Taighde, Idirphlé, Comhairle
Research, Dialogue, Advice

Just Transition in Agriculture and Land Use

COUNCIL REPORT

No.162, June 2023

An Chomhairle Náisiúnta Eacnamaíoch agus Shóisialta
National Economic & Social Council

An Oifig Náisiúnta um Fhorbairt Eacnamaíoch agus Shóisialta
National Economic & Social Development Office NESDO

1. The main tasks of the National Economic and Social Council shall be to analyse and report on strategic issues relating to the efficient development of the economy and the achievement of social justice.

2. The Council may consider such matters either on its own initiative or at the request of the Government.

3. Any reports which the Council may produce shall be submitted to the Government, and shall be laid before each House of the Oireachtas and published.

4. The membership of the Council shall comprise a Chairperson appointed by the Government in consultation with the interests represented on the Council, and

   - Three persons nominated by agricultural and farming organisations;
   - Three persons nominated by business and employers organisations;
   - Three persons nominated by the Irish Congress of Trade Unions;
   - Three persons nominated by community and voluntary organisations;
   - Three persons nominated by environment organisations;
   - Four other persons nominated by the Government, including the Secretaries General of the Department of Finance, the Department of Business, Enterprise and Innovation, the Department of Housing, Planning and Heritage, the Department of Public Expenditure and Reform.
   - Seven people possessing knowledge, experience and skills which the Taoiseach considers relevant to the functions of the Council

5. Any other Government Department shall have the right of audience at Council meetings if warranted by the Council's agenda, subject to the right of the Chairperson to regulate the numbers attending.

6. The term of office of members shall be for three years. Casual vacancies shall be filled by the Government or by the nominating body as appropriate. Members filling casual vacancies may hold office until the expiry of the other members' current term of office.

7. The numbers, remuneration and conditions of service of staff are subject to the approval of the Taoiseach.

8. The Council shall regulate its own procedure.

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Noel Cahill, Economist

A full list of the NESC Secretariat can be found at **www.nesc.ie**

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Abbreviations

3NOP
3-Nitrooxypropanol

ACRES
Agri-Climate Rural Environment Scheme

ABSEI
Annual Business Survey of Economic Impact

AD
anaerobic digestion

AKIS
Agricultural Knowledge and Innovation Systems

ASSAP
Agricultural Sustainability Support and Advisory Programme

CAP
Climate Action Plan

CCAC
Climate Change Advisory Council

CO_2e
carbon dioxide equivalent

DAFM
Department of Agriculture, Food and the Marine

EIP
European Innovation Partnership

EIP-AGRI
agricultural European Innovation Partnership

EPA
Environmental Protection Agency

ESG
environmental social and governance

EU
European Union

FAO
Food and Agriculture Organization

GHG
greenhouse gas

ha
hectare

HNV
High Nature Value

ICBF
Irish Cattle Breeding Federation

ILO
International Labour Organization

IPCC
Intergovernmental Panel on Climate Change

LULUCF
Land Use, Land Use Change and Forestry

Mt $C0_2eq.$
Million Tonnes of Carbon Dioxide Equivalent

NASCO
National Agricultural Soil Carbon Observatory

NESC
National Economic & Social Council

NGOs
Non-governmental Organisations

NPWS
National Parks and Wildlife Service

PES
payments for ecosystem services

PV
photovoltaic

SCIS
Solar Capital Investment Scheme

SDGs
Sustainable Development Goals

UK
United Kingdom

WEF
World Economic Forum

Executive Summary

The agriculture and land use sector can increasingly be a part of the solution to address urgent climate change and biodiversity loss.

Ireland has committed to a national climate objective of transitioning to a climate-resilient, biodiversity-rich and climate-neutral economy by no later than the end of 2050 (Government of Ireland, 2021a). All sectors are required to contribute. For agriculture, a 25 per cent reduction in emissions is required by 2030, with the target for land use and land-use change to be put in place following the completion of the Government's Land Use Review.

This NESC report argues that tackling the environmental challenge must be addressed together with the intersecting economic and social challenges.[1]

The starting point for the ambitious transition that is required is a vision that all stakeholders can agree to work collectively towards. The journey towards this vision must be underpinned by a commitment to continuous learning and will be supported by a just transition process focused on a transition within, not out of, agriculture. The National Economic & Social Council (NESC) identifies the benefit of an inclusive engagement process to develop and deepen a sense of shared purpose for the sector's transition based upon clear, coherent and consistent communications.

In practical terms, transition will involve a wide range of measures related to shifts in land and soil management practices, reducing emissions from livestock, and land-use change – increasing forestry, on-farm renewable energy production and other bio-based products (CCAC, 2021a; Government of Ireland, 2022b; Lanigan *et al.*, 2018). To help frame interventions based on key barriers and enablers, the measures are categorised as:

- 'low-hanging fruit' measures: measures that are low-cost or cost-beneficial, have positive impacts on the wider environment, and are broadly positively regarded by farmers;
- measures characterised by uncertainty: where there is a perception among stakeholders that there are significant issues and challenges that need to be resolved to enable more widespread adoption such as policy inconsistencies or social or cultural barriers; and
- 'hard to do' measures: where there are potentially high costs and, for some farmers, potentially high levels of income reduction and loss of livelihood.

The research found that there is significant activity already underway which can provide a foundation for further work to support an effective, fair and inclusive transition in the agriculture and land-use system. This report outlines the following four areas of action.

[1] The Council would like to acknowledge the role of a Working Group, chaired by Professor Thia Hennessey in examining the issues and in helping to build consensus on the framing and findings outlined in this NESC report. The members of the Working Group are listed in Appendix A.

Socially and Farmer-Inclusive Processes

The Council identifies socially inclusive dialogue and participation as central to ensuring a fair process of transition. The report argues that participatory processes of dialogue, which clearly communicate the scale of change needed, can help develop a shared national narrative and strengthen consensus and decision-making, and that the active participation and engagement of farmers in innovating and changing practice across a diversity of contexts is critical. The main recommendations are to:

- Undertake a deep and wide process of further engagement with stakeholders in a national dialogue on agriculture and land-use transition in order to build a greater sense of shared direction for transition in the agriculture and land-use system. This dialogue should be participatory, clearly communicate the scale of the change needed, and explore with a wide range of stakeholders, particularly those most impacted, how to achieve transition in a fair and equitable manner.

- A strand of shared island collaboration and dialogue should include climate and agriculture; particularly just transition; and

- Build upon local and context-specific participation in innovation and experimentation in order to ensure that approaches that have been impactful at local scale are scaled up nationally.

Enabling People to Benefit from Opportunities of Transition

The Council emphasises that a just transition in agriculture and land use must be opportunities-led. A key issue is the ability to account for and value ecosystem services/natural capital. This is a critical systemic barrier to more sustainable agriculture and land use. In this area, the main recommendations are to:

- Scale up and more fully align farm advisory services with environmental objectives and ensure that bespoke ecological expertise can be provided at farm level. People need the necessary knowledge, skills and capacity to adopt new approaches or to consider more land use or income diversification options in order to be empowered to benefit from the opportunities of transition;

- Accelerate work on accounting for nature and, while recognising the importance of current schemes, the financial resources available from European Union (EU), public and private sources to reward farmers for protecting and enhancing ecosystem services should be significantly increased. Farmers consulted nearly all indicated that they are prepared to go further and implement measures but need support. Most identified financial barriers, including market failures and the costs of transition, as key challenges, while the misalignment of financial incentives was identified as a key barrier to transition; and

- Work more to reduce uncertainty and address specific barriers in order to unlock the opportunities of transition. There is a commitment in policy to agricultural diversification, but areas such as socio-cultural barriers, policy inconsistencies and uncertainty about future markets for alternatives are significant barriers for adopting opportunities for diversification. Research to better understand the social and cultural barriers, action to further align policies to bring more coherence to transition and reducing risks for farmers by creating more market certainty for income diversification are important steps for unlocking the potential of diversification.

Sharing and Mitigating the Costs of Transition

The Council identifies that a key part of the just transition approach is to ensure a fair and sustainable distribution of the effort to bring about transition. Throughout the process, stakeholders have emphasised the importance of recognising that transition will involve costs, and that it is critical to recognise these costs, to share them equitably and to address or mitigate them. In this area, the main recommendations are:

- The distribution of effort of transition should be shared, both among primary producer groups and farmers, as well as sharing the costs of transition among actors along the supply chain. The Council recommends developing a strategy on effort sharing based on additional investment in research, data collection, evidence and monitoring of the distributional impacts across the agriculture and land use sector and informed by new research to consider existing and potential effort-sharing mechanisms. More robust standards and certification should be developed in order to support effort sharing along agriculture and land use supply chains.

- Specific targeted support will be necessary for people facing specific costs due to transition policies or measures. This may include farmers or workers in particular arising from the implementation of 'hard to do' measures such as reduced intensity on drained organic soils and voluntary reductions in livestock numbers. The Council recommends examining the spectrum of supports for those vulnerable to transition in agriculture that should be implemented and progressed in order to ensure that no one is left behind.

- Measures to support an environmentally sustainable transition must pay due regard to the potential for unintended consequences for the environment and for communities impacted by large-scale land-use change, ensuring that robust screening of policies and measures of transition, full implementation of existing standards, and further exploration of social and environmental safeguards as new business models (such as carbon farming) are developed.

Co-ordinating Action

The key to following through on these actions and interventions is to co-ordinate and govern the transition so that it can deliver real change in a balanced, inclusive and just manner. In this area, four components for the fair and effective governance in the agriculture and land-use system are identified as follows.

i the need for comprehensive and multi-level oversight to bring both 'horizontal' and 'vertical' coherence and ensuring that vision is translated into targets and plans, with appropriate time frames, monitoring and reporting;

ii integrating foresight and anticipation together with a learn-by-doing, experimental approach;

iii clearly, consistently and coherently communicating a whole-of-society vision for transition; and

iv mechanisms for financially supporting just transition in agriculture at a scale and extent comparable with the LEADER programme for Rural Development, including regionally focused transition teams and resourcing.

There is evidence for each of these four elements of governance in practice, and, in many respects, the emergence of the structures, institutions, policies and processes required for an effective national approach illustrates that Ireland can provide leadership in how to think about and approach agricultural transition. However, this is at an early stage and the Council recommends:

- establishing an implementation group for climate transition in agriculture in 2023 to consider the recommendations arising from this report;

- that this NESC work on transition should inform and shape the next stages in the development of the Land Use Review;

- agriculture and land-use transition should be a focus of current and future dedicated climate communications work;
- the agriculture and land-use system should be a priority focus for just transition institutions, processes and resourcing in Ireland, notably in the work of the forthcoming Just Transition Commission, which should be established as soon as possible;
- a just transition in agriculture and land use fund should be established, consolidating available carbon tax revenues and other public resources;
- a just transition lens should be applied to climate adaptation in agriculture, forestry and other land use; and
- monitoring transition should include economic, social and environmental aspects and data at the local level in support of place-based transition.

Recommendations

Table 2.1 summarises NESC recommendations across four main areas identified in the integrated framework for action, emphasising that action across each area is necessary for a fair, effective and balanced approach.

PART 1

Background, Argument in Outline and Working Methods

Chapter 1

Background to the Report

Globally, climate change, biodiversity loss and species extinction are having widespread adverse impacts in every region on earth, including heatwaves, heavy precipitation, droughts, and tropical cyclones. In the short term, every region in the world is projected to face further increases in climate hazards, increasing multiple risks to ecosystems and humans (IPCC, 2023). Biodiversity is declining at unprecedented rates and the rate of species extinction is accelerating globally and in Ireland (IPBES, 2019; BSBI, 2023). Climate change is disproportionately impacting the most vulnerable people and natural systems, and some impacts are irreversible as systems are pushed beyond their ability to adapt.

The most recent IPCC *Synthesis Report* makes clear that there is a rapidly narrowing window of opportunity to enable climate-resilient development (IPCC, 2023).

Ireland's direct experience of climate change is changing too. The Environmental Protection Agency (EPA) highlights that three high-impact climate events have occurred in Ireland since 2000, equal to the total number of high-impact events observed in the previous century (EPA, 2020). It also notes the increasing risks and threats to society, business and human life that arise from biodiversity loss and ecosystem services under pressure.

Ireland has committed to a national climate objective of transitioning to a climate-resilient, biodiversity-rich and climate-neutral economy by no later than the end of the year 2050 (Government of Ireland, 2021a).

All sectors are required to contribute: for agriculture, a 25 per cent reduction in emissions is required by 2030, with the target for land use and land-use change to be put in place following the completion of a land use review.

The National Economic and Social Council (NESC) was asked by Government, as part of the Climate Action Plan 2021, to conduct research on how to support a just transition in agriculture (Government of Ireland, 2021a).[2]

This report is a response to that request and is structured in five parts.

Part I provides an overview of the background to this work and outlines its core arguments, findings and interventions. Part I also describes the overall approach and the emphasis on stakeholder engagement throughout the process.

Part II examines forces shaping the future of agriculture and land use through three intersecting lenses: environmental, economic, and social. It examines both the challenges and opportunities in each area.

Part III considers how the actions needed to support transition and new futures in agriculture and land use should be framed. A systems view, clarity and coherence of vision, key principles, and considering mitigation measures in terms of barriers and enablers are identified. An integrated, dynamic framework to frame interventions is outlined.

Part IV focuses on eight interventions that could be taken right away, structured around three broad lines of action: to construct a socially and farmer-inclusive process of engagement; to enable people to benefit from the opportunities of transition; and to share and mitigate the costs of transition.

Part V outlines steps that are critical to ensuring forward momentum and the co-ordination of interventions, focusing on a governance system for the transition, and provides a summary of the report's recommendations.

[2] The Council would like to acknowledge the role of a Working Group, chaired by Professor Thia Hennessey in examining the issues and in helping to build consensus on the framing and findings outlined in this NESC report. The members of the Working Group are listed in Appendix A.

Chapter 2

Argument in Outline

A key argument in this report is that the agriculture and land use sector can increasingly be part of the solution to addressing urgent climate change and biodiversity loss.

The scale of climate mitigation challenge for Ireland's economy and society is considerable. However, the Council believes that the agriculture and land use sector can contribute to national objectives for reducing emissions and increasing carbon sequestration, and can also enhance biodiversity and water and air quality, and contribute towards the wider transition away from fossil fuel energy.

Throughout the Council's work, particularly in its engagement with the Working Group established to support the development of this report, there was a shared sense that this is a moment of opportunity, where opinions are shifting and a way forward could be within reach.

However, the transition is, and will continue to be, complex and demanding. The challenge and focus of this report is to figure out how farmers and other stakeholders can be further supported to positively engage in constructing a future dominated by climate change-mitigation and adaptation, and restoration of biodiversity, water and air quality.

Doing so depends on our ability to follow through at the national level and act on the following seven key findings.

First, the challenge needs to be understood in broader terms than it is often portrayed or debated, i.e. one that focuses primarily on the role of farmers. The agriculture and food system is embedded in land use, including the vital ecosystem services provided by land and soils, and by the bioeconomy. Farmers are ideally positioned to drive the bioeconomy by producing food, fibre or bio-based fuels and materials while also receiving the outputs from processes higher up the value chain to use as bio-based inputs for agricultural and forestry activity, displacing the need for fossil fuel-derived inputs. Protection for ecosystem services can also be recognised – capitalising on positive externalities of sustainable ecosystem services can go some way to countering negative externalities in order to support transition to a low-carbon economy (OECD, 2022b). Unlike other sectors, the agriculture and land use sector has the capacity to be a sink as well as a source of emissions. This provides a significant opportunity.

The overall challenge needs to be viewed as bringing about deep transformative change in the system of agriculture, land use and food production, distribution and consumption. Doing so requires recognising the distinctive features of the agriculture and land-use system, the heterogeneity of actors involved and the significant differences within sectors and across contexts, particularly regionally. It also requires recognising the importance of multiple interventions, including both small-scale incremental changes and larger-scale structural and institutional changes, in order to generate a systemic shift.

Second, the challenge facing the system, especially farmers and rural communities, which is the focus of this report, is threefold: environmental, economic, and social. This report examines these as three interesting lenses that should frame and influence all discussions and policy actions.

The environmental, economic and social risks combined reinforce the urgent need for change. Existing vulnerabilities should not be exacerbated, and there are opportunities in the transition.

Third, a whole-of-government vision that all stakeholders can agree provides a point towards which people can work collectively. An interlinked set of policies at the international, European and national level indicates a broad vision of a fair and inclusive transition in agriculture and land use towards a circular, low-carbon, biodiversity-rich sector, meeting climate, water and air quality targets, while ensuring the livelihoods of farmers and agri-food workers and supporting vibrant rural communities. As such, it is possible to argue that there are a multitude of transitions underway that have the potential for synergy.

There are differences in understanding the implications of achieving transition in practice, particularly the scale and pace of change. This reflects the reality of delivering complex system change where there will be beneficial and negative impacts on a range of stakeholders, political sensitivities, and differences in power and status. Stakeholder engagement as part of this work demonstrated a willingness among farmers to engage, in a solution-focused way, on the most challenging issues. The Council considers that further engagement through a process of dialogue with stakeholders across the food system, including farmers, supply-chain actors, local communities and environmental stakeholders, is

needed to develop a shared understanding of the necessary changes, and to support a collective effort for an effective and fair transition.

Fourth, complex systems change is characterised by uncertainty, opportunities, and costs. The report argues that navigating uncertainty can be supported by a commitment to continuous learning. Change of this magnitude means that there will be winners and losers and, if progress is not to stall, there needs to be a firm commitment to fairness as embedded in the idea of just transition.

The concept of just transition[3] is also one that NESC identifies as very useful as it prioritises and seeks to achieve a climate transition that is fair, equitable, and inclusive in terms of processes and outcomes (NESC, 2020). Just transition is a commitment to focus on and provide practical support to those who may be most negatively affected by aspects of policy change. The Intergovernmental Panel on Climate Change (IPCC) also argues that mitigation actions, that prioritise equity, social justice, inclusivity, among other key principles, lead to more sustainable outcomes, reduce trade-offs, support transformative change and advance climate-resilient development (IPCC, 2023).

Just transition in the agriculture and land-use system is fundamentally different to other sectors based on several distinctive characteristics. It is not a transition *out* of agriculture, but a transition *into* making optimal use of our land and agricultural resources for environmental, economic and social sustainability. It requires a tailored approach to planning and delivering transition that reflects some of the unique characteristics of the agricultural and land use sector and the specific risks, opportunities and challenges this poses.

A commitment to continuous learning and to the principles of just transition, embedded in new governance and institutional arrangements, is needed in order to navigate uncertainty, synergies and trade-offs.

Fifth, an integrated, dynamic framework for action is useful for framing interventions to support a fair and effective transition. Many of the measures for reducing emissions, increasing carbon sequestration and improving biodiversity, water and air quality are clear and are outlined in the Climate Action Plan 2023.

Navigating transition requires an understanding, from a farmer perspective of the barriers and enablers to the more widespread adoption of measures. Different measures will have different key barriers and enablers, particularly the relative importance of supporting skills and capacity, providing resources, working to resolve barriers and the need to recognise and address the depth and potential for loss.

The report argues that measures can usefully categorised as ‘low-hanging fruit’ measures, ‘hard to do’ measures, and measures considered with a degree of uncertainty by stakeholders for framing interventions. The intention is not to rigidly define where any measure fits, but rather to support thinking dynamically about what needs to happen to increase the adoption of measures, and how to help this happen in a fair way.

The framework for action proposed in this report combines this categorisation with principles of continuous learning and just transition to identify four key areas for action, which frame interventions for supporting a fair and effective transition in the agriculture and land-use system.

Sixth, based on the framework for action, the Council identifies interventions and recommendations that, taken together, align with the need to continuously learn and with the principles of just transition and inclusion.

The interventions are designed to address key barriers and enablers and include deepening engagement; local participation; increasing capacity and skills; creating and rewarding sustainability; reducing uncertainties; tackling costs; providing targeted financial supports to the most vulnerable or negatively impacted groups; and helping to avoid unintended, wider, social and environmental consequences.

The Council views the interventions as offering a portfolio of linked actions, with feedback loops between them, and makes recommendations for taking them forward. This portfolio view is helpful when working with uncertainty as a set

[3] A just transition approach has its roots in the trade union movement and the principles developed by the International Labour Organization (ILO), and endorsed internationally, are formally enshrined in the preamble of the Paris Agreement.

of interventions, each aiming to shift the system in the same direction, can compensate for those that fail (Hepburn *et al.*, 2020).

The research found that there is significant activity already underway that can provide a foundation for further efforts to support an effective, fair and inclusive transition in the agriculture and land-use system.

Seventh, the key to following through on these findings and interventions is co-ordinating and governing the transition so that it can deliver real change in a balanced, inclusive and just manner.

The report outlines an approach to governance focused on four key components: comprehensive and multi-level oversight; a proactive, forward-looking and responsive evidence base; consistent and coherent communications; and transition funding mechanisms; and makes recommendations for enhancing governance for a just transition in agriculture and land use.

NESC Recommendations

The Council makes recommendations across four key areas of the framework for action: co-ordinating action; building more inclusive processes; enabling opportunities; and sharing costs. Table 2.1 outlines the 20 recommendations contained in the report.

Table 2.1: Climate Transition in Agriculture: NESC Recommendations

Recommendations for Co-ordinating Action and Driving Ambition	
1	The Council recommends, as outlined in the Climate Action Plan 2023, establishing an Implementation Group for Climate Transition in Agriculture in 2023 in order to consider the recommendations arising from this report.
2	The Council recommends that NESC's work on just transition in agriculture and land use should inform and shape the next stages in the development of the Land Use Review.
3	The Council recommends the agriculture and land-use transition should be a focus of current and future dedicated climate communications work.
4	The Council recommends that the agriculture and land-use system should be a priority focus for just transition of institutions, processes and resourcing in Ireland, notably in the work of the forthcoming Just Transition Commission, which should be established as soon as possible.
5	The Council recommends the establishment of a Just Transition in Agriculture and Land Use fund, consolidating available carbon tax revenues and other public resources.
6	The Council recommends applying a just transition lens to climate adaptation in agriculture, forestry and other land use.
7	The Council recommends a wide scope in the monitoring of transition, including economic, social and environmental aspects and data at local scale in support of place-based transition.
Recommendations for Enhancing Socially Inclusive Processes	
8	The Council recommends that a deep and wide process of further engagement with stakeholders should be undertaken in order to build a greater sense of shared direction for transition in the agriculture and land-use system.
9	The Council recommends that a strand of shared island collaboration and dialogue should include a focus on climate and agriculture, and just transition in particular.
10	The Council recommends building on local and context-specific participation and experimentation in order to ensure that approaches that have been impactful at the local level are successfully scaled up nationally.
Recommendations for Enabling People to Benefit from the Opportunities of Transition	
11	The Council recommends that farm advisory services should scale up and more fully align with environmental objectives and ensure that bespoke ecological expertise can be provided at farm level.
12	The Council recommends that more research is needed on the opportunities and implications of transition for workers in the supply chains and downstream activity associated with agriculture and land use.
13	The Council recommends that work on accounting for nature should be accelerated. This is an area where NESC can play a role and work is already underway.
14	The Council, while recognising the importance of current schemes, recommends that the financial resources available from EU, public and private sources to reward farmers for protecting and enhancing ecosystem services should be significantly increased.
15	The Council recommends further work to reduce uncertainty around diversification options experienced by farmers and other stakeholders.
Recommendations for Sharing and Mitigating the Costs of Transition	
16	The Council recommends developing a strategy for effort sharing based on additional investment in research, data, evidence and monitoring of the distributional impacts across the agriculture and land use sector.
17	The Council recommends that the strategy for effort sharing (Recommendation 16) should also be informed by new research to consider existing and potential effort-sharing mechanisms across the agriculture and land-use system.
18	The Council recommends that more robust standards and certification should be developed to support effort sharing along agriculture and land use supply chains.
19	The Council recommends that an examination of the spectrum of supports for those vulnerable to transition in agriculture should be conducted and progressed to ensure that no one is left behind.
20	The Council recommends more robust screening of policies and measures of transition in agriculture and land use, and greater compliance with regulations, to avoid unintended consequences.

Chapter 3

Project Process and Stakeholder Engagement

3.1 Introduction

This report explores in practical terms how socially inclusive, equitable, environmentally resilient and economically sustainable transition can be achieved. The Council explored this question in dialogue with farmers and stakeholders over the course of a year.

A NESC Working Group was established in early 2022, including members nominated by the Council and a wider set of stakeholders from Government departments and independent experts. The Chair of the Working Group was Professor Thia Hennessy, University College Cork and terms of reference were agreed at the first meeting of the Working Group in March 2022. (See Appendix A for the terms of reference and Working Group membership.)

The Working Group met five times, in March, May, September and November 2022 and in March 2023. As part of the process, a survey of Working Group members was used to explore the opportunities, challenges and the contribution of the work to achieving policy objectives.

Working Group members considered papers on the overall context analysis, the policy framework guiding transition, transition measures, potential policy mechanisms to support transition, and the draft final report.

A farm visit to Clondarrig Farm in Co. Laois took place as part of the second meeting, and the fourth meeting included a presentation on the issue of climate policy and Irish ruminant farming by Adjunct Professor Frank Convery, UCD Earth Sciences Institute.

3.2 Overall Approach

The NESC work complements the work of other initiatives such as the Food Vision 2030 Strategy, the Food Vision sectoral groups exploring transition in the dairy and the beef and sheep sectors, and the development of a Bioeconomy Action Plan (Government of Ireland, 2022a).

In particular, NESC's work seeks to align with the ethos underpinning the Department of Agriculture–EIT Climate-KIC strategic initiative. In a paper prepared as part of the initiative, the authors note that:

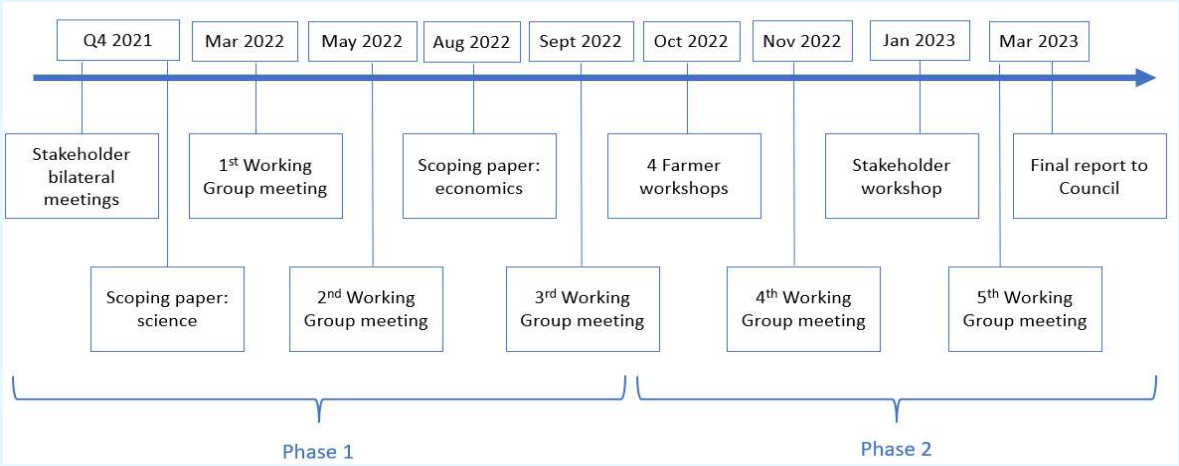
> *if the transition fails to engage farmers in a fair and empowering way, then the trends of declining numbers will continue, and that conversely an approach to transition that repositions farming as a forward-looking, environmentally sustainable and economically viable profession is an opportunity to inspire and attract women farmers and the next generation (DAFM-Climate KIC, 2023 forthcoming: 13).*

As younger farmers are also more likely to adopt new approaches, this is also important for environmental sustainability. At a global level, the UN Food and Agriculture Organization (FAO) High Level Panel of Experts identified the involvement of the next generation of food producers in the transition to sustainable food systems as being too low (HLPE *et al.*, 2019). Food Vision 2030 includes a range of actions aimed at improving social sustainability and attracting new entrants (Government of Ireland, 2021b).

NESC's unique contribution is both its emphasis on wider stakeholder engagement, within and outside the sector, and its consideration of the challenge as it relates to overall economic, social and environmental development in Ireland.

