



Rialtas
na hÉireann
Government
of Ireland

Project
Ireland
2040

Investing in the Transition to a Low-Carbon and Climate-Resilient Society 2018 - 2027



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Taoiseach's Foreword



Climate change is the existential challenge of our generation. We must protect our planet and make it great again. Our guiding principle is that we intend to hand over guardianship and stewardship of our planet to our grandchildren in a much better state than we inherited it. Ireland is a small country but we have a big role to play in meeting this challenge at home and on the world stage.

Project Ireland 2040 is our plan for the future, for a population that will grow by one million people by that year.

Project Ireland 2040 which encompasses the National Development Plan and the National Planning Framework will transform our environmental, social and economic infrastructure over the next two decades. €116 billion will be invested in our public infrastructure in the next years and that's just the start.

It represents a decisive shift in the approach to long-term planning and investment by Government. By underpinning our national ambition for the transition to a low-carbon and climate-resilient society with our new investment and planning framework, we have given an added impetus to action through the Government's National Mitigation Plan.

Project Ireland 2040 is an affirmation of our responsibility and desire to achieve our long-term climate action targets. Over the coming decade, over twenty per cent of the investments that we make (€22 billion), will be dedicated to climate action thus making a significant contribution to our long-term objectives.

However, we do not under-estimate the task before us. The necessary transformation will not be achieved exclusively by public investment and Government will need to deploy the full range of actions available to us to drive sustained and often difficult policy changes across all of areas of our activity including taxation, regulation and behavioural change.

This is necessary because of the scale of the challenge and also because of the rewards for our environment, economy and society.

The societal transformation required for this Low-Carbon transition means that we must find new ways of engaging with our communities to realise and champion change. The National Dialogue on Climate Action will be a driving force in harnessing these strengths in the period ahead.

Project Ireland 2040 is an opportunity to re-imagine how we approach climate action and to safeguard our country for future generations. It re-commits us to what is required of Ireland as a nation and enables us to proceed with determination towards our low-carbon, climate-resilient future.

Leo Varadkar, TD

An Taoiseach

Minister's Foreword



When I published Ireland's first statutory National Mitigation Plan last year, I underlined that addressing climate change is one of the most critical challenges facing us.

The National Mitigation Plan is the first step in addressing this challenge, and it will be built on over time with new policies and measures to address Ireland's greenhouse gas emissions. It does not provide a complete roadmap out to 2050. Instead, to enable it to be amended, refined and strengthened over time, the Plan begins the process of development of medium- to long-term mitigation options. This approach will ensure that Ireland is best positioned to take the necessary actions, in the next and future decades, to achieve the national transition objective to 2050. This approach reflects the broad and evolving nature of the sectoral challenges outlined in the Plan, coupled with the continued development and deployment of emerging low-carbon and cost effective technologies across different sectors of the economy. The National Adaptation Framework, published earlier this year, in turn sets out what Ireland must now do to prepare for those expected impacts of climate change that we are locked in to.

As a country we are playing catch up with our obligations on climate. This is as much an opportunity as an obligation. In any event it is a moral necessity and a vital national interest. Addressing climate change and our climate targets out to 2030 and beyond is top of the policy agenda for the Government. Individual Government Ministers are playing a key leadership role in driving action within their own sectors, and are directly accountable to the Oireachtas, through the Annual Transition Statement, to demonstrate real progress in their sectors to moving Ireland closer to achieving its national transition objective. We will continue to implement this robust accountability framework on a rolling, year-on-year, basis.

Project Ireland 2040 now provides a significant step change in both the ambition of our commitments for climate action and the funding available to meet those commitments over the next decade. Reflecting the strong commitment of Government on this issue, almost €22 billion will be directed to addressing the transition to a low-carbon and climate-resilient society. In addition, the National Development Plan allocated a further €8.6 billion for investments in sustainable mobility. This means that well over €1 in €5 spent under the National Development Plan will be on climate mitigation and adaptation and this capital investment will enable us to deliver a significant reduction in our greenhouse gas emissions over the period to 2030. To complement this large scale investment, I recently announced the launch of a new €500 million Climate Action Fund which will support the delivery of the types of transformational projects that will be necessary to advance our transition to a low-carbon, climate-resilient Ireland.

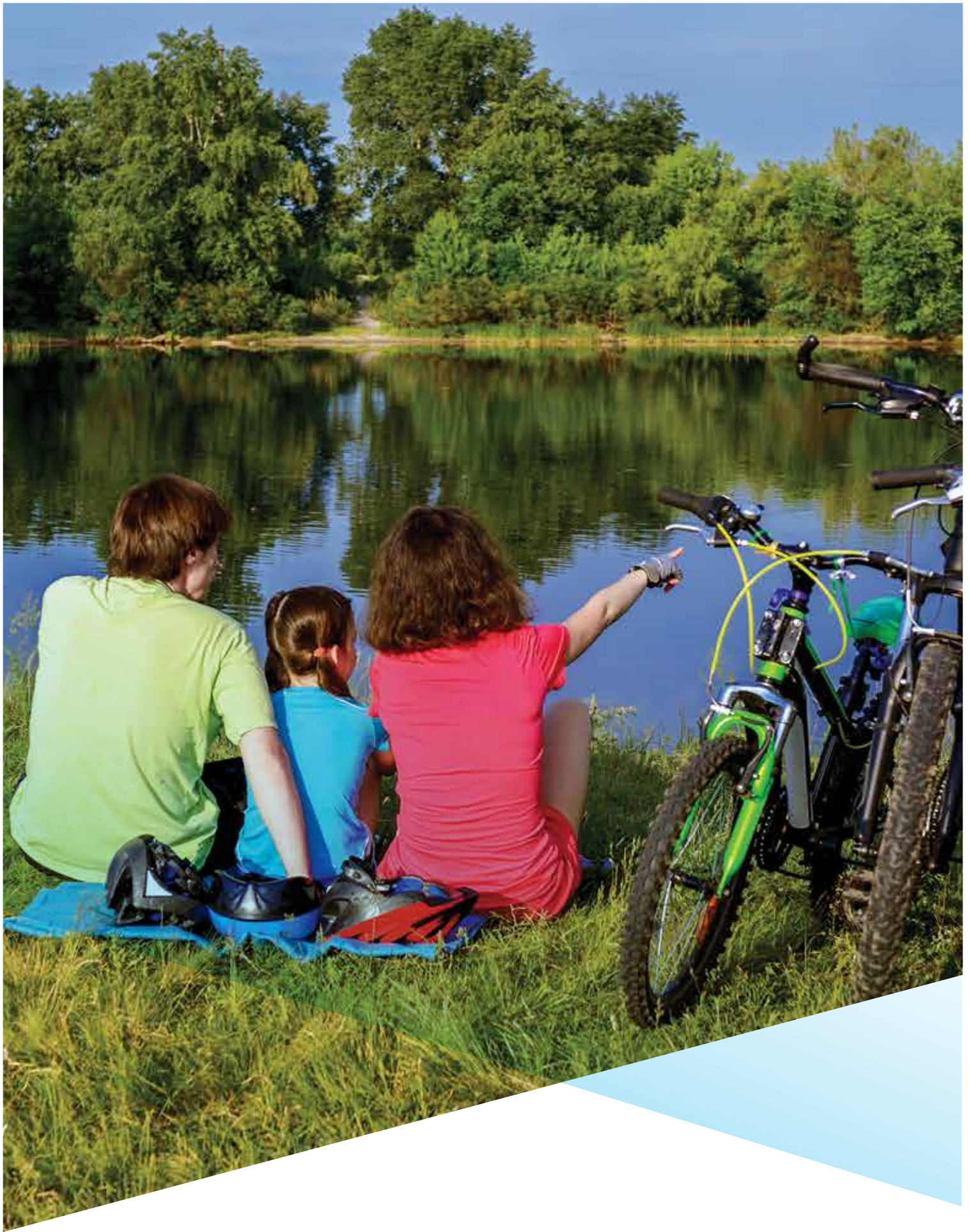
The National Development Plan, as part of Project Ireland 2040, will transform Ireland's approach to addressing climate action. On its own, however, it will not be sufficient. How we address climate action will need ongoing reinforcement across all areas of Government activity. We are already taking some important steps in this regard, in terms of how we approach accounting for climate-related expenditure and in our appraisal of public spending projects. Notwithstanding this, more will need to be done across Government, and with greater urgency, including in the areas of taxation, regulation and behavioural change, and we are looking at these issues closely now.

How we engage with wider society will also be crucial as we will not achieve our climate objectives through Government action alone. The Citizens' Assembly showed that individuals have a strong appetite for engaging with this challenge. Last year, I launched the National Dialogue on Climate Action to involve individual citizens and communities in the process of shaping Ireland's low-carbon transition.

