20   https://www.seai.ie/resources/publications/Renewable-Energy-in-Ireland-2019.pdf

7.2 Targets

To meet the required level of emissions reduction, by 2030 we will:

- Reduce CO_2 eq. emissions from the sector by 50–55% relative to 2030 Pre-NDP projections
- Deliver an early and complete phase-out of coal- and peat-fired electricity generation
- Increase electricity generated from renewable sources to 70%, indicatively comprised of :*

  o   at least 3.5 GW of offshore renewable energy
  o   up to 1.5 GW of grid-scale solar energy
  o   up to 8.2 GW total of increased onshore wind capacity

- Meet 15% of electricity demand by renewable sources contracted under Corporate PPAs

*[*The exact level of offshore wind, onshore wind, solar and other renewable technology will be determined by a new system of competitive auctions where the lowest cost technology will be determined, see box below.]*

Achieving 70% renewable electricity by 2030 will involve phasing out coal- and peat-fired electricity generation plants, increasing our renewable electricity, reinforcing our grid (including greater interconnection to allow electricity to flow between Ireland and other countries), and putting systems in place to manage intermittent sources of power, especially from wind. This will require Obligated Energy Suppliers to work more closely with community and enterprise to ensure wider community gain.

The Renewable Electricity Support Scheme (RESS)

The RESS is a flagship Government policy designed to deliver on our commitments to decarbonise our electricity grid, harness our natural resources and bring renewable energy into the heart of our communities. The RESS will be the key policy measure that will drive the delivery of our 70% RES-E target, attracting significant international investment in the renewable sector in Ireland and driving down consumer costs. The RESS design is at the forefront of international best practice in competitive auction design, community investment and ownership. The inclusion of specific support for offshore wind in the RESS design will be transformative and, in the long run, will deliver the scale of renewables required to decarbonise our electricity system.

7.3 Measures to Deliver Targets

Our 2030 decarbonisation ambition will require all sectors to step-up a level if we are to achieve our EU targets. For electricity, the following measures will be critical to success:

1. Phasing Out Fossil Fuels

Removing fossil fuels from the grid will be essential in the coming years.

- We have committed to end the burning of coal in ESB's Moneypoint generation plant by 2025, and to the replacement of coal-fired generation with low-carbon and renewable technologies. Facilitating this is the recent reform of the EU Emissions Trading System (ETS) and changes to the electricity market in Ireland, along with the resulting price signals. The ESB is engaging with the Department of Communications, Climate Action and Environment regarding the future of Moneypoint
- Bord na Móna have announced that they will transition away from peat by 2028
- As recommended by the Oireachtas Committee, we will keep the dates to phase out fossil fuels under ongoing review
- Initiatives, such as including the Midlands Region in the EU Coal Regions in Transition Platform, and implementing a wider cross-Government policy framework supporting employment in the region, will ensure a just transition. These are set out in Chapter 15

2. Harnessing Renewable Energy

The government is committed to a very significant increase in the level of clean, renewable energy. This will be achieved by a significant step change.

- The new RESS is already expected to support up to an additional 4.5 GW of renewable electricity by 2030, while ensuring citizens and communities can fully participate in the future energy transition in Ireland
- We will increase the volumes and frequencies of the RESS auctions to deliver on the 70% renewable electricity target by 2030. Reaching 70% renewable electricity on the grid will be one of the world's highest levels of renewable penetration
- The first RESS auction is expected to open for applications by the end of 2019. This auction will include a suite of measures for community participation. Terms and conditions will be prepared for second and third auctions to provide a route to market for offshore wind, see above textbox on RESS Auction
- Develop, in conjunction with the Industrial Development Authority Ireland and the wider sector, effective policy tools to harness the significant potential of Corporate PPAs to meet at least 15% of Ireland's 2030 electricity demand from renewable sources. This will be based on input from the industry advisory group established by the Sustainable Energy Authority of Ireland (SEAI)
- Target at least 3.5 GW of offshore renewable energy of mainly offshore wind, the development of up to 1.5 GW of grid scale solar energy, an increase in onshore wind capacity of up to 8.2 GW. This will be delivered in a competitive framework of auctions and corporate contracting with a renewed focus on community and citizen participation
- Enhanced interconnection is planned, including the Celtic Interconnector to France and further interconnection to the UK. We will strengthen the policy framework to incentivise electricity storage and interconnection. Increased levels of storage and interconnection

will be critical to absorbing high levels of renewable generation on to the system, as renewables require back-up which will have to be provided by quick response plant, storage or interconnection

- Our Offshore Renewable Energy Development Plan (OREDP) has identified Ireland's coast as one of the most energy productive in Europe, with a long-term potential of 70 GW of ocean energy opportunity (wind, wave and tidal) within 100 km of the Irish coastline. The development of offshore renewables will be plan-led and aligned with the National Marine Planning Framework. We will also develop an offshore electricity grid, in tandem with new interconnection. This will allow Ireland to balance its significant renewables potential with security of electricity supply and develop long-term ambitions to export its offshore renewable resources

- Examine the increased use of cross border joint cooperation mechanisms for funding renewables, particularly offshore wind, to reduce the cost impacts on Irish consumers and businesses, including for hybrid assets as part of the North Seas Energy Cooperation Initiative

- Put in place a planning and consenting regime and a grid connection framework for offshore wind that aims to deliver offshore wind projects. Prioritise the passage of the MPDM legislation and the new consenting model, as well as implementation of a new offshore grid connection policy that lines up with the RESS auction timeframes

- In line with our commitment in Future Jobs Ireland 2019, establish a pilot Top Team in offshore renewables to provide a multi-organisational response to leveraging the industrial/employment opportunities arising from the operationalisation of the offshore energy policy framework under the Marine Planning and Development Management Bill (MPDM) legislation

3. Micro-generation

The Government strongly supports enabling people to sell excess electricity they have produced back to the grid. To enable this, we will have to make a number of changes.

- We have established a pilot micro-generation grant scheme for solar Photovoltaics (PV), targeting self-consumption, which provides a grant of circa 30% of the installation costs for individual homes.Building on the pilot, we will put an ongoing support scheme in place for micro-generation by 2021 at the latest, focusing on a number of key pillars, including: equity and accessibility for all, ongoing technology cost and remuneration analysis, addressing technical barriers and planning constraints, a clear grid connection policy, and supporting community participation in micro-generation. This will be further supported by measures in building regulations

- Mechanical electricity meters will be replaced in every house by 2024 under the Smart Metering Programme. This will facilitate better demand management and cost savings for consumers, particularly when closely aligned with the ambitious roll-out of retrofitting programmes and micro-generation capacity for homes and small enterprises

- Change the electricity market rules in early 2020 in order to enable micro-generated electricity to be sold to the grid. This should include provision for a feed-in tariff for micro-generation to be set at least at the wholesale price point

- Design market mechanisms, network tariffs, competitive auctions for renewables and the public service obligation in a way that distributes costs fairly, including in terms of competiveness

- Continue promoting closer working with community and enterprise by Energy Obligated Entities to ensure wider community gain

4. Other Measures

- Continue EirGrid's ambitious multi-year programme, Delivering a Secure, Sustainable Electricity System (DS3), which has already made us a world leader in the management of intermittent forms of renewable electricity, such as wind, on the grid, with levels of instantaneous wind penetration reaching 65%+
- Support the ocean energy research, development, and demonstration of floating wind, tidal, and wave technologies, including maximising supply chain and enterprise opportunities
- Support the further development of CHP through a range of incentives aimed at encouraging uptake in the market place. This includes the Support Scheme for Renewable Heat (SSRH) (which will support the heat output from biomass and biogas high efficiency CHP projects), the RESS (which has the potential to support the electricity output from high efficiency renewable energy CHP plants), and the Climate Action Fund (where the first call for applications included specific provision to support CHP plants)

7.4 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
16	We will require, at-scale, electricity/ gas providers to provide detail on energy use and potential energy savings, for instance as part of consumers bills
Regulatory Streamlining of Renewables and Grid Development	
17	Ensure that ESB Networks and EirGrid plan network and deliver on connecting renewable energy sources to meet the 2030 70% RES-E target
18	Facilitate additional hybrid connections (e.g. solar/wind/batteries) operating in the electricity market to increase RES-E penetration
19	Ensure that the next phase of renewable connection policy is fit for purpose to deliver on renewable energy targets and community projects, and report annually on the timeliness of grid connection
20	Implement energy actions under the *Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy* to ensure that large demand connections are regionally balanced to minimise grid reinforcements
21	Ensure that updated planning guidelines for onshore wind are published in 2019
22	Further consider facilitation of private networks/direct lines
23	Assess the network development required to integrate higher levels of RES-E and develop a high-level network development plan to (and beyond) 2030
24	Facilitate very high penetration of variable renewable electricity by 2030 (both SNSP and average) through system services and market arrangements
Offshore Renewables	
25	Facilitate the development of Offshore Wind, including the connection of at least 3.5 GW of offshore wind, based on competitive auctions, to the grid by 2030. We will establish a top team to drive this ambition

| 26 | Support the ocean energy research, development and demonstration pathway for emerging marine technologies (wave, tidal, floating wind) and associated test infrastructure |
| 27 | Support innovation enterprise hubs and the supply chain for offshore renewable energy |

Route to Market for Renewable Electricity Generation

| 28 | Design and implement the RESS. Increase the volumes and frequencies of RESS auctions to deliver on the 70% renewable electricity target by 2030 ensuring an appropriate community/ enterprise mix to achieve an efficient delivery of renewables |
| 29 | Ensure that 15% of electricity demand is met by renewable sources contracted under Corporate PPAs |

Micro-generation

30	Develop an enabling framework for micro-generation which tackles existing barriers and establishes suitable supports within relevant market segments
31	Deliver pilot solar PV micro-generation scheme with a view to commencement of enduring support scheme by 2021, at the latest, to ensure that people can sell excess electricity they produce back to the grid
32	Deliver Smart Metering Programme in line with current planned timelines that will support the market for micro-generation

Carbon Capture and Storage

| 33 | Establishment of a Steering Group to examine and oversee the feasibility of the utilisation of CCS in Ireland, and report to the Standing Committee on Climate Action as appropriate |

8 | Enterprise

8. Enterprise

8.1 State of Play

Enterprise will play a pivotal role in our ability to fulfil this transition and meet our 2030 and 2050 targets. It shapes the way materials are managed, from raw states to final consumption and disposal. It manages large transport flows. It builds and uses a large share of our buildings and it influences a vast supply chain by the priorities it sets. However, emissions from enterprise in the carbon inventory include only those associated with production processes, i.e. manufacturing combustion, industrial processes and F-gases. In 2017, they were 8.1 MtCO$_2$eq., or 13.4% of Ireland's total emissions, which is less than the EU average of 20%. Of this total, over 5.5 MtCO$_2$eq., or 68%, falls within the EU Emissions Trading System (ETS) (emissions from buildings, transport and waste are not included).

The largest share of enterprise emissions comes from the manufacturing sector, mostly chemicals, food processing, beverages, and cement, but it is a relatively small sector in Ireland with 74 companies, comprising 103 separate installations, and these are covered by the EU ETS. Emissions from enterprise that fall outside the EU ETS are highly diverse, with a large proportion arising from Small Medium Enterprises (SMEs), especially those working with industrial gases (also known as fluorinated or F-Gases). These are gases with high global warming potential used in refrigeration, air conditioning and semiconductor manufacturing. According to the CSO, the total population of enterprises in Ireland was approximately 250,000 in 2016, with SMEs accounting for 99.8% of the total.

Table 8.1 Enterprise GHG Emissions, 2017[21]

ETS/Non-ETS	Enterprise Emissions CO$_2$eq.	Share of Total GHG Emissions	Enterprise Emissions CO$_2$eq./head
ETS	5.5 Mt	9.1%	1.15 t
Non-ETS	2.6 Mt	4.3%	0.55 t
Total	8.1 Mt	13.4%	1.7 t

Emissions in the enterprise sector fell dramatically (by almost a third) between 2005 and 2011 as a result of the economic recession, but have since rebounded by over a quarter. This emissions growth is driven entirely by increasing economic activity. This demonstrates how highly correlated industry emissions still are with economic activity.

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21   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

Table 8.2 Trends in Enterprise GHG Emissions

Timeframe	ETS/Non-ETS	Percentage Change	Absolute Change, CO₂ eq.
2005-11	ETS	-40.9%	-2.7 Mt
	Non-ETS	-15.3%	-0.5 Mt
	Total	**-32.8%**	**-3.1 Mt**
2011-17	ETS	41.2%	1.6 Mt
	Non-ETS	1.4%	0.04 Mt
	Total	**25.3%**	**1.6 Mt**

Compared to other EU Member States, Ireland's carbon intensity in the sector, at 1.7 MtCO₂eq./head, is in line with the EU average, despite the sector accounting for a smaller share of total emissions than other EU countries.

Table 8.3 Enterprise GHG Emissions International Comparisons, 2016[22]

	Ireland	Denmark	Austria	Finland	EU 28
Share of Total GHG	13.0%	12.0%	34.4%	22.6%	19.8%
Enterprise Emissions, CO₂eq./head	1.7 t	1.1 t	3.1 t	2.4 t	1.7 t
Change Since 2005	-17.4%	-29.0%	-0.7%	-27.1%	-23.1%

A sectoral breakdown of industry emissions is shown in Figure 8.1, indicating that manufacturing combustion and process emissions from the mineral industry (primarily cement manufacture) account for the most significant share of emissions in this sector.

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22   EEA Annual European Union greenhouse gas inventory 1990–2016 and inventory report 2018

Figure 8.1. Sectoral Disaggregation of Enterprise Emissions[23]
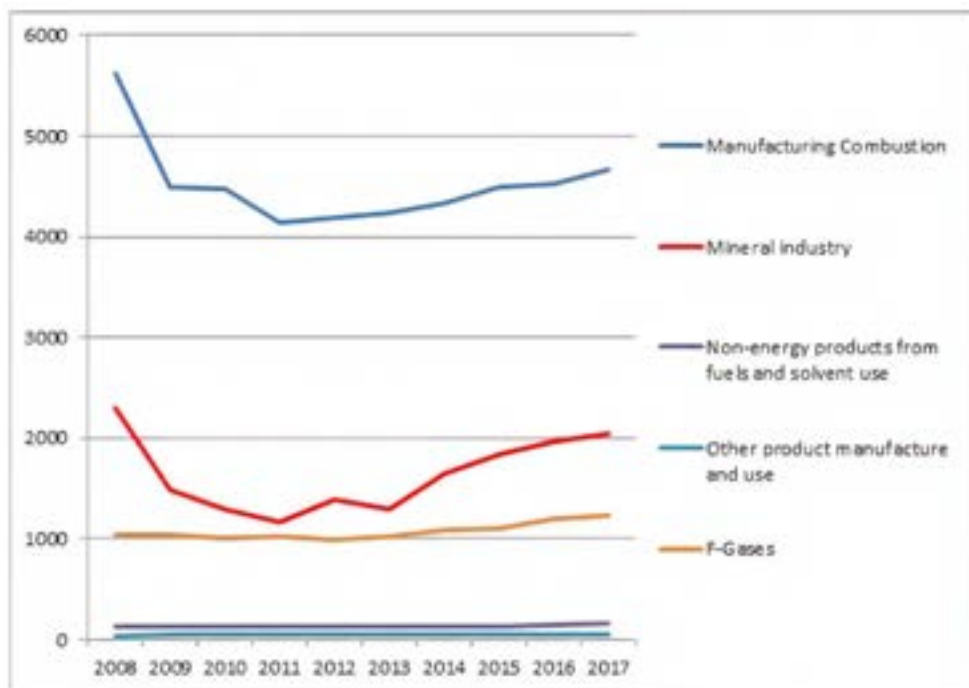
While the recovery in enterprise activity has seen some switching of the sector's energy requirements from fossil fuel to renewable energy, the link between economic growth and emissions has still not been broken.

If enterprise is to contribute to the overall objective, and particularly for the Irish ETS sector to meet the EU target of 43% emissions reduction by 2030, relative to 2005 levels, a dramatic turnaround from the sector's recent trend of a 41.2% increase in emissions between 2011 and 2017 is required. Further work will also be required to align the expected rapid growth in energy demand from data centres with grid infrastructure plans.

Reducing the sector's transport and buildings emissions will take leadership at enterprise level. Transport is currently over 98% dependent on fossil fuels and a high proportion of buildings within the sector have a poor Building Energy Rating (BER), with a low level of renewables penetration. Specific actions to target emissions from space and water heating in commercial buildings, and from transport, are included in the built environment and transport chapters respectively.

It is encouraging to see some major companies committing to 50% emissions reduction by 2030, but this level of ambition must become the norm across the enterprise sector. Companies and sectors that fail to make early moves to decarbonise their activity across their entire business model will become increasingly uncompetitive.

It is clear that policy measures to date, including those presented in Project Ireland 2040, will not achieve the level of decarbonisation required in the industry sector. Projections indicate that emissions from the sector are set to increase by 12% to 9 $MtCO_2$eq. in 2030. The evaluation of the least cost road map implies that these must be reduced to 7.5 $MtCO_2$eq. in 2030.
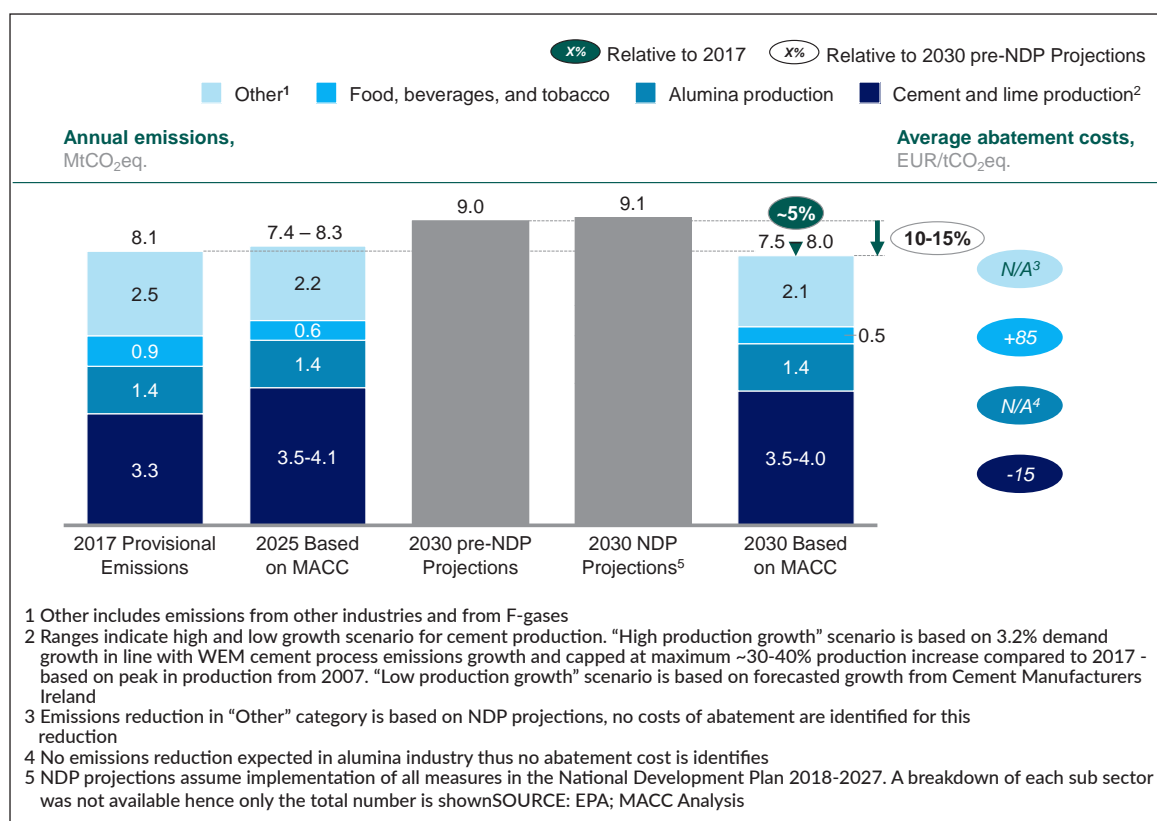
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23   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

Table 8.4 Impact of Policy Measures in Enterprise

2017[24] Provisional Emissions	2030 Projected Emissions Based on NDP	2030 Required Emissions Based on MACC
8 Mt	9 Mt	7.5-8.0 Mt

Analysis of cost-effective measures indicate that there are significant opportunities for the sector, particularly in food processing and other manufacturing. In food processing, measures include phasing out oil and replacing with biomass and electricity. In cement production, measures include use of alternatives fuels, such as Solid Recovered Fuels (SRFs) and other waste streams substituting for fossil fuels. Increasing the use of alternative fuels in the cement sector to 80% by 2030 will help to offset a forecast 40% increase in production over the period.[25]

As shown in Figure 8.2 below, the MACC analysis implies a 10-15% emissions reduction relative to 2030 pre-NDP projections for this sector, which will contribute towards reducing our ETS emissions. The average abatement cost to achieve this reduction ranges between -€15/tCO₂eq. (cost saving) and +€85/tCO₂eq..