The NESC project had two phases. Phase 1 (end 2021–September 2022) of the work included:

- scoping interviews with a range of stakeholders in advance of the project initiation and a survey of Working Group members on the key challenges and opportunities, the role that NESC can play, and priority areas for the project to focus on;
- research on the nature of the challenge, including the social, economic and environmental context; and
- mapping guiding policies and an initial mapping of transition measures.



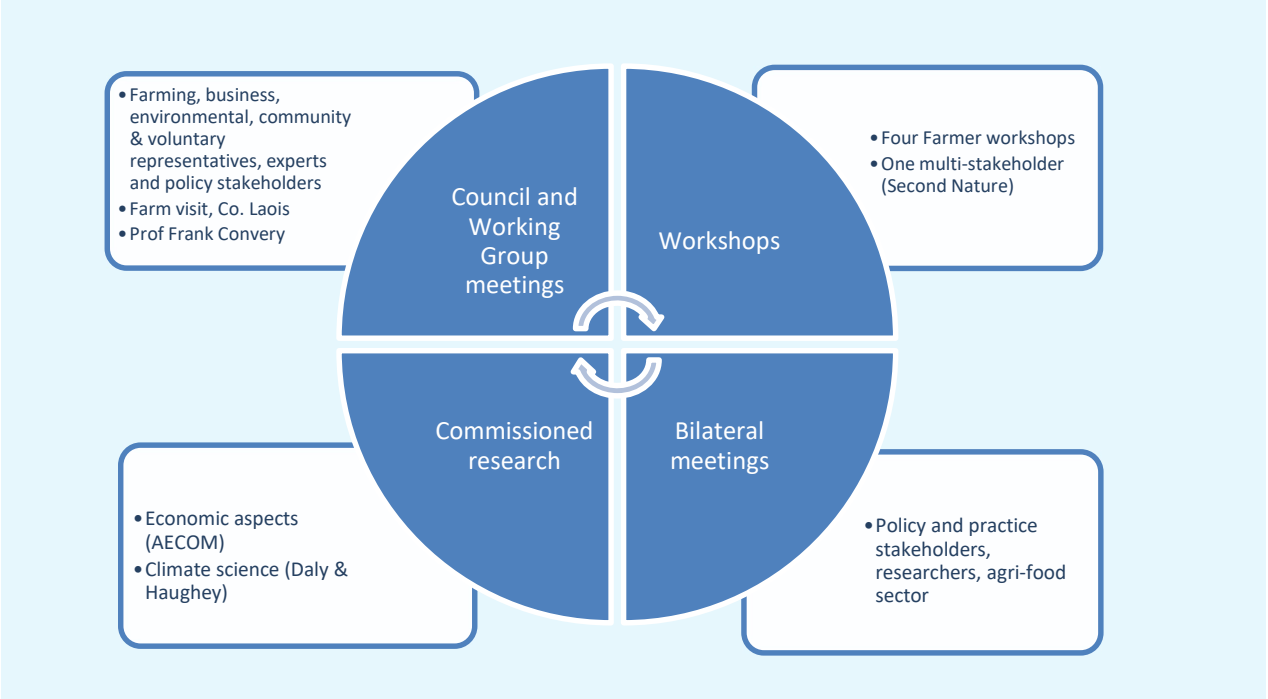
Phase 2 (October 2022–March 2023) drew on stakeholder perspectives on barriers and enablers of transition measures and explored possible policy mechanisms and processes to support a just climate transition.

Participatory workshops were held with farmers to explore their views of transition measures, barriers, and enablers. Supportive policy mechanisms and processes were at the core of a solutions-focused workshop held with stakeholders in Phase 2, which also explored vulnerability and resilience.

A final draft report was discussed by the Working Group, followed by a meeting of the Council in March 2023.

3.3 Engagement Process

In the scoping phase of the work, twenty-four bilateral meetings were held with a range of stakeholders and experts, including members of the Council, during Q4 2021, to explore the key issues that the work should consider and to inform the design of the project.



3.3.1 Focus-Group Workshops with Farmers

In October 2022, a series of facilitated workshops convened by the facilitation consultancy Second Nature were held directly with farmers to explore views on reducing emissions, generating income, and protecting the environment. Three were held in person in Tubbercurry, Co. Sligo; Tullamore, Co. Offaly; and Mitchelstown, Co. Cork.

The aim of the workshops was to hear directly from farmers about their experiences and views on a range of measures to reduce carbon on the farm. Each workshop had two tables, each with between 7 and 10 farmers, with one table including farmers with farms below 50 hectares (ha) and one table including farmers with farms over 50 ha. A total of 54 farmers participated in these in-person workshops, which each lasted 2.5 hours.

After a short introduction to the project, the participants were invited to share their thoughts on farming and on the workshops' agenda, including how they experience climate change on their farms. They were then brought through a series of potential measures to reduce carbon emissions on their farms and were asked to spend time considering those that would have the greatest potential to reduce carbon emissions. They were asked to share experiences of what they are doing, what they would be interested in doing, why something would not be suitable for them, and what they see as key barriers or enablers. At the end of the discussion, farmers were invited to classify measures using a traffic light system – 'yes, no and maybe if' – for each of the measures.

An online workshop was held to gather the views of young farmers, women farmers and innovative farmers. The workshop had seven participants, for several of whom these designations overlapped. The farmers who attended represented a diversity of farm activity and land types. The nature of the discussion with this cohort was aimed at discovering motivations for their work on carbon reduction, what they experienced when trying to be innovative, and their reflections on whether they face any additional barriers (as women or young farmers) for adopting the measures

and whether the sustainability agenda offers specific opportunities or challenges for increasing the numbers of younger farmers and women in farming.

3.3.2 Stakeholder Workshop

Second Nature facilitated a final stakeholder workshop in January 2023 to explore perspectives on identifying the groups that are potentially most impacted by transition, and identifying supports and institutional mechanisms for ongoing stakeholder engagement as part of transition. There were eighteen participants from a range of organisations, departments and agencies as well as researchers and representatives from farming, and from environmental, community and voluntary organisations.

This workshop focused on those who are potentially vulnerable to negative impacts from measures to reduce emissions and on identifying potential supports. The groups considered three key questions in the discussion:

1. Who is particularly vulnerable to transition in Irish agriculture, in your view?
2. Given limited resources, what kinds of targeted supports might be most effective to protect those most vulnerable in transition? What wider supports/initiatives might help make the transition fair and inclusive in an Irish context?
3. How should stakeholders be engaged in the process going forward? What might be required to support the transition process?

PART 2

Climate Transition in Agriculture Through Three Intersecting Lenses

Chapter 4

Environmental Lens

4.1 Introduction

Agriculture, forestry and other land use is a significant net source of emissions, contributing to about 23 per cent of global emissions (IPCC, 2020) and is estimated to be the driver of around 70 per cent of terrestrial biodiversity loss globally due to widespread land conversion, pollution and soil degradation (Secretariat of the CBD, 2014).

This chapter considers the future of Ireland's agriculture when viewed through an environmental lens. It notes that there are considerable challenges but also substantial environmental co-benefits and opportunities in climate action.

4.2 Environmental Challenge in Outline

Ireland faces multiple environmental challenges across the areas of climate, air, soil, water, biodiversity and waste, giving rise to systemic issues across all of society (EPA, 2020). Of particular focus in this work are climate action, biodiversity and water quality, and the need to understand how actions focused on any one of these interact with the others.

4.2.1 Emissions Reduction

To meet the goals of the Paris Agreement, global emissions must peak by 2025 with immediate and deep emissions reductions across all sectors (IPCC, 2022).

The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to a legally binding target of a climate-neutral economy no later than 2050, and to a reduction in emissions of 51 per cent by 2030 (compared with 2018 levels). To achieve these targets, the Act requires the Climate Change Advisory Council (CCAC) to recommend a proposed programme of economy-wide, five-year carbon budgets (the total amount of emissions, measured in tonnes of carbon dioxide equivalent (CO_2e), that may be emitted during a specific time period) and sectoral ceilings (the maximum amount of greenhouse gas (GHG) emissions that are permitted in different sectors of the economy during a carbon budget period).

A carbon budget programme for three successive five-year carbon budgets was agreed in February 2022, including 295 million tonnes of carbon dioxide equivalent (Mt $C0_2$eq.) for the period 2021–2025 and 200 Mt $C0_2$ eq. for the period 2026–2030, which includes 5.25 Mt $C0_2$ eq. of annual unallocated emission savings. Sectoral ceilings were agreed in July 2022, including a sectoral ceiling for agriculture of 106 Mt $C0_2$ eq. for the period 2021–2025 and of 96 Mt $C0_2$ eq. for the period 2026–2030 (Government of Ireland, 2022e).

Reflecting the pattern of Irish economic development, including comparatively low levels of industry, agriculture was responsible for the largest share (33.3 per cent) of total GHG emissions (inclusive of Land Use, Land Use Change and Forestry (LULUCF)) nationally in 2021 (EPA, 2022b). In contrast with the rest of the EU member states where the LULUCF sector has been a net sink for GHG emissions, the Irish LULUCF sector has been a net source of GHG emissions in all years from 1990 to 2021. This is largely due to carbon emissions from grassland and wetland, while the carbon sink provided by forest land and harvested wood products is declining (EPA, 2022b). While all land categories have the potential to be managed as net sinks for GHG emissions in the longer term, there are significant challenges in managing and reducing LULUCF emissions in the medium to longer term (Government of Ireland, 2022b).

Emission reduction trends and projections underline the challenge and urgency of action. Overall, Ireland's GHG emissions increased by 4.7 per cent in 2021 compared with 2020 and are now 1.1 per cent above 2019 pre-COVID-19 restriction levels. Agriculture emissions increased by 3.0 per cent in 2021, driven by increased fertiliser use (up 5.2 per cent) and by a 2.8 per cent increase in the number of dairy cows (EPA, 2022b). The Climate Action Plan 2023 highlights that, despite efficiency gains, if absolute emissions from the dairy sector continue to grow, even with a corresponding reduction in the beef sector, overall agricultural emissions will also continue to grow (Government of Ireland, 2022b). The publication of EPA GHG emissions projections for the period 2021–2040 highlighted the need for urgent implementation of climate plans and policies (EPA, 2022c).

4.2.2 Biodiversity Loss; Water and Air Quality

Transformative changes are also required to restore and protect nature (IPBES, 2019). The biodiversity challenge is reflected in the pressure on habitats, species and water quality in Ireland.

The 2019 assessment report under the Habitats Directive undertaken by the National Parks and Wildlife Service (NPWS) in Ireland, indicated that that 85 per cent of habitats are of unfavourable (i.e. inadequate or bad) status, with only 15 per cent in favourable condition; and that 46 per cent of habitats demonstrate ongoing declining trends, with 53 per cent stable and only 2 per cent improving (DCHG, 2019: 79). The most frequently recorded pressures and threats to habitats (2013–2018) came from agricultural activities (DCHG, 2019: 53). Some key species are also declining (EPA, 2020). Many wild native plants have declined in range or frequency over the past 20 years (BSBI, 2023). In addition, there is evidence that a range of ecosystem services, which agriculture both depends on and consumes, have been in slow, long-term decline due to intensifying farming practices (Juntti, 2022; Moran *et al.*, 2021).

In terms of water quality, the EPA indicates that just over one-half of surface waters (rivers, lakes, estuaries and coastal waters) are in satisfactory condition, and that, at the current level of progress, Ireland will fail to meet the EU and national goal of restoring all waters to good or better status by 2027 (EPA, 2022d). Agricultural run-off was a significant contributor to the deterioration in estuaries and coastal waters along the southeast and southern seaboards. The EPA calls for urgent and targeted action to reduce nitrogen emissions from agriculture in these areas. Fertiliser use declined by 14 per cent in 2022 (Buckley *et al.*, 2022); while this was largely in response to significant price increases, it represents a significant move in the right direction.

4.2.3 Interaction between Climate, Biodiversity, Air and Water

A third dimension of the environmental challenge is the complexity of natural systems, and considering how these systems interact.

It is important to ensure that any measures initiated to reduce emissions from land use or to enhance removal of greenhouse gases avoid potential, unintended, adverse outcomes (CCAC, 2021b). For example, Ireland's experience with forestry highlighted that, without adequate attention to correct planning and management, forestry can impact negatively on habitats, species and water bodies (DAFM, 2022d). The draft new vision for forestry acknowledges these risks and aims to mitigate against them (DAFM, 2022i).

Phase 1 of the Land Use Review recognises these elements and some important interactions, pointing to the value of considering the long-term health of Ireland's agricultural system across a range of dimensions including soil health, climate stability, availability of good-quality fresh water, good biodiversity conditions, thriving rural communities, food security, and decent employment (Government of Ireland, 2023d).

4.3 Opportunities for Environmental Co-Benefits

Many climate mitigation measures for soil and manure management provide significant opportunities for improving water quality, air quality, and opportunities to protect and enhance biodiversity. Agriculture is critically dependent on good-quality soil, and soils can influence the environmental impacts of agriculture (Government of Ireland, 2023d). There are clear environmental co-benefits to acting on climate, where those interconnections are carefully considered.

To illustrate these benefits, in addition to emission reductions, Teagasc reports that extended grazing has positive co-benefits, producing fewer slurry and ammonia gasses and improving air quality, and with more efficient fertiliser use producing less run-off, which in turn improves water quality (Teagasc, 2021b). Research as part of the HEARTLAND (Health, Environment, Agriculture, Rural development: Training network for LAND management) project found that herbage daily growth rates from multispecies swards (receiving approximately 50 per cent less nitrogen per ha) outperformed perennial rye grass and permanent pasture swards in periods of below average rainfall (Shackleton *et al.*, undated).

Many land and soil management measures reduce input costs, diversify production, and improve soil quality, with associated benefits for water quality and water retention. Measures for reducing fertiliser use that have significant positive benefits for biodiversity, water quality and soil quality include greater adoption of regenerative agricultural approaches (see Box 4.1) and organic agriculture, as these either minimise or eliminate the use of chemical inputs. These measures not only reduce GHG emissions, but also benefit biodiversity and water quality from reductions in nitrogen run-off (EASAC, 2022). Each of these are positively related to increasing the adaptive capacity to climate variability such as shifting rainfall patterns.

Box 4.1: Regenerative Agriculture and Agroecological Approaches

Regenerative agriculture has no clear consensus definition, and can cross over with other agricultural approaches including agroecology, permaculture, organic agriculture and agroforestry. Two key characteristics of regenerative agriculture include: (i) restoration, particularly of soil health, including increasing the capacity of soils to capture and store carbon to mitigate climate change, and (ii) reversal of biodiversity loss (EASAC, 2022).

Similarly, there is no definitive set of agroecological practices, but in practice this comes down to the extent to which: (i) they rely on ecological processes as opposed to purchased inputs; (ii) they are equitable, environmentally friendly, locally adapted and controlled; and (iii) they adopt a systems approach embracing management of interactions among components, rather than focusing only on specific technologies (HLPE *et al.*, 2019).

Forests hold substantial potential benefits for biodiversity, water, and air quality, both within their boundaries and by providing wildlife corridors and refuges in the wider landscape (DAFM, 2022a). Forests are also crucial to reducing the risk of natural disasters, including droughts, floods and other extreme events (DAFM, 2022d).

Improvements in biodiversity, air, and water quality support ecosystem resilience, which in turn supports social and economic resilience. There are multiple synergies between mitigation in agriculture and land use and the United Nation Sustainable Development Goals (IPCC, 2022).

Other areas of co-benefits include the potential contribution of agriculture and land use to the achievement of national goals for renewable energy and a shift to a circular bioeconomy. For example, as part of climate action, the EU's target of generating 40 per cent of its energy from renewable sources by 2030 'cannot be achieved' without European agricultural and forestry biomass, according to the umbrella group of EU farm organisations (O'Donnell, 2022).

In Ireland, it is recognised that the agriculture sector has a key role to play in helping Ireland meet its renewable energy targets (Houses of the Oireachtas, 2022a; DAFM, 2020). The overall policy approach is threefold: energy efficiency at farm level, renewable energy deployment at farm level for self-consumption and for export to the grid, and supply of bio-based agri-feedstocks for renewable energy production. Developments such as agrivoltaics and mixed use of land with solar and food/animals may increase take-up of solar photovoltaics (PVs) in future (Houses of the Oireachtas, 2022b; Houses of the Oireachtas, 2022d).

At Millvale Solar Farm in Co. Wicklow, the first solar farm to feed power to the national electricity grid, sheep graze around the panels, suggesting the potential to integrate farming activity with solar energy production (ESB, 2022; O'Doherty, 2022). International research suggests that biodiversity can also be enhanced through the shade and protection that the panels provide (Engineers Ireland, 2019). Case studies identified that a large number of crops, vegetables, livestock, fish and shrimp can grow under solar PVs, although larger-scale demonstrations need to be carried out (IRENA, 2021).

There is enormous potential for maximising the synergies across environmental outcomes in the agriculture and land use sector transition.

Chapter 5

Economic Lens

5.1 Introduction

The agri-food sector is Ireland's largest indigenous sector and a significant contributor to the national economy and employment, and plays a particularly important role in the rural economy. Food Vision 2030 aims to further develop market opportunities at home and abroad (Government of Ireland, 2021b).

In 2021, there were over 170,000 people employed in the agri-food sector as measured by the Central Statistic Office (CSO) Labour Force Survey (2022b) and this represented 7.1 per cent of total employment. This includes those employed in primary agriculture, forestry and fishing, food and drink processing, and wood manufacturing. The sector includes approximately 2,000 fishing vessels and aquaculture sites, and approximately 2,000 food production and beverage enterprises. The sector accounted for 6.6 per cent of modified gross national income in 2021 (DAFM, 2022a). Agri-food exports accounted for 9.4 per cent of total goods exports, with a value of €15.4bn in 2021 (DAFM, 2021).

The Census of Agriculture (CSO, 2022a) indicated there were 135,037 farms in Ireland in 2020. Farms are predominantly small family businesses that follow the family farm model of utilising family labour. Of the 278,600[4] people contributing to farm work in 2020, 47 per cent (130,200) were the farm holders, 41 per cent (114,300) were family members, and the remaining 12 per cent were non-family workers (34,100). Farms range very significantly in size and output. The mean gross production (standard output) per farm was €48,380 in 2020, but one-half of farms had a standard output equal to or less than €13,566 (median standard output). On farms under 10 ha, the mean standard output was €12,557, while the mean standard output for farms above 100 ha was €276,891.

The sector also has a key role in the wider rural and local economy, with estimates for output multipliers ranging from around 2.5 for beef, and from around 2.0 for dairy and food processing, compared with an average output multiplier of 1.4 for the rest of the economy and 1.2 for foreign-owned firms (DAFM, 2022a). The expenditure generated by export sectors in the wider economy is monitored by the Annual Business Survey of Economic Impact (ABSEI).[5] This survey estimated that direct expenditure in the Irish economy by the food, drink and primary production sector in 2020 was €13.9bn,[6] representing 24.3 per cent of direct expenditure by the exporting sectors covered by that survey and second only to the information and communications services sector (€15.0bn).[7]

Changes in prices, employment levels or to long-established local production systems are therefore highly politically sensitive.

The agriculture and land use sector is embedded within the bioeconomy, and there are multiple diversification opportunities emerging in bio-based production.

This chapter looks at the future of agriculture through an economic lens, with particular focus on challenges and opportunities linked with action on climate change and biodiversity loss.

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4 There is a large difference in employment in agriculture as measured by the Census of Agriculture (278,600 in 2020) and the Labour Force Survey (112,000 in the same year). People in employment in the Labour Force Survey are allocated to the sector of their main occupation. Many people who do some work in agriculture will have their main occupation in another sector. Another factor is seasonal work. The Census of Agriculture refers to people who engaged in work in agriculture at during 2020 while in the quarterly Labour Force Survey people are asked about their activity in the week prior to the survey.

5 The ABSEI is a survey of approximately 4,200 client companies, employing ten or more employees in Ireland, of Enterprise Ireland, IDA Ireland and Údarás na Gaeltachta. The survey covers the following sectors: (i) food, drink and primary production; (ii) traditional manufacturing; (iii) modern manufacturing; (iv) information and communication services; and (v) other internationally traded services sectors. The survey covers the vast majority of exports but tourism is a significant export sector that is not covered. Primary production refers to agriculture, mining and quarrying but the vast majority of farms are not included in the survey as they are not clients of the export agencies.

6 This includes purchases by food companies of farm produce. Not all of this expenditure generates income in the Irish economy as some will be absorbed by purchases of imported inputs such as energy by Irish farms.

7 Direct expenditure as measured by the ABSEI survey refers to payroll and Irish purchases of goods and services. Corporate tax payments are not included.

5.2 Economic Challenge in Outline

Five key dimensions to the economic challenge are considered here: underlying economic vulnerabilities; possible income reduction; costs of ecosystem degradation; costs of delay; and downstream employment. This section briefly examines each.

5.2.1 Farm Structures and Underlying Economic Context

There are some challenging underlying economic vulnerabilities in Irish agriculture and farming.

Twenty-seven per cent of farm households (approximately 23,400) were identified as economically vulnerable[8] in the Teagasc National Farm Survey 2021 (Dillon *et al.*, 2022). This is a reduction from the average level of 33 per cent identified as vulnerable in the figures reported in the National Farm Survey between 2016 and 2020. Farms producing a standard output[9] of €8,000 per year or less are not included in the annual National Farm Survey, but accounted for 35.8 per cent (approximately 48,356) of all farms in 2020 (CSO, 2022a). Teagasc conducted a survey of farms with a standard output of €8,000 per year or less in 2015, which found that 50 per cent of these farms are classified as economically vulnerable ((Dillon *et al.*, 2017). The overall number of economically vulnerable farm households therefore includes both the 27 per cent of farm households producing a standard output of over €8,000 per year and the 50 per cent of farm households with a standard output of €8,000 per year or less. Inequality in income within the sector has also been noted by the think-tank TASC as high, relative to other sectors (McCabe, 2019).

There are significant differences across farming systems in relation to the number of farms; average farm size; average family farm income; direct payments as a percentage of family farm income; incidence of off-farm employment; age profile; hours worked; emissions per hectare; and farm economic viability (Dillon *et al.*, 2022). These differences inform the impacts of measures on different farms and the vulnerability of different farms to change, as well as how effective public or market incentives may be in supporting transition.

The proportion of economically vulnerable farm households in 2021 (Dillon *et al.*, 2022) was highest for 'Cattle Other' (35 per cent), followed by 'Cattle Rearing' (33 per cent) and 'Sheep' (30 per cent) and the lowest for 'Dairy' (8 per cent) and 'Tillage' (14 per cent). Inequality has social as well as economic implications.

The main farming types are:

- **Specialist Beef Production:** The most common farm type, with 74,159 farms accounting for 54.9 per cent of all farms in 2020 (CSO, 2022a). Forty-six per cent of specialist beef farms were located in the Northern and Western regions compared with 36 per cent in the Southern region (CSO, 2022a).
  Cattle farm households had the highest proportion of households deemed vulnerable, with 35 per cent of 'Cattle Other' and 33 per cent of 'Cattle Rearing' deemed vulnerable (Dillon *et al.*, 2022). These farms also had the highest reliance on direct farm payments, which made up 139 per cent of farm income for 'Cattle Rearing' and 92 per cent of farm income for 'Cattle Other'. In absolute figures, the average direct payments in 2021 were €8,118 (€246 per ha) for 'Cattle Rearing' and €10,332 (€287 per ha) for 'Cattle Other' (Dillon *et al.*, 2022).
  Average emissions for cattle farms (reported as a single category for the National Farm Survey sustainability

[8] The Teagasc National Farm Survey defines a farm business as being economically viable if the family farm income is sufficient to remunerate family labour at the minimum wage in 2021 (which is assumed here to be €20,129 per labour unit), and to provide a 5 per cent return on the capital invested in non-land assets, i.e. machinery and livestock. Farms that are found not to be economically viable but that have an off-farm income source within the household (i.e. either the farmer or spouse are employed off-farm) are considered to be economically sustainable. Farm households are considered to be economically vulnerable if they are operating non-viable farm businesses and neither the farmer nor farmer's spouse has an off-farm job (Dillon *et al.*, 2022). The farm economic viability definition is a farm business concept; the other two categories are farm household definitions.

[9] 'The Standard Output of an agricultural product is defined as the average monetary value of the agricultural output at farm-gate prices. SO is not a measure of farm income. It does not take into account costs, direct payments, value added tax or taxes on products' (CSO, 2022a). Its relevance here arises from the fact that there is a substantial number of farms (48,536) not included in the annual National Farm Survey because this survey does not cover farms with a standard output of €8,000 or less.

report) were approximately 162 tonnes CO_2e (4.7 tonnes of CO_2e per ha) in 2021 (Buckley and Donnellan, 2022).

- **Specialist Sheep:** The second-most common farm type, with 17,435 (12.9 per cent) farms in 2020 (CSO, 2022a).
  Thirty-three per cent of sheep farms were deemed economically viable and 30 per cent of sheep farm households were deemed vulnerable in 2021 (Dillon *et al.*, 2022). Annual farm income was €20,794 and there is a high reliance on direct payments, which make up 90 per cent of farm income (Dillon et al., 2022). Average direct payments for sheep farms in 2021 were €18,945 (€421 per ha) (Dillon *et al.*, 2022). Emissions for sheep farms were approximately 184 tonnes of CO_2e (4.1 tonne CO_2e per ha) in 2021 (Buckley & Donnellan, 2022).

- **Specialist Dairying:** The third-most common farm type, with 15,319 (11.3 per cent) farms in 2020 (CSO, 2022a). Dairy farms are most concentrated in the South and East, with the highest levels in five counties: Cork (27.7 per cent), Waterford (26.5 per cent), Kilkenny (23.5 per cent), Limerick (23.5 per cent) and Tipperary (21.5 per cent) (CSO, 2022a).
  Dairy farms have the highest level of economic viability at 85 per cent, and the lowest levels of vulnerable households at 8 per cent (Dillon *et al.*, 2022). Dairy farms have the highest average farm income of €98,745 and the lowest reliance on direct payments, which accounted for 21 per cent of farm income (Dillon *et al.*, 2022). Average absolute direct payments for dairy were the second highest (after tillage) at €21,184 (€331 per ha) (Dillon et al., 2022).
  Average emissions for dairy were 608 tonnes CO_2e in 2021 (9.5 tonnes of CO_2e per ha, and 0.85 kg of CO_2e per kg of fat and protein-corrected milk) (Buckley and Donnellan, 2022). The report by the Food Vision Dairy Group notes that an estimated 40 per cent of total agricultural emissions are associated with the dairy sector (Food Vision Dairy Group, 2022).

- **Specialist Tillage:** The sixth-most common farm type, with 4,567 farms (3.4 per cent) in 2020 (CSO, 2022a). In 2021, 73 per cent of tillage farms were identified as economically viable, and 14 percent of tillage farm households were vulnerable (Dillon *et al.*, 2022). Tillage farms had the second-highest (after dairy) average farm income of €57,939 in 2021 and the second-lowest (after dairy) reliance on direct payments, which accounted for 48 per cent of farm income in 2021 (Dillon et al., 2022). Average absolute direct payments for tillage were the highest at €27,744 (€409 per ha).
  Tillage has the lowest associated emissions. Average emissions for tillage were 176.9 tonnes of CO_2e in 2021 (2.5 tonnes CO_2e per ha) (Buckley and Donnellan, 2022).

Regional dynamics are highly significant, particularly given the significant up- and downstream economic importance of agriculture for rural communities compared with other sectors. A recent report assessing the implications of climate mitigation options for the socio-economic value of agricultural production and the rural economy in Ireland concluded that achieving climate action targets will impact regions differently, and noted the importance of indirect up- and downstream impacts (DAFM, 2022b). Teagasc National Farm Survey 2021 results identified the North and West regions as having the highest proportion (34 per cent) of farm households classed as economically vulnerable. Farm business economic viability was highest in the South, the East and the Midlands, where 51 per cent and 49 per cent of farms, respectively, were classified as viable (Dillon *et al.*, 2022).

Stakeholders placed a strong emphasis on the economic risks, focusing on the economic significance of the sector and its importance to food security. It was noted that there were also risks in continuing with the status quo; for example, the Food Vision Dairy Group notes that the continued success of Irish agriculture as a major world exporter of food will increasingly depend on the sustainability of our food production system (Food Vision Dairy Group, 2022). Farmers also raised economic issues, including low incomes and receiving a low price for their output.