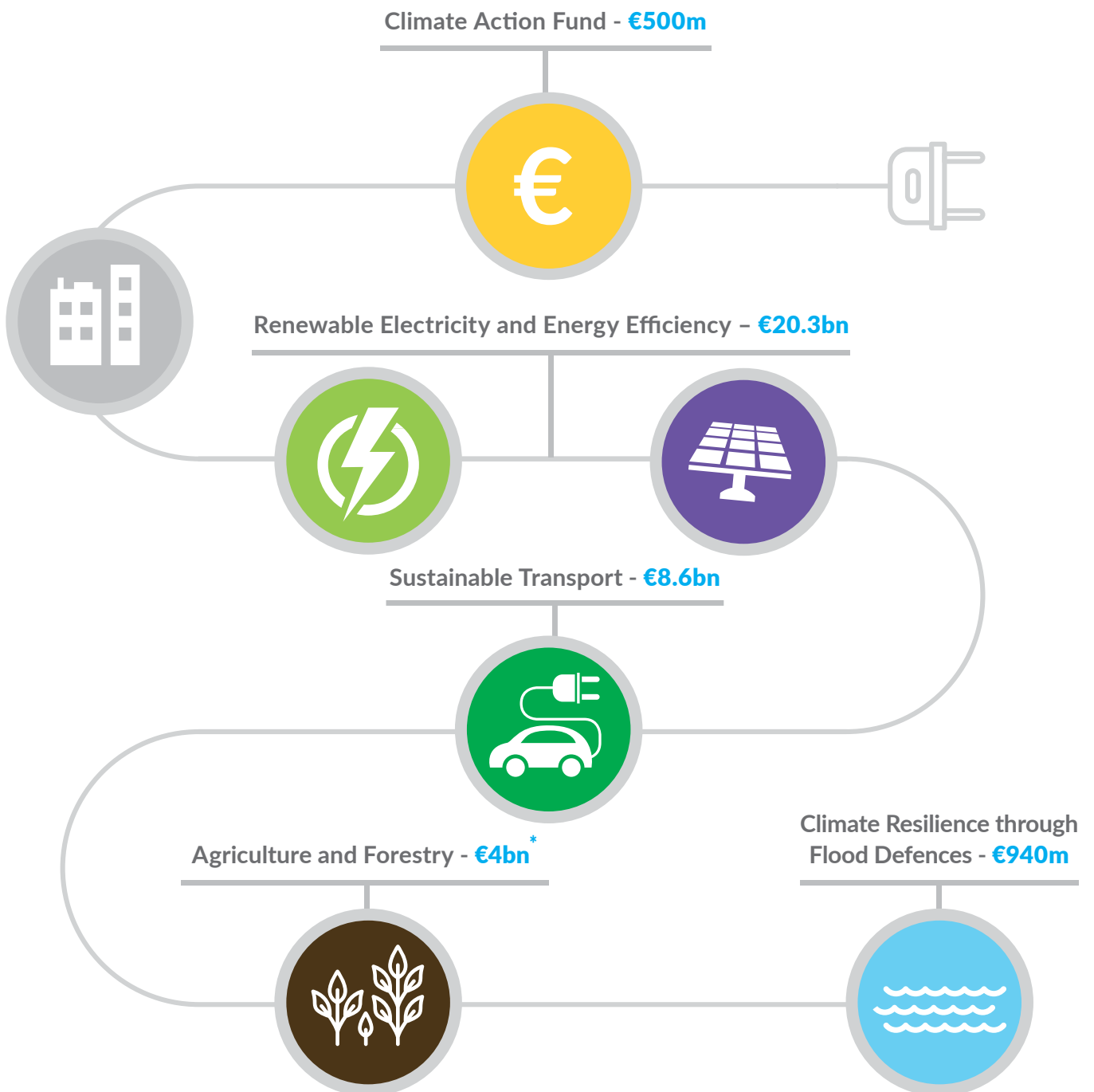
There is no silver bullet to achieve our climate objectives. But by working together, with citizens and across government, we can take the necessary measures to ensure we can make significant progress towards our goal of a low-carbon, climate-resilient Ireland.

Denis Naughten, TD

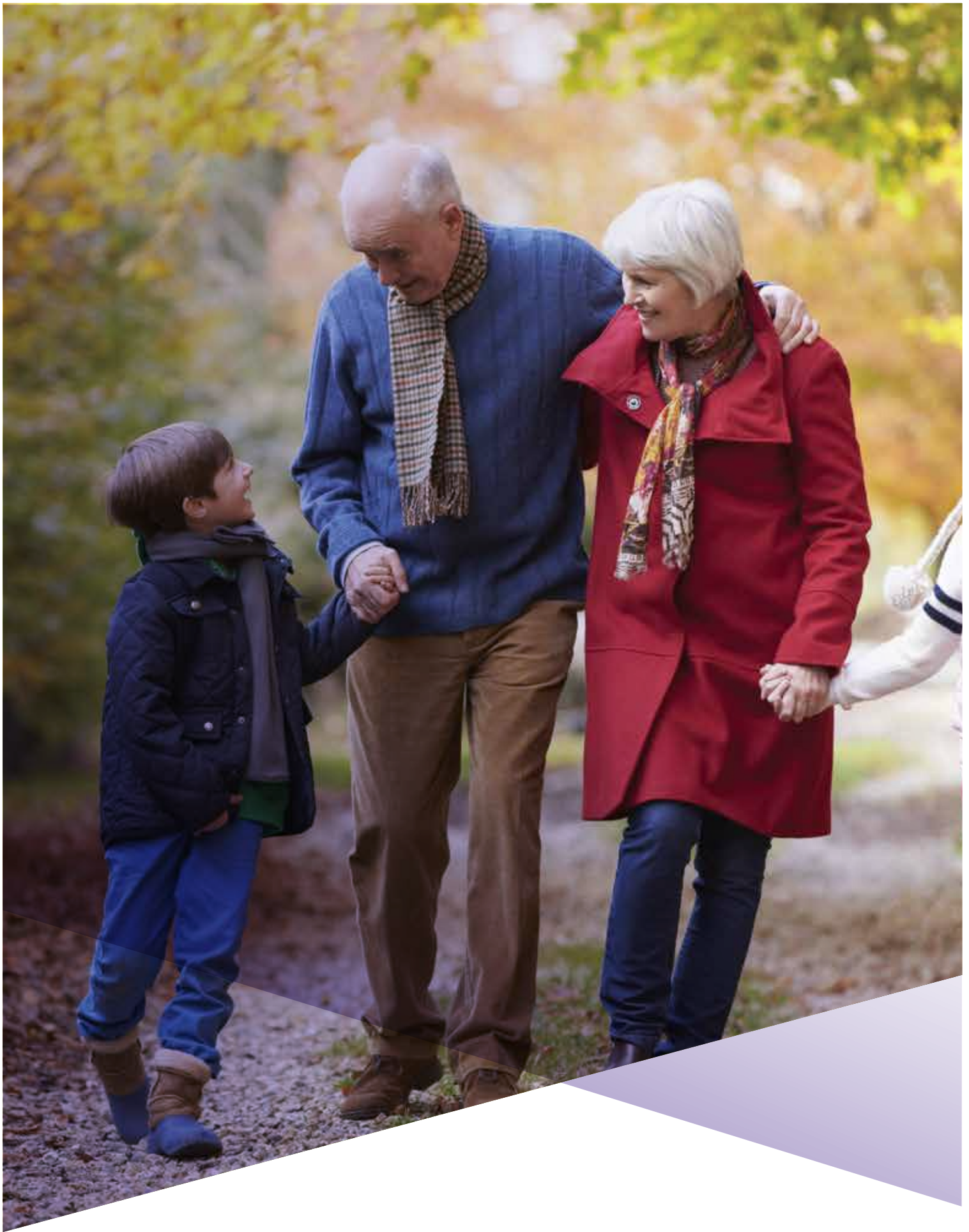
*Minister for Communications,
Climate Action and Environment*



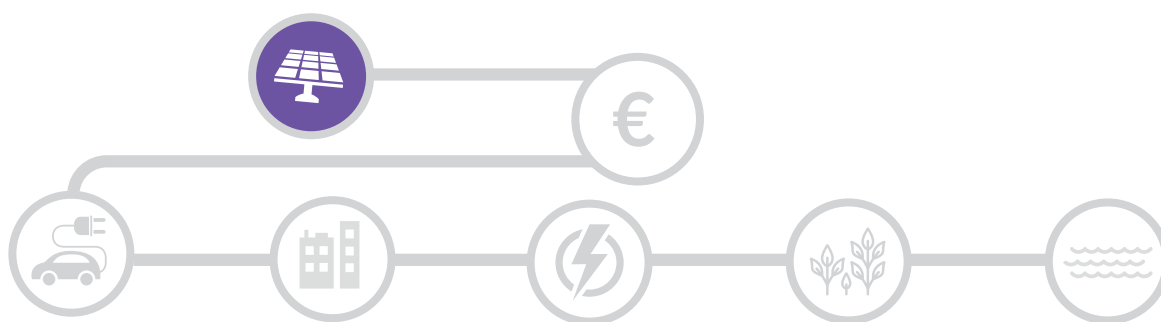
1 | Overview of Investment



*Encompassing Rural Development and Forestry Programmes 2014-2020 and including measures with multiple objectives, including climate mitigation, water, biodiversity and social aspects.



2 | The Climate Change Challenge



Our Changing Climate

One of the greatest global challenges for this and future generations is how we address climate change. Evidence for warming of the climate system is unequivocal and it is extremely likely that human activity has been the dominant cause of the observed warming since the mid-20th century. Observations show that global average temperatures have increased by almost 1°C since pre-industrial times. The atmosphere and ocean have warmed, the amount of snow and ice has diminished 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 the climate system. Changes in Ireland's climate are in line with these global trends.

Climate change is already having diverse and wide ranging impacts on Ireland's environment, society, economy and natural resources. Future impacts are predicted to include sea level rise; more intense storms and rainfall; increased likelihood and magnitude of river and coastal flooding; water shortages in summer; increased risk of new pests and diseases; adverse impacts on water quality; and changes in the distribution and time of lifecycle events of plant and animal species on land and in the oceans. Against this background, strategies must be devised to reduce and manage climate change risks through a combination of mitigation and adaptation responses.

The Global Response to the Climate Challenge

The international community has a limited window for real action to ensure that current and future generations can live sustainably in a low-carbon and climate-resilient world.

Ireland is a party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, which together provide an international legal framework for addressing climate change. In December 2015, the Paris Agreement was adopted by international consensus. The Agreement aims to restrict global temperature rise to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C. It also aims to increase global ability to adapt to the adverse impacts of climate change and to foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten sustainable food production. It also seeks to achieve a balance between emissions sources influenced by human activity, and emissions removals by sinks, in the second half of this century.

The Paris Agreement was adopted by 195 Parties to the UNFCCC representing 95% of global emissions, at the twenty-first session of the Conference of the Parties to the UNFCCC in December 2015. This legally-binding Agreement represents a global milestone in international efforts to achieve a peaking of greenhouse gas emissions as soon as possible, and to achieve net zero emissions in the second half of the century. These efforts are now represented by 188 Nationally Determined Contributions (NDCs), which will increase in ambition over time. Ireland's contribution to the Paris Agreement will be via the NDCs tabled by the EU on behalf of its Member States, which commits the EU as a whole to reduce greenhouse gas emissions by at least 40% by 2030, compared with 1990 levels.