Figure 8.2 Annual Emissions and Average Abatement Costs in Enterprise

1 Other includes emissions from other industries and from F-gases
2 Ranges indicate high and low growth scenario for cement production. "High production growth" scenario is based on 3.2% demand growth in line with WEM cement process emissions growth and capped at maximum ~30-40% production increase compared to 2017 - based on peak in production from 2007. "Low production growth" scenario is based on forecasted growth from Cement Manufacturers Ireland
3 Emissions reduction in "Other" category is based on NDP projections, no costs of abatement are identified for this reduction
4 No emissions reduction expected in alumina industry thus no abatement cost is identifies
5 NDP projections assume implementation of all measures in the National Development Plan 2018-2027. A breakdown of each sub sector was not available hence only the total number is shownSOURCE: EPA; MACC Analysis

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24   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

25   McKinsey's analysis indicates no displacement of process emissions from cement, only combustion emissions, which is why the overall reduction in the sector looks relatively minor

This level of emissions reduction could be achieved by:

- Increasing the share of alternative fuels in cement production from circa 30% to circa 65% by 2025, and 80% by 2030
- Meeting 70% of low-temperature heat demand in the food industry with low-carbon sources by 2025, and 80% by 2030

Table 8.5 Potential Metrics to Deliver Abatement in Enterprise

Key Metrics (Percentage target)	2017	2025 Based on MACC	2030 Based on NDP	2030 Based on MACC
Alternative fuels in cement production mix	~30%	65%	N/A	80%
Low-carbon emissions heat generation in food industry	~40%	70%	N/A	80%

8.2 Targets

To meet the required level of emissions reduction, by 2030 we will:

- Reduce Ireland's ETS industry emissions by 10-15% by 2030, relative to 2030 projections
- Enterprise must contribute to the more ambitious targets for buildings (20-25%) and transport (45-50%)
- Expand the EXEED programme to influence and deliver new best practices in energy efficient design management in at least 80 companies in 2019

Irish Enterprise will be required to implement a detailed agenda of transition and change if it is to ensure that our sectors are climate resilient and can remain competitive in a decarbonising world.

This agenda will include:

- Improving energy efficiency of processes, buildings and transport
- Replacing fossil fuel with renewables in their processes, buildings and transport
- Improving the way in which resources are used in their supply chain to reduce emissions and conform to circular economy principles
- Being innovative across production, distribution, and marketing to realise the opportunities arising
- Developing the new skills and techniques necessary
- Developing measures of the climate and environmental impact of activities which will become more widely expected in the marketplace

This will require leadership from within enterprise, but also the capacity to build networks of good practice within sectors.

The enterprise facing state and local agencies, having regard to their statutory mandates, will be prioritising decarbonisation as part of their strategies.

The focus of programmes emphasising management development, start-up, lean productivity improvement, training, marketing and innovation will all increasingly emphasise this urgent agenda for climate resilience in our sectors. Each of these agencies shall, as part of this plan, be adjusting their suite of programmes in line with this national priority. The use of audits and benchmarks can become a valuable tool in helping enterprise adapt.

It is encouraging to see many companies and some sectors already stepping forward with clear commitments to cut-emissions, to go renewable, to electrify their fleets and to manage waste in a different way. It is important that all sector associations and local chambers recognise and support their members so that networks quickly form to follow the pioneers. Public bodies will be encouraged to form partnerships so that shared endeavour can deliver more. We need to see the emergence of clusters within which the sector's efforts can be aggregated and scaled.

8.3 Measures to Deliver Targets

There are differing cohorts of enterprises operating in the economy that face distinctive needs and challenges in decarbonising. Approximately 5,500 client companies of Enterprise Ireland and IDA Ireland, which represent firms in key growth and emerging sectors of the economy, will be targeted for specific support, either through enterprise agencies with which they already have relationships, or through specialist agencies, such as SEAI and the EPA. However, there is also a highly diverse population of other enterprises, mostly SMEs, often with limited internal capacity to take action to reduce emissions, which we shall work to support, using other networks, including local enterprise offices and sectoral agencies, such as BnM, Bord Bia, Teagasc, and Bord Fáilte.

We already have a number of policy measures in place to support decarbonising the enterprise sector. While continued effort in further developing, enhancing, and implementing these measures is essential, the enterprise sector must do more. Entire sectors of the economy will undergo radical changes, and new types of enterprises and jobs will be created as economies across the world transition to low-carbon, bio- and circular economies. Irish companies will have a pivotal role to play in leading this transition, firstly within their own activities, but then also through the supply chain which they influence. This will require attention at Chief Executive level, and from key associations that can shape sectoral development. The important role of Government and enterprise to encourage, develop and adopt innovative technologies, products and services that increase efficiencies, reduce waste and deliver sustainable development must be recognised. For enterprise, the following measures will be critical to our success:

1. Emissions Trading System

- The key industry measure addressing greenhouse gases is the EU ETS, which covers 68% of emissions from this sector, including both combustion and process-related emissions. A strong carbon price signal, as part of a reformed ETS post-2020, including progressively more restrictive rules on how many allowances will be available within the ETS, is expected to drive decarbonisation over the coming decade by increasing the cost to firms in the ETS of doing nothing to reduce their emissions. We are committed to continuing to work

proactively with our EU partners, including considering the need for further reforms to the ETS or for supplementary measures, so that we ensure the ETS can effectively deliver reductions in greenhouse gas emissions, while addressing the challenges faced by sectors most exposed to international competition

- Within the ETS sector, MACC analysis has identified potential for significant cost-effective abatement, in particular in the cement sector from substituting fossil fuels in combustion for non-fossil fuel alternatives, including from different waste streams, and in the food and drink sector through meeting low-temperature heat requirements with low-carbon sources. The cement sector, in particular, has taken steps in this direction, with plans to accelerate fuel substitution activities in the future. We will work with such sectors to identify any additional measures that could support them in achieving emissions abatement over the coming decade

2. Carbon Pricing

- Enterprise sectors outside the ETS will be incentivised by the general carbon price trajectory set by Government in successive budgets, but will also be exposed to carbon price movements within the ETS in circumstances where such prices can be passed on by ETS sectors. As we progressively decarbonise our economy, policy must prevent a large gap emerging between carbon pricing in ETS and non-ETS sectors to ensure an ongoing strong signalling effect for decarbonisation

3. SEAI Initiatives

- The Large Industry Energy Network (LIEN), a network of 200 large enterprises (some of which are in the ETS), together consume 20% of the entire energy demand in Ireland. These are supported by SEAI through mentoring, energy management systems, training and networking and compliance with legal requirements. Many LIEN members have ambitious decarbonisation plans, driven by economic and Corporate Social Responsibility (CSR) rationales. Some leaders in this sector have achieved significant decarbonisation through energy efficiency, on-site renewable generation and green energy purchases. Through SEAI, we will support and promote decarbonisation by the members of this network

- Building on the LIEN, SEAI will develop a network of 15 to 20 of the largest energy users in Ireland to drive and monitor a public commitment to decarbonisation over the 2020 to 2030 period

- In 2019 SEAI, working with the enterprise agencies, will prioritise preparatory work on the following actions:

  o Accelerate the roll out of renewable energy, Combined Heat and Power (CHP) technologies and Power Purchase Agreements (PPAs)
  o Develop a strategy for waste heat recovery from industrial processes
  o Support the adoption of renewable heat for process and space heating
  o Support industry to test and demonstrate scalable and replicable innovative approaches to decarbonisation

o   Support large businesses with the installation of charging infrastructure for electric vehicles, the conversion of fleets and the piloting of new vehicles
o   Develop proposals for mandatory audits for large industry
o   Expand the use of energy performance contracts
o   Enhance the value of the EXEED programme for large industry with reference to relevant international benchmarks

- SEAI will also expand the EXEED programme in 2019 to deliver new best practices in energy efficient design management in at least 80 companies

4. Regulation

- Emissions from industrial gases and refrigerants are controlled by EU Regulation (No. 517/2014) on *Fluorinated Greenhouse Gases*, which is projected to reduce emissions from these sources by 38% between 2017 and 2030 by restricting the availability of products on the market

5. Future Jobs Ireland 2019 – New Areas of Opportunity

The move to a climate resilient enterprise sector will create many business opportunities. Many of these are already with us but will expand rapidly, such as:

- Renewables, as the installed renewable power capacity goes from 3.5 GW to 17.5 GW huge opportunities will emerge
- Offshore technologies are only applied at a very small level in Ireland now, but the scale of the opportunity has been estimated at 70 GW
- The 25,000 homes currently participating in energy retrofits represent an estimated €150m for the retrofit sector. This sector is expected to quadruple in size
- Many new technologies – micro-generation, anaerobic digestion, biomass, heat recovery, carbon capture, biomethane – will come to maturity bringing new business opportunities

As set out in Future Jobs Ireland 2019, these opportunities will require clear planning by sectors and agencies. The education and training agencies will be required to develop the professional expertise, the apprenticeship and traineeship and the certification capacity to turn these needs into new start-ups and good livelihoods.

The proposed "Top Team" for Offshore Renewables will be a cross-departmental project which can demonstrate the potential of a strategically planned approach.

6. Enterprise Agency Leadership

- Existing enterprise agency programmes, such as Enterprise Ireland's *Green Supports* and IDA's *Go Green*, already encourage client companies to develop a high level of environmental management capability and become more environmentally efficient and sustainable. Client companies are also supported in efforts to apply international environmental best practices to a level compatible with ISO standards
- Decarbonisation of enterprise is about far more than supporting the introduction of energy

efficiency measures. It is fundamentally about decarbonising processes which are adopted by industry to produce goods and services. EI and the IDA will work to further integrate climate change considerations into their overall strategies and the specific supports provided to client firms over the coming period of radical transition

- o In 2019, EI will expand its supports to a larger cohort of client companies. It will also identify further opportunities to engage with specific sectors with common challenges to develop more tailored supports for companies in those sectors. In this context, the agencies will also give specific attention to management development for creating the low-carbon business model of the future, and to the key role of top management in driving low-carbon organisation-wide transformation
- o IDA will use its new strategy for 2020 to 2024 to fully integrate decarbonisation objectives across its portfolio of clients and other relevant stakeholders. Building on the 2018 *Government Policy Statement on The Role of Data Centres in Ireland's Enterprise Strategy*, the new IDA Strategy will seek to ensure new large-scale enterprise investments in Ireland, including consideration of factors such as location, energy storage opportunities and PPA opportunities are made consistent with this Plan and aligned with the build-out of the grid to maximise renewable sources

7. Sectoral Networks and Decarbonisation Strategies

- All Government agencies will support the development of sectoral networks to drive this agenda as part of the new mandate that will apply to all public bodies:

  - o SEAI will develop, in partnership with relevant State agencies (such as EI, IDA, LEOs, BIM, Bord Bia), decarbonisation programmes in key sectors. These programmes will involve the development of audit tools, standards and certification, and supply chain management so that participating enterprises can show a real competitive advantage
  - o A specific senior leadership programme will be developed by agencies to support enterprise leaders focus strategically on managing the challenges and opportunities of decarbonisation
  - o A priority for 2019 will be to establish networks in key sectors, including data centres, pharmaceuticals and food and drink, to promote industry-led sectoral plans. We shall work with sectoral associations to realise this
  - o We will support the development of such networks through a targeted call under the Climate Action Fund
  - o We will use the CSR Stakeholder Forum to encourage businesses to address the impact of their operations on the environment and to promote action through individual supply chains

8. Enterprise Leadership in the Wider Community

- Enterprises can play a prominent role as leaders beyond their immediate business activities. Government will promote their active participation. This will include:

  - o Participation in wider community initiatives, such as Sustainable Energy Communities and Better Energy Communities
  - o Support for business networks of SMEs where experience could be shared, for example

through local chambers of commerce

- o Support for employees to actively contribute to decarbonisation in work and their wider lives
- o Work with industry-led initiatives, such as Business in the Community Ireland, to support decarbonisation programmes, such as low carbon pledges

- The resource of the Climate Action Fund, and the other NDP funds, will act as a catalyst to the transition

Case Study – Pre-competitive Collaboration

Increasingly, industry leaders are looking to tackle environmental issues while also improving their economic value. However, in certain instances it can be costly (or perceived to be costly) to address environmental issues as an individual company. Taking actions can expose companies to competitive disadvantages if other players in their industry do not commit to similar action. On the other hand, if companies work together to tackle such issues collaboratively, it can improve economic value for all as well as supporting the environment and the wider society. Such an approach is often referred to as 'pre-competitive collaboration' where industry leaders come together to form an alliance with a common goal. For example, denim industry players in the Netherlands formed the Alliance for Responsible Denim where they collaborated to tackle water, energy and chemical issues to produce denim in a more sustainable way. The UK's 'Priming Food Partnerships' initiative is another example of pre-competitive collaboration to stimulate technological advances that can deliver healthy nutrition for consumers. This enables the industry to develop standards, generate data and enhance industry knowledge. It also levels the playing field for all participants by removing the competitive disadvantage for any one company.

Source: Investors as Stewards of the Commons? (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3014952); Priming Food Partnerships (https://bbsrc.ukri.org/news/health/2017/170210-pr-priming-food-partnerships-challenges-faced-uk-food-drink-industry/)

8.4 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
34	Engage with the cement and food and drink industry sectors to identify measures to support the achievement of identified potential abatement in these sectors
35	Drive innovation and efficiency in companies by promoting wider take-up of EXEED delivering efficiencies in at least 80 companies
36	Prioritise decarbonisation as part of enterprise agency strategies and drive the decarbonisation agenda across their respective client bases
37	Develop networks in key industry sectors and a roadmap of actions to support decarbonisation of large industry
38	Promote enhanced networking approaches within SEAI Large Industry Energy Network and through the SME Programme
39	Launch targeted call under Climate Action Fund
40	Leverage and mobilise business cluster initiatives under the Regional Enterprise Plans and Future Jobs Ireland 2019
41	Promote the integration of climate considerations into business operations through the work of the Corporate Social Responsibility Stakeholder Forum
42	Work with all business representative groups, including IBEC, Business in the Community, ISME, SFA, Chambers Ireland, and others to create partnerships of companies that sign up to a low carbon trajectory

9 | Built Environment

9. Built Environment

9.1 State of Play

The built environment accounted for 12.7% of Ireland's greenhouse gases in 2017. It is important that we improve the energy efficiency of our buildings, including our homes, workplaces and schools, by meeting higher energy performance standards and by increasing retrofit activity. This will not only reduce Ireland's dependence on fossil fuels, but will also improve our living standards by making our buildings more comfortable, healthier, safer, and less costly to heat.

Table 9.1 Buildings GHG Emissions, 2017[26]

Buildings Emissions CO_2 eq.	Share of Total GHG Emissions	Buildings Emissions CO_2eq./head
7.7 Mt	12.7%	1.6 t

We have already had some success in decarbonising our buildings with emissions falling by 10.3% between 2005 and 2011, and falling again by 11.3% between 2011 and 2017. This scale of continued reduction beyond 2011 is in contrast to most other sectors in Ireland.

Table 9.2 Trends in Buildings GHG Emissions

Timeframe	Percentage Change	Absolute Change, CO_2 eq.
2005-11	-10.3%	-1.0 Mt
2011-17	-11.3%	-0.99 Mt

Notwithstanding this progress, Ireland's emissions reduction from buildings since 2005 is well below that of countries such as Denmark, Austria, and Finland, and our associated CO_2eq./head is greater.

Table 9.3 Buildings GHG Emissions International Comparisons, 2016[27]

	Ireland	Denmark	Austria	Finland	EU 28
Share of Total GHG	12.9%	9.7%	11.4%	8.6%	15.4%
Buildings Emissions, CO_2eq./head	1.6 t	0.8 t	1.0 t	0.9 t	1.3 t
Change Since 2005	-18.4%	-36.4%	-33.8%	-26.8%	-16.5%

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26   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

27   EEA (2018), Annual European Union greenhouse gas inventory 1990–2016 and inventory report 2018

Ireland faces a number of challenges in reducing emissions from our buildings. Our homes use 7% more energy than the EU average and emit 58% more CO_2eq.[28] Our buildings are 70% reliant on fossil fuels, including oil fired boilers; over 80% of our homes and other buildings assessed for their BER have a rating of C or worse; and the current annual retrofit activity for existing stock is far too limited (approximately 23,000, mainly shallow, retrofits).

Table 9.4 and Figure 9.1 set out the target emission reductions in the Built Environment if the most cost effective options are adopted. A hierarchy of the most cost effective investments underpin this, including:

- Improving the fabric of buildings
- District heating in commercial buildings
- Switching from oil burners to heat pumps
- Setting new building standards

While some measures have a very quick payback and are being quite widely adopted, it is clear that we must accelerate universal adoption but also embrace changes whose payback is not so rapid. The analysis shows that our ambitions for the Built Environment must go beyond those set out in Project Ireland 2040. Compared to recent patterns, the rate of emission reduction needs to double from 2% to close to 4% per annum.

In order to deliver the efficient pathway, we must reduce our built environment sector emissions to 5 Mt CO_2eq. in 2030. This requires 40-45% emissions reduction relative to pre-NDP 2030 projections. The average abatement cost to achieve this reduction ranges between +€30/tCO_2eq. and +€85/tCO_2eq. as per Figure 9.1.
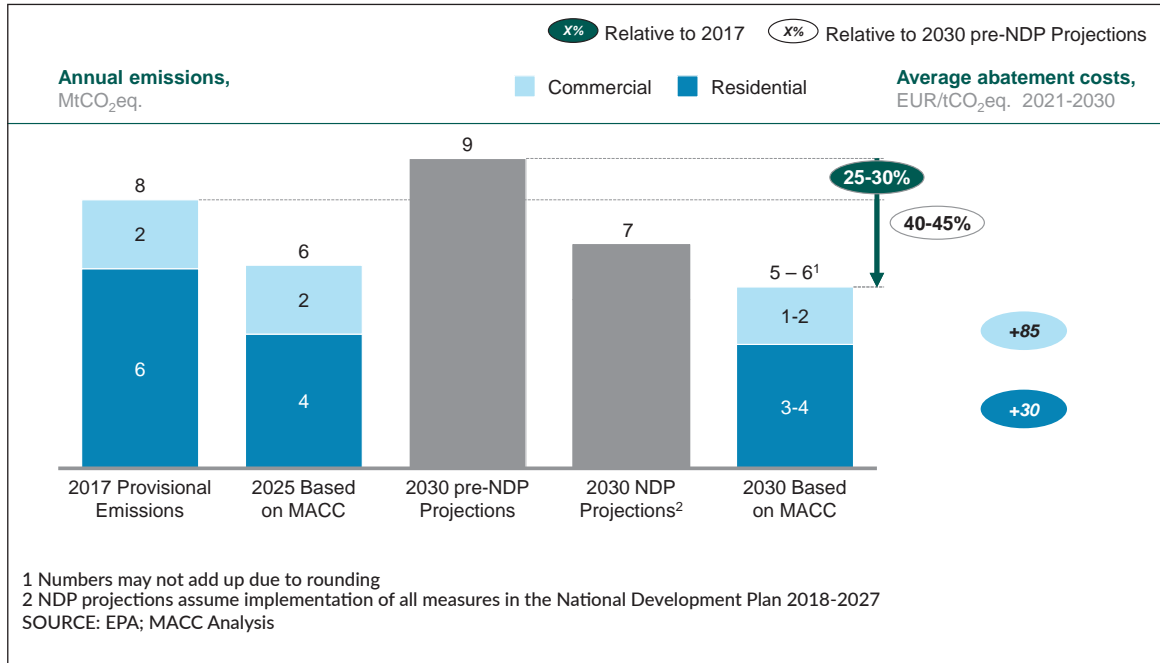
Table 9.4 Impact of Policy Measures in the Built Environment

2017[29] Provisional Emissions	2030 Projected Emissions Based on NDP	2030 Required Emissions Based on MACC
8 Mt	7 Mt	5-6 Mt

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28   SEAI (2018), Energy in the Residential Sector 2018 Report

29   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

Figure 9.1 Annual Emissions and Average Abatement Costs in the Built Environment

1 Numbers may not add up due to rounding
2 NDP projections assume implementation of all measures in the National Development Plan 2018-2027
SOURCE: EPA; MACC Analysis

The most cost-effective abatement measure for the built environment identified in the MACC is to retrofit existing dwellings that use oil boilers to a B2 equivalent BER. While gas may be the cheapest heating source over the period to 2030, opting for such carbon-intensive investments would result in 'carbon lock-in'. This would prevent us from meeting our decarbonisation objectives. Therefore, as we transition to lower-carbon pathways we must ensure the introduction of heat pumps and other low-carbon solutions in new residential and commercial buildings.

The level of emissions reduction required could be achieved by:

- Increasing the cumulative number of buildings that are retrofitted to a B2 equivalent BER to circa 500,000 by 2030
- Reaching circa 600,000 renewable energy heating sources (e.g. heat pumps) in residential buildings by 2030, and circa 25,000 in commercial premises

District heating networks also have several characteristics that are attractive for climate mitigation policy, particularly those that use a renewable heat source, or heat that is currently wasted, such as from power stations or data centres. Heat networks can be very versatile as they are not bound to one source. They can be supplied by waste heat, gas boilers, biomass boilers or heat pumps.

Table 9.5 Potential Metrics to Deliver Abatement in the Built Environment

Key Metrics (Cumulative numbers)	2017	2025 Based on MACC	2030 Based on NDP	2030 Based on MACC
Retrofitted homes to BER B2	990	300,000	450,000	500,000
Heat pumps in residential buildings	17,500	350,000	370,000	600,000
- New buildings	3,500	50,000	200,000	200,000
- Existing buildings	14,000	300,000	170,000	400,000
Heat pumps in commercial buildings	TBD	15,000[30]	15,000	25,000

9.2 Targets

To meet the required level of emissions reduction, by 2030 we will:

- Reduce CO_2 eq. emissions from the sector by 40–45% relative to 2030 pre-NDP projections
- Sharply reduce fossil fuel use, given the current heavy reliance on gas, oil, coal and peat in the sector
- Complete 500,000 building retrofits to achieve a B2 BER /cost optimal equivalent or carbon equivalent
- Install 600,000 heat pumps (400,000 to be in existing buildings)
- Increase the number of Sustainable Energy Communities to 1,500
- Complete the rollout of the Support Scheme for Renewable Heat (SSRH), including support for biomass and anaerobic digestion heating systems
- Deliver two initiatives of municipal scale which have the potential to provide heat equivalent to the needs of about 50,000 homes

9.3 Measures to Deliver Targets

Mobilising the acceleration of work to make our buildings climate resilient will require new approaches that go well beyond existing approaches. The key initiatives which will be developed under the plan are:

- Scaling up the present approach of individual grants to develop a model that aggregates up into large area based packages where economies can be achieved in delivering professional advice, tendering the work and developing smart finance, and easy pay back methods (e.g.