5.2.2 Possible Income and Output Impacts

As part of the CCAC carbon budgeting process in 2021, an economic evaluation was carried out using the Teagasc FAPRI model[10] of the agriculture sector (CCAC, 2021a). This identified implications under various scenarios of GHG mitigation. While the analysis did not include a scenario examining the 25 per cent reduction target agreed by Government in July 2022, the Department of Agriculture, Food and the Marine (DAFM) (2022b) notes that it did include two scenarios that are close: a 20 per cent reduction and a 33 per cent reduction, which together can provide an indication of the implications of the 25 per cent target.

Under these scenarios, agricultural output would be 7–19 per cent lower in 2030 compared with a 2030 baseline (scenario A). Scenario A is consistent with DAFM *Ag Climatise* plan including 29 actions to meet the Climate Action Plan 2019. Income would be 9–25 per cent lower in 2030 compared with the baseline scenario A. Under these scenarios, the model estimates that total cattle would be 9–28 per cent lower in 2030 compared with the baseline (DAFM, 2022b).

These estimates reflect the potential gross economic implications in the absence of the development of alternative income streams, and the estimates assume that there is no policy response to mitigate economic effects.

Potential income reductions estimated for specific measures include estimated potential annual income losses of up to €190 per ha for rewetting organic soils on extensive beef systems (Lanigan *et al.*, 2018), and an estimated reduction in the profitability of dairy per hectare by 15 per cent from a 30 per cent reduction in chemical nitrogen (Dillon *et al.*, 2020).[11] The Food Vision Dairy Group notes that incorporating white clover into existing pastures and nitrogen use efficiency measures have the potential to reduce these negative economic impacts (Food Vision Dairy Group, 2022).

A survey of 1,218 farmers by Bord Bia's Thinking House identified a concern that the 25 per cent emission-reduction target will result in their family farm or enterprise becoming less economically viable (44 per cent of farmers), while 83 per cent agree/strongly agree that farmers will be unfairly penalised financially when it comes to sustainability (Bord Bia, 2022).

5.2.3 Ecosystem Values and Costs

The multiple values of ecosystem services and the cost of their degradation is increasingly recognised. For the first time, in 2020, the top five global risks identified by the World Economic Forum (WEF) came from a single category: the environment. The risks and threats to society, business and human life that arise from ecosystem services under pressure are increasing observed in Ireland (EPA, 2020). Globally, the WEF has estimated that $44 trillion of economic value generation – more than one-half of the world's total GDP – is moderately or highly dependent on nature and its services and is therefore exposed to nature loss (WEF, 2020). Natural capital accounting and accounting for ecosystem services are explored in more detail in Chapter 12.

5.2.4 Cost of Delay

The IPCC emphasises that the economic and social benefit of limiting global warming exceeds the cost of mitigation, even without accounting for all the benefits of avoiding potential damages (IPCC, 2023). Both the International Monetary Fund and the Irish Central Bank argue that the benefits of the early introduction of mitigation policies and further delay in climate response would only amplify transition costs (IMF, 2022; McInerney, 2022).

Delays in the pace of transition also pose economic risks; for example, a failure to act early while a variety of options exist can result in more sudden decarbonisation, which will be more disruptive and expensive (CCAC, 2021c). In its *Global Risks Report*, the WEF concludes that rapid decarbonisation would increase economic and societal disruption in

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[10] The FAPRI-Ireland Partnership, which was established in the mid-1990s between Teagasc and the University of Missouri Food and Agricultural Policy Research Institute (FAPRI) to develop economic models to quantify the effect of policy reform on agricultural markets and farm income in Ireland.

[11] This assumes a linear reduction in profitability in a scenario where cow numbers are held constant, and the reduced grass production was made up for by purchased feed.

the short term, while a slower pace with fewer short-term impacts would entail much larger costs and greater disorderliness in the long term (WEF, 2022).

In Bord Bia's Thinking House survey of 1,218 farmers, 66 per cent of farmers agree that if farmers do not improve their sustainability, the sector will not survive (Bord Bia, 2022).

5.2.5 Possible Employment Impacts

Building on the economic assessment in the CCAC *Carbon Budget Technical Report* (2021a), DAFM (2022b) explored implications for demand and employment in the domestic economy. Based on the Teagasc FAPRI estimates of output value impacts, and using a methodology based on multiplier coefficients, DAFM estimated that there would be between 5,750 and 12,820 fewer domestic jobs as a result of the gross 'Milk and Cattle' output value shocks under the 20 per cent mitigation scenario compared with the baseline; and 16,650–35,450 fewer jobs under the 33 per cent mitigation scenario in 2030. In both cases, the changes are relative to the baseline scenario consistent with *Ag Climatise* (DAFM, 2020). It is important to note that this analysis does not take any potential policy responses into account.

The precise scale of transition in relation to reductions in agricultural output are not yet clear and it is therefore not yet clear what, if any, impacts transition will have on employment for workers in the agricultural and land use supply chains. This includes uncertainty as to the number of new jobs that will be generated, how labour-intensive they will be, or how suitable or attractive they will be to workers currently employed.

Supply-chain workers, particularly those in meat factories, often earn low wages and face difficult working conditions and, internationally, have been identified as being vulnerable to transition (Verkuijl *et al.*, 2022). This has not been fully explored in Ireland to date in relation to transition impacts. However, a report focused on workers in the meat processing sector in Ireland from the Migrant Rights Centre of Ireland (2020) identified a high level of workplace injuries, low pay and discrimination based on a survey of 151 workers. Meat Industries Ireland indicates that 20 per cent of the workforce in the Irish meat sector is drawn from outside of Europe (Ibec, 2020).

5.3 Economic Opportunities

The economic sustainability of agriculture is fundamentally dependent on healthy soils, climate stability, biodiversity, and well-functioning ecosystems. The value of these long-term benefits should be factored in alongside the expected costs of transition.

First, there are a range of practices that, if adopted by farmers, will both save money and reduce emissions. These include land and soil management practices that improve nitrogen use efficiency and animal breeding practices. Increasing efficiency can, however, as a result of the rebound effect, see increased production out-pacing efficiency gains resulting in increases in overall emissions. There is some evidence for this effect in Ireland in the dairy sector where, despite significant gains in milk production efficiency, total emissions have risen driven by increases in total milk production (Haughey, 2021; Lanigan *et al.*, 2018).

Second, there are economic opportunities for diversification of activity at farm level and in the wider rural economy (Government of Ireland, 2021c). Sustainable land uses such as forestry and renewable energy-related development have potential to deliver higher returns than many other farm enterprises (Government of Ireland, 2021c). The developing circular bioeconomy provides other new opportunities such as the processing of feed residues, farm waste and other bio-based resources for the production of textiles and natural packaging (European Commission, 2022b). The evolution of consumer demand driven by health and sustainability will continue to shape dietary choices, including alternative proteins (Bord Bia, 2021). Box 5.1 summarises findings from research commissioned by NESC into opportunities for diversification.

Box 5.1: Economic Opportunities Identified in the AECOM Report

The opportunities for diversification are explored in the AECOM report commissioned by NESC based on existing evidence. AECOM cites research showing that forestry is a financially attractive opportunity (given Government supports) for cattle and beef farmers but not for dairy.

One of the obstacles to afforestation frequently cited by farmers is its irreversibility – once afforested, there is a continuing obligation to maintain the land in forestry. The views of farmers consulted during this study are presented in Section 11.3.3. Specific policy inconsistencies affecting forestry are presented in Section 12.4.

In view of the constraints on standard forestry among farmers, AECOM points to the potential of 'silvopasture'. With this system, stock continue to graze among widely spaced trees. It offers multiple benefits including carbon capture and increased biodiversity. There is a need for research on the constraints of adopting silvopasture in Ireland, including the economic dimensions.

Tillage is identified by AECOM as a means of diversification that would have substantially lower emissions relative to livestock farming while offering the second-highest income among farm enterprises (after dairying). AECOM also identifies the opportunities for organic waste from tillage (such as straw and husks) to be further processed using biorefining techniques – this is an example of a bioeconomy opportunity. Another opportunity is to grow specific crops for the biopharmaceutical sector. However, the report notes that 'to date there has been no national policy formulated which would help to develop this new and emerging market' (AECOM, unpublished: 98). AECOM also identifies farming for nutraceuticals (food substances with health or medical benefits) as a potential diversification opportunity.

Hemp growing is another potential opportunity. Hemp is ideal for growing on marginal land but licensing, lack of end markets and processing infrastructure are identified as the main constraints.

Fruit and vegetables also represent a lower carbon opportunity. Demand is growing while 40 per cent of vegetables consumed in Ireland are imported. There are, however, barriers to entry in the form of the investment required and the challenge of achieving the scale required by buyers. Challenges in supply-chain dynamics are explored in Section 5.2.5. Power (2022) notes that the pressures of the price competitive market in the retail grocery sector negatively affect the development of the horticulture sector.

Renewable energy provides opportunities for farmers at different scales although the reduction in emissions is not accounted for in the agricultural sector. On some farms, there is an opportunity for large-scale energy generation for the grid. AECOM points to agrivoltaics – growing crops or livestock among solar panels – as a potentially promising opportunity for Ireland. There is a widespread opportunity for microgeneration on farms and this is supported by grants. Returns vary but AECOM cites research that the payback period for on-farm solar is typically six to eight years.

It is argued that the Irish bioeconomy and circular economy have unexploited potential, and that developing the bioeconomy would support diversification into non-food areas, including a wide range of bio-based products as well as supporting renewable energy production from agriculture and forestry (Government of Ireland, 2023a). The potential of the bioeconomy is reflected in Food Vision 2030 (Mission 1, Goal 6), which aims to embed the agri-food sector in the circular, regenerative bioeconomy (Government of Ireland, 2021b).

Anaerobic digestion (AD) has significant economic opportunities that are recognised in the Climate Action Plan (Government of Ireland, 2023b). It can generate bioenergy (biogas) and can also be used to produce high-value chemicals. Grass biorefining can produce materials for use in construction (insulation) and the manufacture of fibres and paper. It can also be used to produce feed and feed ingredients.

Renewable energy in Ireland has considerable potential for growth. Energy from renewable sources grew by 8.2 per cent in 2020; 6.6 million tonnes of CO_2 (Mt CO_2) were avoided, equivalent to the CO_2 emissions of over one-half of all Irish homes (SEAI, 2021a).

Research is currently underway in Ireland on how these opportunities can be used to support new revenue streams; for example:

- Research is being conducted on how grass may be converted into value food, feed and fibre as well as energy. Combining grass biorefining and AD is being explored by the Farm Zero C project, supported by Science Foundation Ireland and DAFM.
- The Biorefinery Glas[12] demonstration project, funded by DAFM, is exploring diversification opportunities from grass that is compatible with animal agriculture systems, with the aim of generating bioenergy/biogas while optimising and cascading the use of grass to produce animal feed, food (high-value pre-biotics), bio-based fertiliser and bioenergy/biogas feedstock.
- Research has identified value chains with significant short-term potential in Ireland (Government of Ireland, 2018). Eighteen value chains were identified in a BioÉire project, including sugar beet, horticulture, marine, forestry, paper or cardboard pulp and agricultural or food residues and waste (Government of Ireland, 2019; Government of Ireland, 2022a; Teagasc, 2017).

McKinsey analysis prepared for the CCAC suggests that opportunities exist for Ireland to further develop agricultural exports arising out of the low-carbon transition, including export markets in alternative protein end product and ingredients, low-carbon dairy end products, the provision of carbon credits and carbon management, and bioeconomy products (CCAC, 2021a; CCAC, 2021c).

[12] See https://biorefineryglas.eu/ [accessed 05/05/23].

Chapter 6

Social Lens

6.1 Introduction

> *'Farming provides a strong social identity for those involved. Farm holdings may have been in families for generations, with a deep sense of connection to the land. Farming is about more than an income' (Emmet-Booth et al., 2019: 73).*

Government policy as outlined in *Our Rural Future: Rural Development Policy 2021-2025* acknowledges that agriculture is as much about culture, identity and a way of life as it is about economic or environmental sustainability (Government of Ireland, 2021b); Food Vision 2030 also includes a core focus on social sustainability. The 'family farm' model is an important part of Irish society (Freiberg, 2022). For example, Hennessy *et al.* (2018) highlight the benefits to society from suckler farming contributing to the social fabric and cultural capital of rural communities, often located in marginal or economically disadvantaged areas.

This chapter identifies a number of existing social challenges in the agriculture sector. It emphasises the importance of not exacerbating existing vulnerabilities, and the potential opportunities of transition for increasing the resilience of rural communities.

6.2 Social Challenge

There are several dimensions to the social challenge: age profile; female participation; long hours of work; and mental health and well-being. This section, 6.2, provides a brief overview of each of these factors.

To be socially sustainable, the sector needs to attract younger farmers and women in greater numbers.

6.2.1 Age Profile

In line with similar trends across Europe, the age profile of farm holders has changed over the last 30 years, with fewer farm holders under the age of 45 and considerably more aged 65 or over. In 2020, almost one-third of all farm holders were aged 65 or over compared with just over one-fifth in 1991. In 1991, 33.1 per cent of farm holders were under the age of 45, whereas in 2020 this age group represented 20.8 per cent of all farm holders (CSO, 2022a).

The proportion of farm holders under the age of 35 has been falling consistently since 1991 but there was a slight increase in the proportion in this youngest age category between 2010 and 2020, from 6.2 per cent to 6.9 per cent (CSO, 2022a).

Many of the farmers who participated in the NESC workshops as part of this project also spoke about the issues they face regarding the sustainability of farming. Younger people are not attracted to the profession. It was noted that the farm family has traditionally been at the heart of rural communities and there was concern over its future.

6.2.2 Female Participation

In 2020, there was just over 18,000 female farm holders (or 13.4 per cent) compared with 17,345 (or 12.4 per cent) in 2010 (CSO, 2022a), and this gender imbalance is reflected in the gender demographic of young farmers.

While farms owned by women represent 13.4 per cent of farms overall, the percentage of women farm holders was greater for smaller farm sizes. Almost 20 per cent of farm holders on farms of less than 10 ha were women. An Irish Farmers' Association diversity study reported that traditional male inheritance was a significant barrier to increasing the share of women farmers (IFA, 2019; Quinn-Mulligan, 2018).

The National Women's Council of Ireland observes that there has been no increase in women's ownership of land since 2010 (NWC, 2021). Over 58,000 women in Irish farming are without visibility or farm holder status (Government of

Ireland, 2023e). DAFM hosted an event called A National Dialogue on Women in Agriculture in February 2023 to examine these challenges and a report is forthcoming.

6.2.3 Working Hours

> *Farmers work long hours, and farmer well-being issues include risks of social isolation, stress and farm safety (Buckley and Donnellan, 2022).*

The *Teagasc National Farm Survey 2021* found that, while dairy farms performed well when measured against most social sustainability indicators compared with other farm systems, the main dairy farm operator works significantly more hours per year on average than the farm operator in the other farm systems. Even when time spent working off-farm is combined with time spent working on-farm, the labour input of dairy farm operators is higher than for other farm systems (Dillon *et al.*, 2022).

While long working hours seem to be decreasing for the average EU worker within the agricultural sector, they are increasing in Ireland (Murphy, 2022). Long working hours not only pose a physical and mental health risk for farmers, but, in the context of transition, have the potential to limit the time available for farmers to engage in transition activities, including education and training and implementing new approaches.

6.2.4 Mental Health and Well-Being

Recognising the mental health challenges that farmers experience has prompted initiatives to improve farm safety and wellness among the farming community (DAFM, 2022e). For example, On Feirm Ground, co-funded by the HSE and Department of Health, is a physical and mental health awareness programme aimed at helping farm advisors engage with farmers on health issues and signpost them to the necessary supports.

Just over one-half of all farmers surveyed by UCD School of Agriculture and Food Science in 2022 were experiencing moderate to extremely severe depression and 23.4 per cent were considered at risk for suicide (Russell *et al.*, 2022).

The UCD study identified concern over Government policies designed to reduce climate change as one of the five top stressors (Russell *et al.*, 2022). Rural isolation and changing identities of farmers are other issues that are also worth further exploration. The risk of isolation increases with age: just 39 per cent of farmers over the age of 60 meet people outside of their household on a daily basis compared with 84 per cent of younger farmers (Dillon *et al.*, 2017).

The increased loneliness associated with reduced social interaction leaves single and older farmers particularly vulnerable (Hammersley *et al.*, 2021). Feelings of isolation and a fear of being excluded can influence levels of social cohesion but these can be countered through measures that build rural community engagement (RIA, 2019).

In participatory research with beef farmers, Murphy *et. al.* (2022) identified farmers' concerns with a perceived declining social status of small farms and farmers and a sense of a wider decline in rural Ireland. A strong message from the NESC farmer workshops was that farmers feel 'under attack' in relation to climate action and that their positive contribution to environmental management is not accounted for or rewarded.

Social risks were highlighted in these workshops: farmers are under huge pressure and financial strain that is not sustainable long-term and this is having a huge impact on their mental health.

6.3 Social Opportunities

There is an opportunity to approach action on climate change and biodiversity loss as a catalyst for change and a positive source of renewed vitality within the agricultural sector and rural communities more generally. In a paper prepared as part of the Department of Agriculture–EIT Climate-KIC strategic initiative, the authors note that transition is an opportunity to inspire and attract women farmers and the next generation (DAFM-Climate KIC, 2023 forthcoming).

As younger farmers are also more likely to adopt new approaches, attracting younger farmers into farming is also important for environmental sustainability.

NESC's work with farmers and rural stakeholders confirms that there is a very strong awareness of the scale of the climate and biodiversity challenge, and a survey of 1,218 farmers by Bord Bia's Thinking House confirms a high level of engagement. The survey reports that 83 per cent of farmers have made changes to reduce emissions on their farms, with dairy farmers most likely to state that have made changes on their farms (88 per cent)(Bord Bia, 2022).

The survey also reports that the majority of farmers are willing to implement further changes to reduce emissions: 86 per cent of farmers claim that they are willing to implement further changes on their farm to meet reductions in emissions targets and this is highest among those in the 'starting out life stage' (93 per cent).[13]

Reflecting on more general research, Lunn concludes that for a large majority of people in Ireland – young and old, living in both urban and rural communities – the issue is not winning hearts and minds on the seriousness of the problem, but rather is about getting people to engage with and embrace the specific changes needed to cut emissions (Lunn, 2022).

An appetite to engage in meeting our society's greatest challenge does exist among farming and rural communities. The problem for farmers concerns responding and reacting to the challenges they are encountering, and ensuring that they have the supports they need. If supported in an appropriate way, with meaningful engagement for developing solutions and identifying the appropriate supports, then rising to this challenge has the potential to re-energise the sector and help attract new entrants.

In a NESC Research Series report, Moore-Cherry *et al.* (2022) highlighted the potential of place-based approaches to transition for enhanced regional development. McCabe (2021) highlighted the potential of community wealth-building for progressing climate action in a way that addresses community needs and supports rural development. Similarly, in a paper prepared by Metabolic as part of the Department of Agriculture–EIT Climate-KIC strategic initiative, the authors highlight regional diversity as an opportunity for a more diversified and tailored approach to rural development in the context of transition, noting that

> *The opportunity here lies in capitalizing on [regional] diversity, rather than minimizing it. Diversity is the foundation of resilience and brings richness to culture. It is important then to disaggregate national indicators and data, not only by farm type, but also by spatial distribution, making the concentrations and gaps visible on the map. Then strategies can be formed according to more holistic and place-based realities (DAFM-Climate KIC, 2023 forthcoming: 10).*

A report commissioned by the Department of Rural and Community Development outlines how rural social enterprises also play an important role, often bringing environmental, social, economic and health/well-being contributions intertwined within each enterprise's work, activities and outcomes in order to enhance integrated place-based rural development (Olmedo and O'Shaughnessy, 2022). It recommends support for community-based social enterprise models in the farming, agriculture, fishing and forestry sectors, and for islands and coastal communities due to their potential to contribute to sustainable development.

6.4 Conclusion

Applying the three intersecting lenses (environmental, economic and social) illustrates that there are existing environmental, economic and social strengths and vulnerabilities in the Irish agriculture and land use sector. It is important to note that the specific impacts of transition remain unclear and will depend on the scale of action undertaken, and the policies or supports designed to mitigate impacts. There is a need for more research on the modelling impacts (DAFM, 2022b).

[13] Respondents to the Bord Bia survey were invited to identify their farm-life stage from four options: starting out; building; consolidating; and handing over (Bord Bia, 2022).

Part II identified some of the potential risks arising from transition, including risks associated with reduced economic output, employment and income impacting on the agri-food sector, farmers and rural communities, and on consumers and the economy, as well as potential risks to biodiversity, water and air quality from measures to reduce emissions that do not take these wider environmental issues into account. Exacerbating existing vulnerabilities during the transition of the agriculture and land-use system is a risk that needs to be proactively managed and is a key focus of the interventions explored in Part IV.

In this research, stakeholders identified a distinction between those who will be *impacted* by transition (e.g. those to whom specific transition measures apply) on the one hand, and those who are likely to be *vulnerable* (see Box 6.1) to the impacts of transition (e.g. those for whom the impacts of transition will exacerbate inequalities or increase vulnerabilities, or for whom existing vulnerabilities inhibit the ability to take advantage of opportunities of transition) on the other.

It is also clear that there are significant opportunities for a well-designed transition process to increase environmental, economic and social resilience (see Box 6.1), including both in navigating the changes as part of transition and in resilience to wider changes, including adapting to the impacts of climate change. Ensuring that people are enabled to benefit from the opportunities is also a key focus of the interventions explored in Part IV of this report.

Box 6.1: Vulnerability and Resilience

There are many conceptions of vulnerability, linked to the number of disciplines engaged with it, ranging from climate change to cybersecurity, planning to coastal management, and natural disasters to food poverty (Hufschmidt, 2011; Kim *et al.*, 2021). A common thread in the many conceptions of vulnerability is that vulnerability is susceptibility to harm or risk. However, the experience of vulnerability varies due to resilience.

The concept of resilience has also been conceptualised by many disciplines including psychology, ecology, social science and economics. Resilience can be understood as the capacity to prepare and plan for, adapt or transform in the face of change, particularly unexpected change, in ways that continue to support well-being (Folke *et al.*, 2016). The social and economic resilience of the agriculture sector relies on the resilience of the ecosystems that support it, including crop resilience in the face of climate variability and extreme events, and soil health including soil structure and soil biodiversity (Scott & Faulkner, 2023).

There are multiple potential benefits and opportunities in the process of transition. A significant body of innovation and action from farmers, land managers and supply-chain actors, together with shifts in consumer behaviour, demonstrates willingness, innovation and progress in the efforts being made to achieve a more sustainable agriculture and land use. There is significant potential for co-benefits of action, including income diversification, enhanced rural development, restoration of nature and water quality, and the achievement of other national objectives including meeting renewable energy targets and a shift to a circular economy.

There are economic opportunities from land use diversification. Sustainable land uses such as forestry, bioeconomy, and renewable energy-related development offers potential to deliver higher returns than many other farm enterprises (Government of Ireland, 2021a). Many land and soil management measures reduce input costs, diversify production, and improve soil quality, with associated benefits for water quality and water retention. There is potential for farmers to benefit from, and contribute to, the future growth of renewable energies, the bioeconomy and the provision of ecosystem services in Ireland. With the right supports, farmers are ideally positioned to produce food, fibre or fuel.

Based on measures included in the Climate Action Plan 2023, Box 6.2 provides a snapshot of groups of people who may be positively or negatively impacted by transition, based on current knowledge. There is a need to develop more fine-grained data, and to tailor measures based on vulnerabilities.

Box 6.2: A Snapshot of Who May be Negatively or Positively Impacted

Based upon the measures included in the Climate Action Plan 2023, it is possible to identify in general terms how groups or regions may be impacted differently. The dynamics relating to the vulnerability of groups impacted by transition include economic vulnerability of farm households, farm system, farm size, age profile, wages, working conditions of workers in the supply chain, income levels of consumers, and regional dynamics related to broader economic vulnerabilities.

Groups that may be most impacted by transition include:

- farmers located on the approximately 8 per cent of grasslands on drained organic soils;
- livestock farmers who face barriers to diversifying income;
- farmers with higher current levels of chemical nitrogen fertiliser use; dairy farms in particular account for approximately 50 per cent of the total nitrogen used in 2021 (Food Vision Dairy Group, 2022);
- farm households meeting the Teagasc National Farm Survey definition of economically vulnerable, estimated as 27 per cent of farm households with a standard output of over €8,000 per year, and 50 per cent of farms with a standard output of €8,000 per year or less;
- workers in the supply chain and the wider rural community;
- rural communities;
- young people and women as new entrants into agriculture; and
- older farmers.

Farmers who could be positively impacted by specific transition measures include:

- tillage farmers or farmers who are interested in diversifying into tillage. As the farm system with the lowest GHG emissions, and the second-highest income, policy is incentivising increased areas under tillage.
- organic farmers or farmers who are interested in diversifying into organic production. Organic farming uses no chemical inputs and is associated with lower stocking rates, and therefore has lower associated emissions.
- many farmers who can benefit from the cost savings arising from many of the land and soil management practices and animal breeding and animal health measures.
- many farmers who can benefit from investing in renewable energy over the long term from an energy-efficiency perspective, particularly given rising fuel costs.
- many farm systems that can incorporate trees to some extent in terms of hedgerows and have the potential for considering incorporation of trees by improving or expanding hedgerows, or for farmers with suitable land incorporating agroforestry or silvopasture systems alongside agricultural production.

PART 3
Framing the Actions Needed

Chapter 7

A Systems View

7.1 Introduction

In line with international trends, Ireland has adopted a food systems approach in the agri-food strategy Food Vision 2030 (Government of Ireland, 2021b).

The UN Food and Agriculture Organization (FAO) defines food systems as encompassing 'the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded' (FAO, 2018).

Stakeholders emphasised the value of taking a systems perspective with a broad approach, situating the agriculture and food system within the wider land use, forestry and bioeconomy, as well as taking a broader perspective on environmental issues than climate action alone in order to include biodiversity, air and water quality.

Adopting a systems perspective helps shift from a narrow focus on farmers to the wider set of stakeholders and the role of policies and institutions, and widens the focus of potential opportunities, innovations and intervention points across the agriculture and land-use system.

This chapter discusses Irish agriculture and land use as a system, outlining its key components and some of the unique features that shape thinking about transition.

7.2 Illustrative Systems View

Figure 7.1 provides a diagrammatic overview of the Irish agricultural and land-use system. It highlights the various components, spanning primary production of food, fibre and fuel through to processing, distribution and consumption, both locally and internationally.

Taking account of all the activities relevant to the production and consumption of food and beverages and their associated wastes (Bock *et al.*, 2022) can help to identify critical areas as well as novel and alternative approaches to mitigation on both supply side and demand side (IPCC, 2022).

The Organisation for Economic Co-operation and Development warns that 'climate action all too often aims at optimising individual components within systems rather than transforming the systems themselves, which are unsustainable by design' (OECD, 2021c: 2). Stakeholders emphasised the limitations of individual action by farmers operating in a system where policies, incentives and structures can disincentivise sustainability.