Action at European Union Level

In February 2011, the European Council reconfirmed the EU objective of reducing greenhouse gas emissions by 80 to 95% by 2050 compared to 1990. Work is now underway by the European Commission to update the EU's long-term decarbonisation objectives to ensure their alignment with the Paris Agreement. While maintaining a focus on the long-term objective to 2050, the European Union has also decided that this objective should be achieved by fixing targets for intermediate stages before 2050.

European Union Objectives for 2030

In October 2014, the European Council reached political agreement on headline greenhouse gas emissions reduction targets which subsequently informed the European Union's first Nationally Determined Contribution under the Paris Agreement. The overall EU reduction of at least 40% in greenhouse gas emissions by 2030, compared to 1990 levels, is to be delivered collectively by the EU, with reductions in the Emissions Trading System (ETS) and non-ETS sectors amounting to 43% and 30% respectively by 2030 compared to 2005. As part of this overall EU effort, Ireland will be required to reduce our non-ETS emissions by 30% relative to 2005 levels by 2030.

How Ireland is Responding

The extent of the challenge to reduce greenhouse gas emissions in line with our international commitments under the Paris Agreement, as well as to meet our EU obligations, is well understood by Government. The 2014 National Policy Position on Climate Action and Low-Carbon Development establishes the fundamental national objective of achieving transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050. Specifically, the National Policy Position sets out a long-term vision based on:

- an aggregate reduction in carbon dioxide (CO₂) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors; and

- in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

As envisaged by the National Policy Position, the evolution of climate policy in Ireland will be a dynamic, iterative process, with the ultimate objective of successive mitigation plans and adaptation frameworks incrementally achieving the required transition. While the Government is taking the lead in addressing the climate challenge, our ability to make substantial progress towards our 2050 objectives will require engagement and action by empowered individual citizens, communities and wider civil society. To facilitate this process, the Government established a National Dialogue on Climate Action in 2017. Its overall objective is to provide an inclusive process of consensus-building across society on enabling the transition to a low-carbon and climate-resilient future.

National Mitigation Plan

Ireland's first statutory National Mitigation Plan, published in July 2017, does not provide a complete roadmap to achieve our 2050 decarbonisation objective, but begins the process of development of medium-to long-term options to ensure that we are well positioned to take the necessary actions in the next and future decades. This will be an ongoing process and the National Development Plan represents an important step-change in our journey to 2050.

National Adaptation Framework

Ireland's first statutory National Adaptation Framework, published in January 2018, sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to harness any positive impacts. The Framework outlines a whole-of-government and society approach to climate adaptation in Ireland. Under the Framework a number of Government Departments will be required to prepare sectoral adaptation plans in relation to the priority areas for which they are responsible. Work on these plans has now begun. Local authorities are also taking forward the preparation of local adaptation strategies.

The National Adaptation Framework will be reviewed at least once every five years. The Framework also aims to improve the enabling environment for adaptation through ongoing engagement with civil society, including through the National Dialogue on Climate Action, as well as with the private sector and the research community.

National Planning Framework

Ireland's National Policy Position will fundamentally shape investment choices over the coming decades guided by the ongoing

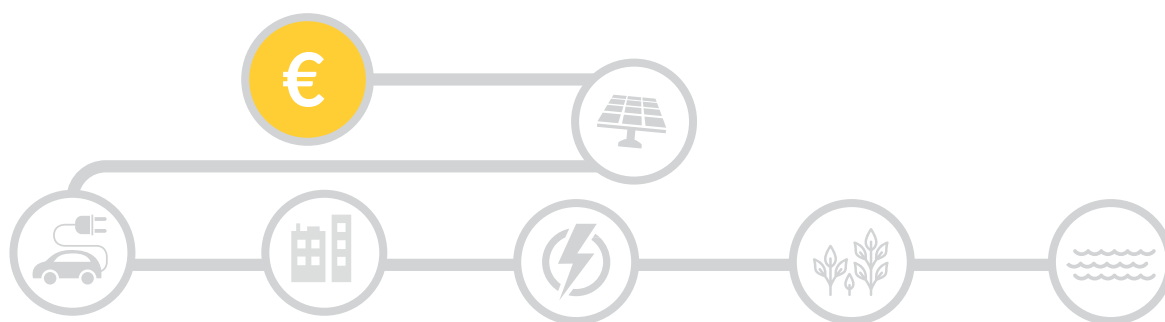
development of both the National Mitigation Plan and National Adaptation Framework. The National Planning Framework now provides the framework for key strategic decisions on the investments required over the next two decades. It highlights the centrality of the transition to a low-carbon climate-resilient society to all elements of spatial policy, focusing on where we live, where we work, and how we travel. These are all directly driving our pattern of energy use, and in particular the current level of harmful greenhouse gas emissions, which Ireland is committed to reducing substantially.





3

Investment in the Transition to a Low-Carbon Society



National Strategic Outcome 8 of the National Development Plan envisages expenditure of €21.8 billion (comprising €7.6 billion Exchequer and €14.2 billion non-Exchequer), over the period of the National Development Plan, in furthering Ireland's transition to a low-carbon and climate-resilient society. A further €8.6 billion is proposed for investment in public transport, which will contribute to the decarbonisation of Ireland's transport system. This means that more than 20% of total funding over the lifetime of the Plan will be dedicated specifically to climate action, supporting a range of additional measures. This will deliver a step-change in Ireland's performance in relation to our objective to significantly reduce our greenhouse gas emissions over the period to 2030 and set us on a sustainable pathway to decarbonisation and climate resilience by 2050.

On account of the inherently cross-sectoral and integrated nature of the decisions required in such areas as transport, energy, agriculture and the built environment, addressing climate change is a unique challenge for public policy. Investment choices across different sectors must, therefore, be coherent and highly integrated with each other requiring a strong co-ordinated approach between the relevant responsible State bodies and State-owned enterprises. They must also be closely aligned and mutually reinforcing in terms of the critical role of complementary taxation and regulatory measures, as well as private investment.

Private-sector investment will have a crucial role to play in the achievement of a low-carbon climate-resilient transition, alongside the substantial contribution made through public investment. In this regard, in order to support private investment decisions, the price of carbon should act as an appropriate signal.

Carbon pricing and low-carbon investment

The Government is committed to carbon pricing as a core element of the suite of policy measures to address and reduce greenhouse gas emissions over time. Carbon pricing has the potential to drive reductions in consumption of fossil fuels and encourage energy efficiency improvements by households and businesses. Ireland is one of a minority of countries globally to have implemented economy-wide carbon pricing measures. Since 2005, electricity generation sites and large industrial installations have been included in the EU's Emissions Trading System (ETS). Outside of the ETS, a national carbon tax, currently set at €20 per tonne of CO₂ emitted, was introduced on a phased basis from 2009.

Over the longer term, 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 decarbonisation objective in a cost-effective manner by 2050. Clear long-term signalling on the future evolution of the carbon tax is essential to ensure that it is able to send a sufficiently strong signal to drive low-carbon investments by households and businesses.

Climate mitigation and adaptation are cross-cutting priorities. A number of vital directions for public investment by relevant sectoral Departments and Local Authorities, to underpin Ireland's response to global climate change, will be prioritised and accelerated over the lifetime of the National Development Plan.

In addition to the proposed expenditure under the key National Strategic Outcomes of the National Development Plan, climate change objectives will need to fundamentally shape our public capital investment choices across a range of sectoral areas, as well as those relating to spatial policy. Work is currently underway, in line with the commitment in the National Mitigation Plan, to review the investment appraisal model under the Public Spending Code, which will have a very important role to play in ensuring that decision-making in relation to public capital investment projects is guided and informed by a full evaluation of its climate impacts.