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30   Not specified in NDP, estimated based on residential ratio

through your electricity bill)
- Ensuring that every significant new build or refurbishment takes the opportunity to maximise the adoption of climate resilient measures
- Promoting the widespread adoption of heat pump or other renewable heating options

These will take significant innovation in the approach adopted by DCCAE and its agencies but will also require collaborative approaches across Government, Local Authorities, Enterprise, Finance and Communities to deliver. A Task Force will be immediately established to develop the model.

In many cases policy measures can be leveraged to greater effect through smart design and the introduction of interim measures. For instance, with smart metering, in the interim period to full roll-out in 2024, new products and services could be introduced that enable customers to avail of cheaper electricity by managing their energy demand, through the use of night rates or other behavioural signals. Notwithstanding this, our 2030 decarbonisation ambition will require a further step-up in activity. A combination of new funding options, a grouped approach to housing retrofits, and signalling advanced performance requirements to phase out fossil-fuel use will all play a key role. For the built environment, the following measures will be critical to success:

1. New Delivery Structure for Retrofitting

Project Ireland 2040 has provided significant additional resources to carry out retrofitting. We will develop and put in place a new retrofitting delivery model, which will group retrofits together to achieve economies of scale, leverage private finance, and ensure easy pay-back methods. The savings on your electricity bill from using less energy can help fund this, while the home will be warmer and produce less emissions.

Various approaches to aggregation exist across a number of countries, but they generally exhibit similar characteristics. An area based retrofit programme would seek to capitalise on critical mass, leveraging economies of scale that would benefit both householders and the supply chain. This type of programme would focus on designated areas in both rural and urban environments and could be designed and delivered to include local authorities, approved housing bodies or other strategic delivery partners. It would also take account of the priorities in Project Ireland 2040 for the depth of retrofit and the targeted replacement of oil boilers with renewable alternatives.

Defined areas could include a mix of residential stock in public ownership and other social housing to provide a 'core project', and also address energy poor homes. The blending in of more private householders for energy retrofits would then balance and scale an overall 'project' and make greater use of non-Exchequer funds. Appropriate methods of procurement, and high performance standards would be employed with due regard for location, scale and ownership mix.

Area based, scaled approaches can make it easier to inform and engage the homeowners being targeted by building on existing community structures and programmes. They can also build the confidence of supply chains, which will need to invest in both competency and capacity as we fulfil our national ambition on the decarbonisation of our built environment.

The Department of Communications, Climate Action and Environment and SEAI will identify a delivery structure and funding options for an area based residential retrofit programme in early 2020 as part of this Plan.

Case Study – Netherlands Retrofit Project

In the Netherlands, the Government funded an innovative project called 'Energiesprong', which aggregated demand for retrofits before deploying builders to complete the work at pace. Builders were incentivised to improve efficiency and speed, and got the turnaround time to retrofit a house down to three days. The initiative used social housing as a launch pad before rolling out the approach across the private sector, and was financed by housing companies, which achieved savings on energy costs, repairs and maintenance. The tenants paid for energy like a phone plan: they got an allowance for a guaranteed indoor temperature, plus an allowance for hot water per day, and a power bundle for light and appliances. Energiesprong has since been rolled out in the UK, Italy, France and Germany.

2. Building Standards, Retrofitting and Energy Efficiency

- We committed to 45,000 energy efficiency retrofits per annum from 2021, including Sustainable Energy Communities. This Plan has stepped that target up to 50,000 and we have committed to design **a new delivery model** for retrofitting, which will examine grouping large numbers of houses together to achieve economies of scale, leveraging smart finance, and ensuring easy pay-back methods
- Local Authorities will upgrade their housing stock under Phase 2 of the social housing retrofit programme to bring dwellings more than 40 years old (30% of the social housing stock) to a B2 equivalent BER
- We committed to a deep energy retrofit programme for pre-2008 schools. 17 schools nationwide were selected for energy efficiency works in 2019, which includes installation of renewables. The detail of this plan will now be developed
- The Public Sector Energy Efficiency Programme supports public bodies in achieving a 33% energy efficiency target by 2020, this will be increased to 50% for 2030, but there are also a number of other initiatives in key areas such as in the health sector and enterprise. We will develop a new public sector decarbonisation strategy, including new initiatives to improve the energy efficiency of public buildings, such as hospitals. This is addressed in Chapter 13
- The Excellence in Energy Efficient Design (EXEED) programme was established to embed energy efficiency design and structured energy management in the commercial and public sectors. The EXEED programme will be expanded to further help commercial buildings and businesses embed energy efficiency measures in the design of their projects, processes, and assets
- Scale-up and improve the Sustainable Energy Communities and Better Energy Communities programme and enlist a wider range of organisations to anchor its collective approach. This will be done through developing new partners, creating more visibility within communities, and attracting matching finance
- Develop the necessary supply chain, including working with Regional Skills Fora to train skilled workers
- Extend sectoral networks to new areas, to raise information and awareness and mainstream the adoption of low-carbon technologies, processes and techniques

3. Market Signals

- A carbon price has been in place since 2010. Carbon pricing can encourage energy efficiency improvements by households and businesses. We are committed to implement a carbon price of at least €80 per tonne by 2030, accompanied by a trajectory of increases over successive annual Budgets. This will improve the payback period for investments and increase the up-take of energy efficiency measures by factoring the cost of carbon into decision-making. How revenue from carbon pricing could be usefully deployed will be based on the principle that measures we design should incentivise involvement in the transition. Carbon pricing is further described in Chapter 6

- We have Accelerated Capital Allowances (ACAs) for energy efficient equipment, which is supporting the reduction of energy use in the workplace and the awareness of energy efficiency standards in appliances and products. We also introduced a new ACA scheme in 2018 for gas-powered vehicles and refuelling equipment, to assist in achieving national targets of transitioning to a low carbon economy. We will continue to review these schemes in the future and examine potential amendments to enhance their effectiveness

- Mechanical electricity meters will be replaced in every house by 2024 under the Smart Metering Programme. This will facilitate consumers in improving energy efficiency, reducing costs, and support the increased uptake of renewables

4. Regulation of New Buildings and Renovations

- Increase the number of homes, businesses and rental properties with BERs and Display Energy Certificate (DECs) as a precursor to regulating for a minimum level of BER upgrade. Appropriate requirements and enforcement mechanisms will be developed that take into account appropriate triggers, such as Government-funded schemes, and potential negative impacts to the supply of rented properties to the market

- More stringent building regulations will apply from the second half of 2019, with all new buildings to be Near Zero Energy Building (NZEB) and existing dwellings undergoing major renovations to meet cost optimal performance equivalent to a BER of B2. These will be progressively extended to improve energy efficiency performance, including to phase out the installation of oil boilers

- Examine ways in which audits for commercial buildings can be further progressed through the use of existing policy levers

- We committed to the full roll out of the SSRH, which will support the adoption of renewable heating systems by commercial, industrial, agricultural, district heating and other non-domestic heat users in sectors not covered by the ETS (Project Ireland 2040 allocation of €300 million to support heat pumps, biomass and anaerobic digestion heating systems)

- At least 40% of all new homes nationally will be delivered within the built-up footprint of existing settlements under our commitment to promote compact and sustainable growth of our cities, towns, and villages[31]. Better spatial planning will reduce the carbon emissions of new developments, and deliver a better quality of life, including shorter commute times, better connections between our places of work and homes, and more vibrant, people-focused environments. Concrete actions to make this a reality include the Land Development Agency aggregating sites, pre-planning of transport, and ensuring that our education and health needs are met

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31   The *National Planning Framework*, see http://npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf

5. Sustainable Energy Communities

The establishment of 256 Sustainable Energy Communities has been a significant success in encouraging local actors to work together. It is underpinned by SEAI mentors and grants for a Local Energy Plan. They have been able to undertake quite ambitious changes across multiple locations in cooperation with the Energy Obligated Companies.

There is a huge opportunity to build on this model and to work with the new Climate Officers in Local Authorities to mobilise more such networks with a target to reach 1500.

- We aim to develop a concerted effort to make local communities more conscious of poor carbon technologies and how they can be rectified. A wider use of BER ratings by auctioneers, Local Authorities and other influencers, the wider promotion of audits can underpin community mobilisation

6. Smart Finance

There is a growing realisation that financial institutions, when they are funding the acquisition of assets, must pay far greater attention to the climate resilience of assets where they risk locking into high-carbon technologies, or other climate vulnerabilities, and in turn, show a greater willingness to fund investment in changes which can make those assets more climate resilient.

- Develop a smart finance initiative to provide a competitive funding offer with State support. A guarantee-based product will offer both a degree of risk-sharing to lenders, and an additional leverage effect, which means that the funding is used in a more efficient way. A scheme, such as the European Investment Bank (EIB) Smart Finance for Smart Buildings programme, could include a package of lower cost loans that are deployed in conjunction with a grant element and advisory services to both the Small and Medium-Sized Enterprise (SME) and residential sectors
- Expand salary incentive schemes within existing SEAI programmes, including setting up public and private sector pioneer programmes for these models and consider other 'easy pay' methods, such as optional addition to Local Property Tax (LPT) bills
- We have developed a gateway approach from the Fuel Allowance Scheme to accessing Warmer Homes
- Examine opportunities associated with green mortgages as part of a portfolio approach to financing energy efficiency improvements, including their application to retrofit a property upon purchase and as a top-up when retrofitting a property already owned

7. District Heating

District heating offers the supply of low-carbon heat to homes, businesses and public buildings from a central source. To realise the potential of district heating we will take a number of actions.

- Develop a national policy framework for district heating, which covers the key areas of regulation, planning, financing and research
- Use the two district heating pilot schemes to develop experience and knowledge that can promote and inform further schemes nationwide to facilitate greater uptake of district heating through self-financed heat networks
- Ensure the potential of district heating is considered in all new developments and in particular in Strategic Development Zones (SDZs)
- Identify a set of potential early mover projects beyond the first two pilot schemes

9.4 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
Consolidating the Evidence Base and Driving Demand	
43	Consolidate data on current retrofit volume and depth to get a full picture of energy efficiency and carbon savings funded by public bodies and those supported by the Energy Efficiency Obligation Scheme across the residential, commercial and public sectors
44	Increase the number of homes and businesses with BERs and DECs
45	Maximise the potential for BER and DEC data to help households and businesses decarbonise their buildings
46	Examine feasibility for commercial rates to be linked to BER
New Delivery Model	
47	Establish a One-Stop-Shop model for energy efficiency upgrades
48	Develop a plan to establish a new delivery body to ensure the effectiveness and efficiency of the delivery system for retrofits, including examining how to deliver a major house retrofitting programme in the Midlands. We will also look at easy pay-back models, for example through your electricity bill
49	Develop a plan to ensure that the grant schemes, new finance models and the delivery system are effectively integrated
Building the Supply Chain	
50	Skill-up current contractors/other industry players in deep retrofit, NZEB and new technology installations
51	Develop the supply chain for renewables and retrofitting through engagement with ETBs and SOLAS
Funding and Financing Projects	
52	Develop and optimise Government funding and grant schemes to drive demand for energy efficiency retrofits that deliver value for money
53	Identify additional options for targeted financing for energy efficiency retrofits in the domestic and commercial sectors
54	Provide easier to access tailored finance for SME and residential energy efficiency investment utilising the European Commission's Smart Finance for Smart Buildings loan scheme
Regulation and Fiscal Measures	
55	All buildings undergoing a major renovation (>25% of building envelope) must bring the rest of the building up to minimum BER of B2 or cost optimal equivalent.
56	All new buildings (public and private) to be NZEB
57	Review NZEB and major renovation performance requirements
58	Examine climate related fiscal measures across various sectors
59	Make time-of-use tariffs and smart bills available to electricity consumers
60	Effectively ban the installation of oil boilers from 2022 and the installation of gas boilers from 2025 in all new dwellings through the introduction of new regulatory standards for home heating systems, and ensure the supply chain for the installation of renewable heating systems is in place. Enact the NZEB performance requirements in regulation in 2019 to facilitate the banning of oil boilers

61	Review how and when the replacement of oil and gas boilers in existing dwellings (domestic and commercial) could commence. The review will be completed in 2020.
62	Examine how and when fossil-fuel heating systems could be phased-out of public buildings, including disallowing the installation of any new fossil-fuel heating systems
63	Address the split incentive issue in the rental market. A special advisory group will make recommendations

Local Authorities

64	Introduce minimum BER standards in the Local Authority social housing stock as part of retrofit works being carried out on older stock or refurbishment of vacant dwellings
65	Develop and establish a climate-action toolkit and audit framework for Local Authority development planning to drive the adoption of stronger climate action policies in relation to the patterns and forms of future development
66	Roadmap to develop supply chain to support the phase out of fossil fuel boilers in new dwellings

Schools and Third Level Institutions

| 67 | Set a trajectory for commencing and implementing the Department of Education and Skills deep energy retrofit programme |

Energy Performance Contracting (EPCs)

| 68 | Support the wider deployment and use of EPCs by building capacity and expertise in the public sector |

Renewable Heat and District Heating

| 69 | Complete the rollout of the SSRH, including support for biomass and anaerobic digestion heating systems |
| 70 | Develop a policy framework for the development of district heating in Ireland and support the delivery of two district heating projects under the Climate Action Fund |

Biogas and Biomethane

| 71 | Set a target for the level of energy to be supplied by biomethane injection in 2030 |

10 | Transport

10. Transport

10.1 State of Play

By 2040 the population of Ireland is expected to grow by over 1 million to 5.7 million people. This growth, along with other National Planning Framework (NPF) growth projections on the economy and employment rates, will drive greater demand for transport across various modes, with increased movement of people and goods. While this is a sign of a vibrant economy, it intensifies our decarbonisation challenge, in particular as transport accounted for 19.8% of Ireland's greenhouse gases in 2017. Furthermore, air pollution emitted from transportation contributes to poor local air quality, in the form of increased micro-particulates and nitrogen oxides, which reduces people's quality of life and harms their health. These issues cannot be ignored and provide further impetus for addressing the challenge in this sector.

Table 10.1 Transport GHG Emissions, 2017[32]

Transport Emissions CO_2 eq.	Share of Total GHG Emissions	Transport Emissions CO_2eq./head
12.0 Mt	19.8%	2.5 t

Transport emissions were on a downward trend between 2005 and 2011 as a result of the economic recession, but have since rebounded as the economy strengthened. This demonstrates the close correlation between transport emissions and economic activity.

Table 10.2 Trends in Transport GHG Emissions

Timeframe	Percentage Change	Absolute Change, CO_2 eq.
2005-11	-14.6%	-1.9 Mt
2011-17	6.9%	0.8 Mt

Ireland's share of transport emissions, as a percentage of our overall greenhouse gas emissions, is more or less in line with the EU as a whole. However, our carbon intensity in the sector, at 2.6 MtCO₂eq./head, is well above the EU average with Ireland emitting 40% more CO₂eq./head. While some of the challenges we face in reducing emissions from transport are universal, such as technical barriers to biofuel substitution; the lack of Electric Vehicle (EV) substitutes in freight; and the higher upfront cost of EVs, other challenges are more specific. These include our dispersed settlement pattern and low population density (which contribute to a high proportion of journeys being made by private car as there is no public transport or active travel substitute); our dependence on fossil fuels with 96.7% of our transport energy demand in 2017 served by fossil fuels; the

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32   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

scale-up required from the present share of new car purchases (circa 12% electric and hybrid) to 100% electric by 2030; and 'fuel tourism', which can vary from year to year depending on currency fluctuations and changes in taxation.

Table 10.3 Transport GHG Emissions International Comparisons, 2016[33]

	Ireland	Denmark	Austria	Finland	EU 28
Share of Total GHG	20.0%	25.9%	29.5%	21.5%	21.7%
Transport Emissions, CO_2 eq./head	2.6 t	2.3 t	2.7 t	2.3 t	1.8 t
Change Since 2005	-6.3%	-4.6%	-5.8%	-2.5%	-4.6%

While Project Ireland 2040 will drive more compact, connected development, and new public transport networks, they will not on their own reverse the growth of emissions which are projected to grow by 25%.

The analysis of the most cost effective policy options available to Ireland shows a very substantial number in the transport sector and, while they have significant upfront costs, their adoption will bring net savings to the economy overall. Consumer costs have fallen significantly. EV battery prices have fallen by 79% in the last 7 years, with 2030 forecasts predicting a further 67% fall by 2030. This will mean cheaper consumer prices. When the upfront cost and the ongoing running cost are looked at together, it will be as cheap to have an EV as to have a petrol/diesel vehicle.

On this basis, the most efficient roadmap for Ireland would include a 45-50% reduction in transport emissions by 2030, with substantial acceleration in the second half of the decade.

While existing policy has banned the sale of new non-zero emissions small vehicles by 2030, the forecast envisages on average only a little over 25% of new vehicles sold will be EVs over the 12 intervening years. This needs to be pushed up closer to 40%.

In some areas, we see very significant early adoption particularly for urban delivery vans where the quick payback period is already encouraging large scale switching in public and private sectors.

The tax treatment of motoring has a very substantial influence on choices and one significant focus will be to use the combination of VRT, motor tax, fuel tax and carbon pricing to support earlier payback and the more ambitious adoption of EVs, acknowledging that there are already generous fiscal incentives in place to promote the adoption of EVs, to the point where there is effectively no VRT paid on high value EVs and a very low motor tax rate of €120.

However, besides fiscal incentives around motoring, the Government will adopt a strong suite of policies to influence:

- The transport intensity of growth
- The carbon intensity of travel

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33   EEA (2018). Annual European Union greenhouse gas inventory 1990–2016 and inventory report 2018

To make growth less transport intensive some key policies include:

- The successful execution of the NPF designed to promote compact, connected and sustainable living
- Expansion of walking, cycling and public transport to promote modal shift
- Better use of market mechanisms to support modal shift
- The successful roll-out of the National Broadband Plan, which can promote remote working and wider activities which reduce unnecessary journeys

While the most influential instrument to reduce carbon intensity of travel will be the fiscal incentive around motoring, other important influences will be:

- Ensuring the EV charging network underpins public confidence
- Creating an early public procurement framework for EVs
- Accelerating steps to decarbonise the public transport fleet
- Enhancing priority for public transport
- Biofuel mix
- Giving Local Authorities more discretion in designating low emission zones
- Developing a strategy for the heavy freight sector

Table 10.4 Impact of Policy Measures in Transport

2017[34] Provisional Emissions	2030 Projected Emissions Based on NDP	2030 Required Emissions Based on MACC
12 Mt	15 Mt	7-8 Mt

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34   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

Figure 10.1 Annual Emissions and Average Abatement Costs in Transport

1 NDP projections assume implementation of all measures in the National Development Plan 2018-2027.
2 Note that the total numbers may not add up due to rounding
3 Other consists of fuel tourism and other emissions from transport (e.g. domestic aviation)
SOURCE: EPA; MACC Analysis
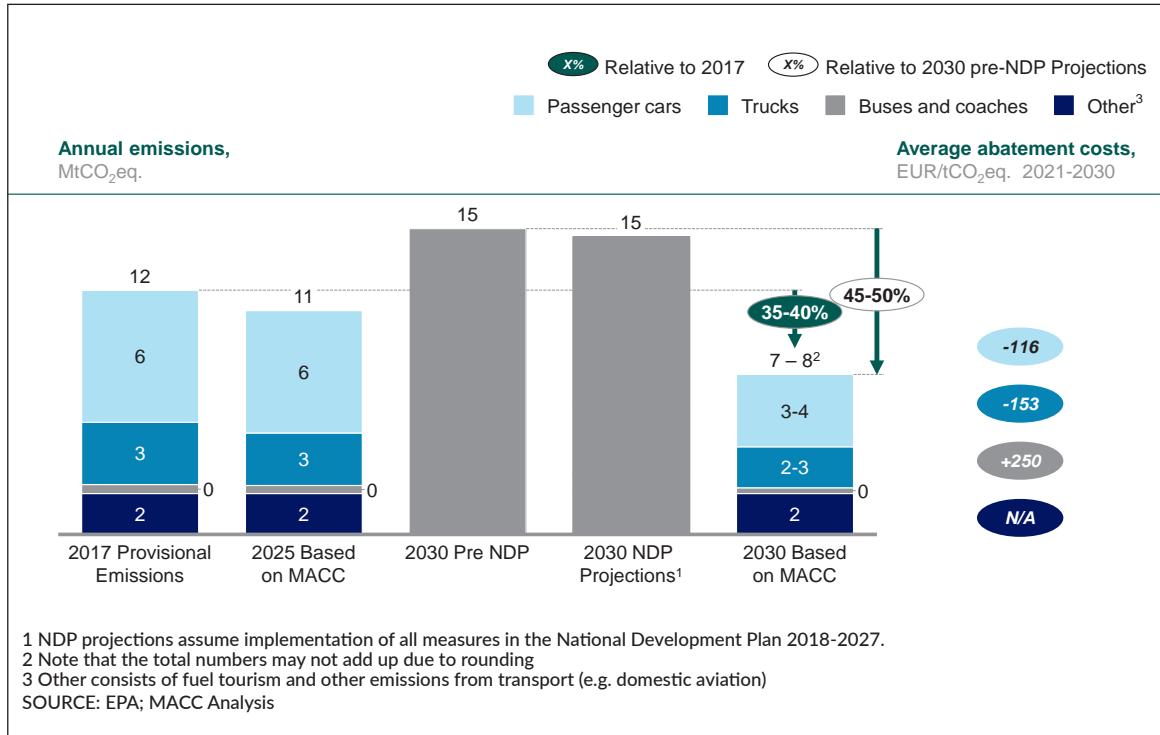
The most cost-effective abatement opportunities for transport, identified in the MACC, are in the electrification of transport. This is due to fast falling battery prices, which are likely to put the overall cost of EVs on par with those of fossil fuel vehicles over the next decade (see case study below on Electric Vans and An Post). In terms of electric buses, while they may be more expensive up-front than petrol or diesel buses, their deployment can be justified by the benefits they offer, including better air quality. Their early adoption would also demonstrate public-sector leadership.