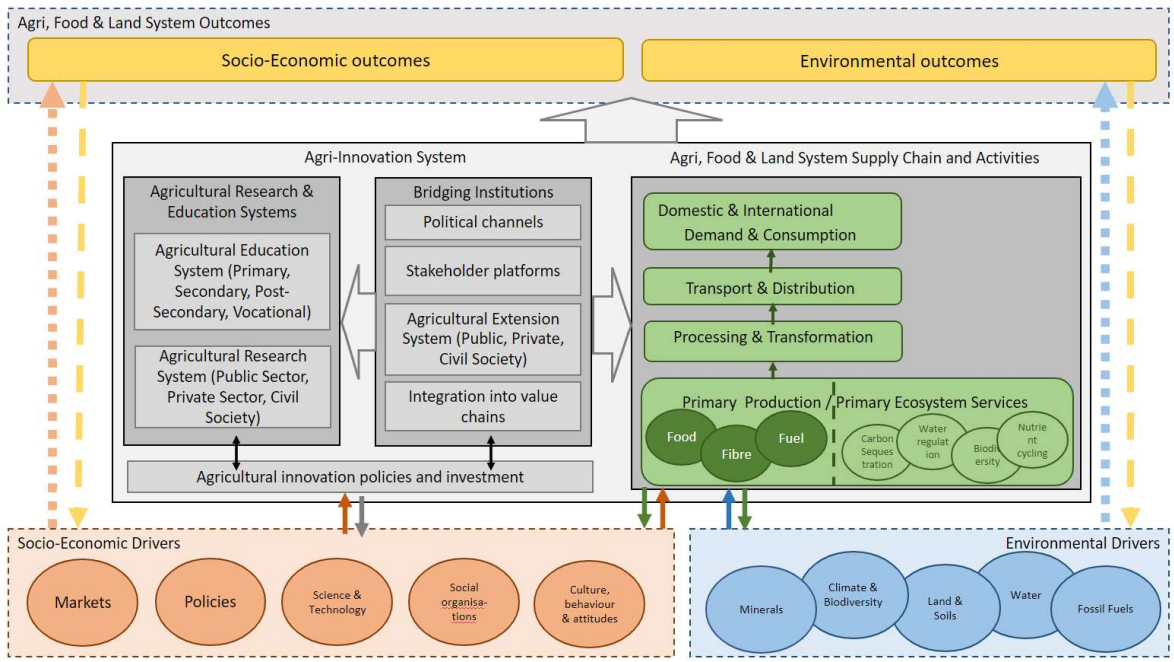
Hepburn *et al.* (2020) identify that the non-linear dynamics of complex systems (including network effects, economies of scale, and bandwagon dynamics) can create self-reinforcing feedback loops that offer the potential for rapid change that can be harnessed in support of transition. They identify intervention points (including areas such as increased public engagement, aligning incentives or redirecting capital flows) as areas where a small push in the right direction can have outsized impacts.

A focus on and search for these types of interventions inform this NESC report.

This system view capturing the range of outcomes – both the challenges and opportunities, across the economy, environment and society – is discussed in Part II.

These intersecting areas and objectives are noted in the Climate Action Plan 2023 through an emphasis on the sector's contribution across food production and food security, climate mitigation and resilience; energy security in a decarbonising system; and increasing home-grown proteins and cereals for domestic livestock as a key objective (Government of Ireland, 2021b).

Figure 7.1: Representation of the Irish Agriculture and Land-Use System



Source: Adapted from Spielman and Birner, 2008 and Posthumus *et al.*, 2021.

This systems view illustrates that farmers are embedded in supply chains that include large businesses that operate globally. These actors significantly influence prices and production systems, as well as the working conditions of agricultural workers, and are therefore vital actors in supporting the transition. Farmers are 'price takers', with limited ability to influence the value of their output. The role of supply-chain actors in the food system is therefore critical in supporting and incentivising the shift towards more sustainable production, the importance of which is recognised in the new Agriculture and Food Supply Chain Bill 2022.

The Irish agri-food supply chain extends internationally, underlying an additional layer of complexity and the importance of consumer preferences and demands in key international markets (United Kingdom, United States, Europe) and potentially limiting the role of Irish demand-side measures as part of the transition in agriculture (Lanigan *et al.*, 2018).

This system view also brings into focus a range of stakeholders in the wider agri-innovation system – agricultural research, education, and 'bridging' institutions that play a critical role in supporting the innovation and learning that is required to achieve social, economic and environmental outcomes. Stakeholders emphasised the important role of farmer-led innovation and peer-to-peer learning, in particular the valuable role played by European Innovation Partnerships (EIPs) in farmer-led development and testing of innovative solutions.

Considering all the actors within the agriculture and land-use system, spanning primary producers, actors along the value chain as well as in the agri-innovation system, widens the range of actions that can be taken by different stakeholders and the scope for effort sharing in the delivery of transition.

The systems view also helps focus attention on the multiple processes and actors and how they interact. In particular, it helps draw attention to how Government interventions to alter one part of the system can generate costs or benefits elsewhere, creating an uncertain mixture of feedback, synergies, and trade-offs (EEA, 2019; Hepburn *et al.*, 2020).

7.3 Unique Aspects of the Agricultural and Land-Use System

Agricultural and land-use systems have several characteristics that distinguish the nature of transition compared to other areas of the economy (Baldock and Buckwell, 2021).

In Ireland, these distinctive characteristics include the strategic importance of the sector to the economy and its contribution to global food security; the extent and diversity of land covered by agriculture with significant implications for nature, air, water and climate; the diversity of farm structures and the nature of the supply chain; and the wider social and cultural significance of the sector, which, taken all together, increase the complexity, uncertainty and political sensitivity of transition.

Unlike other sectors undergoing transition, such as the energy sector, the agricultural and land-use system is made up of thousands of predominantly small family enterprises based in every part of the country. This underlines the importance of understanding and incentivising behaviour, and of clear and consistent communications in supporting transition.

In addition, also unlike other sectors undergoing transition, where the focus has been on retraining and job losses as industries are phased out, transition in the agriculture and land-use system will principally rely upon thousands of individual farmers innovating and changing practices or land use, across diverse soils, land types and production systems.

The active participation and engagement of farmers is therefore of fundamental importance to effective transition. The transition is about knowledge, capacity and behaviour change as well as technology and production practices.

Finally, unlike other sectors, the agriculture and land use sector is unique in the area of climate action as it is both a source of GHG emissions as well as a sink – capable of removing GHGs. This provides a significant opportunity.

7.4 Implications of Systems Thinking

Systems thinking is more than just recognising the complexity or uncertainty of the challenge, and points to the potential of systems thinking for informing the types of interventions that can most effectively bring about change (National Food Strategy, 2021).

No individual policy or policy measure will be sufficient to manage a transition in the agri-food system (Bock *et al.*, 2022). Transition pathways will require both incremental, small-scale transitions together with more structural, larger-scale changes to institutions and norms, which will need to happen in a co-ordinated and integrated 'whole of government' way (HLPE *et al.*, 2017). Thinking about agricultural and land as a system overall can widen the field of vision, and point to multiple interventions including reform of existing policies, repurposing existing or identifying new policies, together with structural and institutional change to generate a systemic shift and to mitigate potential negative impacts (FAO *et al.*, 2021).

Systems thinking can also, especially in the context of high levels of uncertainty, help to identify the importance of pursuing a 'portfolio' of interventions (Hepburn *et al.*, 2020). Hepburn *et al.* argue that this is, first, because, given the uncertainty of complex systems, some interventions may fail and having a set of interventions each aiming to shift the system in the same direction can compensate for those that fail; and second, a portfolio of interventions is likely to add to more than the sum of its parts because interventions will interact and reinforce each other in complex ways to help to shift the system.

A portfolio of interventions is required to deliver an effective transition including interventions that support individual and local action as well as interventions that bring about structural changes to institutions and practices. Part IV of this report explores the portfolio of interventions recommended by the Council to support an effective and just transition in agriculture and land use.

Chapter 8

Vision

8.1 Introduction

A critical starting point for achieving transition in a complex system is a shared vision or point in the horizon towards which all stakeholders can agree to work. Stakeholders and the Working Group emphasised this as being essential for supporting an effective and fair transition.

A 2019 European Environment Agency report argues that a vision for transition should be purposeful, define outcomes, communicate urgency and commitment, and – if based upon collaborative approaches – can support a shared narrative among diverse stakeholders (EEA, 2019).

This chapter identifies policies at the national, European and global level that guide transition across the agriculture and land-use system. Together, they broadly illustrate a vision of a fair and inclusive transition in agriculture and land use towards a circular, low-carbon, biodiversity-rich sector, meeting climate-, water- and air-quality targets, while ensuring the livelihoods of farmers and agri-food workers and supporting vibrant rural communities. Overall climate policy for agriculture is structured around the three pillars of mitigation, sequestration, and sustainable energy, including contributing to the decarbonisation of the energy system.

However, there are deep differences in understanding the implications of achieving this high-level vision in practice; in particular, in understanding the scale and pace of change. This reflects the reality of delivering complex system change where there are potential winners and losers, political sensitivities, and differences in power and status. Some stakeholders identified mixed policy messages as a barrier to transition and underlined the importance of clear and coherent communication.

This chapter concludes that this high-level vision is a useful guide or starting point, but that it requires further engagement work, building on a vision and policy direction that is based upon coherent, consistent and clear communication about the scale of the challenge and the implications of aligning actions with targets.

8.2 Supportive, Enabling Policies

Ireland has committed to a transition to a climate-resilient, biodiversity-rich and climate-neutral economy by no later than the end of 2050, as outlined in legislation (Government of Ireland, 2021a).

The Climate Action and Low Carbon Development (Amendment) Act 2021 established a legally binding framework to enable this transition and includes structures and processes, such as the annual Climate Action Plan (CAP), which set out the national and sectoral targets for emission reductions.[14]

The Climate Action Plan 2023 specifies an emission-reduction target of 25 per cent by 2030 for agriculture, with a target for land use and land-use change to be put in place following the completion of a land use review. Key measures identified for meeting agriculture's target include increasing the adoption of GHG-efficient farming practices, diversifying farm activities (e.g. through afforestation, forest management and bioenergy), and creating new biomethane business opportunities. Key measures for land use, land-use change and forestry include the acceleration of afforestation planting rates, significantly reduced management intensity of peatlands, and more efficient management of grasslands and croplands in order to reduce emissions. This will be further elaborated as part of agreeing a sectoral emission ceiling (Government of Ireland, 2022b).

In Teagasc modelling for a carbon budget in 2030 that is 25 per cent lower than 2018 levels, agricultural GHG emissions (in a business as usual scenario) with all technical measures implemented would be 5 per cent higher than the budget allocation in the first budgeting period (2021–2025) and 12 per cent higher than the budget allocation in the second

[14] The Act identifies that the Minister and the Government shall have regard to value for money; restoring and protecting biodiversity; relevant scientific or technical advice; climate justice; advice of the Advisory Council; early and cost-effective action; maximising employment; attractiveness of the State for investment; evolving scientific consensus and emerging technologies; the role of behavioural change; the risk of carbon leakage; the requirement for a just transition; protection of public health; the National Planning Framework; the special economic and social role of agriculture, including the distinct characteristics of biogenic methane; and the most recently approved national long-term climate action strategy, climate action plan, National Adaptation Framework and sectoral adaptation plans.

budgeting period (2026–2030) (Hanrahan *et al.*, 2021). The Teagasc analysis concluded that meeting carbon budget scenarios requires both actions to achieve technical mitigation and actions to reduce livestock agricultural activity (CCAC, 2021a).

This conveys the scale and nature of the transformation that is implied by current policy and law. Across the Irish policy system, work is focused on what the agricultural, food and land-use system would look like when it is aligned with this overall national vision and regulatory requirements.

First, Food Vision 2030 (Government of Ireland, 2021b), in its ten-year strategy for the Irish agri-food sector, takes a system view and sets out a vision for Ireland becoming a world leader in sustainable food systems by 2030, meeting the highest standards of sustainability (economic, environmental, and social), providing the basis for the future competitive advantage of the sector, and producing safe, nutritious, and high-value food, while protecting and enhancing natural and cultural resources and contributing to vibrant rural and coastal communities and the national economy.

Mission 1 of Food Vision 2030 sets out a vision for 'A Climate Smart, Environmentally Sustainable Agri-Food Sector'. There are seven goals in this mission that aim to deliver a climate-neutral food system by 2050, with verifiable progress achieved by 2030, encompassing emissions reductions; carbon sequestration; improvements in air quality, restoration and enhancement of biodiversity; improvements in water quality; development of diverse forests; enhanced seafood sustainability; exploring the bioeconomy; and strengthening the Origin Green national sustainability programme.

Mission 2 is for 'Viable and Resilient Primary Producers with Enhanced Well-Being'. There are four goals in this mission, which involve improving the competitiveness and productivity of primary producers; increasing the creation of value and distributing it fairly; introducing greater diversification in production systems and incomes; and improving the social sustainability of primary producers across areas such as generational renewal, gender balance, health and safety, mental health and well-being, and rural development.

Second, *Our Rural Future: Rural Development Policy 2021-2025* lays out a vision for a thriving rural Ireland. It includes a focus on supporting improved-quality employment and career opportunities in rural areas; assisting the regeneration, repopulation and development of rural towns and villages; and enhancing the participation, leadership and resilience of rural communities. It also highlights the importance of supporting a just transition to a climate-neutral economy and supporting the sustainability of agriculture, the marine and forestry (Government of Ireland, 2021c).

Third, the draft 4th National Biodiversity Plan sets out a vision for biodiversity for 2050, where 'Biodiversity in Ireland is valued, conserved, restored and sustainably used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people' (DHLGH, 2022: 19).

Fourth, Project Woodland was established to reform the regulation and vision for forestry in Ireland. A step change in approach is envisioned in the new *Shared National Vision for the Role of Trees and Forests in Ireland*, 'the right trees in the right places for the right reasons with the right management – supporting a sustainable and thriving economy and society and a healthy environment' (DAFM, 2022g: 1). This envisages, by 2050, a much larger and more diverse forestry that will deliver multiple objectives and benefits for climate, nature, wood production, people, the wider economy and rural communities, including providing a profitable diversification option for farmers (DAFM, 2022g).

Fifth, the Government's vision for the bioeconomy is to harnesses Ireland's natural resources and competitive advantage and fully exploit the opportunities available while monitoring and avoiding unintended consequences. An important objective is to move Ireland beyond simply target compliance and carbon mitigation to integrating sustainable economic development into our economic model (Government of Ireland, 2018).

It is recognised that a number of gaps remain. For example, targets for emission reductions in the land use sector have not yet been agreed and are to be informed by the ongoing Land Use Review (Government of Ireland, 2022b). The EPA notes the need for an integrated national policy position on protecting Ireland's environment (EPA, 2020) to cohesively bring together various policies that are already in place across different departments. The Department of the Environment, Climate and Communications is aiming to develop a national statement of environmental policy by the end of 2023.

8.3 Global and EU Policies

Transition towards a circular, low-carbon and bio-diversity rich economy and society in Ireland is interlinked with guiding policies at the global and European level. In addition to the Irish policies listed in Section 8.2, some of the main initiatives and specific targets for the agriculture and land use sector are identified as follows.

Globally, the Sustainable Development Goals (SDGs) of the UN 2030 Agenda for Sustainable Development provide a framework for transition in the agriculture and land-use system, including the following goals:

- SDG 2 (to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture);
- SDG 8 (to promote sustained, inclusive and sustainable economic growth, and full and productive employment and decent work for all);
- SDG 13 (to take urgent action to combat climate change and its impacts); and
- SDG 15 (to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss).

The 2015 Paris Agreement under the United Nations Framework Convention on Climate Change, and the Global Biodiversity Framework adopted at COP15 in Montreal in December 2022, provide a legally binding framework to limit global warming to well below 2°C – preferably to 1.5°C – and a global plan to halt and reverse biodiversity loss and put nature on a path to recovery, respectively.

The European Green Deal aims to transform Europe into a climate-neutral, fair and prosperous society, with a modern, resource-efficient and competitive economy (European Council, 2021). It includes a range of policy areas; for example, the EU 'Fit for 55' package aims to achieve climate neutrality in the EU by 2050, with an intermediate target of at least 55 per cent net reduction in GHG emissions by 2030 (European Commission, 2020a).

The European Green Deal also includes a focus on fairness, including the Just Transition Mechanism, which will provide €65bn–€75bn over the period of 2021–2027 to alleviate the socio-economic impacts of transition. Up to €84.5m has been allocated to Ireland under the EU Just Transition Fund over the period to 2027 (DECC, 2021b), based on a number of criteria including the level of industrial emissions, production of peat and oil shale, and the level of economic development (Parliament, 2023). The Midlands have been targeted for allocation of the Fund in Ireland, which will be matched by the Government by up to €169m by 2027 (Government of Ireland, 2020). These funds will be used to address the employment, economic, social, and environmental impacts that accompany the move away from peat production and from electricity generation from peat (Government of Ireland, 2022f).

The EU Biodiversity Strategy for 2030 outlines a long-term plan to protect nature and reverse the degradation of ecosystems, and to ensure that Europe's biodiversity will be on the path to recovery, by 2030 (Government of Ireland, 2022f). The EU Soil Strategy for 2030 aims to increase the level of soil carbon in agricultural land, restore degraded land and soil, and ensure that, by 2050, all soil ecosystems are in a healthy condition.

The EU Farm to Fork Strategy aims to ensure a European food system that is sustainable, fair and resilient, and recognises the key role of farmers in delivering public goods (European Parliament, 2021). Ireland's Circular Economy Programme 2021-2027 aims to reduce pressure on natural resources and create sustainable growth and jobs. It includes a focus on food, water and nutrients, building on the EU Bioeconomy Strategy and Action Plan to increase the overall sustainability and circularity of the bioeconomy (European Commission, 2020b).

Further proposals under development include the European Commission's proposal for a Nature Restoration Law to restore ecosystems, habitats and species across the EU's land and sea areas;[15] an initiative on carbon farming (the European Commission adopted a proposal for the first EU-wide voluntary framework to reliably certify high-quality

[15] See https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-law_en [accessed 05/05/23].

carbon removals in November 2022 (European Commission, 2022d)); a sustainable food system framework,[16] which could lead to a legislative proposal in 2023 to increase sustainability right through the food chain; and the further development of the EU taxonomy for sustainable activities,[17] a classification system designed to provide companies, investors and policy-makers with appropriate definitions for which economic activities can be considered environmentally sustainable.

The 2023–2027 Common Agricultural Policy, adopted by the European Council in December 2021, incorporates the sustainable ambitions of the European Green Deal (European Council, 2021). It aims to help farmers improve their environmental and climate performance through a more results-oriented, performance-based model; better use of data and analysis; improved mandatory environmental standards; new voluntary measures; and an increased focus on investments in green and digital technologies and practices. There has been some debate as to the extent to which this will be sufficiently achieved, particularly in relation to halting biodiversity loss and cutting GHGs (Birdlife International, 2022).

Taken together, policy developments at the global, EU and Irish level indicate a direction of travel of transition towards a circular, low-carbon, biodiversity-rich economy and society. Table 8.1 outlines a (non-exhaustive) list of the key targets related to transition.

The Common Agricultural Policy Strategic Plan aims to support the implementation of some of these targets by contributing to the achievement of environmental and climate objectives as well as supporting viable farm incomes, enhancing competitiveness, and strengthening the socio-economic fabric of rural areas.

Supports for Irish agriculture will total almost €10bn, including €2.3bn in national funding. Support for environmental objectives include environmental conditionality for payments under Pillar 1 of the Common Agricultural Policy; and allocation of 25 per cent of Pillar 1 payments (€1.47bn) to the Eco-Scheme, with an emphasis on reduced nitrogen use, and rewarding farmers for increasing areas devoted to space for nature from 4 per cent for all farms and 7 per cent for farmers in eco-schemes, and €1.5bn funding for a new Agri-Climate Rural Environment Scheme (ACRES), with a results-based and collective (landscape- and catchment-scale) focus under Pillar 2 of the Common Agricultural Policy, among other measures.

8.4 Conclusion

There is a clear intent indicated in policy to move towards a vision of a fair and inclusive transition in agriculture and land use towards a circular, low-carbon, biodiversity-rich sector, meeting climate-, water- and air-quality targets, while ensuring the livelihoods of farmers and agri-food workers, and supporting vibrant rural communities.

Work with stakeholders highlighted differences in approach and the pace of change, with some focusing on more incremental change and others emphasising a more transformative approach.

The Council identifies the benefit of an inclusive engagement process to develop and deepen a sense of shared purpose for the sector's transition. Further dialogue on this should be part of a national and local socially inclusive dialogue with farmers, community groups and environmental and other stakeholders across the agriculture and land-use system, based on clear, coherent and consistent communication (see Chapter 11 and 14).

[16] See https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy/legislative-framework_en [accessed 05/05/23].
[17] See https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en [accessed 05/05/23].

Table 8.1: List of Targets Related to Transition in the Agriculture and Land-Use System (EU and Ireland)

EU	Ireland
• agriculture and land use contribution to achieving net-zero GHG emissions by 2050; and • a reduction of at least 55 per cent in net GHG emissions by 2030.	• a 25 per cent reduction in agricultural emissions by 2030; Land Use, Land Use Change and Forestry (LULUCF) target pending (Climate Action Plan 2023); • reducing chemical nitrogen use to a maximum of 330,000 tonnes by 2025 and to 300,000 tonnes by 2030 (Climate Action Plan 2023); • increase the adoption of protected urea to an 80–90% uptake on grassland farms by 2025 and a 90–100% uptake on grassland farms by 2030; • a target of 450,000 ha (representing 9.2 per cent of the area under farming) under organic production by 2030 (Climate Action Plan 2023); and • production of up to 5.7 terawatt-hours of biomethane by 2030 (Climate Action Plan 2030).
• provisional overall, EU-level objective of 310 carbon dioxide equivalent (Mt CO_2e) of net removals in the LULUCF sector in 2030 (European Council, 2022); • planting at least 3 billion additional trees in the EU by 2030 (EU Biodiversity Strategy for 2030); • a target of 25 per cent of agricultural land under organic farming by 2030 (Farm to Fork); and • (proposed) restoration of organic soils in agricultural use constituting drained peatlands in at least 30 per cent of such areas by 2030 (proposed Nature Restoration Law).	• increase afforestation to 8,000 ha per year (Climate Action Plan 2023); • double the sustainable production of biomass from forests (Food Vision 2030); • a target of 450,000 ha of mineral grassland better managed to improve sequestration by 2030 (Climate Action Plan 2023); and • a target of 80,000 ha of drained organic soils with reduced management intensity by 2030 (Climate Action Plan 2023).
• a minimum of 10 per cent of agricultural area under high-diversity landscape features (EU Biodiversity Strategy for 2030) ; and • (proposed) restoration of at least 20 per cent of the land and sea area by 2030 (proposed Nature Restoration Law).	• Prioritise 10 per cent of every farmed area for biodiversity (Food Vision 2030).
• a 50 per cent reduction in the use and risk of chemical pesticides by 2030 (Farm to Fork); and • at least a 20 per cent reduction in the use of fertilisers by 2030 (Farm to Fork).	• a 50 per cent reduction in nutrient losses from agriculture to water (Food Vision 2030); • a 10 per cent reduction in maximum chemical nitrogen allowances for grasslands and a maximum permitted organic nitrogen load of 250 kg/ha under derogation (Nitrates Action Programme); and
	• a 50 per cent reduction in food waste per person (Food Vision 2030).

Chapter 9

Two Guiding Ideas: Continuous Learning and Just Transition

9.1 Introduction

Bringing about transformation and significant change at the scale required is complex and characterised by uncertainty. Navigating uncertainty can be supported by a commitment to continuous learning.

There is also a need to accept that, in change of this magnitude, there will be winners and losers. If progress is not to be stalled, there needs to be a firm commitment to fairness as embedded in the idea of just transition.

This chapter discusses each of these guiding ideas.

9.2 Continuous Learning

Transition in complex systems is inherently uncertain and, while there is agreement on the overarching goals of transition, the specific transition pathway for achieving a socially equitable, economically viable and environmentally sustainable agriculture and land-use system has still to be determined.

There is uncertainty, not about the need for change, but about precisely how to bring about ambitious action that includes incremental transitions at a small scale together with more structural changes to institutions and norms at a larger scale in our agricultural and land-use system.

Features that characterise a system of continuous learning can help governance of complex challenges such as tackling climate change and biodiversity loss. Policy learning for transition is emphasised in the literature on transition management (e.g. (EEA, 2019; Loorbach, 2010; Rotmans *et al.*, 2001).

First, bringing about change in non-linear systems cannot simply be planned and implemented from the outset, achieved solely by reliance on top-down laws, rules or regulations.

Second, progress towards a vision will not be achieved by relying solely on the independent actions of individuals and groups at the front line.

Third, active engagement and increased flows of information and resources between different levels are required, with a focus on good communication, monitoring, learning and openness to revision.

This system of continuous learning, envisaged by NESC, needs a strong mandate from the top that promotes a clear direction and co-ordination. This can include a vision, goals and targets, sets of rules, or regulations. However, given the complexity and need for innovation, experimentation and diffusion of new methods, there must be an openness in policy-making and areas of authority and expertise to actively revising rules and guidance and to reorientating transition as more is learned. This adaptive approach will be enabled by accommodating diversity, enabling the adaptation of shared goals to varied contexts and fostering co-ordinated learning from local experiments and trials, together with horizon scanning, monitoring and learning.

New solutions to the challenge require experimentation. Recognising the value of local knowledge of soils, land and ecosystems among farmers as well as the role of other stakeholders in grassroots innovation such as rural communities or local non-governmental organisations (NGOs), and through peer-to-peer learning, diversifies the potential for technological, social or business model innovation.

Successful innovations can inform the development and revision of standards and advisory services. The results of active learning should be actively used by agencies and departments to shape and re-shape policy and agri-environmental guidance, regulation, advice and supports, including financial supports.

Continuous learning in this sense is characterised as one of partnership and working together to tackle challenges, and this report includes a focus on enhancing the role of continuous learning in support of transition. Other policy tools remain important, including financial support where required and the role of regulation where necessary.

9.3 Just Transition

Fairness is the most important driver of public acceptance of climate policies, with democratic consent and social licence vital for achieving effective and fair transition (Hepburn *et al.*, 2020; Malerba, 2022). Climate policies that anticipate and address who is impacted and issues of distribution will have a greater chance of success and could well influence whether countries achieve or fail to achieve a net-zero economy (Robins, 2022).

A just transition approach has its roots in the trade union movement, and the principles developed by the International Labour Organization (ILO) and endorsed internationally are formally enshrined in the preamble of the Paris Agreement. Principles of just transition are further applied in a growing body of work (e.g. ClF, 2021; Just Transition Initiative, 2021).

This report applies the definition of just transition as outlined in the Council's 2020 report*, Addressing Employment Vulnerability as Part of a Just Transition in Ireland*. Just transition is one which seeks to ensure transition is fair, equitable, and inclusive in terms of processes and outcomes (NESC, 2020).

Just transition is increasingly recognised as a key strategy for delivering ambitious and effective climate action as it is socially equitable, economically viable and environmentally sustainable, realising opportunities while managing risks fairly (ILO, 2015; NESC, 2020). A just transition approach can provide an integrated, whole-system perspective on justice (procedural, distributive, recognition, and restorative) that can help in identifying systemic solutions to address environmental and socio-economic concerns (Abram *et al.*, 2022). It can also increase focus on the development of new jobs, new skills, new investment opportunities, and the chance to create a more productive and resilient economy.

Internationally, just transition initiatives to date have largely been focused on the energy transition and the impacts on coal-intensive regions when a shift is made towards greener fuels. For Ireland, the focus of just transition resources and governance to date has been directed to the use of peat in the energy sector and to helping the workers and their communities directly affected by the policy to exit peat production in the Midlands. Most of the initiatives, resources and projects supported as part of a just transition approach have not been focused on supporting the climate transition in agriculture.

A just transition framework, informed by NESC research and findings, was first set out in the Climate Action Plan 2021 and is being progressively integrated into the annual climate action plan cycle and sectoral policy-making (Government of Ireland, 2023b). The four just transition principles set out in the framework are:

i An integrated, structured, and evidence-based approach to identify and plan our response to just transition requirements.

ii People are equipped with the right skills to be able to participate in and benefit from the future net-zero economy.

iii Costs are shared so that the impact is equitable and existing inequalities are not exacerbated.

iv Social dialogue to ensure impacted citizens and communities are empowered and are core to the transition process (Government of Ireland, 2021a).

This inclusion of just transition in national climate policy was preceded by Government initiatives in the Midlands, including appointing a Just Transition Commissioner, delivering a Just Transition Fund and, most recently, the development of a territorial plan for the Midlands to co-ordinate support from the EU Just Transition Fund. Significant resources, supported by carbon tax revenues, have been committed by Government to address the Midlands' socio-economic impacts following the closure of peat-fired power stations and the cessation of commercial peat extraction as a feedstock for power generation (Government of Ireland, 2021a).

The resources and projects supported in the Midlands have largely been to create employment and enterprise opportunities, including some initiatives directed at the rehabilitation and restoration of degraded peatlands. These will support future carbon sequestration and, in time, other important ecosystem services and biodiversity in peatlands.

There is valuable learning from these energy initiatives, which have helped to identify areas of good practice. The concept has broadened from a primary focus on job losses to a broader consideration of who will be affected, and how to fairly address their concerns. It also commonly involves an inclusive process of participation that helps identify those most impacted, devises appropriate responses and, in overall terms, helps deliver outcomes that are perceived to be fair.