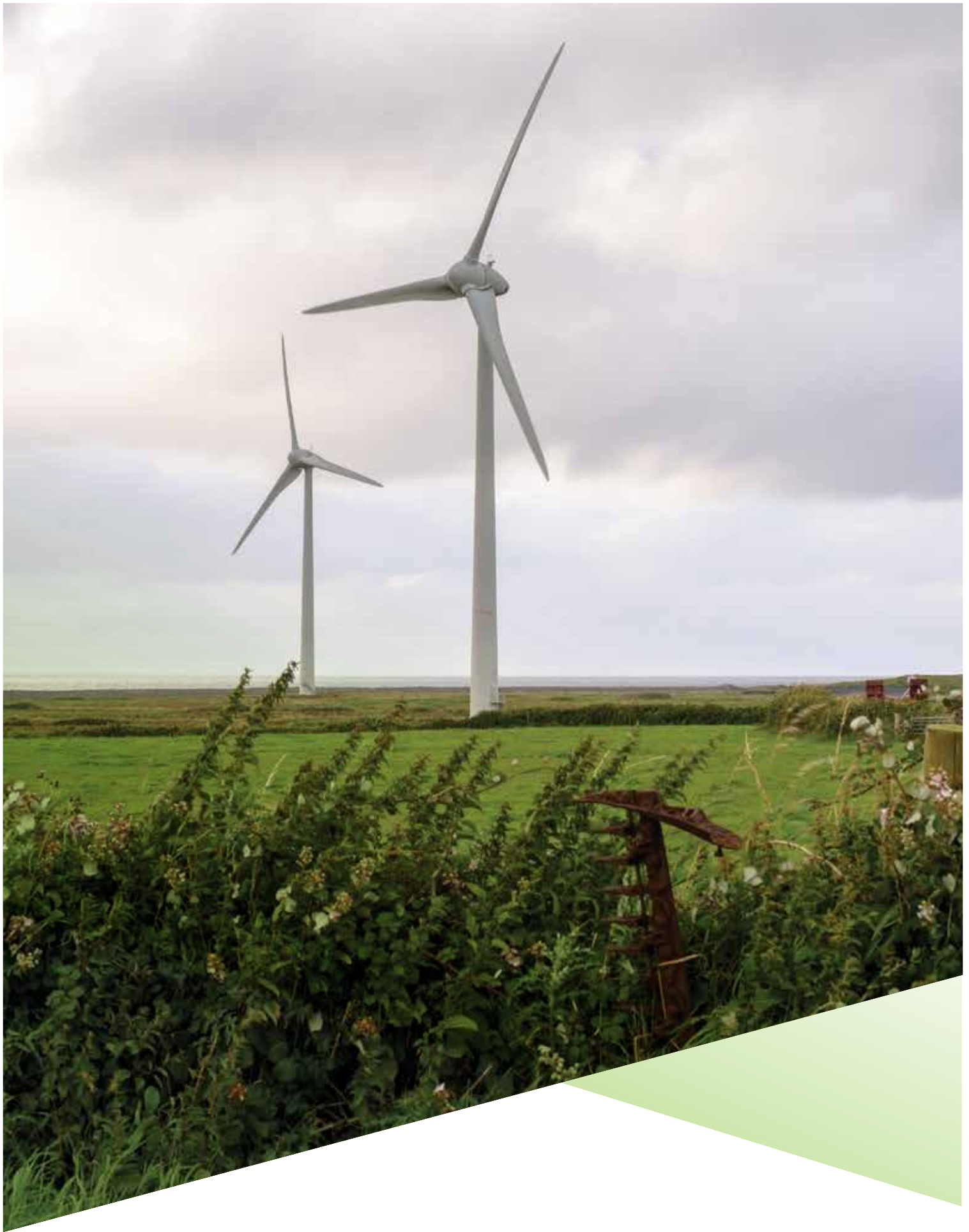
Climate Action Fund

Given the very significant levels of investment required to fund the necessary climate action measures identified in the National Development Plan and National Mitigation Plan, a new Climate Action Fund will be established that will leverage investment by public and private bodies. The fund will have an allocation of €500 million. To finance the fund and ensure it remains capable of replenishing its resources, the Government will repurpose part of the existing petroleum products levy (commonly known as the NORA levy) of 2 cents per litre that has been in place since 2007. The fund will focus on climate action projects where it can augment public or private investment.



Contribution of National Development Plan to Ireland's decarbonisation objectives

Contribution to 2021-2030 Non-ETS targets	Additional contribution to long-term decarbonisation
Investment in energy efficiency, with upgrades to homes increasing from 30,000 to 45,000 per annum from 2021 to achieve a minimum BER Rating 'B'	New Renewable Electricity Support Scheme to support up to 4,500 megawatts of additional renewable electricity by 2030
Investments in energy efficiency of existing commercial and public building stock with a target of all public buildings and at least one-third of total commercial premises upgraded to BER Rating 'B'	Energy research funding to accelerate diversification away from fossil fuels to green energy, including wind, wave, solar, biomass, biofuels, biogas and hydrogen
Supports for changing out oil-fired boilers to heat pumps, along with the provision of roof solar, in at least 170,000 homes	Ongoing reinforcement of existing power grid and enhanced electricity interconnection, including the Celtic Interconnector to France and further interconnection to the UK
Full roll-out of the new Support Scheme for Renewable Heat	Conversion of Moneypoint to end the burning of coal by 2025 and conversion of peat power plants to more sustainable low-carbon technologies by 2030
At least 500,000 electric vehicles on the road by 2030 with additional charging infrastructure to cater for planned growth	Roll-out of the National Smart Energy Metering programme to commence in 2019
Expand the refuelling network for alternatively fuelled vehicles to address freight emissions	Development of gas infrastructure projects to support regional and rural development and the low-carbon transition
Major investments in public transport, including transitioning to low-emission buses and development of a comprehensive cycling and walking network	Piloting of 'climate-smart countryside' projects to establish the feasibility of the home and farm becoming net exporters of electricity
Town-scale pilots of food and agricultural waste-to-gas in agricultural catchments for local gas networks supply and biogas production	No new non-zero emission vehicles to be sold in Ireland post 2030 and no NCT certs to be issued for non-zero emission cars post 2045



4 | Decarbonising Electricity



Decarbonising Electricity

Ireland's energy system requires a radical transformation in order to achieve its 2030 and 2050 energy and climate objectives. This means that how we generate energy, and how we use it, has to fundamentally change. This change is already underway with the increasing share of renewables in our energy mix and the progress we are making on energy efficiency.

Investment in renewable energy sources, ongoing capacity renewal, and future technology affords Ireland the opportunity to comprehensively decarbonise our energy generation. By 2030, peat and coal will no longer have a role in electricity generation in Ireland. The use of peat will be progressively eliminated by 2030 by converting peat power plants to more sustainable low-carbon technologies.

Investment in renewable energy must be complemented by wider measures to moderate growth in energy demand, diversify supply sources by greater interconnection to international energy networks, and increase adoption and utilisation of electricity storage and smart meters.

This will significantly increase our capacity to electrify heat and transport and promote less energy intensive/low-carbon heating solutions, including biomass and biogas.

Commercial State Sector Energy Investments

A range of major commercial state sector energy projects will be undertaken over the period of the Plan. State-owned enterprises are expected to invest in excess of €13 billion in energy-related investments, with a particular focus on investment in regulated energy network infrastructure to provide

smart, reliable electricity networks to support security of electricity supply, smart metering and enable increased renewable generation. The remainder of the investment will be in conventional and renewable power generation assets and other energy related areas.

The focus of the investment in regulated electricity network infrastructure, the majority of which is expected to be funded by the ESB, is to ensure that Ireland's electricity network infrastructure is maintained to the highest international safety standards, that it is fit for purpose in the medium- to longer-term in order to meet projected demand levels, and that it meets the challenge of integrating world-leading levels of renewable energy. The ultimate objective of the investment is to assist in ensuring a long-term, sustainable and competitive energy future for Ireland.

This investment in the networks will deliver positive benefits for the overall economy, as it is a fundamental component in providing the energy/power capacity to support new investment and jobs while seeking to deliver that capacity in an affordable manner to ensure that Ireland remains competitive from an energy cost perspective. Investment in these assets is acknowledged as an important enabler of economic growth and, as such, the sector has a critical role to play in meeting priority infrastructural needs.

EirGrid, who manage, develop and operate the transmission grid, will continue to progress a number of important projects within the All-Island Electricity Market, and will continue to assess opportunities for interconnection with neighbouring electricity markets, for example, the Celtic Interconnector to facilitate the diversification of our electricity supply sources. Increased interconnection would also be expected to put downward pressure on wholesale electricity prices.

ESB, Bord na Móna and Coillte are active in the power generation sector and are currently planning to continue to invest in renewable energy technologies. The harnessing of these technologies will contribute to decarbonising Ireland's electricity generation and meeting ETS emissions targets. The main renewable energy technology that the companies have invested in to date is on-shore wind. The companies had 438 megawatts at the end of 2016, estimated to be c. 15% of the overall operational wind farm fleet in the State. These companies plan to continue to invest in these technologies over the coming years, with some investments expected to be delivered on a joint-venture basis. This investment is currently expected to be predominantly in wind generation assets, but opportunities in other renewable technology options will also continue to be explored.

A high proportion of Ireland's electricity needs have historically been met through gas-fired power generation. However, the growth in renewable power generation along with increased interconnection has meant a reduction in the volume of gas-fired power generation and, in turn, a lower volume of gas being transported through Ireland's gas infrastructure. A significant proportion of this renewable power generation is being delivered from wind energy but, given the intermittent nature of this technology, a proportion of Ireland's electricity needs will likely continue to be generated from gas over the medium to longer term. It will, therefore, remain necessary for a certain level of gas-fired generation to continue to be available to ensure continuity of supply and the integrity of the electricity grid during the transition towards a low-carbon energy system.

Continued investment by Gas Networks Ireland in the gas network, to ensure it remains fit for purpose, will also be made in the years ahead. Any further investment over and above maintenance levels will primarily be driven by future gas consumption levels. In this regard, Gas Networks Ireland is also exploring investment in gas demand growth opportunities, including the potential for extending its gas network.

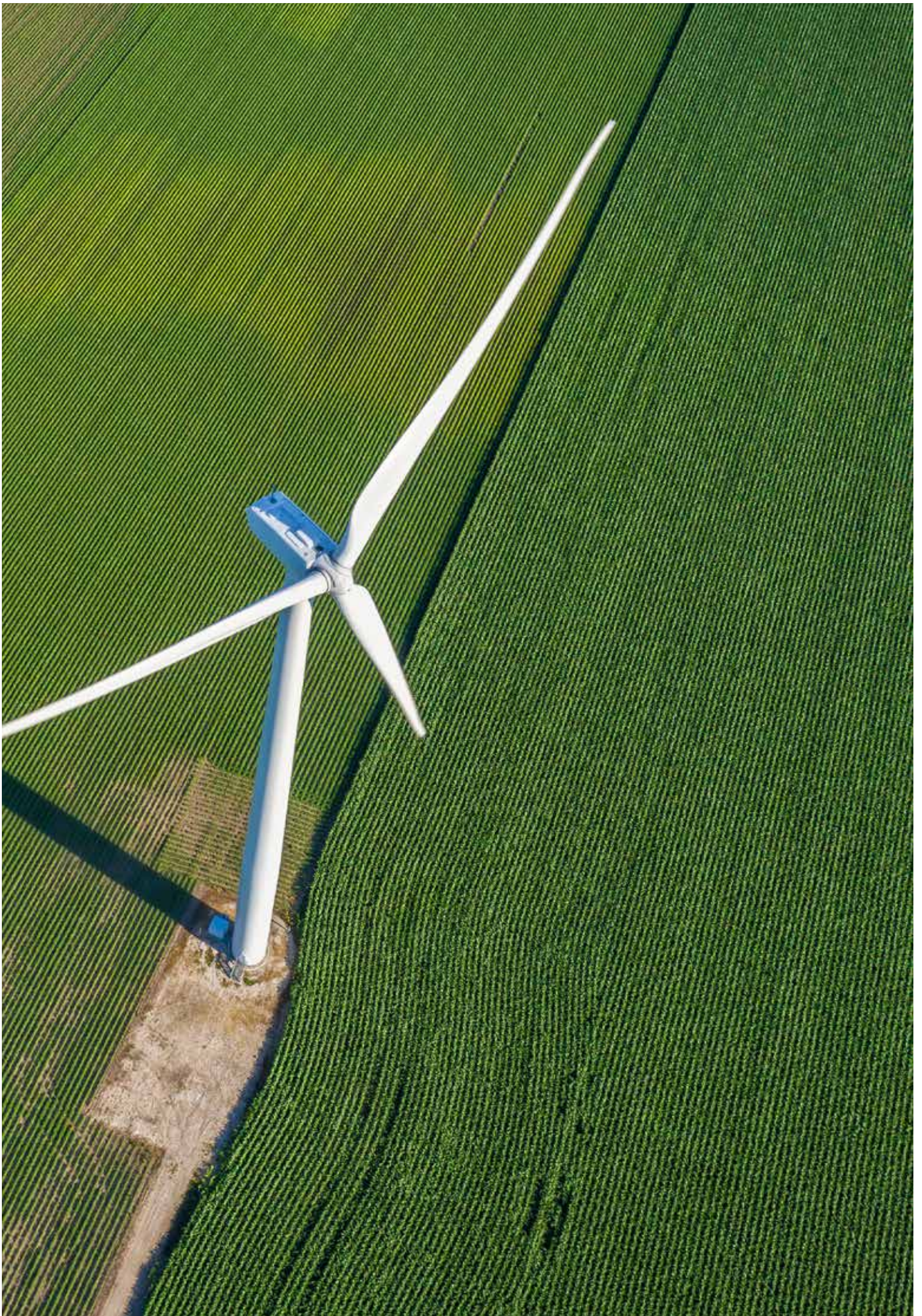
From a gas-supply perspective, the delivery of indigenous gas from the Corrib gas field has enhanced the security of supply, but Ireland will still need to import gas via the United Kingdom on a long-term basis as Corrib production is projected to decline over the