The level of emissions reduction required could be achieved by:

- Increasing the number of passenger EVs on the road to 840,000 by 2030 from 500,000 in the NDP
- Reaching 95,000 electric vans and trucks by 2030, compared with 19,000 in the NDP
- Procuring 1,200 low-emissions buses for public transport in cities
- Increasing the biofuel blend rate from the current E5 and B5 blends to E10 and B12

We will also support action at EU level to reduce emissions from the aviation sector, which do not form part of national targets.

Table 10.5 Potential Metrics to Deliver Abatement in Transport

Key Metrics (Cumulative numbers)	2017[35]	2025 Based on MACC	2030 Based on NDP	2030 Based on MACC
Passenger EVs	2,718	151,000	500,000	840,000[36]
Electric light goods vans	100	30,000	19,000	95,000
Low-emissions buses	0	600	1,250	1,200
Bioethanol blend (Volume)	E5	E10	E10	E10
Biodiesel blend (Volume)	B5	B12	B12	B12

Air Travel

Since 2012, greenhouse gas emissions associated with flights operating in the European Economic Area (EEA), including domestic flights as well as those to and from third countries, are covered by the EU ETS. Airlines are required to monitor, report and verify their emissions, and to surrender allowances against those emissions. Airlines receive tradable allowances covering a certain level of emissions from their flights per year and must purchase allowances to cover any shortfall between their allocated sum of free emissions allowances and their actual emissions, as reported annually.

To support the planned development of a global Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) by the International Civil Aviation Organisation (ICAO), the EU agreed in 2014 to limit the scope of aviation in the EU ETS to flights within the EEA. CORSIA will come into effect in 2021 and aims to stabilise global aviation emissions at 2020 levels by requiring airlines to offset any emissions growth after 2020 by purchasing eligible emission units generated by projects that reduce emissions in other sectors. As Ireland is a member of ICAO, Irish aircraft operators will have to offset any emissions growth after 2020 by purchasing eligible emission units, i.e. pay full carbon price.

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35   DTTAS: Irish Bulletin of Vehicle and Driver Statistics 2017

36   This emissions reduction is achieved through 550,000 BEVs and 290,000 PHEVs

10.2 Targets

To meet the required level of emissions reduction, by 2030 we will:
- Reduce CO_2 eq. emissions from the sector by 45–50% relative to 2030 pre-NDP projections
- Increase the number of EVs to 936,000, comprised of:

  - o   840,000 passenger EVs
  - o   95,000 electric vans and trucks
  - o   1,200 electric buses

- Build the EV charging network to support the growth of EVs at the rate required, and develop our fast-charging infrastructure to stay ahead of demand
- Require at least one recharging point in new non-residential buildings with more than 10 parking spaces
- Raise the blend proportion of biofuels in road transport to 10% in petrol and 12% in diesel

10.3 Measures to Deliver Targets

Our 2030 decarbonisation ambition will require transport to step-up a level. This means a significant ramp-up in EVs from their current numbers (circa 10,000), increased penetration of cleaner, alternative fuels, and an irreversible shift to low-emission mobility. These changes will need to be underpinned by policy tools such as vehicle and fuel taxation measures, and a strong carbon tax trajectory. For transport, the following measures will be critical to our success:

1. Modal Shift

We want to make sure that we provide good public transport, cycling and walking infrastructure, so people are less reliant on their cars, and we can cut congestion. We have already committed to an additional 500,000 public transport and active travel journeys daily by 2035.

Policies need to be better aligned to achieve more ambitious targets for modal shift, involving building supporting infrastructures. We shall:

- Implement major sustainable-mobility projects such as DART Expansion, Metro Link, and the BusConnects Programme. BusConnects targets a 50% increase in bus passenger numbers over the lifetime of the project in our major cities
- Expand sustainable-travel measures, including a comprehensive cycling and walking network for metropolitan areas of Ireland's cities, with a particular emphasis on safety of cyclists. We shall also expand greenways, and develop over 200km of new cycling network under BusConnects
- Promote compact growth and greater integration of policies for land use and transport planning, which will reduce the demand for commuter travel and support more efficient patterns of development and travel
- Establish a Park-and-Ride development office which shall publish a 5 year strategy by Q4 2019, which will consider:

- o Development of an overall Park and Ride Implementation Plan including, where feasible, the provision of multimodal facilities (e.g. EV charging/bicycle parking)
- o A timeline to seek planning permissions for initial tranche of car park extensions at rail stations where required and for new strategic park and ride sites
- o A timeline to commence construction of car park extensions at rail stations (where required) and for new strategic park and ride sites
- o Consideration of how we can implement localised travel planning/behavioural change information programme

- Establish a Cycling Project Office within the NTA, which will publish a 5 year strategy by Q4 2019, which will consider:

  - o Developing an overall cycling Implementation Plan across Dublin, Cork, Galway, Limerick and Waterford based around the metropolitan cycling network plans already established and 200km of segregated cycle lanes under Bus Connects
  - o A timeline to seek planning consents for initial tranche of cycle projects under the remit of the Cycling Project Office
  - o A timeline to commence construction of initial tranche of cycle projects under the remit of the Cycling Project Office

- Consider further opportunities to expand and better integrate existing mobility management initiatives for institutions and enterprises, such as Smarter Travel Workplaces, Smarter Travel Campus, Green School Travel and Workplace Travel Plans, including the potential for increased participation by Local Authority-led structures.
- Establish a new fare structure in BusConnects which will encourage flexible use of an integrated public transport network

2. Conversion of Public Fleets

The conversion of our public fleets will have a positive impact on our emissions and our air quality.

- We committed to transition to LEVs, including electric buses, for the urban public bus fleet, with no diesel-only purchases from 1 July 2019, and will set a roadmap for all public PSO urban bus fleets to become LEVs by 2035
- Develop a Green Public Procurement Framework for conversion to EVs in 2020
- Make converting fleets to EVs a central element of the mandate given to all public bodies (see case study on An Post)
- Pass legislation to enable Local Authorities to introduce low- and zero-emission driving zones

Case Study – Electric Vans and An Post

Globally, many organisations are switching to electric delivery vans for light weight urban delivery services. The Total Cost of Ownership (TCO) for this vehicle segment is currently at parity with ICE vehicles and is expected to reduce further as battery prices reduce. In Ireland, An Post is taking the lead in this space by placing sustainability at the core of their business strategy. Having successfully piloted a number of electric vans in Dublin in 2018, An Post plans to roll out electric vans across the city enabling the company to reach zero emission deliveries between the canals by the end of 2019.

With an expected payback of 2.9 years, light weight urban electric vans not only contribute to reduced carbon emissions, increased air quality and reduced noise pollution but are economically worthwhile for the business. As such, An Post plans to electrify the rest of their urban fleet by the end of 2020, expanding to Kilkenny, Waterford, Limerick and Galway.

An Post's sustainable strategy also includes measures to encourage their employees to drive EVs including providing charging points at their offices. In addition, they plan to install a commercial network of EV charging points at post offices with a pilot of 12 points across the country being trialed this year. An Post is committed to 50% carbon reduction by 2030 and 100% by 2050.

3. Incentives and Regulation

Under this Plan we shall develop a roadmap on the optimum mix of regulatory, taxation and subsidy policies to drive significant ramp-up in passenger EVs and electric van sales. This will be pursued in successive budgets and gradually integrate selective subsidies for EVs.

The falling price of battery technology, grants, the restructuring of various motor taxes, and the trajectory of carbon pricing is already encouraging a rapid penetration of BEVs and PHEVs. A rapid acceleration of this trend is expected from about 2024. To deliver the planned take-up:

- The mix of fiscal incentives will be revised annually as grants are gradually withdrawn
- The decision already taken that no new non-zero emissions vehicles will be sold in Ireland post-2030 and no NCT Certificate will be issued for non-zero emissions cars post-2045 will be backed up by seeking to get agreement in the motor industry to support the target
- We will support developments at EU level to improve average new light and heavy duty vehicle efficiency by enforcing emission performance standards

4. EV Charging Network

The transition from petrol and diesel cars to electric vehicles will make a big impact on our emissions. It will also improve our air quality. We are already seeing a big increase in the number of electric vehicles being sold. By the middle of the 2020s EVs will reach Total Cost of Ownership-parity with diesel and petrol engines. This means that when a consumer factors in both up-front cost and on-going running cost, it will be as cheap to have an EV as a petrol/diesel vehicle.

To give people confidence to switch to EVs, and ensure that the national charging network has a substantial supply buffer ahead of demand, measures include:

- Continue supporting the expansion of the EV charging network as well as the refuelling network for alternatively fuelled vehicles to address freight emissions
- Deliver charging infrastructure under the Climate Action Fund, to include over 90 high-powered chargers at key locations on the national road network, installation of 50 new fast chargers, and replacement of over 250 standard chargers
- Require new non-residential buildings with more than 10 parking spaces to have at least one recharging point installed by 1 January 2025
- Require the installation of a minimum number of recharging points for all existing non-residential buildings with more than 20 parking spaces by 1 January 2025 at the latest, and review the level of provision to ensure it is ahead of demand
- Work with the motor sector and retailers to rapidly expand the charging network on garage forecourts
- Frontload public investment to drive consumer confidence in the availability and reliability of public charging infrastructure, and set a strategy for EV charging stations with a defined target to stay ahead of demand, coupled with clear planning rules that facilitate installation and increase the obligation over time

Electric Vehicle – How do the Running Costs Compare

Electric Vehicle Cost Calculator	€
Travelling 400km each week	
Electric car (e.g. Nissan Leaf)	5.08
Petrol car (e.g. Nissan Leaf equivalent)	43.20
Diesel car (e.g. Nissan Leaf equivalent)	31.48

Electric Vehicle Cost Calculator	€
Travelling 100km each week	
Electric car (e.g. Nissan Leaf)	1.27
Petrol car (e.g. Nissan Leaf equivalent)	10.80
Diesel car (e.g. Nissan Leaf equivalent)	7.87

Source: https://www.esb.ie/our-businesses/ecars/ecars-cost-calculator

Case Study – EV Sales and Costs

The pace of EV sales growth has accelerated significantly in recent years. 2017 was the first year that that global sales of new electric vehicles passed one million units. Under the current growth trajectory, EV producers could almost quadruple in 2020, selling circa 4.5 million units or about 5% of the overall global light-vehicle market. Both car makers and regulators are taking notice. Car makers will launch about 340 BEV and PHEV models in the next three years, significantly reducing supply as a barrier to further market uptake. Regulators in countries and cities are supporting the take-up by setting end dates for the sale of diesel- and gasoline-powered vehicles. Norway, for example, wants BEVs to account for 100 percent of its new-car sales by 2025.

At the same time, the cost of owning an EV is plummeting. In 2010, EV battery prices were $1,000/kWh. At the end of 2017, average prices hit $209/kWh, a 79% drop in seven years. Forecasts to 2030 suggest that battery pack prices will be as low as $70/kWh. All-in-all, this means lower costs for consumers. By the middle of the 2020s EVs will reach TCO-parity with diesel and petrol engines. This means that when a consumer factors in both up-front cost and on-going running cost, it will be as cheap to have an EV as a petrol/ diesel vehicle

Case Study – Electric Buses

Major cities around the world have set ambitious targets to roll out electric buses over the next decade with China leading the charge. Shenzen was the first city to operate a 100% eBus fleet consisting of 16,000 vehicles. However, many other countries across the globe are following their lead, for example, the Netherlands have set targets for 100% of new transit bus sales to be electric by 2025 and a 100% of the entire bus fleet to be electric by 2030. Norway have also committed to all new bus sales being eBuses by 2025 and 75% of their long-distance buses sales being electric by 2030. Furthermore, 12 major cities have signed the 'Fossil-Fuel-Free Street Declaration', pledging to buy only electric buses from 2025 onwards. These include London, Paris, Los Angeles, Copenhagen, Barcelona, Quito, Vancouver, Mexico City, Milan, Seattle, Auckland, and Cape Town.

Source: Bloomberg New Energy Finance, McKinsey & Company Electric Vehicle Index

5. Use of Biofuels

- We established a biofuels obligation scheme and increased the rate for obliged parties to 10% (by volume) from 1 January 2019, with a further increase to 11% (by volume) signalled for 1 January 2020, and will raise the volume of biofuels used in the road transport sector to 10% blend penetration rate in petrol and 12% penetration in diesel by 2030[37]

6. CNG Network

- We shall develop a strategy for heavy freight designed to progress beyond existing commitments
- Deliver 14 public CNG fuelling stations as part of the Causeway Project, with a view to further expansion of the network
- Install the first transmission connected CGI facility for renewable gas and a grant scheme to support circa 74 CNG vehicles

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37   Equates to a statutory biofuel blend rate of 23.484% by 2030.

7. Emerging Technologies

- Further investigate decarbonisation options such as hydrogen vehicles, biomethane and AD substitutes for natural gas

10.4 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
EV and CNG Station Network	
72	Develop the EV charging network necessary to support the growth of EVs to at least 800,000 by 2030 and set a target for the supply of infrastructure to stay sufficiently ahead of demand
73	Develop and implement planning rules and guidelines across residential and non-residential parking locations for EV charging infrastructure
74	Ensure our regulatory regime for buildings requires the installation of EV charging infrastructure
75	Develop an NSAI Standards programme to support climate action policy, focusing initially on supporting the supply chain for renewables, retrofitting and climate adaptation, including standard for electrical wiring rules to include guidance for EV chargers
76	Develop the CNG fuelling network to support the uptake of CNG vehicles
Biofuels	
77	Increase the use of biofuels to contribute to the growth of renewable energy and reduction of greenhouse gas emissions in the transport sector
Regulation and Fiscal Measures	
78	As an alternative to the current grant regime, consider in 2020 a car-scrappage scheme to promote the purchase of electric vehicles
79	Develop a roadmap on the optimum mix of regulatory, taxation and subsidy policies to drive significant ramp-up in passenger EVs and electric van sales from very early in the next decade
80	Introduce legislation to ban the sale of new fossil fuel cars from 2030 and to stop the granting of NCTs from 2045. We will also report on the carbon impact of new sales each year
81	Develop a regulatory framework on low emission zones and parking pricing policies, and provide local authorities with the power to restrict access to certain parts of a city or a town to zero-emission vehicles only. Examine the role of demand management measures in Irish cities, including low emission zones and parking pricing policies
82	Consider the recalibration of VRT and motor tax regimes for passenger cars in light of recent progress on emissions standards and to further incentivise LEVs
83	Consider the introduction of an emissions-based VRT and motor tax for LGVs and HGVs
84	Consider updating and applying the CO_2 based taxation for vehicle BIK regime

Empowering Modal Shift and Sharing Economy in Transport

85	Transition the urban PSO public bus fleet to LEVs
86	Set a road map for more LEVs in public sector fleets
87	All future procurement processes for public buses will include evaluation of procuring only fully electric buses. This evaluation will include review of how electric buses have been introduced into other cities in a cost effective way, including London, Paris and Manchester. It will also consider how smart finance could be used to overcome the higher upfront capital costs of electric buses. This will include consideration of paying a fixed charge for their use, instead of buying up front (as has been done in Chile) or using a commercial agreement to convert capex to opex (as is offered by US transport company Proterra).
88	Increase public bus network capacity and usage (implementation of BusConnects services network)
89	Establish a "Park and Ride Development Office" within NTA and develop overall Park and Ride Implementation Plan, including the provision of multimodal facilities (e.g. EV charging/bicycle parking)
90	Add additional capacity to Luas network
91	Undertake an expansion of cycling infrastructure through the establishment of a "Cycling Project Office" within the National Transport Authority and develop an implementation plan
92	Commence the transition to hybrid trains to allow extended electrification of rail services
93	Extend the Dublin area railway electrification for the Maynooth Line (to Maynooth), Kildare Line (to Celbridge), and Northern Line (to Drogheda)
94	Review public and sustainable transport policy and develop a roadmap to electrify decarbonise all PSO public transport
95	Develop and implement cycle network plans for all major cities
96	Review and bring forward a revised implementation plan for the outstanding policies and actions in the 2009-2020 policy Smarter Travel, A Sustainable Transport Future, in time for Budget 2020
97	Commence full implementation of the National Cycle Policy Framework
98	All cities with a population exceeding 75,000 to produce a sustainable transport plan by no later than June 2020 for review by the NTA and DTTAS
99	Publish an updated strategic rail review paper
100	Develop a new rural transport strategy

11 | Agriculture, Forestry and Land Use

11. Agriculture, Forestry and Land Use

11.1 State of Play

Agriculture generates a third of Ireland's total greenhouse gas emissions. In 2017, it produced 20.2 MtCO₂eq., which is 2% more than in 2005[38] . Irish agriculture has strong green credentials and a positive international reputation in terms of the carbon intensity of its dairy and beef output with high participation in accredited Origin Green carbon audits. Maintaining this "green" brand image is a critically important to an agri food sector that is dependent to a very significant extent on export earnings. The long-term challenge for the sector is to meet the national policy objective of an approach to carbon neutrality which does not compromise our capacity for sustainable food production.

Table 11.1 Agriculture GHG Emissions, 2017[39]

Agriculture Emissions CO_2 eq.	Share of Total GHG Emissions	Agriculture Emissions CO_2eq./head
20.2 Mt	33.3%	4.2 t

How we achieve carbon neutrality will involve greenhouse gas emissions reduction, but also increased carbon-removals. This poses a number of challenges for the sector. It is clear that the importance of environmental responsibility is an increasing concern for consumers, and that to ensure good prices for Irish producers in the medium to long-term and access to markets, we need to ensure that Ireland meets its climate obligations, and that the product produced in Ireland is as carbon efficient as possible.

In the longer-term, it is the challenge of restructuring and adapting to remain competitive and prosperous in a world where carbon-intensive production will come under increasing pressure from the imperatives of climate action and consumer expectations. In fact strong climate action will be essential to maintaining long-term access to markets for Irish agriculture. Specific challenges for Ireland include our position as a key supplier for dairy and beef internationally, but in particular Europe.

However, despite our carbon efficiency in this area, these are products with a high carbon footprint. The Irish dairy sector was artificially constrained by milk quotas up to 2016, but has subsequently grown due to it being the most profitable agricultural activity in Ireland, and one where we have a real competitive advantage.

We will work with other Member States and the European Commission to consider the creation of an alternative regulatory regime (such as an ETS-type system) for agricultural emissions to help address the challenge of meeting increasing food demand internationally whilst at the same time, contributing to climate commitments, including avoiding the perverse incentive to off-shore agricultural activity to less carbon-efficient production systems and locations. However, such an initiative could only be successful if Ireland is seen to be credible on its climate obligations more

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38   This figure includes fuel used in agriculture/forestry/fishing, which was 560.37 ktCO₂ eq. in 2017. To ensure consistency with EPA reporting in terms of inventories and projections, total emissions for agriculture referred to in this Plan are inclusive of fuel combustion

39   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

generally, which it is not at present. Therefore the achievement of such an ambition depends – in the first instance – on implementation of this Plan.

Table 11.2 Trends in Agriculture GHG Emissions

Timeframe	Percentage Change	Absolute Change, CO_2 eq.
2005-11	-9.5%	-1.9 Mt
2011-17	12.8%	2.3 Mt

Throughout Europe, reducing greenhouse gas emissions in agriculture has proved difficult, with only a 1% reduction across the EU since 2005. While Irish agricultural emissions fell during the period 2005 to 2011, they have since risen sharply, driven by larger herds and rising milk production. This means that the overall change since 2005 is small. Our carbon intensity in the sector, at 4 tCO2eq./capita, is substantially higher than the EU average with Ireland emitting 400% more CO2eq./capita. This considerable difference is due to Ireland's agricultural sector share of total emissions being over three times greater than the EU average and our lower population density.

Table 11.3 Agriculture GHG Emissions International Comparisons, 2016[40]

	Ireland	Denmark	Austria	Finland	EU 28
Share of Total GHG	31.2%	20.8%	9.2%	11.1%	10.0%
Agriculture Emissions, CO_2eq./head	4.0 t	1.8 t	0.8 t	1.2 t	0.8 t
Change Since 2005	0%	-2.6%	2.6%	1.1%	-1%

In terms of wider land use, how we manage our land affects how much carbon is emitted to, or removed from, the atmosphere. Switching land from one use to another can fundamentally change an area's capacity to store carbon. For instance, land used for forestry can sequester and store vast amounts of carbon. In Ireland, the total forest area is estimated to be 770,020 ha (or 11% of Ireland's total land area)[41], the highest level in over 350 years and the result of successive public policy initiatives. Nearly 391,358 ha, or just over half, is in public ownership. Forestry provides verifiable removal and storage of CO_2 from the atmosphere, and will help in meeting our EU commitments over the period 2021 to 2030. In recognition of the historic investment in forestry and the low mitigation potential in agriculture, Ireland has been provided flexibility to mobilise carbon credits to a limit of 2.68MtCO2eq. per annum over the 2021 to 2030 period.