Previous NESC (2020) research into the energy transition identified these key lessons from the Midlands experience:

- the value of joint problem-solving and collaboration;
- the importance of early information on skills demand/availability;
- to incentivise training and upskilling;
- to seed funding for small enterprises to help them avail of larger resources;
- to reward enterprises that undertake transition strategies early/on a voluntary basis;
- to target funding to intended impacts; and
- to avoid a one-size-fits-all approach in the design of responses and supports at local level.

Important conclusions from the just transition initiatives delivered to date and from NESC research, while drawn from the energy sector, have wider applicability; for example, there is no template to guide policy-makers who must therefore also rely on a learn-by-doing approach. Further, the delivery of a just transition requires a long-term considered and pro-active approach, and policies and practices have to be underpinned by appropriate governance (Mercier, 2020; Moore, 2020).

The Government's focus on just transition extends beyond the energy sector. The 2023 Climate Action Plan outlines that

> *it is likely that the future impacts of our transition to a climate-neutral economy will be both incremental and broadly based, affecting occupations most closely linked to consumption of fossil fuels, arising from increases in heating, energy, and transport costs, or resulting from changes in agricultural practices (Government of Ireland, 2023b: 70).*

9.3.1 Just Transition in Agriculture and Land Use

A number of recent studies demonstrate focused application of the principles of just transition to the agriculture and land use sector (Anderson, 2019; Baldock and Buckwell, 2021; Carey, 2022; Climate-KIC, 2022; DAFM-Climate KIC, 2023 forthcoming; Muller and Robins, 2022; Verkuijl *et al.*, 2022). The approach taken across these studies is to consider appropriate processes and outcomes that can achieve fairness and inclusion as part of transition of the sector.

The term 'just transition' has negative connotations for some, namely the sense of transition as something that is being done to someone and as being a movement out of, or the end of, something. This report is designed to protect against both. The just transition at the heart of NESC's approach is something that would, and should, be done *with* farmers and rural communities. This is reflected in the interventions recommended.

The measures to achieve transition in agriculture and land use illustrate that the transition for this sector is fundamentally different. It is not a transition *out* of agriculture, but a transition *into* making optimal use of our land and agricultural resources and into a new era of agriculture and farming. The emphasis is on understanding challenges and concretising opportunities. The approach prioritises the environment, economy and social issues. This is important in building trust in a just transition within the agriculture sector, but also in helping to strengthen understanding of what transition means for sectors beyond energy.

The transition in agriculture is, therefore, opportunities-led. Interventions to enable people to benefit from opportunities will be critical. These will include resourcing the necessary skills and advice for new approaches to production and diversifying income and aligning finance; in particular, accounting for and rewarding sustainability for reducing emissions and increasing carbon sequestration and other ecosystem services.

The principles of just transition are already underpinning rural and agriculture policy development. *Our Rural Future: Rural Development Policy 2021-2025* includes a thematic objective of supporting a just transition to a climate-neutral economy (Government of Ireland, 2021c). In a recent report assessing the socio-economics of transition, DAFM set out general principles for a just transition approach based on available literature, which 'recognises farmers as part of the solution as custodians of the land' and builds 'socioeconomic resilience through diversification; creating climate resilience through sectoral adaptation; and ensuring the dissemination of knowledge and uptake of best practices' (DAFM, 2022b: 55).

While much of the focus to date has been on the impact of transition across the food system and farmers, the ILO, in its just transition policy brief of 2022, notes a new emphasis on ensuring decent work in supply chains, and highlights precarious and unsafe working conditions in the meatpacking industry (ILO, 2022a).

This NESC project has developed a practical application of continuous learning and just transition principles throughout its process and focus, and these are reflected in the Council's integrated framework that is outlined in Chapter 10.

Chapter 10

An Integrated Framework for Action

10.1 Introduction

In practical terms, transition will involve a wide range of measures related to shifts in land and soil management practices; reducing emissions from livestock; land-use change, in particular, increasing forestry; and the production of renewable energy and other bio-based products (CCAC, 2021a; Government of Ireland, 2022b; Lanigan *et al.*, 2018).

Work on transition requires a nuanced understanding of these different measures, their implications for different groups of people including those who will be more vulnerable to changes, and the particular barriers to their more widespread adoption.

Over the course of this project, NESC has researched and engaged directly with a wide range of stakeholders, including convening workshops with farmers to explore the social, economic and environmental implications of the different measures as well as the different perspectives on their perceived feasibility, and the barriers and enablers to their adoption.

The research explored the key practical measures for transition in the agriculture and land use sector outlined in the Climate Action Plan 2023, which build upon experience and research informed by Teagasc MACC analysis and advice from the Climate Change Advisory Council (CCAC).

This chapter begins by briefly reviewing the main sources and drivers of emissions and the key measures to address them. It then outlines some key points from workshops held with farmers, focusing on farmers' views on the different measures. It argues that, based on key barriers and enablers, it is useful to consider measures in three broad categories – 'low-hanging fruit' measures, measures that are considered by stakeholders to be 'uncertain', and 'hard to do' measures. It concludes by outlining an integrated framework, which can help to frame interventions for a just transition in the agriculture and land use sector.

10.2 Understanding the Importance of Different Measures

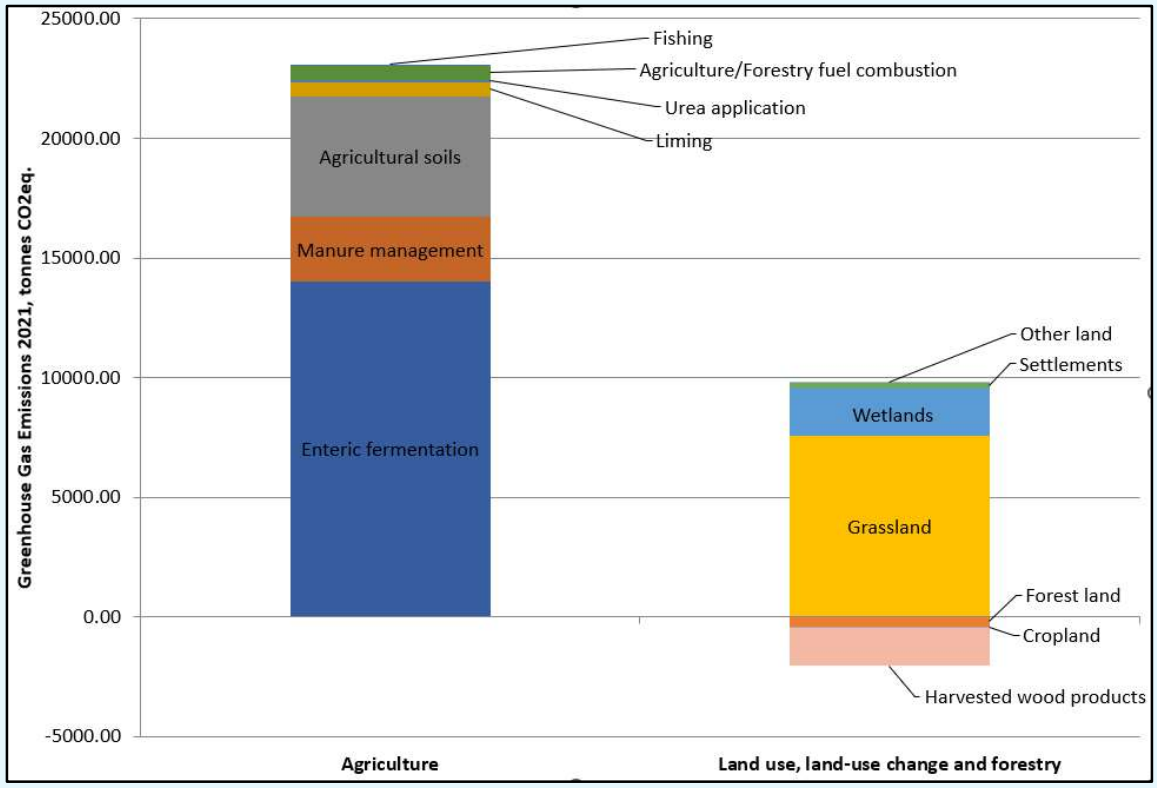
Before outlining the framework, it is helpful to review the main sources and drivers of agricultural and land-use change emissions in order to understand the important role that different measures play in addressing the different sources and drivers of emissions, as well as the projections for meeting targets based on implementing measures. This provides context for why measures that are considered 'hard to do' are included in policy targets for achieving transition.

The main sources of agricultural emissions (see Figure 10.1) are methane (largely from enteric fermentation as part of the digestive process in ruminant livestock) and nitrous oxide (largely due to agricultural soil management activities such as spreading nitrogen fertiliser, as well as the storage and management of animal slurry) (EPA, 2022b).

The single-largest source of LULUCF emissions in Ireland is in grassland estimated at 7.5Mt CO_2e in 2021 (EPA, 2022b), largely due to the drainage of organic soils as part of land management for agricultural use. While the area of organic soil under agricultural management accounts for only approximately 330,000 ha (~8 per cent) of the total grassland in Ireland (EPA, 2022a; Government of Ireland, 2022b),[18] emissions from these soils are estimated to considerably outweigh sequestration by the remaining 93 per cent of grasslands on mineral soils (CCAC, 2021a). A number of research projects are currently underway to improve the accuracy of quantifying soil emissions in Ireland (Teagasc, 2021a).

[18] For information on LULUCF actions to limit/reduce emissions and maintain/increase removals from activities, see https://assets.gov.ie/109144/0eb678f9-35fc-47b2-84bb-cb0b4a9cae8f.pdf [accessed 05/05/23]. Also see Climate Action and Low Carbon Development (Amendment) Act 2021 https://data.oireachtas.ie/ie/oireachtas/act/2021/32/eng/enacted/a3221.pdf [accessed 05/05/23].

Figure 10.1: Irish GHG Emission Sources from Agriculture and LULUCF, 2021



Source: EPA, 2022b.

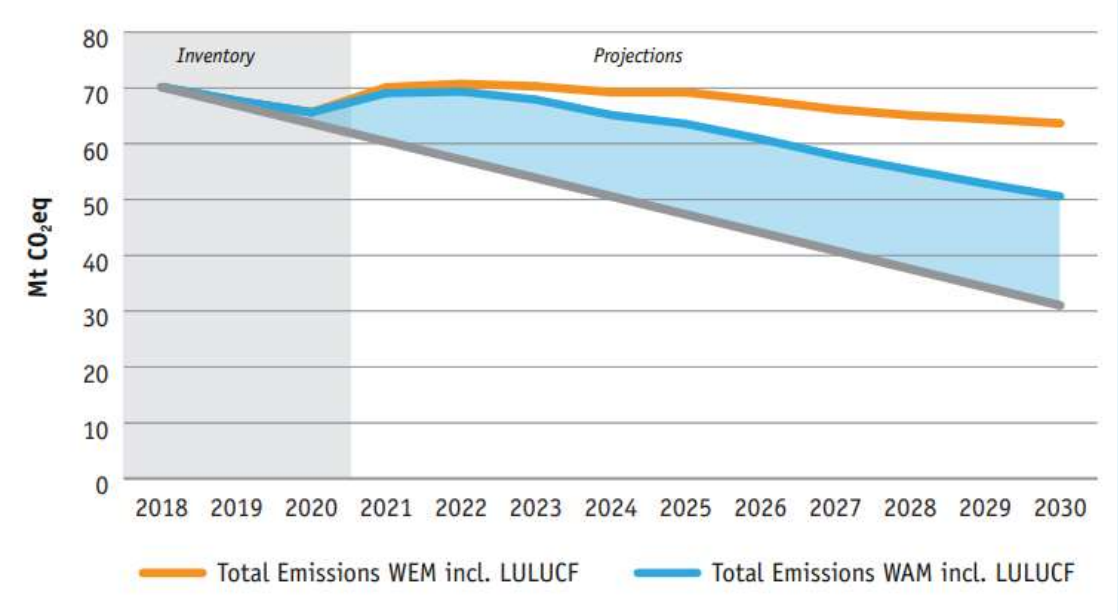
Forest land and harvested wood products have been a significant carbon sink since 1990. However, this sink is in decline, as the age profile of the forest stock matures and harvesting levels increase in line with projected forecasts, in addition to declining afforestation rates. Scientific knowledge of net LULUCF emissions has developed, and a recent revision of the emission factor for forestry on peaty or organic soils now reflects the fact that the emissions from planting trees on this type of soil are higher than previously calculated. As a result, Ireland's most recent *National Inventory Report 2022* indicated a significantly higher 2018 baseline of 6.9 Mt CO_2eq. compared with the previous 2018 baseline of 4.8 Mt CO_2eq. (Government of Ireland, 2022b; EPA, 2022a).

Measures for reducing emissions and increasing sequestration from the main sources and sinks are included in *Climate Action Plan 2023* and *Climate Action Plan 2023: Annex of Actions* (Government of Ireland, 2022b; Government of Ireland, 2023b). Measures for agriculture include reducing chemical nitrogen use; increasing the adoption of protected urea; earlier finishing of beef cattle; reducing the age at first calving of suckler beef cows; improving animal breeding by focusing on low methane traits; extending organic farming; improving animal feeding; miscellaneous measures including extended grazing and rolling out a methane reducing slurry, as well as adding a slow-release bolus pasture-based feed additive; mobilising recommendations of the Food Vision sectoral groupings; and supporting land use diversification options for livestock farmers, such as anaerobic digestion (AD), forestry and tillage to incentivise voluntary livestock reductions.

Measures for land use, land-use change and forestry include increased afforestation and harvested wood products; increasing cover crops and incorporation of straw; better management of mineral grassland for improved sequestration; and reduced management intensity of drained organic soils.

EPA projections indicate that the implementation of all climate plans and policies, as well as further new measures, are needed for Ireland to meet the 51 per cent emissions reduction target and put the country on track for climate neutrality by 2050, with the shaded area in Figure 10.2 illustrating the 'gap' between the (With Additional Measures scenario) projections and the 51 per cent target.

Figure 10.2: Total GHG (Mt CO2 eq.) including LULUCF under the 'With Existing Measures' and 'With Additional Measures' Scenarios



Source: EPA, 2022c.

10.3 Views on Measures in the Farmer Workshops

NESC applied the three lenses of economic, environmental and social sustainability to assessing the range of measures, including published data on cost benefits, the wider environmental impacts of climate action measures, and existing research on social attitudes towards different measures. The results of this analysis were shared in a background paper discussed with the Working Group in September 2022. Focus- group workshops were held with farmers in order to understand their perspectives on the proposed measures, with a particular emphasis on farmers' perceptions of barriers and enablers to the wider uptake of measures.

Measures for taking action on climate change and biodiversity were grouped into four categories for detailed discussion in the focus-group workshops that were held with farmers. Appendix B includes the list of measures discussed and illustrates the results of an exercise capturing farmers' views on different measures. Section 10.3 summarises the perspectives that were shared in the workshops.

10.3.1 Views on Soil and Land Management Measures

Most farmers participating in the workshops were already implementing measures to reduce fertiliser use. Farmers felt that more investment, education and practical support are needed for soil management. Organic and regenerative agriculture got a largely positive reception, with interest expressed. Farmers ranked most of these measures highly. The most controversial soil and land management measure, which was also one of the most controversial measures overall, was rewetting drained organic soils. This was regarded as potentially undoing generations of work and making the land

unsuitable for farming. Solutions suggested for this measure included payment for marginal land, payment for mitigating flooding, and compensation payments for the value of the productive land.

Farmers highlighted that, overall, farmers are not rewarded financially or in carbon credits for adopting measures. This is one of the single biggest issues raised by farmers: they felt that they had invested in creating or preserving habitats but cannot derive benefit from these actions and worry that it will be larger investors or developers of renewables or forestry who will benefit in real terms.

10.3.2 Views on Measures for Reducing Emissions from Livestock

Farmers were generally supportive of measures to improve productivity through animal breeding or feeding. Reducing numbers of livestock was highly controversial. Farmers were concerned that a blanket approach to reducing livestock would leave most of their farms unviable. They expressed distrust and appealed for transparency about any future plans.

Despite the opposition, there was engagement with both the rationale and the measures that could lead to reducing livestock numbers. It was suggested that how it would be done was critical to its acceptance. Suggestions included that each farm should be judged on its own merits and its own carrying capacity; that financial incentives would be required; and that there was potential to cull unproductive cattle. Some expressed the view that farmers were willing to change but not at any cost. It was suggested that for a cohort of older dairy farmers, an exit scheme might be welcomed. Others pointed to risks in the conservation status of land that has reduced grazing sucklers, reflecting the important role that low-input or extensive livestock systems play in maintaining certain habitats and biodiversity, such as High Nature Value (HNV) farming.

10.3.3 Views on Measures in Forestry

Farmers expressed negative views on traditional afforestation but were more open to alternative approaches to forestry. The way forest schemes were managed in the past was viewed as having severe and unproductive restrictions in place. Farmers viewed Sitka plantations as being worthless for biodiversity and blamed them for decimating rural communities, landscapes, and the environment. They felt that there were perverse incentives in place and that the stipulation of holding forestry in perpetuity (which is an important aspect of carbon storage) can be an obstacle to young farmers choosing this as an option. Solutions included moving to broadleaf planting and an associated lifelong payment that recognises the longer growth and harvesting cycle for native trees; and allowing forest sequestration credits to be accrued to farms. Small-scale native woodlands were thought to have the greatest potential if planted on farmland. Most farmers knew very little about agroforestry or how it worked, but were relatively open to it, identifying the provision of more detailed and targeted advice and information as a possible enabler.

10.3.4 Views on Measures in Biomass and Renewable Energy

There was considerable interest in renewables among farmers but some viewed investment as complex, convoluted and too expensive. Many farmers had put solar on their domestic roofs or shed roofs, but export tariffs were low and did not incentivise doing more. A need for reverse tariffs was highlighted in most discussions. Some farmers had considered large-scale solar but had not been able to justify the investment in business terms. Farmers felt that the financial support schemes for solar were not delivering what they promise. It is important to note that the Targeted Agriculture Modernisation Schemes (TAMS) 3 Solar Capital Investment Scheme (SCIS), announced in February 2023, has increased the ceiling for investment and increased the size of available investments.[19]

[19] See https://www.gov.ie/en/service/6ab0f-solar-capital-investment-scheme/ [accessed 05/05/23].

Biogas was much debated with both interest and curiosity, but farmers felt that Government investment today was low. Participants often referenced Northern Ireland's examples of on-farm AD plants and suggested that there could be learning from there, including the solar feed-in tariff for surplus electricity produced. Increasing knowledge about the wide range of products that AD can support would also be an enabler.

10.4 Three Categories of Measure

NESC reviewed the potential measures based on their social, economic and environmental impacts. Particular attention was given to the views of farmers on the barriers and enablers to the wider uptake of measures. It is useful to consider measures in three broad categories to help frame interventions, acknowledging that efforts to deliver measures across all three categories will be needed to deliver necessary climate mitigation.

The intention is not to rigidly define where any measure fits, but rather to support thinking dynamically about what needs to happen in order to increase the adoption of measures, and how to achieve this fairly. The three categories are:

- **'Low-hanging fruit' measures:** The measures that could be considered in this category are low-cost or cost-beneficial, have positive impacts on the wider environment, and are broadly positively regarded by farmers. The key enablers are to support their wider uptake through skills and capacity building, tailored advice and financial support.

- **Measures characterised by uncertainty:** The measures that could be considered in this category are characterised by the perception among stakeholders that there are significant issues and challenges that need to be resolved to enable more widespread adoption. These may include policy barriers or inconsistencies while, for certain types of farm, cohorts of farmers, or regions, the barriers may be social, cultural, or relate to uncertainty experienced by stakeholders. The key enablers for this category are to understand and then address these barriers. Uncertainty does not signal a slower pace of response or hesitancy to act, but rather points to the need to address barriers and challenges.

- **'Hard to do' measures:** The measures that could be considered in this category are those for which there are potentially high costs and, for some farmers, potentially high levels of income reduction and loss of livelihood. The key interventions for this category are to recognise potential costs and have a willingness to commit to equitably share and address costs, compensating for losses in a transparent and formal manner.

The three categories can help to frame consideration of critical intervention points for different measures. For example, interventions such as stakeholder participation, skills, advice and financial support are important for all measures, but resolving barriers and recognising and compensating for costs may be priority interventions for unlocking the potential of measures that fall into the 'uncertain' or 'hard to do' categories.

This categorisation of interventions is helpful for:

i prioritising the different types of interventions to help support key measures;

ii appreciating that through innovation, learning or new research, new measures may emerge or measures that currently face barriers may become possible; and

iii considering measures in an integrated way across these three categories in order to create the synergies necessary to support a fair and inclusive transition.

10.5 'Low-Hanging Fruit' Measures

Many measures, particularly soil and land management measures such as nitrogen use efficiency and incorporation of clover, and technical or efficiency measures for reducing emissions from livestock such as improved animal health and feeding measures (see Box 10.1), are relatively low-cost or cost-beneficial. They have the potential to mitigate emissions related to approximately one-third of agricultural emissions, and have broadly positive implications for biodiversity, water quality and climate adaptation. They could readily be adopted across most farm types and received a broadly positive response in the workshops NESC held with farmers.

For these reasons, these measures can be considered as 'low-hanging fruit'. However, this is not to suggest that they are easy to do and this effort should be acknowledged. They will also require significant support.

The key interventions for these types of measures are proactive engagement of farmers in innovative processes (Intervention 2, section 11.3); adequate support for adopting measures through building skills and capacity building (Intervention 3, section 12.2); and financial support (Intervention 4, section 12.3). Intervention 4 is an example of a transformative measure, where the creation of new business models for ecosystem services or carbon farming could reduce the uncertainty of measures in the second category or incentivising the 'hard to do' measures in the third.

10.6 Measures Considered to be 'Uncertain'

Other measures, e.g. those related to land-use change such as forestry or increasing bio-based production, including renewable energy, are, or have the potential to be, cost-beneficial but may face policy barriers, or rely on new market development and therefore seem uncertain to farmers even though in some cases there is a significant level of interest in them.

For example, traditional or large-scale forestry is one of the biggest potential measures for meeting climate mitigation targets, with the potential (if managed correctly) for substantial benefits for biodiversity, water and air quality, and adaptive capacity, but faces significant policy barriers as well as social and cultural barriers to the widespread adoption of forestry by farmers. NESC workshops indicated a level of interest and openness among farmers to bio-based and renewable energy production and on new/alternative ways of incorporating trees (such as agroforestry, silvopasture, small-scale native woodlands and hedgerows), but identified gaps in the certainty about research and markets, and identified the existence of policy barriers.

Similarly, measures such as promising feed additives to reduce methane emissions from livestock have the potential to significantly reduce emissions but require further research and development before being suitable for use in pasture-based systems. See Box 10.2 for examples of measures considered to be 'uncertain'.

For these measures, the key interventions are to clearly identify and understand the barriers and to resolve issues by reducing uncertainty through technical and socio-cultural research, market development and support, greater policy coherence including an integrated circular bioeconomy (Intervention 5, section 12.4), and through meaningful dialogue and engagement with stakeholders (Intervention 1 and 2, sections 11.2 and 11.3, respectively).

Box 10.1: Examples of 'Low-Hanging Fruit' Measures

Measures to reduce nitrous oxide emissions: Nitrous oxide emissions are the second-largest source of agricultural emissions (see Figure 10.1). Most nitrous oxide emissions occur as a result of agricultural soil management activities such as spreading nitrogen fertiliser on grassland and cropland (Haughey, 2021). The storage and management (including land-spreading method) of animal slurry is also an important source of nitrous oxide emissions. EPA data on Ireland's 2021 emissions reported that increased fertiliser use (up by 5.2 per cent) was one of two significant drivers of the 3.0 per cent increase in agricultural emissions in 2021.

There are a range of measures that can directly or indirectly reduce nitrous oxide emissions, such as nitrogen use efficiency, inclusion of clover/grass–legume mixtures in pasture swards, low-emissions slurry spreading and the substitution of Calcium Ammonium Nitrate fertiliser with protected urea. The Climate Action Plan 2023 commits to reducing chemical nitrogen use to a maximum of 300,000 tonnes by 2030, with an interim target of 330,000 tonnes by 2025. This compares with 367,000 tonnes of chemical nitrogen in 2019 and 399,000 tonnes in 2021. It commits to increased adoption of protected urea, with a target of 90–100 per cent uptake of protected urea on grassland farms by 2030 (Government of Ireland, 2022b).

Efficiency and technical measures for reducing methane emissions from livestock: Mitigation options for methane is the focus of increased research internationally and in Ireland. Core measures related to methane in the Climate Action Plan 2023 include animal breeding that focuses on low methane traits, improved animal feeding, earlier finishing of beef cattle, and reduced age at first calving of suckler beef cows (Government of Ireland, 2022b).

Despite these promising innovations, there are currently limited mitigation options for methane. Teagasc modelling for the carbon budget in 2030 indicated that relatively small reductions in agricultural GHG emissions can be achieved by currently proven technical mitigation, and these measures alone are insufficient to meet targets under all of the carbon budget scenarios analysed (CCAC, 2021a).

Significant work is already ongoing on these 'low-hanging fruit' measures by farmers. The Teagasc Signpost Programme provides practical peer-to-peer advice and exchange on implementation. It includes a network of Signpost demonstration farms as well as a campaign to engage with all farmers to support the transition to more sustainable farming. There is potential to increase the ambition of these measures in transition. Emerging international and Irish experience suggests that there is further scope for deepening practice in regenerative agricultural approaches (EASAC, 2022; HLPE *et al.*, 2019; RASE, 2022).

Box 10.2: Examples of Measures Considered to be 'Uncertain'

Feed additives have the potential to decrease agricultural emissions from livestock. A methane-inhibiting feed additive, 3-Nitrooxypropanol (3NOP), has the potential to reduce livestock emissions by up to 30 per cent and has received approval by the European Food Safety Agency but is not yet commercially available in Ireland. 3NOP is primarily for use with housed rather than grazing animals. Teagasc research is exploring the potential of a range of other potential feed additives aimed at reducing methane, including oils, plant extracts, seaweeds, seaweed extracts and halides, focusing in the short term on in-door systems but with a future goal of slow-release feed additives (Roskam and Waters, 2022).

Over the coming decades, **forestry and harvested wood products** will be the single-largest land-based climate mitigation measure available to Ireland (DAFM, 2022d). Farmers have a significant role in helping to achieve national afforestation targets. Increased afforestation can contribute to reaching targets directly by increasing carbon sequestration, and indirectly as a potential diversification option for land use.

As the total area under commercial forestry increases, the potential role for long-term carbon storage in harvested wood products also becomes more substantial. In 2021, harvested wood products sequestered more carbon than forest land (EPA, 2022b).

The concept of strategically deploying native woodlands to protect and enhance water quality and aquatic/riparian ecosystems is becoming established in Ireland with grant aid available under the Native Woodland Schemes (DAFM, 2022d). The low-density planting of trees within grassland systems as part of agroforestry systems increases land functionality, enhances the natural environment and improves nutrient catchment potentially limiting nitrous oxide emissions (Emmet-Booth *et al.*, 2019).

The Climate Action Plan 2023 aims to increase annual afforestation rates from approximately 2,000 ha per annum in 2021 and 2022 to 8,000 ha per annum from 2023 onwards, with an overall target of 68 kha of afforestation by 2030.

Emission reductions arising from displacing fossil fuels by substituting **bio-based products and renewable energy** generated on-farm are not accounted for under the agriculture and land-use sectors, but they play an important role in contributing to the national target to increase the proportion of renewable electricity to up to 80 per cent by 2030, including up to 8 GW generated from solar by 2030. Such emission reductions also contribute to the achievement of a renewable heat target (a Renewable Heat Obligation will be introduced by 2024 in order to drive the accelerated introduction of renewable gases), which will be essential to decarbonising other sectors of the economy, such as high-temperature industrial heat in manufacturing processes (Government of Ireland, 2022b). The role of farmers is increasingly important to achieving national energy security.