medium term. An important project in this regard that is now nearing completion is the c. €100 million gas pipeline twinning project (South-West Scotland On-shore System project), which involves the construction of 50kms of gas transmission pipeline from Cluden to Brighthouse Bay, Scotland.

Reconfiguration of existing power generation assets to lower carbon fuel sources

Certain large-scale thermal power generation assets within the ESB and Bord na Móna fleet will reach the end of their useful lives in their current configuration over the medium term. With further investment, there may be the potential for some of these assets to be reconfigured to generate electricity from lower-emission fuel options which would contribute positively to the decarbonisation of electricity.

For example, the most suitable replacement low-carbon technology will need to be identified for the ESB-owned coal plant at Moneypoint before the end of its useful life in its current configuration in 2025. Depending on the decision made in relation to the future of the plant, a significant investment will be required. For example, to replace the existing plant with an equal-size plant fired by gas would cost up to €1 billion.



Future of Moneypoint

The Government's 2015 Energy White Paper and the 2016 Programme for a Partnership Government both commit to identifying, before 2020, the most suitable replacement low-carbon generation technology for Moneypoint.

With Moneypoint emitting approximately 4.4 Mt of CO₂ per annum, accounted for under the EU-ETS scheme, reconfiguration to end the burning of coal in Moneypoint by 2025 would drive significant greenhouse gas emissions reductions in the period beyond 2025.

Assuming coal is unlikely to be part of future generation at Moneypoint, any replacement generation will have significantly lower carbon intensity than current generation from the site and could facilitate repurposing of some existing infrastructure at the site.

Options to replace the current generation, which makes up 16.3% of Ireland's total electricity generation capacity, are currently being assessed against a number of criteria, including commercial, technical, regulatory and sustainability criteria.



Bord na Móna is currently co-firing its peat station at Edenderry with biomass in line with its stated ambition to replace large scale peat production with alternative energy sources by 2030. ESB also has two peat plants at west

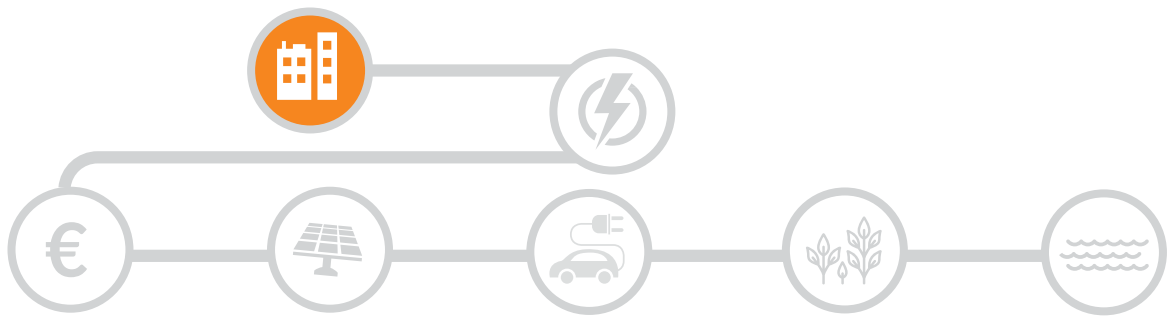
Offaly and Lough Ree. These plants will have to be converted to more sustainable low-carbon technologies following the expiry of the Public Service Obligation in respect of the plants at the end of 2019.

Key Electricity Sector Investments

National Development Plan Commitment	Existing National Mitigation Plan Measure	NMP Measure Number
Decarbonising electricity generation through the Renewable Electricity Support Scheme	Alternative Energy Requirement Scheme and Renewable Energy Feed-in-Tariff Schemes 1-3	RE1, RE2, RE3, RE4
Conversion of Moneypoint electricity generation plant to end the burning of coal by 2025	To arrive at decisions on optimal future low-carbon technical solutions for Moneypoint generation plant	RE8
Conversion of peat power plants to more sustainable low-carbon technologies by 2030		
Roll-out of the National Smart Energy Metering programme to commence in 2019	Smart Metering	BE21
Ongoing reinforcement of existing power grid		
Develop further interconnection to increase energy security and facilitate more variable electricity generation on the grid, including the Celtic Interconnector to France and further interconnection to the UK	To increase security of electricity supply and facilitate increased levels of variable renewable electricity on the system	RE7
Use of energy research funding to accelerate diversification away from fossil fuels to green energy, including, wind, wave, solar, biomass, biofuels, biogas and hydrogen	Ocean Energy Prototype Development Fund	RE5



5 | Decarbonising Our Built Environment



Decarbonising Our Built Environment

Improving energy efficiency is central to our transition to a low-carbon economy. This is because using less energy, and using it in a more flexible way, is the most cost-effective and accessible way to tackle climate change. This is why conserving energy is the first step to take in the process of decarbonising our built environment. It is also a step everyone can take in some shape or form. In addition, the more energy use that is reduced through efficiency measures, the lower the effort required to achieve renewable energy targets.

The benefits of energy efficiency are not only for our energy system and our emissions profile. There are also direct benefits from improved energy efficiency for citizens across our society including:

- making homes warmer and drier improves health and social inclusion;
- reducing energy use reduces energy bills for householders and businesses and supports competitiveness and rural development;
- energy efficiency in the public sector reduces the public sector energy bill, freeing up funding for public services while driving quality and innovation in those services, thus contributing to public sector reform; and
- making homes energy efficient to enable the move away from fossil fuels is critical for improving the quality of the air we breathe. This is particularly important for those communities that are reliant on solid fuels for heating.

Ireland has the potential to become a global leader in decarbonising the built environment, which international analysis indicates is the most cost effective way to tackle climate change. Improving the energy efficiency of the built environment is

therefore a central plank of Ireland's action on climate change. Energy efficiency will also realise benefits for air quality, health, social inclusion, business competitiveness and better public services, all of which will make a real and positive impact on people's lives.

Planned National Development Plan investment of €4 billion in the period 2018 to 2030, along with taxation and regulatory measures, would see a very significant change in the energy performance in the residential sector, with upgrades to homes increasing from 30,000 to 45,000 per annum from 2021.

SEAI Deep Retrofit Pilot Scheme

The Government's 2015 Energy White Paper, the National Mitigation Plan and the Long Term Renovation Strategy all recognise the fact that extensive renovation of our building stock will need to take place in order to meet both national and international targets for energy savings and emissions reduction by 2050.

To support this, DCCAE, through the Sustainable Energy Authority of Ireland, began a Deep Retrofit Pilot Scheme in 2017 to determine the optimum approach to incentivise deeper levels of renovation, beyond the existing models, post-2020.

Deep retrofitting involves a significant reduction in building's energy requirements and permits the realisation of the mitigation potential associated with the built environment. As well as achieving energy

efficiency potentials, deep retrofitting can also induce changes in consumer energy consumption behaviour.

The Deep Retrofit Pilot Scheme is a multi-annual programme investigating how to create a scalable offering for the deep retrofit of Ireland's housing stock to an A3 Building Energy Rating (BER), while building consumer demand and contractor capacity for deep retrofit.

Under the scheme Government is funding up to 50% of the total capital and project management costs for homes that achieve an A3 BER post retrofit. This will inform a model that can make deep retrofit available to individual homeowners on a larger scale post 2020, and critically will help Ireland move away from fossil fuels to clean renewable heating systems, such as solar and heat pumps.