40   EEA (2018), Annual European Union greenhouse gas inventory 1990–2016 and inventory report 2018

41   The Department of Agriculture, Food and the Marine (2018) Ireland's National Forest Inventory 2017 Main Findings https://www.agriculture.gov.ie/media/migration/forestry/forestservicegeneralinformation/MainFindings301018.pdf

Forestry also provides important resources for the bioenergy supply chain and the wider bioeconomy, as well as timber products, which can act as a less carbon-intensive substitute for other materials in construction and related sectors. Under the current National Forestry Programme 2014-2020, afforestation rates have been an average of 5,500 ha per year. This is below the target rate and at these rates, Ireland will not achieve its 18% land cover target by 2046. Due to the skewed age class distribution of Irish forests the annual rate of removals and emissions of greenhouse gases are likely to vary considerably in the coming decades as areas of older, mature forests are harvested and replanted. Achieving higher rates of afforestation will help to reduce this variation and maintain a more consistent rate of sequestration in the future.

Given that carbon sequestration and preventing carbon loss is subject to external drivers, such as climate variability and natural disturbance, it is important that we adopt a diverse range of climate mitigation options, across all land uses.

Teagasc MACC for Agriculture

The Teagasc report *An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021–2030 identified the potential contribution of the sector under the following three sub-categories: agricultural methane and nitrous oxide, carbon sequestration, and offsetting via fossil fuel displacement. The cumulative abatement potential for each of these categories, in the period 2021 to 2030,* is as follows:

- 18.5 MtCO₂eq. from agricultural methane and nitrous oxide
- 29.7 MtCO₂eq. from carbon sequestration through Land Use, Land-Use Change, and Forestry (LULUCF) measures, however, under current flexibilities, the contribution of carbon sequestration towards Ireland's target would be capped at 26.8MtCO₂eq.
- 13.7 MtCO₂eq. from offsetting via fossil fuel displacement, however, these reductions would largely be attributed to the fuel consuming sectors, i.e. the transport sector and power generation sector

The MACC analysis published by Teagasc in 2018 fed into the updated MACC analysis that informed this Plan. In terms of cost-effective agricultural mitigation, the Teagasc MACC estimated an average cost-effective abatement potential of 1.73 MtCO₂eq. per year from 2021 to 2030. However, in order to achieve our 2030 emissions reduction target, the agriculture sector will need to achieve the full abatement potential identified in the Teagasc report, which is an average abatement of 1.85 MtCO₂eq. per year from 2021 to 2030. This will require a phased increase from 0.4 MtCO₂eq. abatement in 2021 to 3.1 MtCO₂eq. in 2030. Of the measures presented in the Teagasc MACC below, improved nitrogen use efficiency and the use of low-emission fertilisers and spreading techniques can achieve abatement early in the decade. Achieving this early impact will require greater knowledge transfer and additional research.
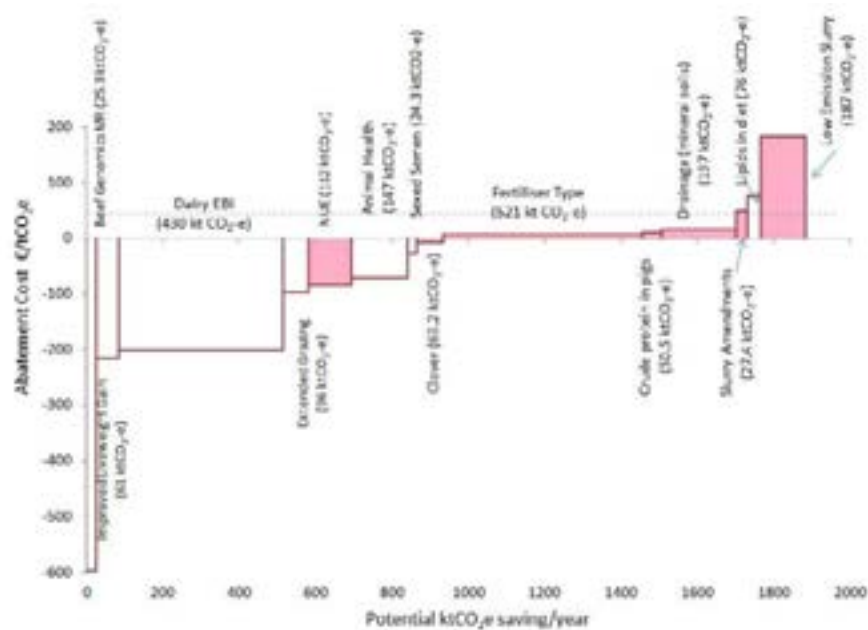
Table 11.4 Impact of Policy Measures in Agriculture

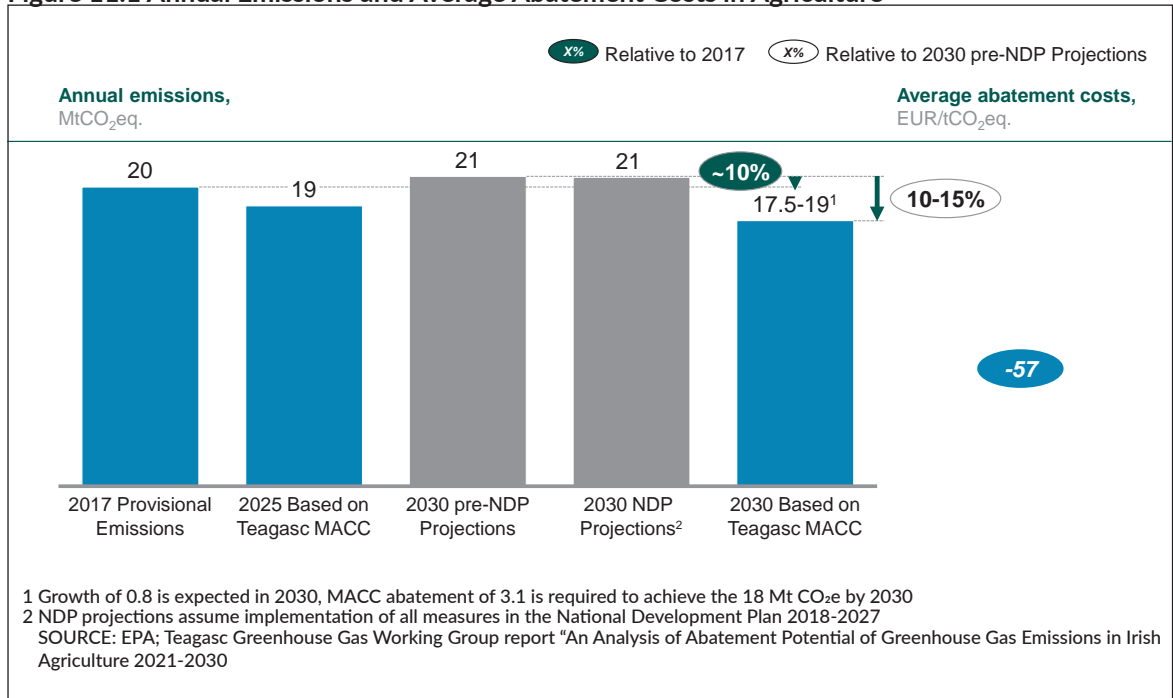| 2017 [42] Provisional Emissions	2030 Projected Emissions Based on NDP	2030 Required Emissions Based on MACC
20 Mt[43]	21 Mt	17.5 – 19 Mt

As shown in Figure 11.1 below, emissions were at 20 $MtCO_2eq.$ in 2017 and are forecast to be even higher in 2030 at 21 $MtCO_2eq.$ This increase is despite implementation of Project Ireland 2040 measures. This is because growth projections for the sector surpass current emissions reduction measures, which brings to light the extent of the challenge that is faced and the need for the step-up that this Plan delivers. We must build on existing measures, supported through CAP, through Agri-Environment schemes, such as GLAS and through capital investments for low emission slurry spreading equipment to reduce the agriculture sector's total emissions to 17.5-19 $MtCO_2eq.$ in 2030. This implies a target of 10-15% emissions reduction by 2030, relative to pre-NDP 2030 projections. The average abatement cost to achieve this reduction is circa € 57/$tCO_2eq.$ Furthermore, the sector will deliver the total LULUCF flexibility allocated to Ireland of 26.8$MtCO_2eq.$

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42   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

43   Agriculture emissions in 2017 were 20.21 Mt $CO_2eq.$ with 0.56 $MtCO_2eq.$ of that total arising from fuel used in agriculture/forestry/fishing

Figure 11.1 Annual Emissions and Average Abatement Costs in Agriculture

| | X% Relative to 2017 | X% Relative to 2030 pre-NDP Projections |

Annual emissions, $MtCO_2$eq.

Average abatement costs, EUR/tCO_2eq.

1 Growth of 0.8 is expected in 2030, MACC abatement of 3.1 is required to achieve the 18 Mt CO_2e by 2030
2 NDP projections assume implementation of all measures in the National Development Plan 2018-2027
   SOURCE: EPA; Teagasc Greenhouse Gas Working Group report "An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030

The level of emissions reduction required could largely be achieved through the following agricultural methane and nitrous oxide measures:

- Reducing nitrogen emissions by replacing 50% of CAN fertiliser with protected urea products and by nitrogen-use efficiency through increasing soil pH
- Advancing manure management by changing 50% of slurry spreading technology and timing to low-emission trailing-shoe slurry spreading
- Improving animal production efficiency through increasing the EBI and improving animal health

Carbon sequestration through LULUCF measures will also contribute to emissions reduction in the sector. This includes:

- Increasing afforestation
- Rewetting 40,000 ha of organic grassland soils (maintaining 40k p.a. average)
- Better management of 450,000 ha of grassland

Table 11.5 Potential Metrics to Deliver Abatement in Agriculture

Key Metrics	2017	2025 Based on MACC	2030 Based on NDP	2030 Based on MACC
Replacing CAN fertiliser, %	1%	40%	N/A	50%
Trailing-shoe slurry spreading, %	~10%	40%	N/A	50%
Increasing EBI and animal health, EUR/cow	€70	€180	N/A	€230
LULUCF flexibility measures				
Afforestation, ha p.a.	~5,500	6,500	N/A	10,000
Rewetting organic soils, ha p.a.	0	40,000	N/A	40,000
Improving grassland management, ha	0	225,000	N/A	450,000

11.2 Targets

To meet the required level of emissions reduction, by 2030 we will:

- Deliver 16.5-18.5 $MtCO_2eq.$ cumulative abatement
- Achieve 26.8 $MtCO_2eq.$ abatement through LULUCF actions over the period 2021 to 2030, comprised of:

  o an average of 8,000 ha per annum of newly planted forest, and sustainable forest management of existing forests (21 $MtCO_2eq.$ cumulative abatement)

  o at least 40,000 ha per annum of reduced management intensity of grasslands on drained organic soils (4.4 $MtCO_2eq.$ cumulative abatement)

  o better management of grasslands, tillage land and non-agricultural wetlands (1.4 $MtCO_2eq.$ cumulative abatement)

- Set a target for the level of energy to be supplied by indigenous biomethane injection in 2030, taking account of the domestic supplies of sustainable feedstock and consider how the supports necessary to reach such a target would be funded

11.3 Measures to Deliver Targets

We already have a number of policy measures in place supported through the CAP to start decarbonising the agriculture sector. While existing policy measures have increased carbon efficiency to an extent, the expansion of the dairy and dry stock herds has exceeded those gains, with the situation further exacerbated by forestry planting having more than halved since 2000. Therefore, while continued effort in further developing, enhancing, and implementing these measures is essential, the agriculture sector must step-up action to deliver the scale of ambition now required. The new CAP will be a central driver of change, with cost-effective measures required in agriculture mitigation, LULUCF ambition, and energy substitution. For agriculture, the following measures will be critical to our success:

1. Reducing Emissions on Our Farms

- Achieve 16.5-18.5 $MtCO_2$eq. cumulative methane and nitrous oxide emissions abatement between 2021 and 2030, including through implementing the full suite of cost-effective, on-farm abatement measures identified by Teagasc in 2018
- The current CAP (2014 to 2020) requires 20% of funding to be used for agricultural practices that benefit climate and the environment. All farmers who participate in the Basic Payments Scheme must implement 'greening' practices
- Ensure the future CAP (2021 – 2027) supports prioritising the protection and enhancement of carbon sinks on farms
- The RDP has provided funding of €4 billion to support rural communities in Ireland, some of which covers climate mitigation measures such as capital supports for low emissions slurry equipment and multi-year commitments for agri-environment measures. Various agri-environment measures have facilitated the planting of approximately 11,000 km of new hedgerows and the rejuvenation of some 6,000 more
- The majority of farm enterprises (90% beef output, and more than 90% dairy output) and food processors have engaged positively in sustainability initiatives, by Teagasc and Bord Bia, making food production more efficient and enhancing environmental outcomes. Through regular auditing and data analysis, the Teagasc sustainability report and the Origin Green report shows steady progress in improving emissions efficiencies, although further opportunities remain. With the help of the agri-food sector, further mainstream and strengthen the verifiability of Origin Green to promote low-emissions intensity production at both the farm and processing levels, which will help farmers earn a market premium
- Teagasc is leading innovative research (including on animal and grassland management; crops, environment and land use; and energy efficiency on farms), to inform knowledge transfer, via networks of advisory bodies, on cost-effective decarbonising of farming practices. Design effective knowledge-transfer interventions that reduce barriers to rapid deployment, by farmers, of new technologies and changes to farming practices and land use and enhance the transfer of knowledge between farmers and other stakeholders, including the prioritisation of agricultural advisory services (both Teagasc and private) so as to focus on providing tailored assistance on low-carbon farming
- Build on the online nutrient management planning to immediately progress more efficient nitrogen use through enhancement of soil fertility
- Accelerate the assessment of feed additives (that are at an advanced stage of development) to mitigate methane emissions from enteric fermentation, including identification of their abatement potential in grazing-based systems and the perceived risks to food safety

2. Forestry and Land Use

- We have invested nearly €3 billion in forestry, since the late 1980s, which through ongoing sustainable forest management will contribute to delivering abatement of 21 MtCO₂eq. over the period 2021 to 2030
- We have reviewed the current afforestation programme to enhance participation rates, and inform land use policy to increase the benefits for climate, the environment, and rural communities
- Under their six regional strategic plans for 2016-2020, Coillte is committed to replanting or restocking a total of 34,770 ha between 2016 and 2020
- Bord na Móna's estate extends to a little under 80,000 ha. To date a little over 18,000 ha of the cut-away and cut-over peatland has been rehabilitated and the target for 2019 is to complete a further 3,000 ha. By way of additional context, as much as 50,000ha of the overall estate is currently under consideration for a wide variety of commercial future uses of which renewable energy projects constitute the greatest proportion by far
- Hedgerows are estimated to cover 3.9% of the Irish landscape or 660,000 km length. The total area of hedgerow and non-forest woodland patches across the landscape could possibly represent a significant carbon sink and could potentially be used as a mitigation option

3. Promoting Diversification of Land Use

We are committed to promoting diversification of activity at farm level and in the wider rural economy towards low-carbon opportunities. We need to restructure agriculture to ensure sustainable land uses that will yield secure family farm income in the longer term. The CAP proposals already include concrete incentives for such changes, as well as a determination to double the scale of farm supports directly linked to climate abatement. The concept of more farms devoting part of their land to planting to abate carbon and implementing mitigation measures is a desirable outcome. These are ambitious transitions, on which Government will engage with the farm organisations, and which can be developed within the structure of the emerging CAP. To maximise these long-term carbon-sink benefits, we will:

- Increase afforestation rates from their current levels to an average of 8,000 ha per year, in order to reach our forestry land-cover target of 18% by the second half of this century, through engaging with a range of landowners, from farmers through to State Bodies and Local Authorities. While this will mostly yield benefits in the longer term, it will also contribute to our 2030 target through carbon sequestration and displacing other high-carbon uses of land
- Supplement the attractive financial incentives already in place (for faster afforestation, sustainable forest management, and wood mobilisation), with knowledge transfer programmes to raise awareness of the benefits of forestry and ecosystem services, including tackling the attitudinal and behavioural barriers to changing land management and use
- Ensure ongoing action to manage the risk to current carbon stocks from natural disturbances, such as fires, and deforestation
- Enable increased access into forests to allow the efficient and timely harvesting of timber for delivery to the market

4. Opportunities in the Bioeconomy

- With the publication of the *National Policy Statement on the Bioeconomy* in February 2018, we are integrating sustainable economic development into our economic model as we transition to a low carbon and circular economy. This presents opportunities for the agriculture sector to turn renewable biological resources and residual side -streams into value-added bio-based products, such as food, feed, chemicals, construction materials, and bio-energy
- We are optimising the use of domestic harvested wood in longer lived products, which results in the double climate benefit of enhancing the storage of carbon in these products, as well as substituting wood for materials of higher carbon intensity
- We will continue to support the development of blue bioeconomy through such projects as the Clean Oceans Initiative and support the realisation of the value-add from processed marine biological resources
- Promote the transition to a circular bioeconomy at the regional level through Regional Spatial and Economic Strategies. These strategies focus on developing the particular assets and strengths of each region, and involve activating stakeholders to develop value chains and suitable bioeconomy business models
- Help the Regional Assemblies study bioeconomy feasibility to identify areas of potential growth and use this information to inform investment decisions under Project Ireland 2040
- Bring together multiple stakeholders in a forum on agricultural diversification and climate change, with the purpose of developing a suite of new opportunities that promote new viable farm enterprises
- The potential of the bioeconomy is also recognised in Future Jobs Ireland, as it cuts across a range of sectors where Ireland has distinct natural advantages and a well established enterprise base, including agriculture, marine, biopharma and forestry. The emerging bioeconomy sector affords the opportunity to leverage Ireland's natural resources and comparative advantages and to build on our enterprise strengths and innovative capacity to enable the creation of highly productive and sustainable jobs in the emerging low carbon economy

5. Cost-effective Energy Substitutes

Realising the potential of bioenergy supply opportunities, including biomass mobilisation and biogas/biomethane supplied from anaerobic digestion, will require sustained attention over the period ahead. We will:

- Support biomass mobilisation, by mapping through the Regional Authorities, rural and urban biomass, feedstock loss and waste, and current biomass mobilisation, to help industry develop new value chains and business models. Crucial future elements to consider include scale-up requirements; working with industry/regional authorities to identify market opportunities; mapping the knowledge and innovation system from lab to market; and learning about the economic, environmental, social and spatial impacts
- Adopt a whole-of-Government approach to reviewing the potential of anaerobic digestion to supply biogas and biomethane, including opportunities in indigenous grass silage and slurry
- Set a target for biogas and biomethane development in Ireland
- Develop and stabilise the indigenous supply of biomass for renewable heat and CHP
- Stimulate market demand through the SSRH. The second phase of the scheme will provide

multi-year support payments to anaerobic digestion and biomass heating systems. We will develop and stabilise the indigenous supply of biomass for renewable heat and CHP

6. Better Management of Peatlands and Soils

Peatlands cover 21% of our land area. A high proportion of this is under agricultural and other uses, with 16% designated for nature conservation purposes. Peatlands represent 64% of our total soil organic carbon stock, representing the largest store of carbon in the Irish landscape. This store is very vulnerable, especially to drainage for forestry, grazing and extraction. We will develop and better manage our carbon sinks with the following measures:

- Restore/rewet all raised bogs designated as Special Areas of Conservation and Natural Heritage Areas within three cycles of the *National Raised Bog Special Areas of Conservation Management Plan 2017-2022*. Such restoration measures and hydrological management of our protected peatlands will halt and reduce peat oxidation and carbon loss
- Undertake further research to assess the potential to sequester, store and reduce emissions of carbon through the management, restoration and rehabilitation of peatlands as outlined in the *National Peatlands Strategy*
- Realise the emissions reduction potential of at least 40,000 ha of grasslands on drained organic soils, yielding up to an additional 0.44 Mt in sequestered CO_2 annually between 2021 and 2030. Priority actions include identifying precisely which areas of carbon-rich and drained organic agricultural soils are suitable for water-table-management techniques to reduce carbon losses. This work will inform the development of agri-environment policies, including the new CAP, recognising regionally differentiated strategies may be appropriate. Other agricultural lands will account for a further 0.26 Mt annual sequestration 2021-30
- Upgrade land-use and habitat mapping systems to establish the baseline condition of wetlands and inform the development of best-practice guidelines for wetland management, including the management of degraded sites and peatlands currently exploited for energy peat extraction
- Create additional incentives to adopt carbon-positive, post-production management options on Bord na Móna lands, and similar options on other commercial and private peat extraction sites
- Ensure robust reporting and accounting of the emissions impact to meet relevant international reporting requirements (this will be done under the National Land Cover and Habitat Mapping Programme)
- Develop further measures to help rehabilitate exploited and degraded peatlands, including as part of national land-use planning and the new CAP, and recognising that strategies may need to differ between regions
- Strengthen policies, including through the new CAP, to improve hedgerow management and encourage the planting of new hedgerows[44]. We will ensure that Local Authorities extend current county-based hedgerow surveys nationwide, and once completed by 2020, Government will commission a study to quantify the climate mitigation and adaptation potential of this resource by 2021

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44   Including hedges in the inventory will require ongoing surveys similar to national forest inventory to monitor the extent of and state of the carbon pool. The biggest current gap is to quantify the carbon in above- and below-ground biomass of various hedgerow types through sampling

7. Developing Clusters of Exemplar Practice

- Establish an industry group to promote new "environmentally friendly" branding and standards on low-emissions fertilisers to improve awareness
- Establish an Animal Feed Network Stakeholder group to review the environmental standards in all livestock rations, and to engage the whole industry in using feed supplements and altered crude protein levels to reduce methane and ammonia emissions
- Increase the number of new Knowledge Transfer Groups, which promote sustainable forest management and mobilisation of timber amongst forest owners
- Encourage existing forestry producer groups in timber mobilisation and forest management
- Establish exemplar "sign-post" networks and communities within the agricultural sector to be leaders in adopting best practice to improve soil fertility and optimise fertiliser use, reduce N_2O emissions, and enhance carbon sequestration in soil/biomass
- Recognising the changing expectation of consumers, the Irish food processing sector can play a valuable role in helping suppliers to better meet the changing needs of the marketplace and create incentives in the supply chain for low carbon methods

Future Common Agricultural Policy

The main policy framework and much of the resources that will enable these abatement measures to happen will flow from the successful design and implementation of the next CAP at EU level, which will operate in the period post-2020. 40% of the overall budget of the new CAP at EU level will contribute to environmental or climate action, based on verifiable results. Ireland supports this enhanced ambition, including opportunity to focus the funding on climate mitigation and adaptation, biodiversity, and carbon sequestration and storage measures, while ensuring a just transition to a more diversified and decarbonised vibrant rural economy. Negotiations on the Commission's proposals for the new CAP are ongoing, and when concluded will be implemented in Ireland through, the development of a strategic plan for the period 2021 to 2027.In developing this strategic plan, in close consultation with stakeholders through a new Consultative Committee, the Department of Agriculture, Food and the Marine will mainstream climate action opportunities which optimise synergies for the delivery of environmental benefits in the areas of climate, water and biodiversity.