Energy measures are considered as part of an integrated approach to agriculture and land-use transition because they can play an important enabling role in reducing agricultural and land use emissions. First, energy efficiency and renewable energy generation can reduce farm costs, including diversification of income to self-supply, and selling on-farm generated power to the grid (Government of Ireland, 2022b). The Climate Action Plan 2023 commits to supporting at least 500 megawatts of local community-based renewable energy projects and increased levels of new micro-generation and small-scale generation (Government of Ireland, 2022b). Second, it can provide an income diversification option for farmers and a land-use alternative to livestock production (Government of Ireland, 2022b). The Climate Action Plan 2023 commits to the production of up to 5.7 terawatt-hours of indigenously produced biomethane by 2030, based on agricultural feedstocks, and to the construction of up to 200 AD plants of scale by 2030.

Biogas produced from AD (using agricultural feedstocks such as manure or grass silage) can be used for a range of purposes including electricity and heat generation. Biogas can be upgraded to biomethane and used to displace natural gas via grid injection and digestate can be used as a replacement for chemical fertiliser (Smyth, 2021).

10.7 'Hard to Do' Measures

There are a small number of measures that are highly sensitive due to their potentially high costs. These include reduced intensity of production on drained organic soils and voluntarily reducing livestock numbers. Without mitigation actions, they would lead to significant output reductions and job losses, and to knock-on social and economic costs for rural communities. These measures are therefore also the most sensitive and controversial and have the most obvious potential to exacerbate inequality. For these reasons, they are categorised as 'hard to do'. See Box 10.3 for examples of 'hard to do' measures.

For these measures, the priority intervention point is to recognise the costs and address them by sharing the costs of transition (Intervention 6, section 13.2), and by mitigating potential costs through targeted supports (Intervention 7, section 13.3).

A notable feature in the farmer workshops was that, although these measures were clearly identified as unpopular, farmers constructively engaged in discussions about barriers and potential enablers, and clearly emphasised the importance of engagement. Socially inclusive, proactive and meaningful dialogue with farmers is critical to identifying solutions and building trust (Interventions 1 and 2, section 12).

Pursuing all of the interventions in an integrated way, while delivering effective climate action, could also lead to positive synergies and opportunities. For example, successfully supporting 'low-hanging fruit' measures (rewarding ecosystem services in particular), and resolving the issues surrounding measures considered to be 'uncertain' (so that they are regarded as attractive diversification options) could positively impact on 'hard to do' measures, so that they are not regarded as a reduction of agricultural activity with associated costs, but rather as an expansion of agricultural activity into a more diverse range of agricultural and land use activities.

10.8 Part III Conclusion – An Integrated, Dynamic Framework for Action

Figure 10.3 outlines an integrated framework for action, combining the three categories of measures (illustrated in green), with the guiding ideas of continuous learning and just transition principles to identify four key areas of action (illustrated in grey) and eight interventions (illustrated in blue) that are recommended by the Council and that are the focus of Part IV of this report.

Box 10.3: Examples of 'Hard to Do' Measures

Under LULUCF, the single-largest source of emissions is grassland estimated at 7.5 Mt CO_2eq. in 2021 (see Figure 10.1). Although grasslands occurring on mineral soils are capable of carbon sequestration, grasslands occurring on drained and improved peatland are significant sources of emissions. The area of **organic soils under agricultural management** accounts for approximately 8 per cent of the total grassland area (EPA, 2022a; Government of Ireland, 2022b),[20] but emissions from these soils are estimated at 8.3 Mt CO_2eq., which considerably outweighs the estimated 2.0 Mt CO_2eq. of sequestration by mineral soils (CCAC, 2021a). Teagasc's Spatial Analysis unit is currently surveying the state of drainage in these grasslands, as drainage may no longer be effective on a proportion of this area (Teagasc, 2021c).

Reducing emissions on these soils will generally involve raising the water table. The Climate Action Plan 2023 commits to better management of 450,000 ha of mineral grassland to improve sequestration by 2030 and to reduced management intensity of drained organic soils on 25,000 ha of land by 2025, rising to 80,000 ha by 2030 (Government of Ireland, 2022b). Teagasc is engaging in research on reducing inputs and raising the water table, as well as alternative uses for areas that are rewetted (Teagasc, 2021c). The Farm Carbon EIP[21] is a two-year pilot programme aimed at quantifying the benefits of environmental improvement measures in order to establish viable sustainable farming options to support sustainable land use of agriculture on drained organic soils. The FarmPEAT[22] Programme is a two-year programme to reward farmers for improved management of habitats on peat soils along with other important landscape features such as eskers, field boundaries and watercourses.

Reducing emissions from ruminant livestock: Methane emissions are the single-largest source of emissions from agricultural production (see Figure 10.1). They arise primarily from enteric fermentation from ruminant livestock, which accounted for over 60 per cent of GHG emissions in 2021 (EPA, 2022b).

In Teagasc modelling for a carbon budget in 2030 25 per cent lower than 2018 levels, agricultural GHG emissions (in a business as usual scenario), with all technical measures implemented, would be 5 per cent higher than the budget allocation in period 1 (2021–2025) and 12 per cent higher than the budget allocation in the second budgeting period (2026–2030) (Hanrahan *et al.*, 2021). The Teagasc analysis concluded that meeting carbon budget scenarios requires both actions to achieve technical mitigation and actions to reduce livestock agricultural activity (CCAC, 2021a).

The Climate Action Plan 2023 identifies emission reductions of 1.5 Mt CO_2eq. by 2030 based on mobilising the recommendations of the Food Vision sectoral groupings and supporting land use diversification options for livestock farmers (such as AD, forestry, organic farming and tillage) to incentivise voluntary livestock reductions. Policy statements have emphasised that there will be 'no coercion or compulsion'[23] and that the focus will be on the voluntary uptake of measures to diversify land use away from livestock production.

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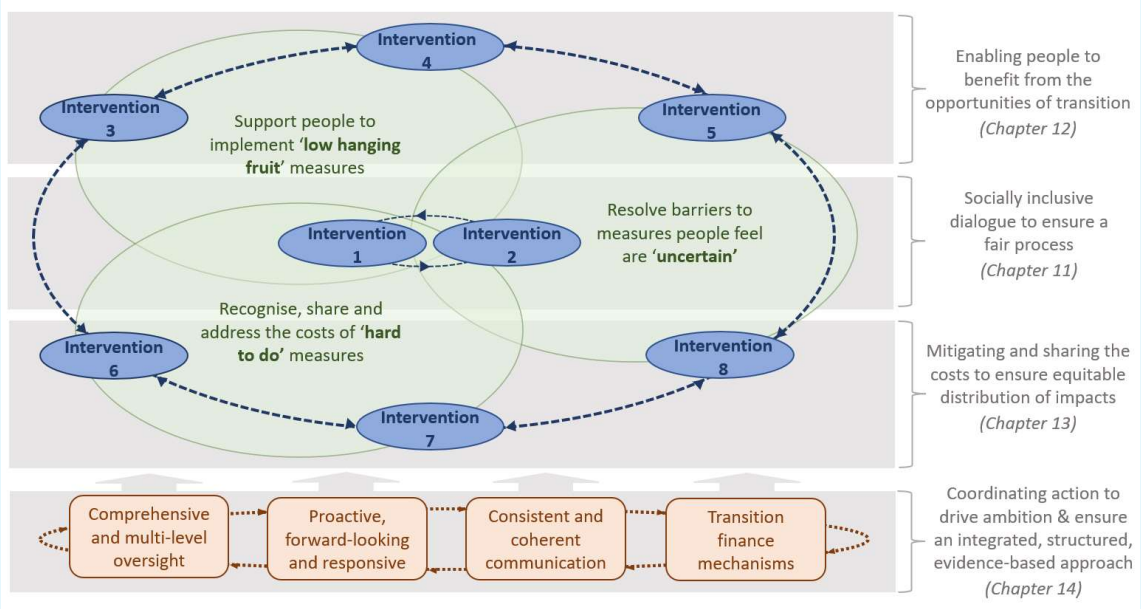
20 Information on LULUCF actions to limit or reduce emissions and maintain or increase removals from activities defined under Decision 529/2013/EU (Government of Ireland, 2015). Also see Climate Action and Low Carbon Development Climate Action and Low Carbon Development (Amendment) Act 2021 https://data.oireachtas.ie/ie/oireachtas/act/2021/32/eng/enacted/a3221.pdf [accessed 05/05/23].

21 See https://farmcarbon.ie/ [accessed 05/05/23].

22 See https://www.farmpeat.ie/ [accessed 05/05/23].

23 See https://www.gov.ie/en/press-release/dab6d-government-announces-sectoral-emissions-ceilings-setting-ireland-on-a-pathway-to-turn-the-tide-on-climate-change/ [accessed 05/05/23].

Figure 10.3: An integrated framework for action: principles, enablers and interventions



The framework is dynamic in that measures are understood to move between categories – for example, when barriers and blockages are resolved, it may highlight the types of resources needed for a measure to be implemented more generally. The eight interventions are understood to interact with and reinforce each other.

The framework is helpful for prioritising interventions to support key measures; for appreciating that through innovation, learning or new research, new measures may emerge or measures that currently face barriers may become possible; and for considering interventions in an integrated way, aligned with the key principles of just transition, which can create the synergies necessary to supporting a fair and inclusive transition.

The framework represents an integrated approach with action across all areas required to support an effective approach to just transition in the agriculture and land use sector.

PART 4
Taking Action Now

Chapter 11

Socially and Farmer-Inclusive Processes

11.1 Introduction

Socially inclusive dialogue and participation are central to ensuring a fair process of transition. A core principle in the Climate Action Plan just transition framework is a commitment to social dialogue 'to ensure impacted citizens and communities are empowered and are core to the transition process' (Principle 4, Climate Action Plan 2021a: 40). Dialogue and engagement were identified as important enablers to all three categories of measures – 'low hanging fruit', those considered 'uncertain' and 'hard to do'.

Consultation on agricultural policy already exists. For example, farming representative organisations participate in stakeholder groups such as Food Vision and many policies such as the Common Agricultural Policy are subject to public consultations where farmers can give their views. However, for transition, further dialogue processes are also valuable. Deeper stakeholder dialogue on achieving climate action in agriculture and land use that is participatory and inclusive would support a frank, constructive and evidence-based approach to transition.

Transition at the scale required in the agriculture and land-use system involves difficult choices and trade-offs and is therefore characterised by friction and disagreements over facts, values and diverging interests. It will impact in both beneficial and negative ways on a range of stakeholders, groups and individuals and will therefore be inherently political and contested. Research suggests the importance of deep stakeholder participation in dealing with the range of possible tensions (Hepburn *et al.*, 2020; OECD, 2021b; Verkuijl *et al.*, 2022). The NESC Working Group endorsed this view and further emphasised the importance of understanding power and politics within the system.

Throughout this work, stakeholders were in agreement that debate on agriculture and climate action has been unhelpfully polarised. Criticism has targeted all stakeholders. Those advocating for more action have been characterised as blaming farmers and having unrealistic ideas about the future of agriculture. Those defending the status quo have been characterised as not engaging with the reality of the situation, and letting farmers down by missing opportunities and giving the impression that 'business as usual' can continue. Criticism was also directed at the policy system and advisory services and at the perception of mixed policy messages on the nature and scale of transition.

In contrast to the polarisation in the debate, focus-group workshops with farmers indicated a willingness to engage with transition, and nearly all farmers indicated that they are prepared to go further and implement measures but need to be supported. Throughout the work there was a shared sense that this is a moment of opportunity, where opinions are shifting and a way forward could be within reach.

Socially inclusive processes are important for societal acceptability for transition, to support a problem-solving approach and to build trust. Food Vision 2030 identifies the importance of dialogue and partnership in fostering understanding and managing the inevitable trade-offs between economic, social and environmental performance (Government of Ireland, 2021b).

Hepburn *et al.* (2020) identify stakeholder involvement as being critical on two levels. First, at the level of decision-making, where participatory processes of dialogue can help develop a shared national narrative and strengthen consensus and, second, at the level of active participation in the practical process of transition. However, trust in the process of dialogue can be undermined when deliberative outcomes are not considered in decision-making or if challenges remain unaddressed; for example, because they are 'hard to do' or where there is resistance to change. While dialogue is a key element of transition, it is not sufficient without a wider framework of action.

Previous NESC research on community engagement in wind energy (NESC, 2014) explored what an intentional, participatory and problem-solving process could look like, and also highlighted the importance of both an overarching sectoral and national engagement process together with effective and inclusive processes of participation at the local level, which combines expertise in order to facilitate exploration, innovation and delivery to explore, test and scale up ideas.

This chapter outlines two interventions for a socially inclusive process in agriculture and land-use transition:

i Intervention 1: Engage a wide range of stakeholders in national dialogue on agriculture and land-use transition in order to support achieving the vision of a fair and inclusive transition in agriculture and land use.

ii Intervention 2: Support local participation in innovation and experimentation in order to align with national priorities, shape best practice, and inform future policy on an ongoing basis.

This chapter explores each of these in turn to identify the current work in each of these areas and how they could be built upon.

11.2 Intervention 1: Engage a Wide Range of Stakeholders in National Dialogue on Agriculture and Land-Use Transition

11.2.1 Introduction

The OECD emphasises the importance of robust, inclusive, evidence-based policy processes in preventing or managing frictions related to disagreements over facts and diverging interests, and differences over values among different stakeholders, in order to achieve societal consensus on policy priorities (OECD, 2021b).

Hepburn *et al.* (2020) highlight the role of engaging in dialogue on decision-making, with a national conversation to support vertical and horizontal alignment across scales and sectors on the importance of net zero and the options to achieve it. They also highlight the importance of clear and coherent communications on the evidence, nature and scale of transition in order to inform dialogue.

As noted in Chapter 8, a shared narrative or vision is an important means of developing a collective purpose, and while there is an emerging 'direction of travel' indicated in policy, areas of mixed messages and differences remain with regard to the scale or approach of transition. An inclusive process of dialogue that involves the wide range of stakeholders from across the agriculture and land use sector, including farmers and rural communities, workers, supply-chain actors, environmental stakeholders and consumers, would help build a shared sense of collective purpose. The focus of such a dialogue could be, for example, on the future of agriculture and food systems or agricultural transition as part of a national land use review. Clear and consistent communication on the science, evidence and intended scale of change is critical.

NESC suggests that there would be considerable benefit from county-level engagement processes, and from discussing measures and opportunities in person across the agriculture, forestry and other land use system.

Engaging stakeholders in a process of dialogue or co-creation should acknowledge the wide range of views, including likely scepticism or resistance to some aspects of transition, and involve a wide range of people based on systematic mapping and including the groups most likely to be vulnerable, as well as farmers, scientists, NGOs and consumers. Deep listening and clearly communicating intentions, outcomes, opportunities and challenges are important (Verkuijl *et al.*, 2022). Efforts should be made to include 'hard-to-reach' groups in order to ensure that no one is left behind. Ensuring that those most impacted by, or most vulnerable to, transition are involved is also important, as particularly vulnerable groups may already experience a lack of representation in decision-making processes.

11.2.2 Current Context

The National Dialogue on Climate Action is a key mechanism for participation and includes the National Climate Stakeholder Forum, Climate Conversations, and the National Youth Assembly on Climate (DECC, 2021c). The Government is considering recommendations from Ireland's Citizens' Assembly on Biodiversity Loss, the first of its kind in the world.[24]

More focused dialogue on the specific challenges of transition in the agriculture and land-use system will be necessary as transition begins to incentivise increased afforestation and other land-use change to support identification of potential unintended consequences, to support integrated and coherent approaches and to generate societal trust and buy-in.

As noted, farming representative organisations and other stakeholders have opportunities to engage with and shape policy, supported by DAFM, through consultation and engagement on policy development, for example Food Vision 2030 and the Food Vision sectoral groups. A number of initiatives, including the current project are underway, and others are planned that can deepen and widen the levels of engagement within the agriculture and land use sector. For example: *Ag Climatise* committed to establishing a dialogue on the future of farming in Ireland, which will include farmers, scientists, environmental and social groups to find practical solutions for productive, sustainable agriculture (DAFM, 2020: 28).

Following the Land Use Review, any process to develop a land use strategy, as identified in Food Vision 2030 (Government of Ireland, 2021b: 6, would be a significant opportunity to reach a wide range of stakeholders involved in, and impacted by, land use and land-use change in order to reflect on the implications and priorities for enabling transition in agriculture and land use. While publicly owned land represents a relatively small percentage of land cover, stakeholders emphasise the important leadership role that activities on State-owned land can play in demonstrating best practice in the transition of land use.

The review process is likely to identify multiple land use demands, which will require a fair and robust process to inform decision-making. A report prepared as part of Phase 1 of the Land Use Review identifies the critical challenge in developing a national land use strategy as 'how best to reconcile conflicting public attitudes, and also the differences between the preferences of individuals and communities and wider societal needs' (Scott and Faulkner, 2023: 3).

Experience from Scotland highlighted the benefits of developing regional land use frameworks within an overall national strategy, which has the potential to bring stakeholders together, build understanding about competing interests, and involve local communities in decisions about their areas (Scottish Government, 2016). An integrated, multi-level land use strategy in Ireland would benefit from a joined-up approach across sectors and could operate from localised contexts through to national objectives, enriched by a socially inclusive process of participation. Given that no target has yet been agreed for the land use, land-use change and forestry sector, stakeholder dialogue on a long-term vision and target would be welcome. Stakeholders consulted as part of NESC's work note that one element of such a vision should be to ensure that our land is a net sink rather than a source of carbon and for this be fully measurable, reportable and verifiable.

There is potential opportunity for collaborative engagement across the island of Ireland on the shared challenge of sustainable agriculture (see Box 11.1).

A national Citizens' Assembly, or series of Regional Citizens' Assemblies, could play an important role in involving a wide set of stakeholders in considering the future of agriculture or focusing in on problem solving specific areas for measures that fall within the categories of 'uncertain' or 'hard to do'.

[24] See https://citizensassembly.ie/citizens-assembly-on-biodiversity-loss/ [accessed 23/03/23].

Box 11.1: Shared Island: An Opportunity for Collaborative Engagement in Sustainable Agriculture

The Council's 2021 report *Collaboration on Climate and Biodiversity: Shared Island as a Catalyst for Renewed Ambition & Action* identified sustainable agriculture and the need for emissions reduction as potential areas for North–South collaboration (NESC, 2021). This is an issue that is especially challenging on the island of Ireland in comparison with other countries, due to agriculture's significant contribution to the economy. The commonalities, rather than differences, in farming were the focus – some of which are unique to the island of Ireland, due to the island's fertile soil in a temperate climate. Agriculture produces the largest share of emissions, north and south – 37.5 per cent (excluding LULUCF) in the Republic of Ireland and 26.6 per cent in Northern Ireland (2021 and 2020, respectively) (DAERA, 2022; EPA, 2022b). Agriculture had an increased share in the Republic of Ireland and was slightly lower in Northern Ireland than the previous year.

In the report, the Council recognised that responding to agricultural emissions on the island of Ireland is a shared and complex challenge. Finding ways to reduce emissions and the impact of agriculture on a range of wider environmental issues – such as water quality and biodiversity – is a shared challenge across the island. It has been noted that there is obvious scope for increased co-operation and joint research programmes (Arnold, 2020).

The Council recommended the establishment of a strategic working group on Sustainable Agriculture: Expanding Shared Areas of Interest.

The principle of a just transition was mentioned in relation to farming. An example was given of the work of the Irish Central Border Area Network on its river catchments catalyst project. This recognises the importance of a just transition for farmers – in this case, the adoption of different agricultural practices that improve and protect water quality. An essential component consists of a livelihood analysis of the farming community, which involves consideration of farming income streams and their relationship to the wider rural economy. Both North and South are establishing Just Transition Commissions, with a fund for agriculture being established in the North.

The consultation highlighted that engagement with people around climate change and in rural communities should not be separated from broader community development and well-being initiatives. There was a strong focus in the submissions on the need to explore how to transition to more sustainable types of agriculture, and the importance of acknowledging that rural life is more than farming. There were risks in relation to the future of rural communities, which may be impacted by climate change and biodiversity loss.

Another area highlighted was drainage on wetlands/peatlands, which was identified as a key area of work for both jurisdictions, given the trans-boundary implications of these types of works on carbon storage levels and inventory reporting. The innovative All-Ireland Pollinator Plan, supported across the island, resonated with farmers and was noted as an example and potential model for developing bottom-up, expert-led but multi-actor initiatives.

The consultation identified a number of specific areas where opportunities to collaborate might exist. These included a common approach to the financial supports in which farmers should be incentivised and financially supported to adopt climate-mitigating practices; payments to farmers as land managers and as protectors of nature for the provision of ecosystem services; and an all-island roll-out of the Farming for Nature initiative.

The consultation also raised the idea of conducting visioning work with farmers in order to identify possibilities. Cross-border listening exercises could inform policy and practice. Collaboration and meaningful participation with communities was considered important, as well as involving farmers. The co-creation and co-ownership of climate action by communities was viewed as key, as was co-design with stakeholders to avoid setting up new structures and institutions.

11.2.3 Looking Forward

Many activities underway as part of the commitment to engagement and participation.

A national dialogue process for agriculture and land use is required in order to envision and explore the implications and priority actions needed to achieve a just transition, and to generate a shared sense of direction among all stakeholders. Such a dialogue should be participatory, should clearly communicate the scale of the change, and should explore with a wide range of stakeholders, particularly those most impacted, how to achieve transition in a fair and equitable manner.

The potential opportunities for such a national dialogue include having a dedicated sectoral focus as part of the National Dialogue on Climate Action; the next phase of the Land Use Review; an initiative under Shared Island; or a new Citizens' Assembly or series of Regional Citizens' Assemblies.

11.3 Intervention 2: Support Local Participation in Innovation and Experimentation

11.3.1 Introduction

A distinctive aspect of the agriculture and land use sector, compared with other sectors, is the wide variety of different land and soil types that are managed by over 130,000 individual farms, each with unique skills, knowledge, experience, preferences and priorities for what they want from their land, farm business and household.

This diversity at the local level highlights the complexity of achieving priorities at the national level, where there are societal needs for environmental outcomes (emission reduction, clean water, carbon-sequestration) that can potentially have either synergies or trade-offs with the multiple land functions and management priorities at the local level (Coyle *et al.*, 2016; Schulte *et al.*, 2015; Schulte *et al.*, 2014).

The active participation and engagement of farmers in innovating and changing practice across a diversity of contexts is fundamental to effective transition. What is needed to reduce emissions or increase carbon sequestration on different land types will depend on specific soil types and existing land management practices; what incentives will have impact or what supports are required will be based on the different priorities, skills, knowledge, or resources available to the individual farmer. Transition is therefore deeply context-specific.

New solutions will require experimentation, and there is enormous value in recognising local knowledge of soils, land and ecosystems among farmers as well as the role of other stakeholders in grassroots innovations. The EEA (2019) underlines the fact that innovation, experimentation and diffusion involving a wide range of stakeholders are critical at the local level and recommends that the key role for policy in support of transition is to promote real-world experimentation with diverse forms of sustainability innovation by a diversity of 'users' – including farmers as well as civil society and local communities that support social and grassroots innovation as a priority action for transition. Hepburn *et al.* (2020) emphasise the importance of community dialogue in identifying tailored local solutions and motivating place-based action as important elements for transition. Murphy *et al.* (2022) identify socially inclusive dialogue and participation as key factors in developing relevant policies and practices that can build trust and ownership within communities in transition. Research by Moore-Cherry *et al.* (2022) on place-based approaches to transition found a willingness among farmers to engage in transition, but believed there was no way for them to do so and felt side-lined from decision-making (Moore-Cherry *et al.*, 2022).

Engaging directly with farmers and in agricultural research, experimentation, innovation and learning can help to reduce uncertainties, better inform the design and delivery of innovative solutions, identify recommendations for improving policy and practice, and ultimately support a transition that is fairer and more effective.

Participants in the NESC stakeholder workshop held in January 2023 highlighted the importance of local participation and inclusion in the practical day-to-day of the transition, in the interface between the 'bottom up' of farm context,

priorities and experience and the 'top down' of national priorities, research, advisory and supports. There was strong support for conversations at the local level – in every farm, parish and catchment area to build understanding and a platform for action. Some stakeholders thought the community co-operative model could be more generally applied, including as a potential model for an engagement process focused on local-area transition action plans.

Both rural development and transition in agriculture require strong innovation ecosystems that can bring together local authorities, together with other key public and private stakeholders, who are viewed as central for building knowledge, trust and social capital between actors at regional and local levels (European Commission, 2021b).

In a paper produced as part of an EU Horizon 2020 project, Moodie *et al.* (2023) argue that policies are needed that explore ways of facilitating cross-sector integration between traditional and modern knowledge-based industries and businesses in order to help deliver green transitions. In this regard, rural areas present ideal testing grounds for the development of innovation labs and living labs. The opportunities from the development of a circular bioeconomy in Ireland are likely to be ripe for further cross-sector and local integration, involving farmers, supply-chain actors and local entrepreneurs.

In a paper prepared as part of the Department of Agriculture–EIT Climate-KIC strategic initiative, the authors note the potential for establishing local task forces across all regions in order to build regionally specific transition plans (DAFM-Climate KIC, 2023 forthcoming).

11.3.2 Current Context

The Teagasc Signpost Farm Programme has been providing targeted advisory support for climate and sustainability actions on farms and includes a network of demonstration farms across farm sectors and regions. Other sustainability training programmes include the Irish Co-operative Organisation Society/Dairygold sustainability training programme and the Irish Co-operative Organisation Society/Teagasc Sustainable Fertiliser training programme.

There are many examples of approaches that involve farmers coming together with experts and other stakeholders to develop localised solutions. Box 11.2 shows an example in the area of agriculture and water quality, the Agricultural Sustainability Support and Advisory Programme (ASSAP) is an example of an approach that combines top-down scientific evidence and advice with tailored catchment-level engagement, including the use of new national resources (such as Pollution Impact Potential maps for field scale assessment of the risk of pollution) to use for targeted advice in close collaboration with farmers (ASSAP Independent Review Panel, 2021).

The EPA's 2022 water quality report (2022d) highlighted that improvements in water quality are being made, particularly in the priority areas for action, where the Local Authority Waters Programme and the ASSAP had worked with targeted actions over the previous three years. The report noted that the gains made in areas with targeted supports are being wiped out by declines in water quality elsewhere, suggesting that targeted approaches were more effective.

In an external expert assessment of the ASSAP, an independent review panel (2021) highlighted the importance of the 'how' in the approach, and emphasised the need for a stronger focus on 'on-farm and action-based engagement … [and] a transformation in the method and role of advisory services, from transmitting certified knowledge, to bringing such knowledge into greater engagement with farmers to co-produce plans and solutions tailored to the specific conditions of each farm and catchment' (ASSAP Independent Review Panel, 2021: 17). Ireland's Agricultural Knowledge and Innovation Systems (AKIS) incorporates peer-to-peer knowledge exchange through knowledge transfer groups, and co-operation through providing support to the operational groups for developing and testing innovative solutions under the agricultural European Innovation Partnership (EIP-AGRI), and through supporting community-led local development through Local Action Groups and Local Development Strategies.

Box 11.2: The ASSAP

Responding to its obligations under the Water Framework Directive, in 2013 the EPA established a new Catchment Science and Management Unit as part of a larger effort by the EPA and its partner institutions in water quality management to establish a process to agree priorities for intervention with key stakeholders and to ensure that the agreed interventions are executed with the fullest possible participation of the affected actors on the ground.

When field investigations reveal problems arising from agriculture, the local assessment teams refer them to the ASSAP. Formed in 2017, the ASSAP is jointly funded by two government departments and the co-operatives through their trade association, Dairy Industry Ireland. It has a staff of 44 Agricultural Sustainability Advisors, 20 employed by Teagasc and the remainder funded by the dairy industry, representing nine co-ops. These staff were all trained according to a curriculum developed by the EPA, Teagasc and other public bodies. In consultation with the local assessment team, the ASSAP advisors work with farmers contributing to local environmental efforts to improve land, farmyard and nutrient management, as required. The ASSAP also works closely with the Local Authority Water and Communities Programme, which was created in 2016 to increase public engagement in the formulation of Ireland's River Basin Management Plan. Following an external review in 2021, the ASSAP has been extended to the end of 2027.

A useful example illustrates an approach to spatially tailored land use management planning based on soil function. O'Sullivan *et al.* (2017) explored a method for engaging stakeholders from across the agriculture and land-use system in science, policy and practice – including farmers – to design an optimised catchment based on soil-function targets drawing on Schulte *et al.* (2016)'s research on the spatial distribution of soil types. Using what is termed 'the catchment challenge model', stakeholders were consistently able to design an optimised catchment that could potentially realise the soil-function targets set. Research projects supported by DAFM and Teagasc include the development of a stakeholder land-use decision-support tool, and a carbon farming decision support tool will enhance the accuracy and application of this work.[25] In principle, the mechanisms for incentivisation are already in place and could be adapted for the implementation of a targeted land management approach (O'Sullivan *et al.*, 2017).