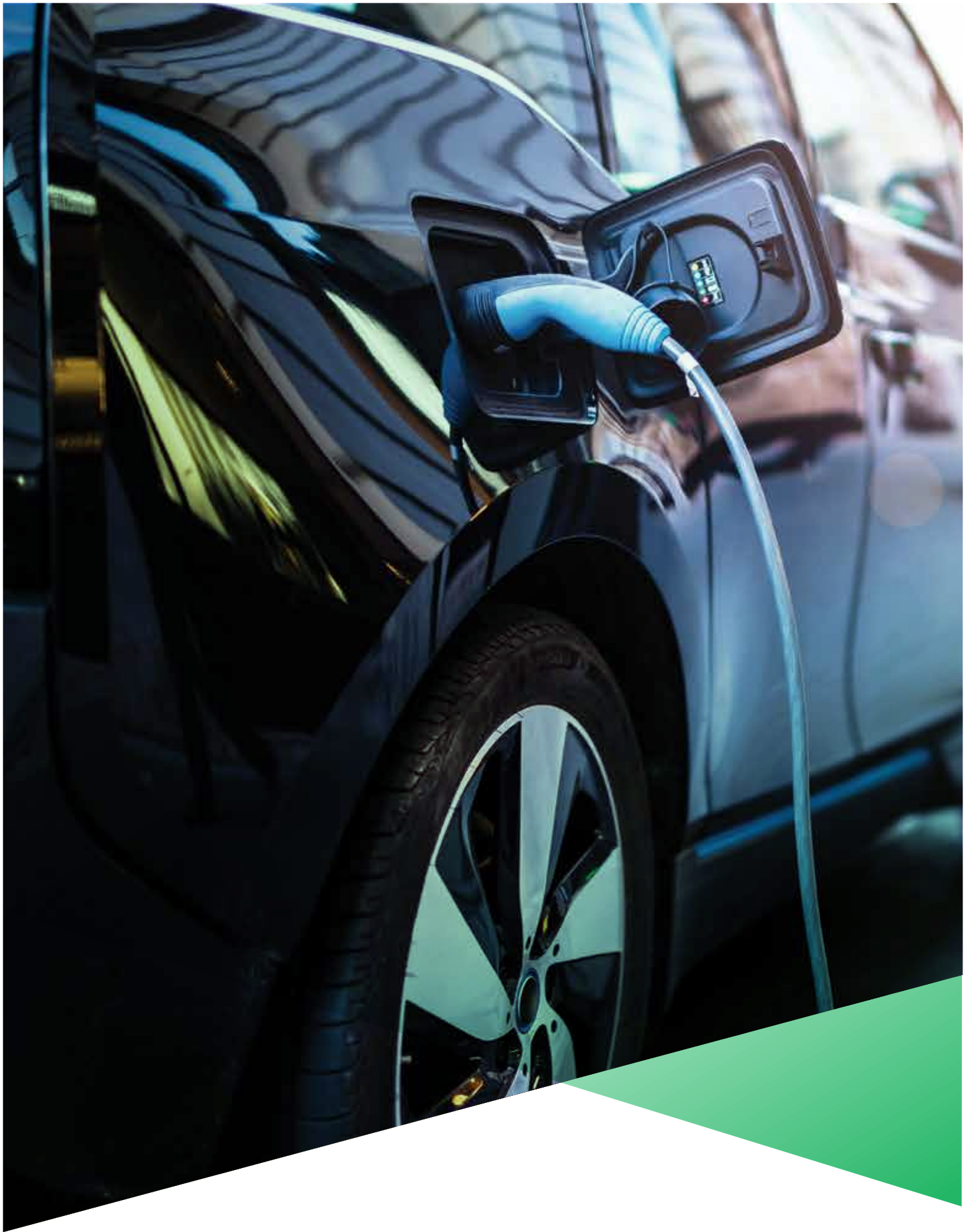
The completion of a comprehensive €750 million retrofit programme would place the public sector built environment on a sound trajectory for 2050 and lead the way in developing Ireland's sustainable energy supply chain.

The Sustainable Energy Authority of Ireland (SEAI) and OPW continue to collaborate to

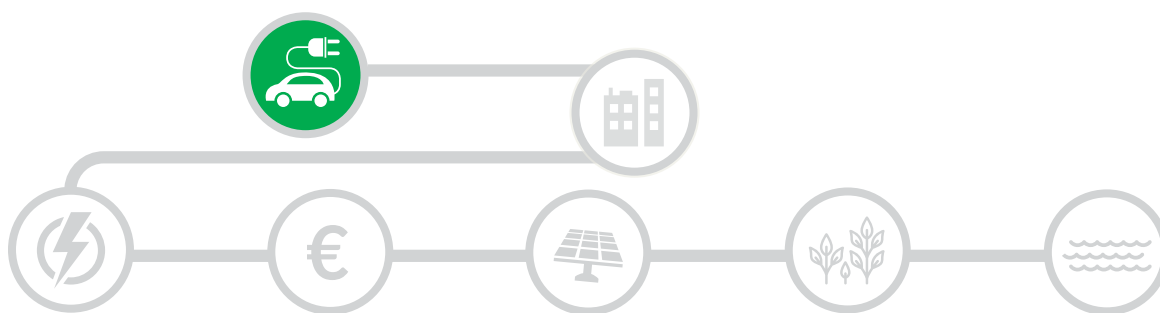
develop a scalable model for making our public sector built environment energy efficient, thereby reducing emissions and saving public money. The focus to 2020 is on heating and lighting, with a schedule of deep retrofit opportunities being identified on an ongoing basis.

Key Built Environment Investments

National Development Plan Commitment	Existing National Mitigation Plan Measure	NMP Measure Number
Deep retrofitting of existing housing, commercial and public building stock, with a target of 45,000 homes per annum from 2021 to achieve a minimum of BER Rating 'B' and all public buildings and at least one-third of total commercial premises upgraded to BER Rating 'B'	Better Energy Homes, Better Energy Warmer Homes, Housing Assistance Package, Better Energy Communities, Warmth and Wellbeing Pilot Scheme, Deep Retrofit Pilot Scheme, Social Housing Upgrades Energy Efficiency Obligation Scheme, Large Industry Energy Network, SME Support Scheme	BE1, BE2, BE3, BE4, BE5, BE6, BE7, BE13, BE14, BE15
Supports for changing out of oil-fired boilers to heat pumps, along with the provision of roof-top solar, in at least 170,000 homes	As Above	BE1, BE2, BE3, BE4, BE5, BE6, BE7
Regulating new build to the highest energy efficiency standards	Building Regulations	BE10 (1-4)
Full roll-out of the new Support Scheme for Renewable Heat	Support Scheme for Renewable Heat	BE20
Deploying broadband, smart meters and new technologies to facilitate more distributed energy generation and 'smart buildings'	Smart Metering	BE21
Development of gas infrastructure projects to support regional and rural development and the low-carbon transition		
Promotion of less energy intensive/ low-carbon heating solutions, including biomass, biogas and the electrification of heat	Support Scheme for Renewable Heat	BE20
Support new initiatives in district heating (such as the Dublin Docklands' District Heating Scheme) in cities and large towns, with a leading role for State bodies, for example, Gas Networks Ireland, and Local Authorities		N/A



6 | Decarbonising Transport



Decarbonising Transport

Transport accounts for 20% of Ireland's overall emissions (and 27% of our non-ETS emissions), with 52% of overall transport emissions coming from private cars, 24% from freight, and 4% from public transport. The National Mitigation Plan highlights, as a priority, the necessity to progressively electrify transport systems, making a shift away from polluting and carbon intensive propulsion systems to new technologies such as electric vehicles and introduction of electric and other alternatively fuelled systems for public transport fleets. The main actions planned to achieve this are securing an early transition to zero/low-emission vehicles in the private and public fleets and setting targets for substantial progress in phasing out the Internal Combustion Engine and replacing it with Electric Vehicles/other alternative fuels through schemes to incentivise Low-Emission Vehicles.

To complement this planned investment, a total of €8.6 billion is to be invested in sustainable mobility under National Strategic Outcome 4. This will help to make progress towards the decarbonisation of Ireland's public transport system over the coming decade.

Gas Networks Ireland CNG refuelling stations

Under the National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland: 2017 to 2030, Ireland's ambition is to have 70 fast-fill Compressed Natural Gas (CNG) stations deployed nationwide by the end of 2025.

To support this, Gas Networks Ireland is managing a project called 'The Causeway Study: Impact of CNG on the Irish Gas Network', co-funded by the European Union, which will, *inter alia*, facilitate both private and public access to a national network of CNG refuelling stations.

On 21 May 2018, a joint venture between Gas Networks Ireland and Clean Ireland Recycling produced Ireland's first private fast-fill CNG station at the Clean Ireland Recycling premises in Shannon, Co. Clare. This development represents a significant step in delivering increased penetration of alternative lower carbon fuels in Ireland and helping to reduce greenhouse gas and air pollutants.

CNG powered vehicles offer a similar driving experience to that of petrol or diesel vehicles. However, CNG represents a more environmentally friendly and efficient alternative to petrol or diesel. CNG can deliver a 22% reduction in CO₂ emissions and a 99% reduction in particulate matter, as well as saving up to 35% on fuel cost when compared to diesel.

Gas Networks Ireland also offer a CNG Vehicle Fund, which makes up to €20,000 available to businesses to support the purchase of commercial CNG vehicles.

Key Transport Sector Investments

National Development Plan Commitment	Existing National Mitigation Plan Measure	NMP Measure Number
Transitioning the car transport fleet to electricity and providing additional charging infrastructure, with at least 500,000 electric vehicles on the road by 2030	National Policy Framework on Alternative Fuels Infrastructure for Transport Low-Emission Vehicle Incentivisation Taxation Policy	T3, T4, T7, T19, T20
A commitment to have no new non-zero emission vehicles sold in Ireland after 2030 and no NCT certificate issued for non-zero emission cars post 2045	As Above	
Delivering priority public transport programmes including BusConnects, LUAS Green Line Capacity Enhancement, DART Expansion Programme and Metro Link so that increased transport demand is met by greener public transport	Public Transport Investment Public Transport Efficiency National Intelligent Transport Systems Strategy	T1, T5, T8, T16, T10
Replacing existing diesel buses for the urban public bus fleet with lower emitting alternatives under the BusConnects programme, with no diesel-only buses purchased from 1 July 2019, while promoting commercial bus services and small public service vehicle industry to use low-emission fleet	Public Transport Efficiency Public Sector Energy Efficiency Strategy Eco-Driving	T5, T14, T22
Expand the refuelling network for alternately fuelled vehicles to address freight emissions	National Policy Framework on Alternative Fuels Infrastructure for Transport	T7

Encouraging a significant modal shift through greater levels of investment and further development of meaningful alternatives to private car use under the following three major environmentally sustainable transport schemes:

- new urban cycling and walking routes which will provide additional sustainable travel options to complement increased capacity and faster, higher quality public transport in our main cities;
- traffic management, bus priority and other smarter travel projects in the five cities: Dublin, Cork, Limerick, Galway and Waterford; and
- pilot initiatives for low-emitting technologies in the transport sector