11.4 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
Irish Agriculture Vigorously Adopting Carbon Abatement Opportunities and the Food Industry Encouraging this Transformation	
101	Bring forward proposals for the introduction of measures to implement the full suite of options set out in the June 2018 Teagasc Report, 'An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021–2030'
102	Implement suite of measures to improve nitrogen use efficiency
103	Support the maximum possible environment and climate ambition in the post-2020 CAP
104	Improve livestock management, including through extended grazing
105	Develop research and innovation infrastructure
106	Establish feed modification programme
107	Introduce measures to promote improved efficiency in livestock
108	Review animal health and finishing regimes
109	Improve on-farm slurry management
110	Actively engage all stakeholders to develop a roadmap to ensure the future development of the agriculture and land-use (including forestry) sector will be built on environmental sustainability, and contribute fairly to Ireland's climate, air and energy targets
111	Introduce enhanced knowledge transfer programme through Teagasc advisory service (cross-cutting with actions 2, 3, 4, 7, 8, 9 and 12)
112	Develop exemplar networks with leaders in adopting best practice to improve soil fertility and optimise fertiliser use leading to reduced greenhouse gas emissions and enhanced carbon sequestration in soil/biomass
113	Commission an independent assessment of greenhouse gas abatement measures to establish what additional measures can be developed
114	Undertake a review of nitrogen fertiliser management and imports on nitrates derogation farms in 2019 in view of impacts on soil fertility, as well as EU climate and nitrate obligations
Promoting Diversification of Land Use, Part of Gradual Transition	
115	Implement and review roadmap for achieving afforestation rates as outlined in the Programme for Government and Forestry Programme Mid-Term Review
116	Implement the Forestry Programme 2014-2020 in line with Mid-Term Review recommendations and targets set
117	National Bioeconomy Implementation Group to examine sectoral coherence, network and awareness raising, research and innovation and the circular bioeconomy potential of harnessing the value from side-streams from both agriculture and forestry
118	Work with industry stakeholders to increase the use of low carbon materials, taking into account international best practice

119	Increase productivity and resilience of the national forest estate and tree species to improve adaptation to climate change to deliver cumulative additional sequestration potential
120	Develop tools for communicating productivity and climate benefits of forests for landowners
121	Work with other public bodies and community groups exploring opportunities to increase public access in forests on publicly owned lands
122	Improve the accuracy of carbon accounting and existing yield models to optimise carbon sequestration benefits, and investigate the effect of different forest management scenarios on carbon within the context of carbon accounting
123	Continuation and strengthening of activity in forest health, including monitoring and surveillance of the health and vitality of Ireland's forest estate and implementation of import controls on a range of plants, wood and wood products
124	Support Regional Assemblies to identify areas of potential growth in the bioeconomy
125	A greater focus on research into land diversification in agricultural colleges, the EPA and Teagasc, to help educate farmers on the benefits of diversification
126	Upskill farmers and foresters to ensure they have the knowledge and tools required to implement climate mitigation practices

Cost-effective Energy Substitutes

127	Seek to bridge the short term supply gap in indigenous biomass
128	Support the use of biomass to increase the level of renewable energy in the heat sector
129	Develop comprehensive sustainability criteria for biomass production by mid 2021
130	Set a target for the level of energy to be supplied by indigenous biomethane injection in 2030, taking account of the domestic supplies of sustainable feedstock and consider how the supports necessary to reach such a target would be funded

Better Management of Peatlands and Soils

131	Assess and implement mitigation options on rewetted organic soils
132	Deliver the full LULUCF flexibility available to Ireland in the context of the 2030 greenhouse gas targets
133	Assess and implement mitigation options on post-production, peat extraction sites
134	Implement measures for peatlands conservation

12

Waste and the Circular Economy

12. Waste and the Circular Economy

12.1 The Challenge of Sustainable Use of Resources

We need to focus on designing out waste, prioritising prevention of waste at every opportunity through eco-design, reuse and repair, taxation and levies. An OECD study of four countries' greenhouse gas emissions found emissions arising from material management accounted for between 55% and 65% of national emissions. Ireland's material consumption is well above the EU average, and continues to rise as the economy recovers and grows. This indicates that there is scope for savings in greenhouse gas emissions through maximising the efficiency of our material usage.

Our current, linear production and consumption model – based on produce, use and dispose – is significantly carbon and resource-intensive. 'Making more with less' is key to preventing wastage in a modern economy.

The estimated 1 tonne of food waste per home has a negative emissions impact whether composted, landfilled or incinerated, and is harmful to the environment and human health. The 300k/tonnes of plastic packaging waste will have a carbon footprint of over 10 $MtCO_2$eq. in the period 2021 to 2030 and more effective policies on prevention, choice of material and recycling could significantly cut this.

These savings won't be directly credited to the Waste sector, but they are triggered by a radical change in the way we think about waste at every level; the producer, the processor, the retailer and the consumer.

12.2 State of Play

When it comes to the formal inventory of greenhouse gasses, it is only the direct emissions from enterprises handling waste which are entered under the Waste heading (i.e. principally methane from landfill CO_2eq. used in collecting and processing within Ireland).

The gains in reducing material use and replacing virgin material by recycled will be credited back up the supply chain. Similarly improving recycling and reuse to displace exports of waste will somewhat perversely appear as higher emissions.

In this narrow sense material management which generates waste processing accounts for just 1.5% of Ireland's total greenhouse gases in 2017.

Table 12.1 Waste GHG Emissions, 2017[45]

Waste Emissions CO_2 eq.	Share of Total GHG Emissions	Waste Emissions CO_2eq./head
0.9 Mt	1.5%	0.2 t

Waste emissions are strongly coupled with economic growth. Emissions in 2011 were 54% lower than 2005, in 2017 they were 58% higher than 2011. Reducing waste and sending less waste to landfill can lower our emissions.

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45   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

Table 12.2 Trends in Waste GHG Emissions

Timeframe	Percentage Change	Absolute Change, CO₂ eq.
2005-11	-54%	-0.7 Mt
2011-17	58%	0.3 Mt

Waste emissions on a per capita basis are lower in Ireland compared to the EU average. Emissions have also fallen since 2005, but not as much as in other Member States or compared to the EU average.

Ireland has made significant progress in managing waste streams, particularly in improving recycling rates and diversion from landfill.

Ambitious targets have been adopted for 2030 (see Targets box)

The key policy tools which have been successful in Ireland are:

- Levy on landfill and diversion regulations
- Widespread segregation of waste capturing recyclables and biodegradable waste
- Industry supported recycling operation
- Regional waste planning

However, to achieve our targets all of these areas need improvement particularly to develop better prevention strategies, improve capture rates, reduce contamination and reduce the amount of non-recyclable materials.

Table 12.3 Waste GHG Emissions International Comparisons, 2016[46]

	Ireland	Denmark	Austria	Finland	EU 28
Share of Total GHG	1.6%	2.5%	2.0%	3.4%	3.2%
Waste Emissions, CO_2eq./head	0.2 t	0.2 t	0.2 t	0.4 t	0.3 t
Change Since 2005	-25.8%	-2.5%	-43.3%	-29.4%	-30.7%

Waste policy measures currently in place will have a significant effect on projected emissions over the next decade. Emissions reductions are primarily attributable to reduced methane emissions from landfill over the period, in line with the projected reduction in waste going to landfill.

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46   EEA (2018), Annual European Union greenhouse gas inventory 1990–2016 and inventory report 2018

The latest release of data on Biodegradable Municipal Waste (BMW) to landfill, reports that Ireland met the 2010 and 2013 targets under the Landfill Directive (1999/31/EC).[47] Ireland's success in diverting waste from landfill is underpinned by two key levers: increases in the levy for disposal of waste to landfill, and requirements to divert BMW from disposal to landfill under the Landfill Directive targets.[48]

Table 12.4 Impact of Policy Measures in Waste

2017[49] Provisional Emissions	2030 Projected Emissions Based on NDP	2030 Required Emissions Based on MACC
0.9 Mt	0.45 Mt	0.45 Mt[50]

12.3 Targets

Landfill Reliance Target:

- Limit diversion of biodegradable municipal waste to landfill to maximum limit of 427k tonnes by 2020 and for every year after
- Reduce diversion of municipal waste to 10% by 2035

Recycling:

- Recycle 65% of municipal waste by 2035
- Recycle 70% of packaging waste by 2030
- Recycle 55% of plastic packaging waste by 2030
- Separate collection obligations extended to include hazardous household waste (by end 2022), bio-waste (by end 2023), and textiles (by end 2025)

Food Waste:

- Reduce food waste by 50% by 2030

Plastic Single-Use Items:

- Ban specific single-use plastic convenience items including polystyrene food containers, cups and drinks containers in line with Single Use Plastics Directive
- Provide for 90% collection of plastic drinks containers by 2029
- Determine and introduce reduction targets and measures no later than 2022 to be achieved no later than 2026
- Ensure all plastic packaging is reusable or recyclable by 2030

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47   http://www.epa.ie/nationalwastestatistics/municipal/

48   The rate of the levy is kept under review, currently at €75 a tonne for liable waste disposed at landfill, is kept under review

49   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

50   Note: no specific additional abatement for waste sector identified in MACC

12.4 Measures to Deliver Targets

Irish and regional waste policy is based on a waste hierarchy: waste prevention; preparing for reuse; recycling; and energy recovery; with disposal, namely landfill, being the least desirable option. It is implemented by the Government, local authorities and the EPA. Its present strategic plan (2014 -2020) is called Towards a Resource Efficient Ireland[51] and is backed by three Regional Waste Management Plans (2015-2021).

We now plan to transform our approach to waste in line with modern, circular economy principles[52]. This will involve a mind-set change from accepting waste as a fact of life to demanding the highest level of protection for our natural and man-made resources and the environment.

Ireland has scope for major progress in all of the key areas of the waste hierarchy.

1. Prevention

Priority areas for prevention planning will be in plastics, food and construction waste:

- Building on the ban on purchase of single use plastics throughout the public service, we shall implement the EU single use plastic ban
- The prospect of an EU wide plastic packaging tax could create a major incentive for reduction. We shall work with Member States to design the structure of that tax to encourage preventable reduction
- We shall introduce modulated fees within the Repak levy scheme to discourage use of the most difficult plastics such as composites
- We shall develop a strategy with the food sector and the food cloud to deliver our commitment to 50% reduction of food waste

2. Recycling and Reuse

There is great scope for improved performance in recycling. Almost two thirds of plastic packaging is not on the current recycling list. Of the non-garden organic waste currently collected, only 24% is captured in the organic waste bin. Over 30% of what goes into the black bin could have been recycled. Contamination rates have deteriorated and often destroy recycling for a whole load.

The most challenging improvement shall be to step-up our plastic recycling from 35% to 55% over the next decade, with a 90% collection target for beverage containers.

We shall develop a range of policies:

- Expand our successful Producer Responsibility Schemes (e.g. tyres) to new areas
- Implement the EU wide ban by 2030 on non-recyclable plastic
- Use modulated fees to encourage the use of easy to recycle materials
- Complete a study of deposit and return schemes and review trials of other incentive

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51   http://www.epa.ie/pubs/reports/waste/prevention/reports/towardsaresourceefficientireland.html

52   The significance of the Circular Economy in delivering sustainable growth and promoting climate change mitigation is reflected in international policy frameworks. Goal 12 of the UN SDGs (Sustainable Production and Consumption) sets out a series of targets that include resource efficiency, wasted food, waste management, reuse and recycling, public procurement, education, and removal of fossil fuel subsidies. The EU Circular Economy Action Plan, Closing the Loop, adopted in 2015, includes an ambitious new legislative framework for waste management, as well as Eco-design proposals to improve product durability; food waste reduction actions; and proposals for reuse of water and bio-nutrients, see https://eur-lex.europa.eu/resource.html?uri=cellar:8a8ef5e8-99a0-11e5-b3b7-01aa75ed71a1.0012.02/DOC_1&format=PDF

schemes targeting beverage containers
- Promote trials of better public recycling opportunities on street and at Bring Centres
- Work with industry to expand initiatives such as the Plastics Pledge
- Work with industry to improve labelling to avoid confusion or ambiguity
- Target the improvement of key capture rates by extending segregated collection where not now available and promoting better practice
- Implement the target of 30% replacement of virgin plastic to be recycled
- Introduce levies on disposables where sustainable alternatives are available

Tackling Plastic Waste

We are committed to leading the way in reducing single use plastics and are working both at a national and European level to tackle the problem. The Government has:

- Agreed that Government departments and bodies will no longer purchase single-use plastic cups, cutlery and straws
- Strongly supported new EU legislation on Single-use Plastic (SUP), which will ban straws, cotton bud sticks made from plastic, plastic plates and cutlery, plastic coffee stirrers and plastic balloon holders
- Committed to a 90% plastic bottle collection target and a 55% plastic recycling target
- Commenced a clean oceans initiative to collect, reduce and reuse marine litter and clean up our marine environment
- Commissioned a review to establish the best way to reach a 90% collection target for beverage containers, after which the Minister will announce the necessary actions
- Introduced a new law to ban microbeads

- We will improve segregation and collection performance to increase recycling and reduce contamination through increased regulation, education and awareness
- We will strengthen enforcement structures and measures to ensure we maximise material collection, and protect the materials collected for recycling and reprocessing
- We will drive transparency and information-sharing in materials management. Householders, businesses and the public sector as consumers of resources need clear and reliable information about their behaviour and its impact before sustained behaviour change can take place. To achieve this we will examine ways to strengthen data reporting and appropriate information sharing to build stakeholder confidence
- We will improve the take-up of collection services and explore how every household could have access to a three bin (recyclables; food/organic; and general waste) service
- We will use research and development funding to drive innovative developments
- We will promote the optimal use of data to explore and identify opportunities for efficiencies and synergies in our use and reuse of material resources
- We will use the leverage of public bodies to form networks for the effective delivery of

climate action
- We shall undertake research to develop a better system of recording material flows through the elements of the supply chain and on to their final destination, so we can better inform policy and give citizens better confidence and understanding of the flows

3. Diversion

The achievement of the target of just 10% of waste going to landfill will require

- Regulating the materials that go to landfill
- Improve the mechanical treatment of residual waste to produce fuel which replaces fossil fuel

4. Circular Economy and Resource Efficiency Policy

- A Circular Economy Policy and Action Plan for Ireland will be developed to replace the current suite of policy, plans and programmes in 2020-21. Inspired by the EU's Circular Economy Action Plan, Ireland's response will provide policy direction on waste prevention, eco-design, reuse, repair, recycling, recovery and diverting waste from landfill, and lead a cross-Government reflection on how these principles can be embedded throughout our public policy frameworks
- We will deliver a major step-up in recycling so Ireland can meet new EU legislative provisions, including recycling 55/60/65% of municipal waste by 2025/30/35; and recycling 70% of packaging waste by 2030; and specific targets for various packaging materials such as plastic, paper and cardboard, aluminium, and glass
- We will also create a fund to promote more innovation in reduction, reuse and recycling in the community. A consultation with the public and stakeholders on the measures required will be a priority task in 2019, with follow-up initiatives that maintain regular dissemination of information on sustainable lifestyle

5. Circular Bioeconomy

- We recognise that the transition to a more circular bioeconomy - where the value of biobased products, materials and resources is maintained in the economy for as long as possible and the generation of waste minimised - could provide an essential contribution to developing a sustainable, low carbon, resource efficient and competitive economy.
- We will develop the bioeconomy to help achieve our carbon mitigation objectives by reducing our reliance on fossil fuels; decarbonise our society by promoting more sustainable bio-based products; and grow rural and regional businesses and jobs

12.5 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
135	Lead the transformation from waste management to circular economy practice through delivery of a new national policy
136	Revise waste legislation to incorporate new circular economy requirements, including legally binding waste/recycling targets
137	Develop a new National Waste Prevention Programme, and Regional Waste Management Plans that will guide our transition to a circular economy by EPA and Local Authorities
138	Support the development of eco-design and circular economy opportunities for Irish enterprises to reduce waste over the full lifecycle of products
139	Develop and implement a suite of measures to reduce the impact of single-use plastics
140	Maintain Government leadership in taking responsibility for own resource consumption, particularly single use plastics, energy, waste and water
141	Identify opportunities to strengthen the regulatory and enforcement frameworks and structures for the waste collection and management system, to maximise the collection of clean, segregated materials for reuse and/or recycling from all households and businesses, and to incentivise consumers to reduce, reuse and recycle
142	Regulate and incentivise producers of waste, particularly packaging, to ensure the prevention of waste and the use of recycled materials in packaging products
143	We will scope a number of possible environmental levies, including a possible levy on single use plastics, as part of the review of the Environment Fund. Further detailed research would be required prior to the introduction of any new levy
144	We will identify and commence delivery of measures to address the key regulatory barriers to the development of the bioeconomy, including exploring opportunities to establish "End of Waste" criteria for certain bio-wastes

13 | Public Sector Leading By Example

13. Public Sector Leading By Example

13.1 State of Play

Engaged and empowered public bodies can achieve more than just reduce their own emissions, they can stimulate and inspire action across wider society. This Plan clearly recognises that Ireland must significantly step-up its commitments to tackle climate disruption. The leadership role public bodies can play in taking early action on climate is fundamental to achieving our decarbonisation goals. While important changes to our policy framework will be a key factor in our transition to a low-carbon economy, public bodies must go beyond shaping the policy framework. They must act as exemplars of best practice in taking climate action across all sectors and use their capacities to lead a wider transition.

To that end, we must support the emergence of public sector champions, who in addition to achieving their own ambitious climate action objectives, engage, motivate and empower businesses, industry, communities and individuals to act to mitigate climate change.

Although public sector buildings accounted for only 1.5% of our greenhouse gas emissions in 2017, the broader leadership role of public bodies means that their actions can act as a catalyst for more ambitious climate action across society and must not be overlooked.

Some ways in which public bodies can demonstrate leadership include, engaging in Green Procurement, becoming partners in Sustainable Energy Communities, becoming first movers in installing EV charging networks and electrifying their fleet, and publishing audits of their own performance and developing strategies for improvement.

Table 13.1 Public Sector Buildings GHG Emissions, 2017[53]

Public Sector Buildings Emissions CO_2 eq.	Share of Total GHG Emissions	Public Sector Buildings Emissions CO_2eq./head
0.9 Mt	1.5%	0.2 t

While emissions by public bodies showed some modest improvement during the crash, that pattern has not continued during the recovery when emissions showed no fall.

Table 13.2 Trends in Public Sector Buildings GHG Emissions

Timeframe	Percentage Change	Absolute Change, CO_2 eq.
2005-11	-5.2%	-0.05 Mt
2011-17	0.3%	0.003 Mt

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53   http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/

13.2 Targets

To meet the required level of emissions, by 2030 we will:

- Reduce CO_2 eq. from the sector by 30%
- Improve the energy efficiency of public sector buildings by 50%
- Set a target to demonstrate leadership in the adoption of low emission transport options
- In 2019, have a Climate Mandate adopted by every Public Body, making the sector a catalyst for climate action
- In 2019, agree a Climate Action Charter with Local Authorities
- All Public Buildings to reach BER 'B' Rating

13.3 Measures to Deliver Targets

We will implement a number of initiatives to demonstrate the leadership role of the public sector in taking climate action. This includes setting more ambitious targets for energy efficiency and emissions reduction, mandating climate action in all public bodies, committing to greater transparency on our emissions and to more comprehensive sustainability reporting, catalysing markets through green public procurement, working with the financial sector to drive investment and innovation towards low-carbon practices and services, and supporting Local Authority leadership.

Public bodies will play a central role in demonstrating that Ireland is embedding a strategy of decarbonisation, sustainable development and climate resilience into every aspect of Irish society. This will be done within a framework of high level as set out in the target box above. This will be a crucial yardstick to measure progress and to evaluate policy and effort. However, equally it is important that public bodies have a broad mandate to be creative and innovative in pursuit of these goals and engage in collaboration across traditional silos. Like in the Enterprise sector the challenge of decarbonisation and resilience must be embraced right across all activities and be driven by top leadership who recognise the central importance of this strategic goal. The challenge must be internalised as well as adopting some of the centrally designated frameworks such as Green Procurement, Carbon Pricing in Capital Evaluation, measurement of Carbon Footprint, etc. In this context a broad mandate tailored and adopted by each and every public body will be central to this plan.