The agricultural EIP-AGRI, which aims to facilitate and support the engagement of farmers and land managers with other stakeholders in designing localised solutions to environmental issues (DAFM, 2019; European Commission, 2015), is a valuable example of a localised approach. While these projects importantly were supported by training and advisory services, a key feature in these schemes were farmers choosing the approach that they wish to take in order to meet the target. Ireland has one of the best-developed and longest-running result-based agri-environmental schemes in the exemplary Burren Programme, which commenced in 2005 with twenty demonstration farms, farming 2,500 ha of priority habitat, and which today has 328 farms covering an area of 23,000 ha of priority habitat. It provides local high-end scientific support, training, updating and performance monitoring of farm advisors, see Box 11.3 (Dunford, 2016).

The successful approach of the Burren Programme involved a hybrid model of results-based payments in combination with payments for capital works (non-productive investments) (Finn, 2020). Building on the Burren Programme experience, a range of European Innovation Partnerships (EIPs) specifically tested innovations in locally adapted, results-based, agri-environment payments. This has provided further impetus to widen the adoption of results-based payments approaches, including informing the design of the new Agri-Climate Rural Environment Scheme (ACRES).

[25] For example, DAFM funds the National Agricultural Soil Carbon Observatory (NASCO), and Teagasc is developing a Land-Use Decision-Support Tool and a carbon farming decision tool.

Box 11.3: Farming for Nature

Farming for Nature is a not-for-profit, award-winning initiative aiming to support High Nature Value (HNV) farming in Ireland that was established by Brendan Dunford and Brigid Barry in the Burren, Co. Clare. It is an independent project of the landscape charity Burrenbeo Trust (www.burrenbeo.com) and was established in 2018. It works to build a network of exemplary farmers, celebrating the positive role that these farmers play in supporting biodiversity. It enables farmer-to-farmer knowledge exchange and provides advisory services.

Farming for Nature ambassadors are made up of farmers – male, female, couples and family farmers. They come from across Ireland and include beef, sheep, forestry, dairy, HNV, horticulture and tillage farmers who manage a wide range of valuable habitats. A recent booklet for farmers outlines practical steps to enhance biodiversity and climate action sector by sector (Farming For Nature, 2023).

Well documented, the programme provided insights into the key elements of an effective scheme, including adopting a farmer-centred approach, trust and respect, being responsive and adaptive, and encompassing a strong advisory service and institutional support, among other key areas.

11.3.3 Looking Forward

Stakeholders identified the co-operative project model under ACRES, which emerged from learning gleaned from the EIPs, as providing a strong model that should be scaled up further.

This sort of approach can involve farmers coming together to assess the ecological needs of the region and to develop and deliver appropriate actions. They can support climate change mitigation and adaptation as well as biodiversity and water-quality interventions, co-operating at the catchment level. The results of innovation, experimentation and learning can shape the development of best practice as well as the revision of policies or standards based on new evidence from learning.

The effective and swift roll-out of the ACRES Co-operation Project model could be prioritised, ensuring sufficient financial and human resources and the necessary institutional changes to support a decentralised approach. This would be based on local action planning and centred on farmers as the leading actors of change. With sufficient support, there is potential for this model to be further rolled out into more regions, and for innovation and learning to shape the revision of future best practice, standards and policies, as part of a responsive governance of transition. The interaction between national policy and processes and bottom-up initiatives will be important to both align local processes to national targets and to ensure that evidence-in-practice shapes future policy.

Chapter 12

Enabling People to Benefit from Opportunities of Transition

12.1 Introduction

The key measures for tackling climate change and biodiversity loss indicate that this is not a transition 'out of' agriculture but rather a transition 'into' making optimal use of our land and agricultural resources. The transition therefore is, and can be further developed to be, opportunities-led.

A core principle in the Climate Action Plan just transition framework is that 'people are equipped with the right skills to be able to participate in and benefit from the future net zero economy' (Principle 2, *Climate Action Plan 2021*; Government of Ireland, 2021a: 40). Enabling people to benefit from the opportunities of transition is also about financial incentives and resolving barriers to the wider uptake of measures that farmers consider to be 'uncertain'. Currently, a critical systemic barrier is the failure to account for and value ecosystem services/natural capital, and addressing this would provide a significant, potential opportunity to enable transition.

Nearly all the farmers who took part in the NESC workshops indicated that they are prepared to go further and implement measures but that they need support. Most identified financial barriers, including market failures and the costs of transition, as key challenges. Cost acts as a barrier to transition; for example, costs for implementing measures or income foregone as a result of reduced intensity of use (ASSAP Coordinating Team, 2020; ASSAP Independent Review Panel, 2021; O'Sullivan *et al.*, 2017). This echoes the finding of Bord Bia's Thinking House survey of 1,218 farmers, which found that the majority of farmers (86 per cent) are willing to implement further changes to reduce emissions on their farms, and financial supports/grants were identified as the most common (82 per cent) support that they believe they require in order to do so (Bord Bia, 2022).

This chapter outlines three interventions to enable people to benefit from the opportunities of transition:

i Intervention 3: Scale up and align the provision of skills, advice and research for transition.

ii Intervention 4: Account for and reward environmental sustainability. Align financial incentives with transition objectives so that people are financially incentivised towards more sustainable practices.

iii Intervention 5: Reduce uncertainty through greater policy coherence by identifying and removing policy barriers and addressing social or cultural barriers.

Interventions 3 and 4 are important for all measures but may be the priority focus for 'low-hanging fruit' measures. Intervention 4 could be transformational if payment for ecosystem services resulted in a new business model for agriculture, potentially enabling the wider uptake of 'hard to do' measures. Intervention 5 is important for unlocking the potential of measures that are considered to be 'uncertain'.

12.2 Intervention 3: Scale up and Align Skills, Advice and Research for Transition

12.2.1 Introduction

To benefit from the opportunities of transition, people need to be empowered with the necessary knowledge, skills and capacity to adopt new approaches or to consider more land use or income diversification options. Effective transition will depend on the skills and capacities of farmers to adopt new approaches or to diversify farm enterprises.

This will be locally context-specific. Depending on their farm systems and current land use practices, transition measures for primary producers will involve the adoption of more low-carbon, biodiverse, agricultural land management practices; measures to mitigate emissions from livestock; the incorporation of more trees through afforestation or agroforestry; the production of biomass for biorefining, bioenergy or other uses; or the incorporation of solar or other renewable energy technologies.

The skills and capacity required will relate first to experiential knowledge, together with scientific data of the specific soil and land capacity, its current performance in terms of land functions/ecosystem services, and its suitability for different transition options to enhance one or more of these. Second, they will relate to primary producers' knowledge of and information on the potential of new supply chains or markets and whether they represent a viable diversification opportunity for land-use change. Third, they relate to the capacity, skills or knowledge required to adopt new approaches, practices or technologies for agricultural production or to diversify into new areas.

Farmers participating in the NESC workshops identified the need for more support and guidance in climate mitigation. Many farmers felt that they don't receive sufficient support for innovation. Some felt they are ahead of the support organisations in understanding what will work on their farms. Stakeholders that felt some measures, such as regenerative agriculture and agroecology, or alternative approaches to forestry such as agroforestry, had not received sufficient attention in the past and need more research and advisory expertise. Stakeholders emphasised that measures need to be diverse and context-specific. Farmers in all the workshops highlighted the need for a localised approach.

In the Bord Bia Thinking House survey, farmers identified the top supports they require and 50 per cent of them identified knowledge supports or training as the second-highest ranked requirement (after financial support), followed by specialist advice (45 per cent). When asked, 86 per cent of farmers agreed that they need far more guidance to improve their environmental sustainability (Bord Bia, 2022). For example, in relation to soil and land management measures, O'Sullivan *et al.* found that farmer knowledge was strongest for the primary productivity function of land with knowledge gaps more prevalent across the other four soil functions, particularly water regulation and carbon cycling and storage (O'Sullivan *et al.*, 2017). In the area of forestry, some of the potentially more socially acceptable options of increasing the number of trees on-farm, such as agroforestry, represent a novel and innovative land use in an Irish context, and the Irish Agroforestry Forum suggests that increasing knowledge of agroforestry among farmers and among experts who provide advice is an important enabler (Irish Agroforestry Forum, 2021), points that were also reflected in the NESC workshops.

Ensuring that farmers are supported with skills and capacity highlights the important role of advisory services. The role of AKIS is therefore the main focus of this section on Intervention 3. Peer exchange and advisory services comprise the principal avenue for farmers and land managers. Ireland already has a very highly regarded food and agriculture research and advisory service, as well as excellent examples of peer-to-peer collaboration and exchange. Stakeholders emphasised the importance of further alignment of advisory services, and the research and guidance they provide, with sustainability objectives.

It is also important to note that skills and capacity across the whole agriculture and land-use system will be important. Across Europe, the agri-food and forestry workforce need new skills and competences, which, in turn, require the identification of the existing and emerging skills that are required in the categories of bioeconomy, sustainability, and digital technology (Mayor *et al.*, 2022). Skills and capacity building in biodiversity, nature-based solutions and renewables would be particularly relevant.

Stakeholders emphasised the importance of specialist-skills development in relation to renewable energy generation, supply chains and the bioeconomy, which represent new areas of development in relation to production but also to business innovation and market development. Renewable energy technologies require new skills and expertise (European Commission, 2023a), including potential land-use change as well as connecting with different value chains. The role of third-level educational institutions in providing courses aligned to new opportunities in the low-carbon economy was also emphasised.

12.2.2 Current Context

Further development of the national Agriculture Knowledge and Innovation System (AKIS) is recognised as priority within the Common Agriculture Policy strategic plan 2023–2027.

Teagasc is the national body providing integrated research, advisory and training services to the agriculture and food industry and rural communities. It is well resourced and regarded, both nationally and internationally. There is a significant programme of research and advice on improving sustainability, including research related to soil carbon, animal breeding, methane-inhibiting feed additives, and lower-nitrogen approaches to grassland management.

Stakeholders have emphasised that further alignment within the food and agricultural advisory services to include environmental sustainability as a core function is necessary to support the transition. In an external expert assessment of the ASSAP, an independent review panel found low levels of compliance with good agricultural practice, indicating 'weakness across the wider advisory services, cross-compliance inspection and industry buy-in to the GAP regulations' and recommended that 'a major enhancement and refocusing of the mainstream advisory services (both public and private) with a stronger focus on sustainability (economic, social and environmental) and on-farm and action-based engagement' (ASSAP Independent Review Panel, 2021: 11).

The launch of Teagasc's new Climate Action Strategy (2022-2030), which commits to significantly increasing the resources it devotes to climate-related research and knowledge transfer, indicates a move in this direction. The collaborative, Teagasc-led, 'whole of industry' Signpost Programme to support farmers in climate action was formally launched in May 2021, and includes 119 demonstration farms as well as regular in-person and online knowledge-sharing events. The Signpost Programme will be scaled up nationally as part of Teagasc's ambition to engage with 50,000 farmers on climate action by 2030 (O'Mara, 2022).

A number of pilot farm projects will inform more widespread development of on-farm renewable energy generation. The Irish Farmers' Association in association with Bord Gáis Energy ran a solar pilot for farmers and is currently partnering with Bord Gáis Energy to put solar panels on sheds during 2023 (IFA, 2022a). Teagasc is providing research, education and advisory services to support renewable energy development on farms that support a number of research and demonstration projects (Teagasc, 2022). DAFM is working to address barriers to energy generation, and the updated Targeted Agriculture Modernisation Schemes (TAMS) 3 includes grant aid for installing solar panels.

Research and demonstration projects are also informing developments in bioenergy. Biorefinery Glas (comprised of small-scale, farmer-led, green biorefineries) and the Irish Bioenergy Association small-scale biogas demonstration programme will provide research on AD and are supported by DAFM through the EIP, as part of the Rural Development Programme 2014-2020 (Houses of the Oireachtas, 2022a).

Stakeholders noted the importance of research into areas of practice that may not have received much attention in the past. For example, there are globally low levels of investment in agricultural research focusing on agroecological and regenerative agricultural approaches (HLPE *et al.*, 2019), and stakeholders consulted as part of NESC's research reflected that this has also been the case in Ireland. In a paper prepared as part of the Department of Agriculture–EIT Climate-KIC strategic initiative, the authors identify regenerative practice as a key recommendation for intervention (DAFM-Climate KIC, 2023 forthcoming). Greater investment in researching regenerative approaches in an Irish context, building on peer-to-peer farmers' networks such as the Farming for Nature ambassadors, would provide a more robust evidence base in support of wider adoption of these measures.

Research on alternative forms of afforestation, which may be more acceptable to farmers than traditional afforestation, could be important in supporting increased levels of tree planting; for example, the recently commenced research in developing agroforestry for cattle to increase carbon capture by trees and mitigate emissions from cattle (Teagasc, 2021c).

Beyond production, the Bioeconomy Forum highlights the need for new kinds of professionals in transitioning to a circular bioeconomy, including the concept of a bioeconomy professional who can connect and integrate across all stages of the value chain within the bioeconomy, and therefore requires the development of competencies to fulfil roles

at all stages of the value chain. It recommends that the Regional Enterprise Plans, Regional Skills Areas, further- and higher-education institutions and Teagasc should aid the development of the project management and the scientific, transversal and cross-sectoral skills that are required for developing the bioeconomy professional role (Barrett, 2022).

12.2.3 Looking Forward

Ongoing development of AKIS will be essential in addressing the key challenges associated with transition through the co-creation and diffusion of science, technology and knowledge.

The development of multiple demonstration sites where the outputs of research are put into practice at the farm level are crucial to demonstrating knowledge in action. Knowledge sharing from these sites should be open and transparent and should be available across a range of sectors and stakeholders in order to foster knowledge exchange and collaboration among the diverse set of actors that will best support system-change innovation.

The Council recommends further deepening alignment in the food and agricultural advisory services to include environmental sustainability as a core function. This approach is necessary to support the transition and would include more mission-focused, publicly available research and farmer-led innovation, including - in addition to the significant focus on areas like feed additives, increasing focus on areas such as regenerative agricultural approaches and agroforestry.

Further research is needed into the wider skills that will be required as part of the agriculture and land use sector, including in new areas of the bioeconomy and the role of educational institutions in providing appropriate training courses to meet future demand.

12.3 Intervention 4: Account for, Reward and Incentivise Environmental Sustainability

12.3.1 Introduction

Stakeholders consulted as part of this research identified the misalignment of financial incentives as a key barrier to transition. There were many suggestions for the types of potential policy mechanisms to support transition, including payment for ecosystem services, reforming agri-environment schemes, price signals, carbon quotas, carbon trading, carbon farming, and the role of standards and advisory services.

Insufficiently rewarding farmers for emission reductions, carbon sequestration or other environmental services was a strong theme, rooted in what was viewed as a cross-cutting systemic failure to account for nature. While stakeholders acknowledged recent reforms of the Common Agricultural Policy to strengthen environmental outcomes, many emphasised the need for further alignment and improved monitoring and evaluation to better deliver environmental objectives and support farmers and farm enterprises transition to more sustainable approaches.

Results-based payments for ecosystem services (PES) were the most frequently mentioned solution by stakeholders, and that the sources of finance for result-based PES could come from both public and private sources and could be better targeted depending on farm profitability and vulnerability.

Adequately accounting for and rewarding people who take advantage of the opportunities for transition by ensuring coherent, sufficient, long-term and consistent resources aligned to results was a clear message from stakeholders consulted by NESC.

Section 12.3 explores aligning financial incentives with sustainability and, more fundamentally, accounting for and rewarding sustainability outcomes.

First, it identifies the current gap in accounting for and rewarding sustainability.

Second, it identifies that results-based PES have proven to be a successful approach in agri-environment schemes.

Third, it suggests that these approaches should be further built upon, with significant increases in financing from a range of sources.

12.3.2 Accounting for Environmental Sustainability: Robust and Comprehensive Data

The absence of robust farm-level data was highlighted as a significant barrier by stakeholders because monitoring, reporting and verifying progress on emissions, biodiversity, air and water quality is an important foundation for managing improvements as well as financially rewarding progress.

This finding was underscored by the Food Vision Dairy Group report (2022), which pointed to the essential role of providing information on carbon production and sequestration at the farm level, compatible with the national inventory, in enabling farmers to manage their carbon levels.

Bord Bia, Teagasc and the Irish Cattle Breeding Federation (ICBF) are actively collaborating to create a farmer-centric sustainability platform, utilising the three agencies' collective knowledge, data and support tools, to enable delivery of Climate Action Plan targets for the agriculture sector. In the long term, it is envisaged that all data, support tools and other resources will be consolidated in one place but, in the interim, the focus is on linking each agency's existing resources to maximise efficiency and deliver a higher level of service to farmers (see Box 12.1).

Box 12.1: Bord Bia, Teagasc and ICBF sustainability platform, 'AgNav'

The vision of 'AgNav' is to deliver science-led support and engagement tools that provide accurate and verifiable data to famers working to deliver on Climate Action Plan targets. Resources in relation to research, data collection and analysis, and education and planning will be connected to create a 'one-stop shop' for farmers implementing climate action and sustainability improvements on their farms.

There will be three elements to the collaboration: (i) assess: using a sustainability assessment and resulting feedback report to establish current farm performance against a number of relevant environmental and sustainability indicators; (ii) analyse: farmers and/or advisors identify opportunities for changes to practices on farm that could result in improved performance; and (iii) act: following the identification of the most appropriate actions for their farm, a farmer and/or the advisor can create a sustainability plan for the farm that can include targets and timelines for implementation/completion.

Collection of soil data represents a further gap. The recently published *Land Use Evidence Review Phase 1 Synthesis Report* (Government of Ireland, 2023c) includes specific evidence recommendations for developing a national monitoring network for soils and for continuing to invest in soil-mapping at detailed scales. Sustainable land management requires an understanding of what soil types are suitable for land use in a specific location, which depends on conducting detailed soil-mapping to assist in decision-making. Teagasc is working to improve data collection on and monitoring of Irish soils. DAFM has provided funding to establish the National Agricultural Soil Carbon Observatory (NASCO) in order to quantify the national values for soil emissions and sequestration. soil organic carbon Baseline levels of soil organic carbon are currently being measured across more than 100 Signpost Farms. Building on this work, Teagasc aims to produce verifiable, Ireland-specific, land-management carbon sequestration factors that can be inputted into national inventories, including quantifying the impact of different management options such as optimal soil fertility, stocking rates, and use of grazing compared with that of cut pastures (Teagasc, 2021c).

To fully appreciate the role of nature and natural systems requires understanding each ecosystem and the relationship between them; for example, the flows between water, soil, forests, wetlands, seas and wildlife and a systems approach (Farrell and Stout, 2020). Natural capital is a way of measuring and valuing the benefits that the natural world provides to society, including food, cleaning the air of pollution, sequestering carbon, and cleaning fresh water (ONS, 2022).

Values can help reveal how natural capital is delivering important benefits to society and the economy (NCI, 2021) as well as highlighting the intrinsic and fundamental importance of our natural world.

Data on all natural systems are needed to properly understand the connections and trade-offs between them (NCI, 2021). The UN System of Environmental Economic Accounting – Ecosystem Accounting establishes international standards for the collection of data and compilation of ecosystem accounts to track the extent and condition of ecosystem assets and services over time. While relatively new, the development of data, capacity and practice has been building, through the work of Natural Capital Ireland, the National Biodiversity Data Centre, the EPA, the National Parks and Wildlife Service and other statutory bodies, and the establishment of an Ecosystem Accounts division in the Central Statistics Office. However, there remains no central information point bringing together all the data on natural systems in Ireland.

One of the leading researchers on natural capital in Ireland, Professor Jane Stout, has highlighted that natural capital accounting can be a useful tool for farmers and policy-makers, helping to inform decision-making and planning, as well as developing incentives to protect and restore nature on farmland (TCD, 2021). Norton *et al.* highlight how the consideration of ecosystem services benefit values, together with measuring and mapping at a smaller spatial scale, could help shift policies towards a payment-for-ecosystem-services approach, which could mitigate the agricultural sector's contribution to climate change, habitat/biodiversity loss and water quality (Norton *et al.*, 2020).

Adopting a holistic and integrated natural capital and sustainable circular bioeconomy framework could shape incentives and innovation in maximising co-benefits for biodiversity, water quality and other eco-system services (DAFM, 2022b). Phase 1 of the Land Use Review recommends the development of a national map of ecosystem extent and condition that is compatible with the principles of ecosystem accounting and Article 17 of the Habitats Directive reporting requirements, and that can support land-use decision-making (Government of Ireland, 2023c).

12.3.3 Rewarding Sustainability: Results-based Payments, PES and Carbon Farming

The limited data that are available on ecosystems contribute to undervaluing nature and ecosystem services and, in turn, reinforce the unsustainable use of natural resources. Until recently, the wide diversity of ecosystem services provided by farmers (such as water quality, flood and fire resilience, and soil quality) have not been widely acknowledged in payments to farmers (McLaughlin *et al.*, 2020), and McGurn and McKay argue that it is unsustainable for farmers to carry the costs of providing the services that society wants where it does not make economic sense for them to do so (McGurn and McKay, 2020). The Food Vision Dairy Group report (2022) highlighted the need for rewarding farmers for carbon sequestration.

Stakeholders and experts highlighted that provision of ecosystem services is of such critical national importance across the agriculture and land-use system that it needs to be paid for – whether publicly, privately or by consumers (Food Vision Dairy Group, 2022).

PES are a mechanism through which those who benefit from ecosystem services can compensate those who provide them, for mutual gain (Farley *et al.*, 2012). Payments may cover the cost of investment as well as of potential income forgone. Investment in ecosystem services can be conceptually reframed as investment in future cost savings, as doing this can provide monetary returns as an alternative, for example, to costly spending on engineered flood defences and water treatment and enhanced climate adaptation (McGuinness and Bullock, 2020).

Results-based payments are central to PES. A results-based approach means that payments to farmers are directly linked to the quality of the biodiversity and particular ecosystem services on their farms, thereby incentivising better biodiversity outcomes (O'Rourke and Finn, 2020). Agri-environment schemes have demonstrated the successful application of PES in an Irish context. Results-based agri-environment schemes pay land managers for achieving specific environmental outcomes, such as species-rich grassland or the promotion of an endangered species (O'Rourke and Finn, 2020). Payment reflects the level of achievement, but the farmer or land manager is free to choose the appropriate methods with appropriate advisory support (O'Rourke and Finn, 2020).

Ireland has had positive experience with results-based projects such as the ground-breaking Burren Project and other EIP projects such as the Hen Harrier Project, the BRIDE (Biodiversity Regeneration in a Dairying Environment) Project and the Protecting Farmland Pollinators Project. The EU Results Based Environment Agri Pilot Programme (REAP) was piloted in Ireland and Spain between 2015 and 2018, co-funded in Ireland by The Heritage Council, DAFM and Teagasc.[26] The pilot regions were selected from HNV farmland and offered contrasting farming methods and climate and physical challenges (O'Rourke and Finn, 2020). It found that farmers, overall, viewed the results-based approach as a fair mechanism for delivering agri-environment payments, and that having a results-based scheme in place in the future might make the continuation of farming more attractive to those considering other opportunities. In research with farmers on new and innovative contract approaches, farmers in Ireland rated results-based payments highest out of four contract types for ease of understanding, applicability to their farm and for being economically beneficial (Hennessy and Bradfield, undated).

Experience with the EU LIFE projects and EIPs has informed the development of agri-environment schemes under the new Common Agricultural Policy strategic plan, in particular ACRES, which will receive €1.5bn in funding (DAFM, 2022c). Using a habitats-based approach, delivered through both multi-functional prescription and results-based actions, ACRES aims to contribute significantly to achieving improved outcomes in biodiversity, climate, air- and water-quality. These objectives will be achieved through a general approach offering a range of measures for individual farmers, and a co-operation project approach that will be available to farmers who opt to undertake measures in eight defined high-priority geographical areas, as well as through bespoke farming and landscape actions (DAFM, 2022b). Farmers participating in this approach will have the assistance of a local Co-operation Project team, which will assist in implementing ACRES at the local level.

Successful results-based agri-environmental programmes have demonstrated the effectiveness of PES in practice. A wider application of valuing nature would include collecting more comprehensive data on natural capital and ecosystem accounts, embedding natural capital accounting into policies and practice, and adequately incentivising the protection and enhancement of critical ecosystem services. NESC's project, focusing on accounting for nature, will explore the opportunities and challenges further.

Sequestration of carbon, or carbon farming, is an ecosystem service that is of particular relevance in climate mitigation. The European Commission points to the potential role of valuing ecosystem services via carbon farming (see Box 12.2) to create a potential new business model for farmers and foresters (European Commission, 2022d), which may enable income diversification to facilitate land-use change. There is an opportunity to design EU-wide carbon-farming standards that can enhance biodiversity while safeguarding against negative impacts (Scheid *et al.*, 2023), although it is important to note a range of outstanding issues such as the degree of uncertainty and variation in soil carbon data. Moran (2022) highlights that results-based approaches to rewarding ecosystem services provide a feasible mechanism to incentivise carbon farming. The locally adapted results-based payments projects have already adopted an integrated approach with the use of field scoring systems designed to incentivise nature, water and carbon ecosystem services in a 10-point field-scoring system, which is set to be rolled out under ACRES. Building on this work as part of carbon-farming initiatives is an opportunity to align interventions and demonstrate ambition.

[26] This partnership was co-ordinated by the European Forum on Nature Conservation and Pastoralism, with the Atlantic Technological University Sligo, BirdWatch Ireland, the National Parks and Wildlife Service, High Nature Value Services Ltd. and Gestión Ambiental de Navarra (O'Rourke and Finn, 2020).

Box 12.2: Carbon Farming

Carbon-farming practices are management practices known to sequester carbon and/or reduce GHG emissions (CCI, 2021) and include restoration of peatlands and wetlands; afforestation and reforestation; and protecting soils, reducing soil loss and enhancing levels of soil organic carbon (European Commission, 2021c). Guidance produced for the EU concluded that result-based carbon farming can contribute significantly to the EU's efforts to tackle climate change (COWI *et al.*, 2021).

According to the European Commission, questions remain about the practical implementation of carbon farming schemes. These include technical challenges in the certification of sequestered carbon, uncertainty of measurement, and the risk of re-emission, as well as potential impacts on biodiversity (European Commission, 2022c). Scheid *et al*. (2023) outline the need for careful consideration of context-specific biodiversity impacts in order to avoid potential harmful effects – a carbon-farming practice that is beneficial in one area could in fact be harmful elsewhere.

Carbon-farming practices will be promoted as part of Farm to Fork, under the CAP and other EU programmes such as LIFE and Horizon Europe, and also under public national financing (European Commission, 2022e). The European Commission's technical guidance handbook outlines details of the approach ahead of the proposed introduction of a carbon farming initiative (European Commission, 2021e).

A new EU regulation has been proposed to develop a regulatory framework for certifying carbon removals, which aims to offer incentives to farmers to scale up carbon farming within the EU. The framework would be adopted by Member States on a voluntary basis, with a government commitment to introduce it in Ireland. The Green Restoration Ireland Cooperative Society Ltd project aims to develop clear, workable guidelines for a transition to carbon farming programme (Government of Ireland, 2022b).

Stakeholders emphasise the risks of market-based approaches that rely on potentially uncertain removals, suggesting that activity-based rather than market-based supports may reduce risks (O'Neill, 2023).

The EU Life Carbon Farming Project will develop a standard process with Irish partners and a funding mechanism to encourage wider adoption of mitigation measures on commercial farms. The overarching goal is to use climate finance to reduce the carbon footprint of 700 livestock farms by 15 per cent over a six-year period (Teagasc, 2021b). The Farm Carbon EIP aims to quantify the benefits of environmental improvement measures on agricultural peatlands (Farm Carbon and EIP-Agri, 2021).

Teagasc's NASCO will monitor soils and set baselines for the levels of carbon trapped in land. Ultimately, it is hoped that farmers will be rewarded with improved-quality soil. Minister for Agriculture, Food and the Marine Charlie McConalogue has outlined that 'Carbon farming is an area that will become a crucial part of the future of farming in this country. This will be an opportunity for our farmers to derive a new income stream for their farm' (Forde, 2022). Farmers have already highlighted the issue of recognising existing carbon storage.