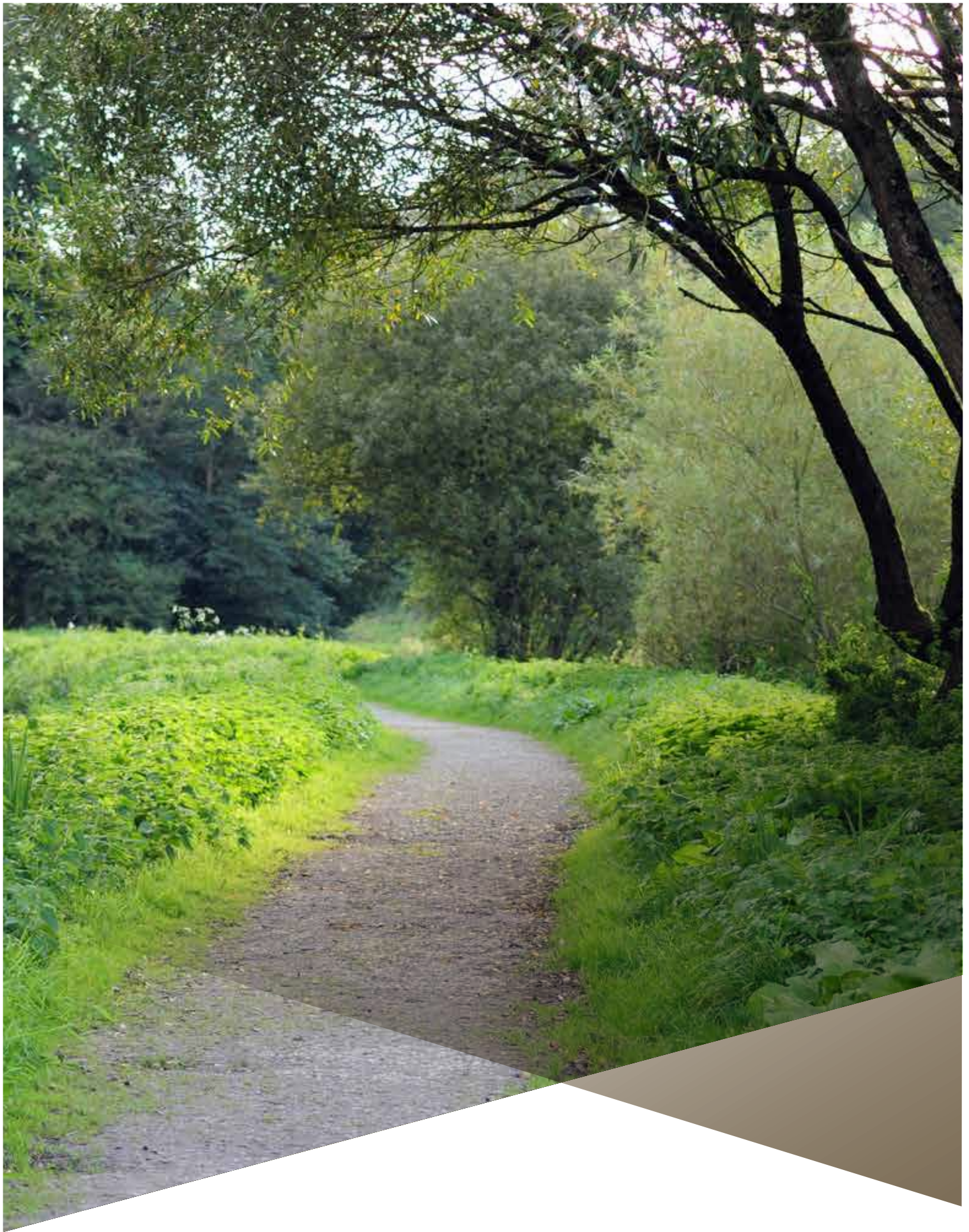
National Policy Framework on Alternative Fuels Infrastructure for Transport

T7, T9, T10

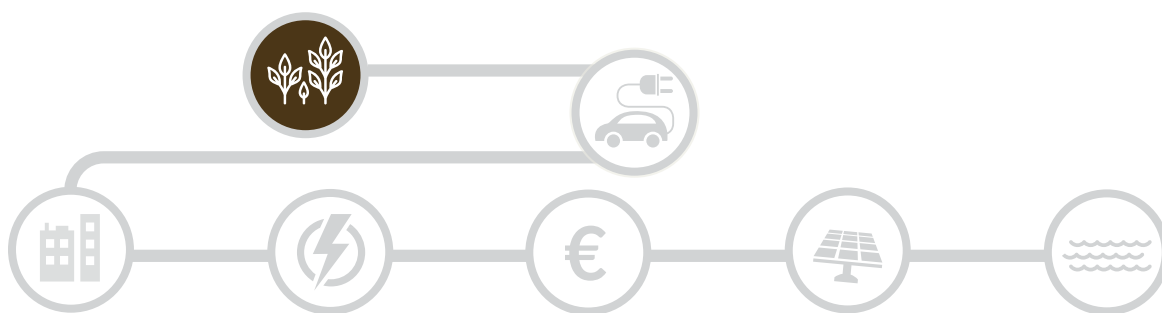
Active Travel Policy

National Intelligent Transport Systems Strategy





7 | Agriculture, Forestry and Land Use



Agriculture, Forestry and Land Use

While agriculture emissions have fallen 3.5% from 1990 to 2016, the sector accounts for 46% of Ireland's non-ETS emissions, and these are projected to increase by 3% to 4% by 2020 from current levels. The projected increase in the period to 2020 is associated with the substantially greater increase in milk production since the end of milk quotas in 2015.

In order to support the achievement of climate action goals, the policy objective is an approach to carbon neutrality for agriculture and land use including forestry that does not compromise sustainable food production. Agriculture, including land use, will continue to focus on reducing emissions, enhancing carbon uptake in soils, and increasing fossil fuel and energy intensive materials displacement. There will be particular emphasis on innovation and early widespread adoption of improved techniques in both primary production and the processing sector and increased afforestation through a new national forestry programme and contribution from the sector to bioenergy production.

Ireland's Rural Development Programme (RDP) 2014-2020 is providing support of €3.4 billion for climate-change objectives. Examples of schemes within the RDP which have a specific climate focus include the Beef Data and Genomics Programme (BDGP) and the Green Low-carbon Agri-environment Scheme (GLAS). BDGP entails farmers undertaking a six-year commitment to carry out pre-defined actions to deliver a more climate friendly suckler herd. In the preparatory analysis undertaken in designing BDGP, it was estimated that the scheme would generate greenhouse gas savings of between 92 and 300 kilotonnes.

GLAS will deliver overarching benefits in terms of the rural environment, while addressing the issues of climate change mitigation,

water quality and the preservation of priority habitats and species. For example, GLAS includes actions targeted at reducing emissions levels (such as support for low-emissions slurry spreading to be applied to 160,000 hectares and minimum tillage practices to be applied to 28,000 hectares) and sequestration actions (such as planting of 6,500 hectares of new hedgerows). The RDP and in particular both of these schemes (the BDGP and GLAS) will provide measurable climate related benefits for Ireland and Irish agriculture.

Ireland's forests play an essential role in helping with climate change mitigation, through carbon sequestration in forests and the provision of renewable fuels and raw materials. Irish forestry is a major carbon sink and afforestation is one of the most significant mitigation options that is available to Ireland to help meet its EU climate targets. Climate change mitigation also occurs when forest-based biomass replaces fossil fuels for heating or power generation. This helps to reduce the dependence on imported fossil fuels.

Further innovation and new measures will include:

- town-scale pilots of food and agricultural waste to gas in agricultural catchments for local gas networks supply and biogas production; and
- piloting of 'climate-smart countryside' projects to establish the feasibility of the home and farm becoming net exporters of electricity through the adaptation of smart metering, smart grids and small-scale renewable technologies, for example, solar, heat pumps and wind.

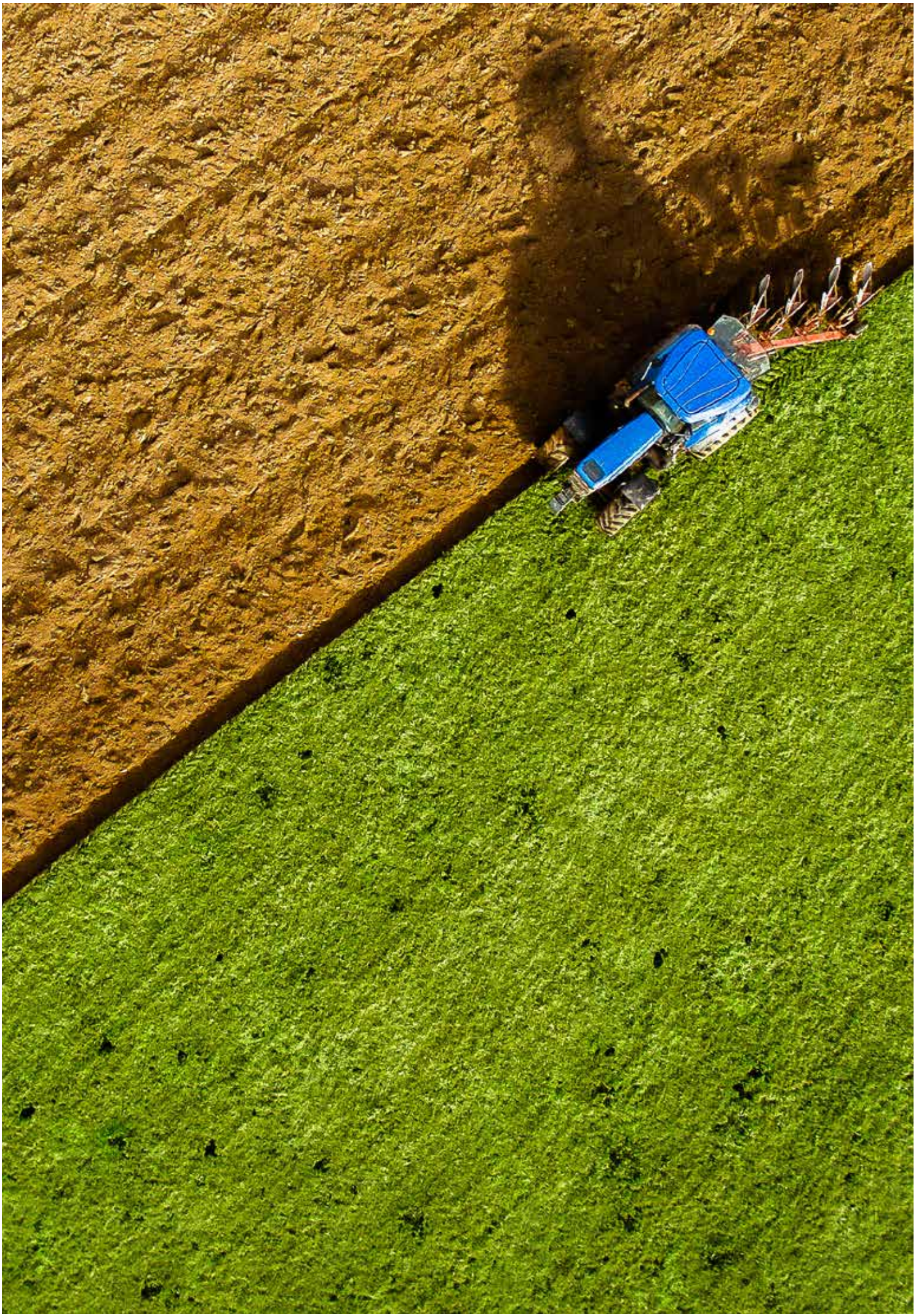
Further work is planned, in the context of the policy approach to carbon neutrality for agriculture, to elaborate a full menu of mitigation (including sequential options in the agriculture, forestry and land use sector) to