1. From Public Sector Energy Efficiency to a Decarbonisation Strategy

The Public Sector Energy Efficiency Programme supports public bodies in achieving a 33% energy efficiency target by 2020, including through an annual monitoring and reporting system where all public bodies are required to submit their energy consumption data so as to track progress of the sector. By the end of 2017, energy efficiency improvements of 24% were achieved by the sector overall, with a cumulative CO_2eq. emissions saving of 3.6 Mt. Key supports include:

- Pathfinder Programmes are helping to identify scalable models for public sector buildings and school retrofits that can be expanded under Project Ireland 2040
- The Energy in Education Programme supports our schools in undertaking audits and implementing energy projects. Participating schools reduced their energy bills by 5-10% through energy management, and by up to 40% through energy efficiency retrofits
- The Office of Public Works runs a behavioural and energy targeting campaign called Optimising Power @ Work
- Under Project Ireland 2040 we have committed to an energy performance improvement programme to upgrade all public buildings to BER 'B' level

However, while some bodies far exceeded the target others have made little progress. The policy support to this process has the potential for significant improvement:

- The energy status of all public buildings will be published
- Audit tools will be developed to help bodies identify opportunities
- Technical support will be developed to help bodies implement strategies for reduction
- Opportunities for aggregations participating in clusters will be developed

This process which has proven effective under the guidance of SEAI, will be expanded to embrace the new target for greenhouse gas emissions targets.

The framework goals for the new Public Sector Decarbonisation Strategy shall be to deliver 30% emissions reduction by 2030 and to develop a roadmap to carbon neutrality by 2050. It will rely heavily on the development by individual public bodies of tailored strategies based on the mandate set out in the next section. Other national initiatives will include:

- A new Public Sector Decarbonisation Strategy will be put in place, including strengthening the technical supports and incentive arrangements available to public sector managers to deliver within their organisations. It will be closely aligned with the developing model for Energy Efficiency. It will include guidance on measuring carbon footprint, exemplars of success and methods of collaboration and aggregation of action
- Develop a detailed roadmap for deep retrofitting our school buildings to a minimum standard of BER B2, including facilitating renewable energy installation and export of electricity to the grid in line with provisions of the new micro-generation framework to be developed under this Plan
- Offset the climate effects of official air travel through the travel agency contract for central Government departments

All An Post Deliveries in Dublin City Centre will be Zero Emission by the end of 2019

On 20 February 2019, the Minister Richard Bruton T.D., Minister for Communications, Climate Action and Environment, announced that all An Post deliveries between the canals will be zero emission by the end of this year, as part of the company's 'Post Eco' plan to eliminate carbon emissions by 2050. Under the Post Eco Plan, An Post will deliver:

- Zero emission postal deliveries in Dublin City Centre by year-end 2019
- Zero emission postal deliveries in Cork, Galway, Kilkenny, Limerick and Waterford by 2020
- 750 EVs to replace the urban fleet by 2022, 200 of which will be on the streets in 2019
- A number of trials – including public charging points for EVs and installing solar panels on buildings
- Eco-Driving training for all drivers to ensure best practise driving

Altogether, initiatives being introduced in 2019 will save 1,000 tonnes of carbon annually.

Inland Fisheries Ireland's Launches New Electric Car Fleet

On 14 April 2019, An Taoiseach Leo Varadkar along with Richard Bruton TD, Minister of Communications, Climate Action and Environment and Sean Canney TD, Minister with responsibility for Inland Fisheries, launched Inland Fisheries Ireland's new electric car fleet.

The four vehicles will be driven by Project Officers from the organisation's National Strategy for Angling Development (NSAD).

The organisation is introducing energy efficient vehicles with a view to achieving a 24% reduction in the carbon emissions from its fleet. The move to 'green' vehicles is just one of many changes which Inland Fisheries are making to ensure they reduce their overall emissions, with a view to achieving an energy reduction target of 33 per cent by 2020.

2. Climate Action Mandate for Public Bodies

- We will require each public body to demonstrate how it is showing leadership and driving change by introducing a Climate Action Mandate
- The mandate will involve a 'core' group of requirements that every public body has to meet, and a wider set that should be pursued by larger organisations. The core requirements will have specific timelines for their introduction (with all core requirements to be in place not later than the end of 2020), and be clearly measureable against a set of key performance indicators, and may include the following:

  o a collective target to reduce CO_2eq. by 30% and improve energy efficiency by 50% by 2030 with a view to achieving carbon neutrality by 2050 (with improving measurement over time)
  o adoption of measures which will yield carbon abatement at no cost where entire lifetime costs are considered
  o reporting of greenhouse gas emissions and sustainability activities in annual reports
  o establishing a green team to engage staff in being part of the solution

- o delivering a green procurement approach which incorporates carbon pricing and climate criteria in public tenders
- o every public building with public access to display an up-to-date Display Energy Certificate
- o pursuing and reporting on resource efficiency actions across all public facilities, including measures to reduce food waste, promote water conservation, waste segregation, reuse and recycling practices
- o facilitating employees in adopting lower carbon lifestyles
- o collaborating with suppliers and service providers in joint decarbonisation initiatives, including working with clients to adopt low carbon approaches such as the development of clusters
- o digitisation of paper-based processes made the default approach
- o implementing all measures which reduce our carbon emissions, which have a positive Net Present Value, using the trajectory for carbon price issued by the Department of Public Expenditure and Reform, including developing a method for planning and reporting on these actions
- o ensuring our policies and practices do not lock us into high carbon pathways and that we carbon-proof major decisions and programmes on a systematic basis, moving over time to a near-zero carbon investment strategy
- o cultivating and actively participating in partnerships with enterprise and community groups who have as their goal improvement in use of resources and reduced climate impact

- • Large public bodies may be required to commit to:

  - o achieving formal environmental accreditation, such as EMAS or ISO 14001, and ISO 50001
  - o a proportion of energy to come from certified renewable sources and/or onsite renewables
  - o active support for customers, clients and other stakeholders to adopt low carbon approaches (including active support of clusters and introducing conditionality into certain programmes)
  - o adopting a near-zero carbon investment strategy where feasible
  - o active management of equipment containing refrigerant gases, including maintenance and disposal planning
  - o promote the establishment of networks for collective action and drive delivery by an awards framework to recognise excellence

- • Each public body will be held accountable for the implementation of the mandate to the Climate Action Delivery Board and ultimately Government. Technical support for the implementation of the mandate will be provided through SEAI
- • In 2019, we will also consider how large public bodies could adopt a near zero-carbon investment strategy
- • For the commercial state sector, we will work with NewERA, to develop an appropriate framework to address the role of each semi-state body in advancing climate action objectives, including encouraging the board of each company to take advantage of opportunities to reduce greenhouse gas emissions, within the scope of their commercial mandate. In this regard, we will examine the potential role of the Shareholder Letter of Expectation as the appropriate way to frame the necessary mandate

3. Redesigned Model for Green Public Procurement

Annual public sector purchasing accounts up to 12% of Ireland's GDP, a large part of overall economic activity and demand. This provides Ireland's public sector with significant influence to stimulate the provision of more resource-efficient, less polluting goods, services and works within the marketplace.

While a policy on Green Procurement was published in 2012 which sought to incorporate green procurement into 50% of the number at the value of public contract, this has not achieved its intended impact, and a new approach is being developed as part of this plan.

There have been significant initiatives in the public sector to lead in the adoption of EV (see box) and a commitment that for the urban bus fleet no diesel only buses will be purchased from 1st July 2019.However again, management in public bodies can achieve much more through their procurement.

Other initiatives recently taken have included a ban on Single-Use Plastics which has applied throughout the public service since the end of March 2019, and the obligation to develop a Resource Use and Waste Policy in each public body to high sustainability targets.

Incorporating green criteria into public purchasing provides an opportunity to convert environmental policy objectives on carbon reduction, air and water quality, and waste reduction into delivered actions. The procurement of goods and services by Government departments and bodies, in line with the Government's own policies, will underpin the credibility of the national policy objectives themselves and enhance Ireland's image as a green economy. The following steps will be taken to accelerate green procurement practice:

- The phased introduction of green criteria across Government and Public Sectors targeting priority products and services
- Building green criteria into OGP frameworks as they arise for renewal
- Providing support to procurers in using GPP guidance
- Engaging with suppliers, especially SMEs regarding GPP opportunities
- Working collaboratively to ensure an All of Government approach to the successful incorporation of green criteria and other social considerations into public procurement policy and practice
- Developing clusters and networks for GPP
- Using existing GPP frameworks in place in other Member States
- Building monitoring and reporting into the public sector corporate governance model
- Supporting further research work on quantifying costs/benefits of GPP in an Irish context
- The OGP reporting annually on implementation of GPP

4. Public Fleets

- A new public procurement framework contract for electric vehicles will be introduced in 2020 which will allow public bodies to purchase EVs with reduced administrative burden
- The deployment of electric vehicles in the Small Public Service Vehicle (SPSV) sector will be stimulated, taking account of other requirements for this sector, including wheelchair accessibility

5. Local Government Leadership

Our Local Authorities occupy a pivotal role in their respective local communities and can act to demonstrate public sector leadership on climate action in their areas as well as key mobilisers of action at a local and community level. Four Climate Action Regional Offices have already been established to assist the Local Authority Sector in building capacity to engage effectively with climate change, including developing and implementing its own climate action measures. While this has focused to date on the development of robust Adaptation Plans within the Local Authority areas, there is scope for this network working through Local Authorities to act as a catalyst for much wider change, and under this plan they will be required to develop an annual programme with measurable impact.

- Local Authorities will be supported to build their capacity to further develop this role through upskilling, knowledge dissemination, characterisation of scalable interventions and funding support
- Resources from the Project Ireland 2040 Funds will be mobilised to support local authority ambition on climate action, including measures to encourage refurbishment and regeneration and the local development of low-carbon, climate-resilient economic activities
- To further develop the community engagement role of local authorities, we will pilot 'climate action community engagement' offices in a number of Local Authorities
- Through these new offices, Local Authorities will become key partners and enablers of an expanded network of Sustainable Energy Communities across Ireland, complementing the actions for Local Authorities on citizen engagement and community leadership in the following chapter

6. Climate Action Charter for Local Authorities

- A Climate Action Charter for Local Authorities will be developed and support offered in developing their activities under the Charter, including running competitive calls to support innovative projects, and benchmarking progress with badging against a set of key performance indicators, designating bronze, silver and gold levels.
- The charter will include the following principles:

  o We be advocates for Climate Action in our own policies and practices, and in our many various dealings with citizens
  o We aim to measure the carbon impact of our various activities as accurately as possible and report annually on our carbon footprint, refining the quality of measurement over time including the publication of the energy profile of key buildings
  o We will implement, in so far as possible, all measures which reduce our carbon emissions, which have a positive NPV, using the trajectory for carbon price issued by the Department of Public Expenditure and Reform, and will develop a method for planning and reporting on these actions
  o We will deliver a 50% improvement in energy efficiency by 2030 (on the 2009 base)
  o We shall ensure that in our policies and practices we do not lock into high carbon pathways, and shall put in place a process for carbon proofing major decisions and programmes on a systematic basis, moving over time to a near zero carbon investment strategy
  o We will ask our suppliers to provide information on their carbon footprint and steps

they plan to reduce its impact
- o We shall support our employees to undertake changes in their lifestyles both at work and beyond, to reduce carbon impact and will encourage work-based employee-led groups to identify and implement ideas for improvement
- o We shall encourage our clients to undertake change in their lifestyles to reduce carbon impact, and support those clients who face difficulties in funding changes
- o We shall cultivate and actively participate in partnerships with enterprise and community groups who have as their goal, improvement in the use of resources and reduced climate impact
- o We shall exercise our planning and regulatory roles to help improve climate outcomes in the wider community and beyond the public sector, by influencing or requiring certain efficiency standards to be met (e.g. outdoor lighting)

13.4 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
145	Develop a strategy to achieve at least a 30% reduction in CO_2eq. emissions by 2030 and a 50% improvement in public sector energy efficiency
146	Strengthen incentives and supports to enable managers and Energy Performance Officers to deliver on targets for 2020 and new 2030 targets
147	Introduce a Climate Action Mandate for every public body and a Climate Action Charter for each Local Authority through the use of Ministerial policy directions, or equivalent power
148	Mandate the inclusion of green criteria in procurements using public funds, introducing requirements on a phased basis and provide support to procurers as required
149	Enable the deployment of electric vehicles in public sector fleets
150	Support the development of Local Authority climate action leadership and capacities
151	Implement an enhanced approach to energy performance and renewable energy capability in school buildings
152	Offset the climate effects of official air travel, through the travel agency contract for central Government departments
153	Introduce civil service mileage rates for electric vehicles reflecting the costs incurred by drivers using their own vehicles for work

14 | Ireland's International Action on Climate Breakdown

14. Ireland's International Action on Climate Breakdown

14.1 International Development Cooperation and Climate Change

Ireland's new policy for International Development *A Better World* places climate action as a major policy priority, in recognition of the grave threat climate change poses to the achievement of the Sustainable Development Goals globally. This whole of government policy includes some important commitments relevant to those Government Departments engaged in international development. The Government has committed to 'future proof' the entire development cooperation programme, meaning that the climate implications of any intervention, especially for the poorest in society, will be taken carefully into account. It also means that we will see all development interventions as an opportunity to build the capacity of those most vulnerable to adapt to climate change.

A Better World also includes a commitment to at least double the percentage of international development assistance funding we will provide to climate action, building on a strong track record against Government commitments. We will also examine innovative approaches to climate finance, risk insurance, and working with the private sector on climate action. Cross-departmental coordination will be important to making this happen effectively.

Within Ireland's development cooperation programmes, we will continue to focus assistance on the poorest and most climate vulnerable, with special attention given to ensuring our climate action is gender responsive, and contributes to reducing humanitarian need. Working in our core intervention areas of agriculture, health, education, social protection, and disaster risk reduction, we aim to build climate adaptation into all our programmes especially in countries where we give bilateral assistance.

We will also strengthen our climate support to Small Island Developing States. The enhanced partnership with these States is reflected in a new strategy: 'Ireland's Strategy for Partnership with Small Island Developing States'. It includes increased collaboration on climate action in a number of areas: influence at the United Nations and in international financial institutions; influence with EU processes and funding mechanisms; direct support to regional and other assistance programmes; and person-to-person technical assistance on a range of technical issues, including ocean and the blue economy. Ireland will deliver at least €5 million per year to support resilience in Small Island Developing States.

Case Study – Ireland's International Development Cooperation and Climate Change

Ireland's new policy for International Development, "A Better World", reinforces the Government's commitment to deliver the United Nations target of allocating 0.7% of Gross National Income (GNI) for Official Development Assistance (ODA) by 2030. Ireland's 2019 ODA allocation of €817 million was an increase of 32% on 2014 levels and Government recognise the significant increases that will be required to meet the ODA target by 2030.

Climate change is one of the priority areas in *A Better World* with future-proofing all our development cooperation an overarching priority. Ireland is well positioned to achieve its commitment to provide €175m for global climate over the period 2016-2020, having provided €117.1 million over 2016-17 and committed in *A Better World* to further scale up funding for climate action.

Ireland's support for climate action at a global level is 100% grant-based and particularly focuses on climate adaptation in Least Developed Countries, particularly in sub-Saharan Africa. Ireland is well known for giving a global voice to those most at risk and is committed to increasing funding for climate action. Ireland's international climate action is also focused on helping the most vulnerable men and especially women to adapt to climate impacts, and securing a just transition. Ireland is also developing a strategy to intensify support for Small Island Developing States, some of which are dramatically exposed to the impacts of climate change.

Ireland has a long-standing tradition of working with young people through its development education programme. The aim of the programme is to build and strengthen the involvement and contribution of schools and students towards a more sustainable world. Initiatives such as the Young Scientist Awards and the Young Environmentalist Awards all contribute to citizens' led activism in sustainable development and climate action. The *Our World Irish Aid Awards* is an educational annual awards programme which has become established in hundreds of primary schools all over Ireland over the last eleven years. The annual awards help primary pupils (from 3rd to 6th class) to learn how Irish Aid is working to achieve the United Nations Global Goals to fight poverty and create a better future for children and their families in developing countries.

The 2017 Awards theme, *For People and Planet*, encouraged pupils to explore the Sustainable Development Goals, and how Ireland has pledged to work in partnership to fight poverty, conflict and climate change and to create a better future by 2030.

Ireland will continue to work through systems and initiatives for development education to involve and empower community groups, the education sector and young people in progressing climate change solutions and international sustainable development.

14.2 Climate Diplomacy

Ireland has built up a strong voice on the international stage on climate action for the poorest people and countries. Within the United Nations Framework Convention on Climate Change process, we strongly champion the voice of the Least Developed Countries Group, and provide support to strengthen the impact of their interventions. We provide in-kind expertise to the United Nations Framework Convention on Climate Change Least Developed Countries Expert Group, and play a leading role within the EU on related matters. We co-chair the OECD Development Assistance Committee network on climate and environment, Environet. We are also active in crucial negotiations on agriculture and climate finance, as well as the interaction with the

Intergovernmental Panel on Climate Change. Gender and climate justice are at the heart of our engagement in United Nations Framework Convention on Climate Change, and in 2017 Ireland played a leading role in securing agreement on the landmark Gender Action Plan at the climate negotiations.

Building on this strong track record, and the prioritisation of climate action in *A Better World*, we will continue to make our voices strongly heard on climate action. We will continue to champion the needs of those most vulnerable to climate change, especially the poorest people in least developed countries and small islands. Our international engagement will be driven by the principles of climate justice. We will continue to be active within the EU, OECD, and the United Nations. We will also endeavour to highlight the threat posed by climate change to the Sustainable Development Goals, across a range of other multilateral processes, including on security, gender, and financing for development among others.

Ireland is actively involved in the preparation of the United Nations Secretary General's Climate Action Summit, taking place in September 2019. The summit entitled *A Race We Can Win* aims to demonstrate a leap in political ambition towards bolstering national and international climate action. Together with the Marshall Islands, Ireland is leading the track on Youth Engagement and Public Mobilisation. Our joint efforts will focus on maximising the engagement and contribution of citizens, especially young people, in long-lasting climate solutions. We are working closely to identify concrete activities that amplify the voices of the increasingly concerned public and widen the space for young people to contribute to climate change solutions.

14.3 Actions

We will put climate action at the heart of our policy on international development. The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
154	Seek to at least double the percentage of ODA spending on climate finance by 2030, and report on our expenditure each year
155	Place climate action, especially for Least Developed Countries and Small Island Developing States, at the heart of all development cooperation and policy partnerships, as well as our engagement in multilateral processes
156	Include climate as a core theme in all new Irish Aid Country Strategies with first new strategy to be concluded in 2019
157	Launch a Strategy for Partnerships with Small Island Development States in recognition of the specific challenges presented by climate change to them, accompanied by a package of support and partnerships
158	Play a leadership role at the September 2019 UN Secretary General Summit on Climate Action, championing Youth Engagement and Public Mobilisation

15 | Citizen Engagement, Community Leadership and Just Transition

15. Citizen Engagement, Community Leadership and Just Transition

15.1 Mobilising to Tackle the Climate Emergency

Tackling the climate emergency is the greatest challenge facing humanity. The prospects for our children will be shaped by our success. The future resilience of Irish jobs and enterprise will be determined by the approach we take. This is not just a question of Ireland's global responsibilities; it will also directly shape our own society, its resilience, its sustainability and its quality of life.

Those societies who delay the transition needed will face higher costs and fewer opportunities. This plan is designed to demonstrate the determination of Government to shape a path to a decarbonised world. However, what is unique about this challenge is that change must happen in every home, in every workplace and in every network which supports our lifestyle. This requires a very high level of engagement, buy-in and motivation. The National Economic and Social Council (NESC) has highlighted that how the challenge is framed, and how the policy process is designed, is very important. NESC identifies the challenge of developing policy in an environment where technology is fast changing and where there are few fully known, easy or cheap options which effectively address climate change.

In the Programme for Government, a commitment was made to convene a Citizens' Assembly on Climate Action. Their report, the follow-up hearings and report by the All-Party Oireachtas Committee, and the unanimous adoption of that report and declaration of a Climate and Biodiversity Emergency, has created a strong foundation for this process.

A New Citizens' Engagement Model

The Citizens' Assembly was an exceptional experiment in democratic governance. Comprising ninety-nine citizens, it afforded participants the time, space and structure to consider complex questions of public policy in a comprehensive and deliberative way. Climate change was one of five topics under examination, with the 13 recommendations the citizens agreed upon significantly more radical than expected. The Citizens Assembly identified a clear roadmap for climate action in Ireland and the follow-up Oireachtas report, adopted with cross-party consensus, has identified the policy tools and options which can be used to make progress. This Plan will ensure that these recommendations are operationalised and supported. It provides a compelling programme, and Government will act with parties in the Oireachtas and across civil society to build the momentum for change, climate action and a sustainable future for all.

The process employed by the Citizens' Assembly shows potential for the National Dialogue on Climate Action (NDCA) to be developed as a new model of citizen engagement on climate change, with deliberation leading to action at its core. Work is underway in Dublin City University, funded by the EPA, to develop toolkits, based on the lessons of the Citizens' Assembly, to help deepen public engagement. The model shows how Irish citizens can be engaged in policy and decision-making processes, which enhances the legitimacy and acceptance of climate policy decisions. There is potential for further Citizen Assembly processes to be rolled out nationwide through the NDCA. This will serve as a model of citizen engagement on climate change, engaging more citizens, achieving greater buy-in, and leading to climate action and feedback to the policy process.