enable the implementation of an approach that makes Ireland a leader in sustainable and low-carbon farming and land management, while simultaneously ensuring we meet our legally

binding climate targets, as well as our 2050 National Transition Objective.

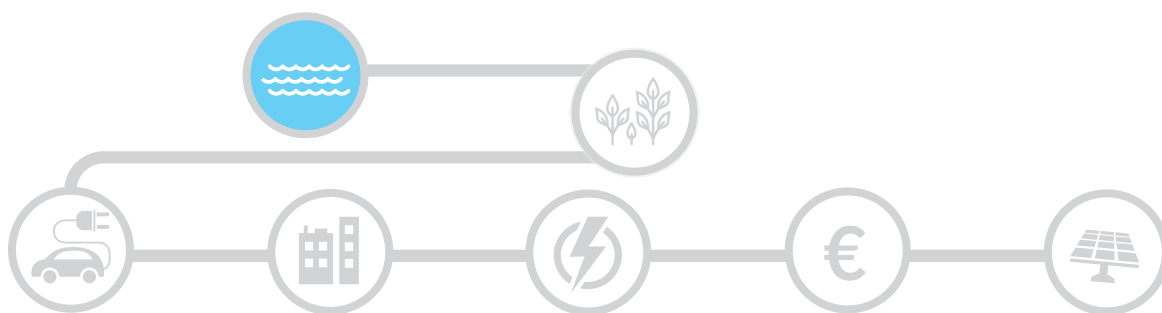
Key Agriculture, Forestry and Land-Use Sector Investments

National Development Plan Commitment	Existing National Mitigation Plan Measure	NMP Measure Number
Ongoing investment in relevant environmental schemes through Rural Development Programme 2014-2020, including Beef Data and Genomics Programme, Green Low-Carbon Agri-Environment Scheme (GLAS), Targeted Agricultural Modernisation Scheme (TAMS), and Organic Farming Scheme	Cross Compliance and Green Direct Payment Beef Data and Genomics Programme Knowledge Transfer Programme, Green Low-Carbon Agri-Environment Scheme Targeted Agricultural Modernisation Scheme Organic Farming Scheme Smart Farming Programme Better Farms Programme Pasture Profit Index Origin Green Carbon Navigator	AF1A, AF2A, AF2B, AF2C, AF2D, AF2E, AF2F, AF3, AF4, AF5, AF7, AF8, AF9
Forestry Programme 2014-2020 providing grants and / or annual premiums for establishment, development and reconstitution of forests, woodland improvement, native woodland conservation	Forestry Programme 2014-2020	AF10(A-I)
Piloting of 'climate-smart countryside' projects to establish the feasibility of the home and farm becoming net exporters of electricity		
Town-scale pilots of food and agricultural waste to gas in agricultural catchments for local gas networks supply and biogas production	Animal By-products	AF6





8 | Building Resilience to Climate Change



Building Resilience to Climate Change

The commitment of resources through the National Development Plan will help support the delivery of adaptation investments in making our low-carbon, climate-resilient transition. The National Adaptation Framework, published earlier this year, notes the importance of seeking to minimise cost, enhance the effectiveness of actions taken and maximise the opportunities arising from climate change. Through sectoral adaptation plans key sectors will be identifying priority actions to aid our climate-resilient transition – and these actions will require significant capital investment into the future.

The benefit of early, anticipative or preventative adaptation in investment decisions is clear. We need to act early. Investments now in adaptation will realise significant savings into the future. It is also important to consider wider benefits where adaptation action contributes towards achieving other policy and development objectives. The National Adaptation Framework recognises that uncertainty regarding the impacts and extent of climate change should strengthen the case for early investment in climate protection and resilience that could help avoid locking in future exposure to climate risks by limiting the range of potential adaptation measures available.

Our key sectors here in Ireland are facing many challenges presented by climate change – for example in agriculture it has been estimated that projected impacts of climate change could result in total economic costs to the agriculture sector in the region of €1 billion to €2 billion per annum by mid-century. For the electricity and gas networks, a key priority will be the challenge of ensuring network investment reflects the additional cost associated with climate adaptation, while the transport sector recognises the need to consider preventative measures so as to avoid, for example, the significant financial costs

caused by extreme rainfall and severely cold weather in 2009 - estimated to have cost in excess of €225 million for repairs to national, regional and local roads.

The key sectors are addressing these challenges by preparing their own respective statutory sectoral adaptation plans, which are required under the National Adaptation Framework. They will set out how we go about reducing Ireland's vulnerability to the impacts of climate change. Local Government, supported by the recent establishment of the Climate Action Regional Offices, will also be tackling this challenge and will be working with these sectors in implementing climate resilience at the local/regional level.

Climate Action Regional Offices

In launching the National Adaptation Framework in January 2018, the Minister for Communications, Climate Action and Environment also announced funding of €10 million over a five year period to establish four Local Authority Climate Action Regional Offices to support the implementation of national climate policy. The establishment of the regional offices represents a key action under both the National Mitigation Plan and the National Adaptation Framework.

The regional offices are located in four lead authorities (Cork County Council, Dublin City Council, Kildare County Council and Mayo County Council) and are based on four geographical areas with the associated grouping of local authorities in each region based upon shared climate change risks. The regional offices will enable a more coordinated engagement across the whole of government and will play a key role in contributing to Ireland's low-carbon climate-resilient transition, including in assisting with the preparation of local adaptation strategies by each local authority.



We also need to look at how best to partner and collaborate with the private sector in terms of achieving climate resilience – how do we enable businesses to provide leadership within the sector and how do we capture the benefits of doing so for both our economy and society as a whole? We must also think of our own potential to lead – how we can demonstrate climate resilience to the private sector on a global perspective and, in doing so, provide the basis for attracting more inward investment?

Flood Risk Management

The existing flood capital investment programme and Flood Risk Management Plans developed under the Catchment Flood Risk Assessment and Management (CFRAM) process will help reduce the vulnerability of the country to the negative effects of climate change through effective adaptation measures.

Investment of €350 million since 1995 has already delivered 42 major flood relief schemes around the country that are providing protection to 9,500 properties and an economic benefit to the State in damage and losses avoided estimated at €1.9 billion. €430 million has been allocated for flood mitigation initiatives over the period 2016 to 2021 to protect threatened communities from river and coastal flood risk. This funding is supporting the development and implementation of a significant existing flood relief investment programme which includes eight major flood relief schemes under construction and 26 schemes under design and at planning to protect 11,200 properties. Major projects included in the existing programme include Lower Lee (Cork City), Skibbereen, Enniscorthy, Bandon, Clonakilty, Claregalway, and Athlone Flood Relief Schemes.

In addition, the programme supports the delivery of 660 minor works schemes, delivered directly by Local Authorities nationwide that provide local solutions to prioritised flooding issues.

In 2011, the Government identified 300 areas that are at potentially significant risk from flooding and together account for 80% of Ireland's potential flood risk from rivers and seas, the primary source of flooding in Ireland. Since then, extensive and detailed engineering modelling has been completed by the OPW through its CFRAM programme for each of

these 300 areas. This is the largest ever study of flood risk in Ireland and has delivered:

- 29 Flood Risk Management Plans that set out c. 118 other major and minor capital projects in addition to those already included in the existing programme; and
- flood maps for the flood risk in each of these areas that will support planning and emergency response management.

The Government is committed to the policy objective of delivering further capital works/ flood relief schemes to minimise the impacts of river and coastal flooding on society through the roll-out of the 29 Flood Risk Management Plans. Delivery of this capital works programme will be underpinned by a total investment of up to €940 million over the lifetime of the National Development Plan.

The 29 plans include proposed flood relief schemes which will need to be prioritised. The prioritisation process, which relates primarily to the proposed physical flood-protection measures, will be based on an evaluation process, including Multi-Criteria Analysis and benefit to cost-ratio (which represents the overall benefits, on balance across each of the objectives, per euro cost of a proposed measure), and the risk arising from the nature of the local flood waters within a community. The prioritisation will be applied on a regional basis. Schemes will range from very large schemes costing in excess of €15 million each to smaller schemes that can be progressed by the Local Authorities with funding available from the OPW.