It is essential to the success of this plan that people across the country become mobilised in this dynamic environment. To support this, we have designed into the plan key elements:

- Engagement, feedback and learning, including providing information to existing networks and further developing their capacity to act
- Evaluation of evolving technologies, promoting innovation, and developing the capacity to realise opportunities
- Embedding the concept of just transition in policy instruments (domestically and globally)

We will expand the use of tools such as www.sustainabletoolkit.ie developed by the EPA and wheel. ie. We will provide more community based training and support to allow community and voluntary groups enhance their capacity and understanding in the area of climate action, ensuring that the local champions who act as catalysts for action have the knowledge and capacity to do so.

15.2 Engagement, Capacity Building and Local Action

This Plan will be a living document which will not only monitor performance and progress on agreed indicators, but shall also openly invite feedback, learning and problem solving as it evolves from year to year. To support that there shall be a continuing schedule of Regional Consultative Fora under the NDCA. There will also be a coordinated step-up in the activities of key bodies to motivate a move from engagement to practical local action.

We will engage and empower citizens and communities to take local action by linking to existing and new networks and clustering initiatives, using the NDCA and Local Authority structures. The Climate Action Regional Offices will lead a step-up in climate action within Local Authorities.

- We will establish a Community Outreach programme, building on the success of other outreach initiatives and the Green Schools programme, and rooted in community and voluntary organisations and other civil society groups, that encourages local communities to drive change at a local level
- The NDCA will drive action at community level, including focusing on youth activities as well as facilitating reporting back to regional gatherings on initiatives undertaken locally. This approach will harness existing networks and help build new ones, supporting better communication, and more focused deliberation leading to effective action
- The SEAI support for the development of Sustainable Energy Communities (SEC) shall expand from 256 now to 500 by 2020, and 1500 by 2030
- The existing SEC network will be leveraged through the Local Authority structures to ensure greater collaboration between the SECs and the NDCA
- The existing network of 215 Citizens Information Centres and 330 libraries will be engaged to provide information to citizens on the transition to a low-carbon society
- A streamlined, one-stop-shop approach to project applications will be developed to significantly reduce the administrative burden associated with multiple funding channels
- The significant potential of the social enterprises will be supported to contribute to job creation and to innovative approaches to the challenges presented by climate change
- The design of policy tools, including the new Renewable Electricity Support Scheme, will explicitly seek to mobilise local and community involvement in micro-generation and in major Renewable Energy projects
- The obligated energy suppliers will be required to promote a closer working with community and enterprise to ensure wider community gain and help to realise the new model of delivery being developed under this Plan

- New collaboration for Climate Action will be built with the initiatives under the Rural and Urban Funds under Project Ireland 2040
- Public Bodies and Local Authorities will be mandated to support fledgling initiatives within their communities
- Work will take place in developing Portlaoise as a low-carbon town. During the course of this project we will carry out a review to identify lessons for other towns
- All Local Authorities will be asked to develop a decarbonisation project, each of which would have a specific focal point, for example an airport or a flood risk town
- We will also establish a category of low-carbon town projects under the Climate Action Fund
- Local Community Development Committees will also be used to step-up how we mobilise and support urban and rural communities to reduce carbon emissions. In particular, they will have a key role in stepping up activities by assisting in scaling up from an individual project based approach to more coordinated and structured approach locally
- The Public Participation Network (PPN) will be leveraged to share information and knowledge, as well as a means to animate local community groups to get involved in climate action initiatives. There are currently approximately 15,000 community organisations registered with 31 PPNs
- An enhanced Green Schools will encourage students, teachers and the wider community to talk about climate change and get involved in local climate action. Schools on the Green-Schools programme will be actively reducing their carbon footprint through improved transport, energy, waste, water choices or planting for biodiversity. Participation in the Climate Action Week, the Climate Action Expo and the Climate Ambassador programme will help inform students of the science and the policies
- A new short course on climate action will be developed for the junior cycle curriculum to complement the ongoing implementation of the National Strategy on Education for Sustainable Development 2014 – 2020
- All schools will be encouraged to have an "energy champion" within their distributed leadership team
- We shall engage with the Creative Arts Community to see how they can provide meaning and awaken interest in this global challenge
- The third level sector will be supported to host Climate Mitigation Centres to build the capacity to plan and take action to achieve zero-carbon third level institutions
- Curricula will be reviewed to ensure climate science is properly embedded in relevant course material

15.3 Evolving Opportunities, Innovation and Delivery

Developing the opportunities in a decarbonising economy has been recognised as a key pillar of this plan. They are clearly emerging in retrofitting renewable energy, new farming methods, planting and soil remediation, resource recovery and the bioeconomy. These will be systematically developed through research and innovation, enterprise hubs, and skill development at both national and regional level. This task will be an explicit mandate for all key players.

- Existing initiatives and structures[54] will be mobilised to maximise enterprise opportunities. This will include support for the work underway in the Midlands, to deal with the challenges to Bord na Móna, its employees and various contractors and businesses, including local services which depend on the current business model. The work underway by the Regional Transition Team under the Midlands Regional Enterprise Plan to 2020 will be actively supported by the Department of Communications, Climate Action and Environment, and the Department of Business, Enterprise and Innovation

- We will commission research on the impact of the transition on specific sectors (jobs or roles), regions, communities and cohorts of citizens. This will comprise an assessment of the economic and employment implications of the transition, which will include work on the distributional impacts of carbon tax, changes in fossil fuel subsidies, modelling of options in transport, and studies of the impacts on the agriculture sector and in the western region. In addition, as part of the Future Jobs Ireland, Government has commissioned the National Economic and Social Council to develop policy recommendations for consideration by Government for the operation of Transition Teams to manage the impact of the economic transition on vulnerable workers and sectors. Work on this will be a key input in helping to mitigate the disruptive impact on workers and sectors

- The Expert Group on Future Skills Needs will examine the skills needs of enterprises associated with the transition to a green growth and low-carbon economy. Regional Skills Fora will provide an opportunity for employers and the education and training system to work together to meet the emerging skills needs of their regions, supporting enterprise development under the Regional Enterprise Plans

- SEAI will prioritise the development of supply chain for opportunities in a decarbonised economy. One of the key areas where new opportunities exist is in relation to the transition to renewable energy, across a range of technologies, including wind, biomass and solar[55]. There are significant supply chain opportunities in each of these technologies once critical mass is achieved, as illustrated for example by the Energy Vaasa supply chain initiative in west Finland. It is evident that these supply chain opportunities can enable Ireland to gain major rewards from the transition to a sustainable energy future

- New targeted calls from the Climate Action Fund will be designed to foster innovation, exemplars, and partnerships, clusters and networks to pioneer change across large industry, SMEs, the public sector, and communities

- The opportunities afforded by digital technologies will be harnessed, including our commitment to connect all homes in Ireland to high-speed broadband, as a powerful enabler of citizen and community engagement in the low-carbon transition. These technologies will also be a key driver of new economic and employment opportunities for all regions in Ireland, which will also have the potential to make a positive impact on our emissions by, for example, reduced commuting

- An annual Innovation and Research Forum will provide an arena to track the emerging technologies and the barriers to their uptake

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54   These include Regional Enterprise Plans to 2020, the Regional Steering Committees which oversee these Plans as "live agendas" and the current regional mandates of the enterprise agencies and the Regional Assemblies' Regional Spatial and Economic Strategies

55   SEAI Supply Chain Report, 2014

15.4 Just Transition

The level of change envisaged in this plan cannot be avoided and nor can the taxpayer compensate for all the many actions which will have to be taken. However, it is essential that the burdens borne are seen to be fair and that every group is seen to be making an appropriate and fair level of effort. This will be essential to maintaining the high level of political and civic consensus which has been built

- A Just Transition Review Group will be established within NESC as part of NESC working group structures. Through this Group, NESC will review the ongoing transition and identify specific transition needs among cohorts of workers, enterprises, communities and specific groups of people. It will collaborate and engage with a wide range of stakeholders and will work closely with the NDCA and SDGs Stakeholder Forum. The NESC will publish a periodic review and strategic advice on the Just Transition. This will include an examination of the range of national and international funding opportunities[56] and how these could be used to underpin the work of this Group and the priorities identified. The periodic review and strategic advice will be a key input to the formulation and adaptation of a five year Just Transition Strategy
- We will help improve the resilience of communities and households by providing information and building capacity, taking account of the distinctive needs of urban and rural communities. We will provide improved training and support initiatives for all community and voluntary stakeholders to support community, local and national low-carbon action. We will identify ways to improve how current energy poverty schemes target those most in need, to make them as efficient as possible. We will also improve the resilience of communities by taking measures to protect those who are most vulnerable to the risks associated with severe weather events. This includes pro-active action to review infrastructure sizing, and taking steps to improve services and make them more resilient in the event of severe weather events. It includes examining the challenges and possible solutions to address the concerns facing many citizens and businesses that, because of ongoing climate change and severe weather events, they are unable to insure their property
- We shall ensure that in developing proposals for Carbon Pricing the impact on low income groups and those facing greater challenges adopting are factored in
- We will enhance the capacity of our education and training system to support a just transition. This will include more explicit focus on the type and volume of skills needed in the low-carbon transition. It will include supports for workers in vulnerable sectors and returnees to the labour market through a focus on career advice, up-skilling and re-training, as well as the development of new skills and expertise in our education and training system. The Department of Education and Skills will support all of the required initiatives through ongoing collaboration with relevant departments and agencies

We are committed to a just global transition.

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56   This will include funding within Department of Rural and Community Development, SEAI, EPA and SFI funding, the Project Ireland 2040 funds, and European engagements such as EU LIFE, Horizon 2020, Interreg, Sniffer, URBACT and the overarching EU Invest Programme. The scope to use capital funding programmes, such as Local Authority Capital Budgets, European Regional Development Funding or European Investment Bank will be also monitored on an ongoing basis

15.5 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
159	Enhance the effectiveness of climate-related communications, network building and deliberative capacity within and through the NDCA
160	Assess the economic and employment implications of the transition to a low-carbon economy
161	Establish a Just Transition Review Group under NESC working group structures to advise the Climate Action Delivery Board
162	Support the work of the Regional Transition Team established in the Midlands Region to address the specific challenges posed by the transition to a low-carbon economy, and to propose the additional measures that need to be taken
163	Examine national and international sources of funding that could be used to support the transition to a low-carbon economy and society
164	Coordinate and support the development of tools and supports at regional and enterprise level which address just transition objectives
165	Extend flagship low-carbon projects to other towns and villages
166	Prioritise the development of supply chain opportunities through appropriately designed and complementary energy and enterprise policies and measures of priority
167	Expand the SEAI Sustainable Energy Communities Programme from 256 members to 500 by 2025, and 1,500 by 2030
168	Provide improved training and support initiatives for community and voluntary stakeholders to support community, local and national low-carbon development, incorporating community outreach elements
169	Create a framework in which social enterprises can be formed and grow
170	Support, through the education system, the required initiatives in the Just Transition through existing and new strategies being developed, and through ongoing collaboration with relevant Government departments and agencies
171	Enhance the career advice service provided through the Public Employment Service to include offering support for those impacted by technological and other changes
172	Assist local enterprises, through the Regional Skills Forum, to identify their skills' needs through a variety of audit tools to ensure that the Region has effective skills capacity to support the Just Transition
173	Review ways to improve how current energy poverty schemes target those most in need
174	Review infrastructure sizing and design standards to reflect the demand of domestic scale low-carbon technologies
175	Promote greater awareness of, and access to, network services available in the case of severe weather events by ESB Networks
176	Engage with all utility providers to improve the resilience of services in the face of severe weather events
177	Review challenges associated with the availability of property (home and business) insurance, and possible responses to this issue
178	Science Foundation Ireland, with engagement of the Department of Communications, Climate Action and Environment , will create national awareness amongst the Irish public of key actions that need to be taken at an individual and national level to ensure Climate Action adaptation and mitigation
179	Undertake public consultation to inform future Rural Development Strategy
180	Ensure that the school curriculum is reviewed against climate action on an ongoing basis

16 | Adaptation

16. Adaptation

16.1 State of Play

As well as taking measures to reduce greenhouse gas emissions, we must also adapt to certain climate change impacts that are already locked in and will continue and evolve for the foreseeable future.Many of the observed changes are unprecedented over decades to millennia. The atmosphere and oceans have warmed, the amounts of snow and ice have diminished, and sea levels have risen.

The 2018 Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C clearly states that the impacts of human-induced global warming of 1°C are already being felt around the world in terms of the intensity and frequency of some climate and weather extremes. In addition, the special report highlighted where climate models project real and significant differences in the scale of the impacts we will face on a global level between current levels of warming, and warming of 1.5°C and 2°C.Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and will increase further if we reach 2°C..

The need for adaptation to address the current and future risks posed by a changing climate is, therefore, both urgent and essential to successfully transition to a climate resilient economy and society by 2050.

Observations show that Ireland's climate is changing in terms of sea level rise, increases in average temperature, changes in precipitation patterns and weather extremes (EPA 2017). Temperatures have increased by about 0.8°C over the period 1900 to 2012 – an average of about 0.07°C per decade. The overall trend is upwards and consistent with global patterns of change.

Climate change is expected to have diverse and wide ranging impacts on Ireland's environment, society and economic development, including managed and natural ecosystems, water resources, agriculture and food security, human health and coastal zones. The most immediate risks to Ireland which can be influenced by climate change are predominantly those associated with changes in extremes, such as floods, precipitation and storms.

The potential impacts and costs of inaction to the effects of climate change are significant. The floods of Winter 2015/16 are considered to be worst floods on record and occurred during what was also the wettest winter on record (with rainfall totals at 189% of normal). The Department of Transport, Tourism and Sport allocated €106 million alone for repairs to the rail network, regional and local roads and €8 million for national roads.

Storm Ophelia in 2017 necessitated a massive national emergency response, shutting down schools and Government Buildings and disrupting business across the country. At the peak of Ophelia 385,000 homes and businesses were without power and 109,000 homes were left without water supply. It has been reported that the cost of insurance claims due to 2017's Storm Ophelia-related damage was estimated at €45 million, with 2018's Storm Emma reported as costing Irish insurers an estimated €39 million.

Summer 2018 saw prolonged drought conditions across the country, particularly in the eastern region, severely testing our water supply infrastructure and reminding us that we also need to prepare for the impact of higher temperatures and longer dry spells in the summer. Under business

as usual greenhouse gas emissions, climate model projections for the end of this century suggest that 1995, the hottest summer in modern Irish history, may be seen as an unusually cool summer in the future. By the end of this century, summers as cool as 1995 may only occur once every 7 years. That translates into summers at least as hot as 1995 occurring almost 90 percent of the time.

16.2 Policy Measures to be Further Developed

Effective climate adaptation can minimise risks and costs and also protect lives and property by building resilience into existing systems. This can ultimately help minimise the emergency response that is necessary in response to severe weather events. Work undertaken in the area of flood risk management to date is a good illustration of this principle. Flood risk prevention strategies often make use of assessments of long-term changes in flood intensity and frequency based on climate projections. This can build long term resilience into flood defences to cope with conditions that may arise in the future.

In this regard, early adaptation planning for the impacts of climate change makes economic sense. Figures compiled by the OPW estimate the current cost of a 1 in 10 year flood event in Limerick City at around €4 million. Under a medium emission future scenario this figure rises to €117 million. Under a high emissions future scenario this figure rises again to €358 million. These figures are even higher for 1 in 100 and 1 in 1000 year floods.

Adaptation seeks to minimise costs and maximise the opportunities arising from climate change. Adaptation actions range from building adaptive capacity (e.g. increasing awareness, sharing information and targeted training) through to policy and finance based actions. Adaptation actions should be risk based, informed by existing vulnerabilities of our society and systems, and an understanding of projected climate change. Adaptation actions taken to increase climate resilience must also consider impacts on other sectors and levels of governance.

National Adaptation Policy

Ireland's main policy response to these challenges is set out in our first statutory National Adaptation Framework, which was prepared under the Climate Action and Low Carbon Development Act 2015, and published in January 2018.

While outlining a whole of Government approach to climate adaptation, the National Adaptation Framework (NAF) identifies 12 key sectors under the remit of 7 Government Ministers where sectoral adaptation plans are to be submitted to Government for approval no later than 30 September 2019. Table 16.1 sets out the departments and sectors under a themed approach that are preparing sectoral adaptation plans under the NAF.

Table 16.1 Sectoral Adaptation Plans under Preparation

Theme	Sector Level	Lead Department for Sectoral Adaptation Plans
Natural and Cultural Capital	Seafood	Department of Agriculture, Food and the Marine
	Agriculture	
	Forestry	
	Biodiversity	Department of Culture, Heritage and the Gaeltacht
	Built and Archaeological Heritage	
Critical Infrastructure	Transport infrastructure	Department of Transport, Tourism and Sport
	Electricity and Gas Networks	Department of Communications, Climate Action and Environment
	Communications networks	
Water Resource and Flood Risk Management	Flood Risk Management	Office of Public Works
	Water Quality	Department of Housing, Planning and Local Government
	Water Services Infrastructure	
Public Health	Health	Department of Health

The NAF also identifies the critical role to be played by Local Authorities in addressing climate change adaptation. In January 2018, the Department of Communications, Climate Action and Environment entered into a five year financial commitment of €10 million to establish four Local Authority Climate Action Regional Offices (CAROs). The offices will have a key role in 2019 in supporting the preparation of local adaptation strategies and driving climate action (adaptation and mitigation) at Local Authority level. Local Authorities are also required to prepare a local adaptation strategy by 30 September 2019.

A number of resources are also in place to assist the sectors and local authorities with adaptation planning. These include the online resource, *Climate Ireland*, Sectoral Guidelines for Planning for Climate Change Adaptation, and Local Authority Climate Change Adaptation Strategy Development Guidelines, which were developed under the NAF in 2018.

Climate Ireland

The provision of accurate and authoritative information and expertise is a crucial element in ensuring that Government, Local Authorities, communities and the private sector can plan ahead and respond effectively to the challenges of climate change.

Ireland's Climate Information Platform, *Climate Ireland* was developed on a phased basis under the EPA Research Programme as a "one-stop shop" of information, data and knowledge to support

those preparing for, and adapting to, the consequences of climate change.

The platform provides a central source of climate data for Ireland, combining authoritative information from a variety sources such as Met Éireann, OPW, EPA, the European Environmental Agency and the Intergovernmental Panel on Climate Change (IPCC) to assist a variety of stakeholders in planning ahead for the likely impacts of climate change.

Climate Ireland is currently managed by a research team in the MaREI Centre in UCC. The platform itself is hosted within the Irish Centre for High End Computing. The project has concluded its final research phase and is currently in receipt of interim funding from EPA until end 2019. DCCAE is currently developing a proposal in relation to the future of *Climate Ireland* in conjunction with EPA and other stakeholders, including Met Éireann, OPW and Marine Institute.

The NAF identifies the critical importance of putting *Climate Ireland* on a permanent operational basis to continue to inform the relevant national sectors, but also in terms of providing a valuable, credible data and consistent information resource to civil society and the private sector.

Whole of Government Climate Resilience Ambition

The NAF emphasises the importance of a whole of Government response to climate adaptation that includes all Government Ministers, not just those responsible for preparing adaptation plans for the twelve identified sectors. 'Climate proofing' Ireland is a collective responsibility for which every member of Irish society is responsible. Government can provide an enabling environment for independent adaptation actions by private actors in terms of ensuring the necessary information and incentives are available to respond appropriately, but a proactive role for Government is also justified to tackle clear market failures and to lead and coordinate this effort. The Government will continue to work to deliver the NAF and the objectives of sectoral adaptation plans and local adaptation strategies prepared under it. In line with the Climate Act, the NAF will be reviewed at a minimum of every 5 years.

At a minimum, the completed sectoral plans will present evidence of a clear understanding and description of the risks presented by climate change to the sector, their current levels of vulnerability to such risks, and actions required to address these risks and ensure climate resilience within their sectors. In presenting the plans it will be crucial that line departments identify any resource implications of the measures outlined in their sectoral plans and engage with the Department of Public Expenditure and Reform in relation to them as soon as possible. This will ensure effective implementation from 2020 onwards but will also help clarify where cross sectoral priorities interact or indeed overlap.

The effective integration of adaptation into decision making (mainstreaming) within all relevant national policy and legislation, and department and agency decision-making, is essential. An example of this would include ensuring that spatial plans underpinning our economic development take account of current, medium as well as long term climate risks, or ensuring that building standards evolve in line with the likely impacts of climate change. Climate change also poses clear risks to enterprise, but adaptation also brings opportunity through green growth, innovation and climate services. Ireland must position itself to meet these opportunities.

Under the NAF, all departments must engage with key players in their respective sectors, championing adaptation policies and encouraging the private sector and civil society to partake in the collective adaptation effort. In this regard it will be crucially important to continue to implement

a programme of awareness raising to address climate adaptation and resilience through local and regional level partnership with the NDCA. This should include promoting better societal response in the context of the increased risk of extreme weather events in a changed climate.

The current iteration of this overall Plan focuses primarily on the need to identify further mitigation measures to at least achieve our greenhouse gas emissions targets set for 2030. However, the Government is also fully committed to providing clear leadership in promoting the policy objective of climate change adaptation, and to supporting a coherent approach to dealing with the challenges ahead. This will build on and be informed by ongoing work currently being undertaken at sectoral and local level under the NAF.

16.3 Actions

The detailed implementation maps for actions, including timelines and responsible organisations, are set out in the accompanying Annex.

Action Number	Action
181	Build sectoral resilience to the impacts of climate change through delivery of sectoral plans as required under the NAF
182	Build local/regional resilience to the impacts of climate change through delivery of Local Authority Adaptation Strategies as required under the NAF
183	Put in place arrangements to ensure Climate Ireland is developed to its full potential as an operational support for climate adaptation and climate action in Ireland