The challenges of carbon farming have been underscored by the recent debate on Coillte's agreement with private investment fund Gresham House (Mullally, 2023)..

12.3.4 Sources of Finance

The Common Agricultural Policy provides direct payments to Irish farmers. Established in 1962 with the original aims of increasing agricultural productivity and ensuring a fair standard of living for farmers, significant reforms include aligning with rural development and, more recently, moving towards a fairer, greener and more results-oriented policy.[27] Over €1,150m was paid to more than 122,526 farmers under the Basic Payment Scheme/Greening in 2021 (DAFM, 2021). Advance estimates by the Central Statistics Office for 2022 suggest a total of €1,882m of subsidies net of taxes on products and production in 2022.[28] To date, the contribution of the Common Agricultural Policy to reducing agricultural GHG emissions has been limited (ECA, 2021; Verschuuren, 2022), and some stakeholders have emphasised the need for an increased focus on targeting agri-environmental schemes based on their results and ensuring sufficient financial support for environmental outcomes.

The Common Agricultural Policy is a key EU tool for supporting transition. Ireland is allocating €1.4bn to supporting more ambitious environmental- and climate-oriented practices, such as reducing chemical nitrogen usage, increasing tree planting, and extending nature- and biodiversity-rich land areas (DAFM, 2022c). However, there may be limitations to relying on CAP to finance transition. Baldock and Buckwell (2021) argue that further work would be required to fully align the CAP with the European Green Deal and to tailor it to a just transition plan. Also, while significant, additional investment will be necessary due to the scale of biodiversity and climate action required.

The current reach of agri-environmental schemes compared with income and overall direct payments limits the extent to which they can support transition for all farmers. For payment for eco-system services to become a new business model for sustainable agriculture, a significant up-scale of financial investment is required. For example, while all farmers need to adhere to Good Agricultural and Environmental Conditions, and while Ireland has relatively high participation rates in agr-environmental schemes compared with the European average, the majority of farmers are not participants in agri-environmental schemes, and uptake is concentrated in the north and west of Ireland (Elliott *et al.*, 2020). The new, expanded ACRES may have changed the regional profile of participants and, together with other eco-schemes and the farmers participating in EIPs, should increase the reach of environmental schemes. Direct payments overall make up a decreasing proportion of the income of profitable farms, particularly in the dairy sector. For ecosystem services to become a new business model will require significant additional resources. Non-financial recognition, for example the Farming for Nature Ambassador Awards, may also play a part in supporting transition.

A wide range of funding sources beyond the Common Agricultural Policy could support a significant scale-up in financing the provision of ecosystem services, including from public, private and innovative sources.

The European Commission's proposal for the certification of carbon removals suggests that it will enable innovative forms of private and public financing, including impact finance or result-based public support under State aid or the Common Agricultural Policy. It also highlights a range of funding sources for carbon removal such as the EU Innovation Fund (which can finance carbon capture and storage projects, among others), the European Regional Development Fund, the LIFE programme and the Horizon Europe programme, including the EU Mission: 'A Soil Deal for Europe' (European Commission, 2022d). The Dutch group Rabobank has developed an outcome payments mechanism for dairy farmers using a monitoring tool that assesses the sustainability of farms based on six indicators. It has integrated this tool into its loan application process and rewards the best-performing farms (Furness, 2022).

Ireland's carbon tax has been in place since 2010 and carbon tax receipts are ringfenced for a socially progressive retrofit programme, social welfare measures and supports for more sustainable farming (Government of Ireland, 2022b). The Government is committed to additional spending of €9.5bn using the revenues raised by the planned increases in the carbon tax over the period to 2030. A series of green budgeting reforms is underway, which will contribute to greater transparency and improved outcomes. The Climate Action Fund and Rural Regeneration and Development Fund will promote investment in climate action.

Globally, private finance is paying more attention to environmental outcomes, including pre-investment screening and across investment strategies, and is beginning to translate into accelerating financial flows such as impact investing,

[27] See https://www.consilium.europa.eu/en/policies/cap-introduction/timeline-history/ [accessed 05/05/23].
[28] See https://www.cso.ie/en/releasesandpublications/ep/p-oiiaa/outputinputandincomeinagriculture-advanceestimate2022/ [accessed 05/05/23].

environmental social and governance (ESG) linked investing and green use of proceeds bond issuance (Baker, 2020; Climate Bonds Initiative, 2021; GIIN, 2020). The Blended Finance Taskforce's Better Finance, Better Food initiative provides examples of business models and financial solutions that are mobilising capital for more sustainable agriculture and land use (F4B, 2021).

In a review of policy and institutional finance arrangements for biodiversity conservation in Ireland, McGuinness and Bullock (2020) identify a range of public and private sources of finance, such as the Climate Action Fund, carbon taxes, the voluntary offsetting market, and private investments such as impact investing and Irish Sovereign Green Bonds. The National Treasury Management Agency has launched two Irish Sovereign Green Bonds in 2018 and 2023, recently raising €3.5bn (NTMA, 2023). Under the terms of these bonds, any proceeds raised can only be devoted to eligible green expenditure (McGuinness and Bullock, 2020).

In October 2022, an International Sustainable Finance Centre of Excellence was established in Ireland to lead on research and develop talent and leadership activities to support the design and implementation of innovative financial mechanisms in the transition to a net-zero economy in Ireland and internationally. The centre aims to assist domestic and international financial institutions to develop practical and scalable solutions, 'including accelerated ESG integration and the nature-related and biodiversity financing agenda' (Sustainable Finance Ireland, 2021: 22).

Companies and financial institutions have a role to play in the pace and scale of climate mitigation by providing finance and investment in nature-based solutions. As a business opportunity for the global agri-food private sector, the returns-to-investment ratio in climate finance is estimated at over 15:1 for society and businesses (CPI, 2022).

Private investments require a tangible return; for example, through PES such as flood attenuation or carbon sequestration. McGuinness and Bullock (2020) note that Ireland's success with these mechanisms has been mixed to date. However, there is increasing awareness of the enabling conditions and considerations required for their effectiveness.

For investors, the just transition reduces systemic risk, enhances human capital, and strengthens their societal licence to operate (Robins and Rydge, 2019). Public financial institutions, such as national and multilateral development banks, have started to incorporate the just transition into their Paris Alignment activities and Robins (2022) argues that institutional investors have also stepped up their action on the just transition, although Ireland's levels of corporate environmental investment is currently relatively low (Goldrick-Kelly, 2023).

12.3.5 Looking Forward

There is significant progress being made on the tools and systems for collecting farm-level data and for broader national approaches to accounting for ecosystem data. There is evidence for the effectiveness of, and farmer satisfaction with, results-based PES. Following reform, the Common Agricultural Policy now has an increased focus on sustainability and results-based approaches. There is also a wide range of sources of finance that could provide investment at the scale necessary for PES to become a new business model for farming. Scott and Faulkner (2023) have highlighted the applicability of PES to help support a just transition within the agricultural sector.

Progressing a framework for accounting for nature in Ireland would be valuable for agriculture and land-use transition and would underpin results-based payment for ecosystem services as a potentially viable new business model for farming. This will require significantly increasing the financial resources from a variety of sources invested in rewarding farmers for protecting and enhancing ecosystem services.

The Council identifies this as a critical intervention with the potential to support a significant transformation in the agriculture and land-use system and recommends that this work proceeds rapidly and at scale.

12.4 Intervention 5: Research to Understand and Action to Address Specific Barriers

12.4.1 Introduction

There is a commitment in policy to agricultural diversification. Food Vision 2030 signals actions aimed at a 'making the sector more diversified, resilient and based on circular economy principles' (Government of Ireland, 2021b: 6). The potential of diversified sources of income is identified in the Climate Action Plan 2023 as a way to incentivise voluntary land-use change by livestock farmers to areas such as tillage, forestry and biomethane generation. Diversification is one of the eight priority actions in the Teagasc Climate Action Strategy (2022-2030).

A strong message from stakeholders is that there are limits to the impacts of incentivising or supporting individual action, where existing barriers limit the widespread adoption of measures. MaREI (2017) emphasises the importance of understanding such barriers and that policy-makers must pay attention to the barriers that exist to institutional and individual behavioural change (MaREI, 2017).

NESC's research has explored stakeholder perceptions of barriers and enablers across the different transition measures. Issues such as socio-cultural barriers, policy inconsistencies and uncertainty about future markets for alternatives emerged as the most significant barriers to adopting opportunities for diversification. Stakeholders also emphasised the concentration of power in retail and processing as being barriers to transition (see section 13.2.3).

Better understanding the social and cultural barriers, aligning policies to bring more coherence to transition, and reducing risks for farmers by creating more market certainty for income diversification, are important steps towards unlocking the potential of diversification.

12.4.2 Current Context

NESC has identified three key barriers to the wider uptake of opportunities for diversification. First, social and cultural issues in relation to forestry and renewable energy generation were identified as potentially important barriers. For example, afforestation faces considerable social and behavioural barriers, some irrespective of economic considerations. Emmet-Booth *et al.* (2019) cite research to suggest that while some younger farmers on larger farms may be willing to consider afforestation, if financial returns are greater than those obtained from agriculture, older farmers on smaller holdings were reluctant to consider afforestation, regardless of economic incentives.

While farmers have a high level of interest in the bioeconomy and renewable energy generation, particularly in solar PV since the pilots scheme was announced, and are also interested in installing AD, according to research by O'Connor *et al.* (2020), wider social issues may be an obstacle, with large AD developments, in Ireland as elsewhere, attracting local objections. The most common societal aspects of the implementation of renewable energy technologies in the EU, at the farm and community levels, are social acceptance, technology uncertainty, knowledge transmission, and quality of life (EIP-Agri Focus Group, 2019).

Second, specific policy inconsistencies and barriers were identified as significant sources of uncertainty. For example, the longstanding regulatory challenges in forestry are well known, and Project Woodland was established in 2021 to address them. DAFM points to the importance of overcoming barriers in the development of a new forest strategy. They emphasise that administrative processes and support structures for grant-aided forestry schemes should not become disincentives for those interested in planting trees and that these could be tackled by improving the efficiency and effectiveness of the various forestry licensing processes and application procedures and ensuring that legal and regulatory requirements become streamlined, efficient and user-friendly (DAFM, 2022d).

In NESC workshops with farmers, there was a more positive ranking for alternative ways to integrate trees into farms than traditional afforestation; for example, through small-scale native forests, enhancing hedgerows or exploring agroforestry/silvopasture. The Irish Agroforestry Forum (2021) suggests that significant policy barriers to agroforestry

include land reclassification (land under agroforestry is reclassified as forest land) and the related issue that, once land is reclassified, it precludes the receipt of other agricultural grants or payments such as from organic or agri-environment schemes. The Forum advocates removing conflicting penalties (such as excluding scrub and trees from productive land eligible for payments) and taking a pro-rata approach, whereby the percentage of land planted under the afforestation programme draws the relevant afforestation grants and premiums and is bound by its terms and conditions, while the areas of land in between is eligible for agricultural payments.

In relation to diversification into tillage, challenges for reaching targets include the accessibility of sufficient land in the context of competition for land. A group is expected to be established by the Minister for Agriculture, Food and the Marine to examine the future of the tillage sector to identify and address challenges.

Common challenges hindering farmers' involvement in renewable energy across Europe are the complex permit procedures and regulatory factors that do not support the sale of surplus electricity (European Commission, 2023a). In Ireland, recent policy developments are enabling the creation of more renewables opportunities for farmers in terms of energy-efficiency measures and income generation (see Box 12.3). However, some regulatory (e.g. policy restrictions, access to the grid and planning) and financial barriers remain, which have limited the potential growth in this area to date (Houses of the Oireachtas, 2022a).

Existing measures and schemes are oversubscribed and limited, and there is appetite for further opportunities. Barriers to planning, policy, and access to the grid are also deterrents to reaching the full potential.

Teagasc has outlined issues with planning permission, a lack of a support mechanism, and issues of grid connection as barriers to AD. The Irish Farmers' Association has pointed to restrictions on farmers selling surplus energy (IFA, 2022b). Planning, support, resources and information challenges remain for delivering supports on microgeneration and small-scale generation projects. Accessing the electricity network itself can be a lengthy, uncertain and expensive process (ISEA, 2022).

Third, uncertain markets and risk have been highlighted as barriers to diversification. In NESC workshops, stakeholders, particularly farmers, have noted past negative experience with diversification initiatives such as miscanthus production and highlight uncertainty around future diversification options. They emphasised that the risks arising from uncertain future markets appear to be falling to farmers themselves.

Government has an important role in fostering policy and regulatory certainty to enable new market development. Policy can help reduce uncertainty and can share risks as well as guide investment. Financial investments in land-use alternatives to make them a viable economic alternative are critical. This includes targeted work on market development and the development of new business models. Interventions can also help generate reliable, long-term income arising from other land-use services such as soil sequestration, habitats for biodiversity, water regulation, and nutrient cycling.

The EU taxonomy for sustainable development activities is a classification system of environmentally sustainable economic activities that is intended to help scale up sustainable investment and implement the European Green Deal. It is intended to provide policy-makers with appropriate definitions for which economic activities can be considered environmentally sustainable in order to create security for investors, protect private investors from greenwashing, help companies to become more climate-friendly, mitigate market fragmentation, and help shift investments where they are most needed. The EU taxonomy Complementary Climate Delegated Act, published in June 2021, includes forestry and energy (including biomass), but the establishment of the technical screening criteria for agriculture has been delayed in view of the negotiations underway on the Common Agricultural Policy at the time, and in order to achieve greater coherence across the different instruments to achieve the environmental and climate ambitions of the European Green Deal (Official Journal of the European Union, 2021).

Box 12.3: Renewable Energy Policy Developments Enabling Energy Efficiency and Income Generation Opportunities for Farmers

A competitive auction process, the **Renewable Electricity Support Scheme** provides support to renewable energy projects, focusing on cost-effectiveness, technological diversity and enabling greater community participation (DECC, 2022).

The **Microgeneration Support Scheme** was launched in December 2021, and aims to support the deployment of an expected 380 megawatts of new microgeneration (50 kilowatts (kW to support the deployment of rooftop and ground-mounted solar PV. Under this scheme, non-domestic projects of between 6 kW and 50 kW will be paid by electricity suppliers for exported electricity over 15 years, initially at a rate of €0.135 per (kilowatt-hours) kWh under the Clean Export Guarantee tariff (DECC, 2021a).

TAMS offer €17m in grant supports that are specifically aimed at improving energy efficiency in the farming sector through the installation of solar PV technology along with battery storage on Irish farms (up to a maximum of 11 kW solar PV panels and 6 kWh of battery storage capacity). Grant support is paid at a rate of 40 per cent (60 per cent for those qualified under the Young Farmers Scheme), up to a maximum investment ceiling of €80,000 per holding (DECC, 2021a); 100 per cent of the energy produced must be consumed on the farm (DAFM, 2022h). TAMS 3, launched in February 2023 and building on TAMS II, will provide €370m over five years. It includes some new schemes such as the Women Farmer Capital Investment Scheme, the Farm Safety Capital Investment Scheme and the Solar Capital Investment Scheme (SCIS). The SCIS will be grant-aided at the enhanced rate of 60 per cent (DAFM, 2023).

The **Small-Scale Generation Scheme** is intended to recognise the need to provide alternative income streams to farmers (Government of Ireland, 2022c). Exported electricity will be capped at 80 per cent of estimated generation in order to incentivise self-consumption. The SSG is likely to cater for farms with a high-power demand, such as pig or poultry farms, and for exporting power in areas of high local demand, where the electricity network can accommodate this (Cadogan, 2022).

The **Support Scheme for Renewable Heat** supports renewable heat generation while ensuring that biomass is sourced sustainably (SEAI, 2021b). Revisions to the EU Renewable Energy Directive have sought to achieve an increase in the use of energy from renewable sources by 2030, with more stringent sustainability criteria for biomass (EPRS, 2022).

Businesses, farms, and community buildings such as schools and sports clubs generating up to 5.9 kW, will be eligible for a Sustainable Energy Authority of Ireland grant. Such supports for new installations are expected to last until 2028. It is also expected that 60 per cent capital grant aid will be available to farmers for rooftop solar in 2023, subject to approval by the EU through the TAMS by the end of 2022 (Cadogan, 2023; IFA, 2022a).

The role of the State in serving the public good is critical to delivering immediate solutions, but must design them in such a way as to serve the public interest over the long term (Mazzucato and Li, 2020; NESC, 2020). It can support investments through the use of de-risking instruments. Public de-risking strengthens the financial viability of projects by transferring extra risk to the public sector. The European Environment Agency outlines the potential of mobilising private capital through, for example, 'blended finance', specifically designed to enhance the expected return from, and/or mitigate the risk of, investments as needed; for example, the Rewilding Europe Capital initiative (EEA, 2022). New markets could direct private-sector finance towards land conservation, thereby driving positive nature and carbon outcomes: for example, Australia's Threatened Species Action Plan aims to work with the financial sector to increase funding of landscape conservation and restoration through market development (IPR, 2023; Australian Government, 2022).

A range of instruments is available: from tax credits, grants and loans to transaction enablers, interventions that facilitate investment from other actors but without direct State investment (OECD, 2021a). To support investment in the short term, a focus is needed on creating a market and de-risking and aggregating investments. In the medium term, a focus on metrics and disclosure, transforming land-use sectors and aligning subsidies and incentives, provides the necessary enabling conditions (UNEP, 2021). Verkuijl *et al. (*2022) identifies examples of direct financial support for investing in the development of alternative sources of protein in Canada (US$100m), Denmark (US$195m), The Netherlands (US$60m) and Israel (US$18m).

Companies can also incentivise farmers to adopt sustainable practices through long-term contacts, and through financial and technical assistance in providing stability and reducing risks. Premiums for low-emissions commodities and arrangements that compensate farmers for ecosystem services such as carbon sequestration can also be effective (Ceres, 2023).

12.4.3 Looking Forward

There is evidence of processes of alignment in research and policy incentives that support diversification opportunities, including the new forestry grants, enhanced supports for organic production and tillage, and the launch of TAMS 3 in February 2023.

The Council considers the need for:

- More research into economic opportunities arising from transition and how these can be supported strategically, and research to achieve greater understanding of the experiences and choices of farmers on the ground, to help inform the ways in which these barriers can become compounded and deter changes in practice. This recognises the key roles of social inclusion and direct engagement with farmers as an ongoing part of continuous learning (Intervention 2, section 11.3), and an evidence-based process can draw on this information to revise policy and incentives for greater coherence and impact.

- Policy interventions to reduce uncertainty around diversification in order to share risk and guide investment. For example, NESC's work on wind energy highlighted the potential of energy co-operatives, following from Ireland's strong history of co-operatives in agriculture. These bring local communities and farmers together to have a significant, direct, financial stake in the project beyond land-lease payments and tax revenue (NESC, 2014). LEADER funding could help catalyse the development of circular bioeconomy value chains, and Government support for new farmer-owned co-ops could enable engagement at the scale that will be required. New co-operative business models can be developed and biodiversity, natural capital and local livelihoods can be restored in order to generate new economic opportunities in rural and regional areas, while also protecting the environment and climate. Co-operative approaches could align natural capital, primary production and circular bioeconomy value chains for the sustainable mobilisation and valorisation of bioresources (Irish Bioeconomy Forum, 2022).

Chapter 13

Sharing and Mitigating the Costs of Transition

13.1 Introduction

A key part of a just transition approach is to ensure a fair and sustainable distribution of the effort to bring about transition. This is reflected in one of the Climate Action Plan's just transition principles, that 'costs are shared so that the impact is equitable and existing inequalities are not exacerbated' (Principle 3, *Climate Action Plan 2021*; Government of Ireland, 2021a: 40).

Throughout this NESC research, stakeholders have emphasised the importance of recognising that transition will involve costs, and that it is critical to recognise these costs, to share them equitably and to address or mitigate them.

This chapter outlines three interventions for sharing the costs of transition:

i Intervention 6: effort sharing in order to share the costs of transition more equitably;

ii Intervention 7: identifying and providing targeted financial supports to offset costs; and

iii Intervention 8: acknowledging that not all costs are financial, this intervention is to ensure social and environmental safeguards to prevent unintended consequences.

Intervention 6 and 7 are priority interventions in considering 'Hard to do' measures, while Intervention 8 is particularly important for measures considered to be 'Uncertain'.

13.2 Intervention 6: Ensure Effort Sharing and Sharing the Costs of Transition

13.2.1 Introduction

There are a wide range of stakeholders across the agriculture, food and land-use system among whom the effort and costs of transition could be shared. With appropriate safeguards and measures to enable agri-food producers and supply chains to transition to more sustainable systems, economic outcomes can be protected while ensuring national climate action targets are met in the coming years (DAFM, 2022b).

Primary production accounts for the majority of GHG emissions and other environmental impacts of food production, and much of the discussion around transition measures tends to focus either on the primary producer (how food is produced) or on the consumer (food choices); however, the practices of supply-chain actors (e.g. from processing, retail and marketing) connecting the two have a considerable power in shaping the sustainability of both the production and consumption ends of the food system. Strong and supportive action by private actors in the market – including processors, retailers and input suppliers – is necessary and could be a powerful driver of change (Baldock and Buckwell, 2021).

Attention is therefore needed to consider both the distribution of effort among primary producers – where there are significant differences between regions, farm sectors and farm enterprises of different sizes and age profiles – and how to share the costs of transition among actors along the supply chain.

This is, perhaps, the greatest challenge in considering how to deliver a just transition as it requires clarity on the extent of effort being shared (one of the most sensitive areas of transition), as well as the need to identify those who are considered impacted and vulnerable to the impacts, and on how the effort can be shared equitably. Effort-sharing fairness is only possible if the total effort to be shared is made very clear and is enforced.

The broader distribution of environmental costs across society also needs to be considered. The European Commission has reported the ongoing issue of negative externalities and highlighted that households in most EU Member States contribute substantially more in revenues in relation to their air pollution and GHG costs than do sectors like industry, energy or agriculture, noting that across the EU the agriculture sector has a particularly low internalisation rate, at just 6 per cent of its air pollution and GHG emission costs (European Commission, 2021a).

13.2.2 Effort Sharing Among Primary Producers

There are policy interventions and financing that can support effort sharing. In other sectors, approaches to effort sharing include quotas or taxes, but these are not currently applied to agricultural greenhouse gas emissions (ECA, 2021). Many of the health and environmental costs associated with food production and consumption have not been internalised (European Parliament, 2023a). This reflects a broader focus on developing an effective pricing system for agricultural GHG emissions to incentivise the transition to low-emission agriculture (OECD, 2022a).

Effort-sharing initiatives such as exploring the potential role of cap and trade emission model (considered a measure in the interim Food Vision Dairy Group report, 2022), or taxes on agricultural emissions (as recommended by the Citizens' Assembly on how the State can make Ireland a leader in tackling climate change (Citizens' Assembly, 2018)), have been considered. Such approaches would have implications across different farm types as their average levels of emissions vary. Current research is exploring what an emissions trading scheme for agriculture at the EU level might entail legally, but a complex regulatory framework would, at a minimum, entail setting baseline levels of soil carbon in farms, and monitoring, reporting and verifying levels of emissions (Verschuuren, 2023).

While carbon taxes have focused mainly on the energy and transport sectors, other research is exploring food-related measures that can also deliver cost-effective emission reductions. From a study on Spanish consumption taxes on food products, García-Muros *et al.* (2017) conclude that policy can reduce emissions and, at the same time, help to move consumption patterns towards healthier diets, but that, looking at the distributional effects, it had more effect on specific social groups. They argue that that effect can be ameliorated if exemptions on some basic food products are introduced (Garcia-Marcos *et al.*, 2017). Such mechanisms are not supported by current policy, which focuses on other approaches to effort sharing.

Current approaches to effort sharing are based on policy plans. The two sectoral groups established – the Food Vision Dairy Group and Food Vision Beef and Sheep Group – explored the contribution of the different sectors to emission reduction measures. For example, while there no sub-targets for each farm sector specified in the Climate Action Plan 2023 for reducing chemical nitrogen use, the reports of the Food Vision Dairy and Food Vision Beef and Sheep groups recommend the same reduction target (of 27-30 per cent reduced chemical nitrogen use) for dairy and for beef and sheep. The Food Vision Dairy Group proposes a slightly higher-target uptake rate (100 per cent) for the adoption of protected urea compared with the proposed-target uptake rate (90 per cent) for beef and sheep.

Improved animal breeding as a result of focusing on low-methane traits are measures recommended by both the Food Vision Dairy and the Food Vision Beef and Sheep reports, with a higher estimated mitigation in the Food Vision Dairy Group report than in the Food Vision Beef and Sheep report. The initial costs for the genotyping strategy referenced in both reports are estimated at €10.1m per annum, with cumulative cost estimates of €80.9m to 2030 (Food Vision Beef and Sheep Group, 2022). Measures such as earlier finishing of cattle and reducing the age of first calving are specific to beef and suckler beef farms but are also estimated as having a positive economic effect at farm level (Food Vision Beef and Sheep Group, 2022).

The Climate Action Plan 2023 indicates a voluntary livestock reduction through incentivising land-use diversification options for farmers. As such, the effort sharing across farm sector, size, or location would reflect farmer choice based on individual contexts. Voluntary approaches to land-use diversification, particularly where this may result in large-scale land-use change towards afforestation or renewable energy production, may shape the balance of regional rural development and have up- and down-stream implications for the rural economy and ecosystems. In the context of the differential distribution of farm income across regions and the wider economic differences across regions, effort sharing at the regional level should be the focus of monitoring as part of supporting balanced rural development.

In considering the dynamics related to the vulnerability of groups impacted by transition (see section 6.4), stakeholders emphasised that effort sharing could include differentiated approaches; for example, on the types of measures or timescales for their by older or younger cohorts, or based on the relative size of farm enterprises.

13.2.3 Effort Sharing Along the Supply Chain

Stakeholders have consistently identified the important role of supply-chain actors in supporting transition, emphasising differences of power along the supply chain that can hinder or enhance the adoption of more sustainable practices and shape the viability of diversifying production.

A recent report by the UK's Forum for the Future and the Oxford Farming Conference examining supply-chain synergies argued that new approaches should recognise the dependence of the supply chain on the farmer and reconfigure supply-chain relationships to consider fairness, sharing the challenge of transition and long-term supply-chain reconfiguration (Forum for the Future and Oxford Farming Conference, 2023). The report highlights potential policy areas to consider, including an integrated political strategy that recognises the environmental and social dimensions of food and farming, as well as economics, good food governance and codes of practice, and public procurement standards.

Supply-chain actors, from processing through to consumers, shape the operating context for primary production – the demand for products, the standards by which they are produced, the prices paid, and the volume of food waste along the supply chain and by consumers.

This section identifies three avenues for effort sharing among actors along the supply chain.

First, there is a need for increased **fairness and transparency** along the supply chain. In research exploring the perspectives on just transition of key actors in the beef sector in Ireland, Murphy *et al* (2022) found that the main concern identified was the perception of unequal and unfair forms of distribution between processors, large farmers, and smaller farmers. New legislation under finalisation, the Agriculture and Food Supply Chain Bill 2022, contains new powers to deliver more transparency and fairness in the agriculture and food supply chain. It will establish an independent, statutory office (the Office for Fairness and Transparency in the Agri-Food Supply Chain) to analyse markets and enforce unfair trading practice rules, and will be charged with ensuring fairness to producers by providing price data analysis and stopping unfair business-to-business practices within the agricultural and food supply chains.

In a statement to the Joint Oireachtas Committee on Agriculture, Food and the Marine during pre-legislative scrutiny of the Bill, the Minister for Agriculture, Food and the Marine, Charlie McConologue, emphasised that the new office 'will be an advocate for farmers and fishers and other small food businesses in the agricultural and food supply chain to help them improve their position and to bring greater transparency and fairness all along the supply chain' (DAFM, 2022f).

The new office has been broadly welcomed by stakeholders, although some have expressed concern about the scope of unfair trade practices included in the Bill, especially in relation to below-cost selling.[29] The Oireachtas Joint Committee on Agriculture, Food and the Marine pre-legislative scrutiny report recommended 'that the new body shall be obliged to examine with a view to proposing mechanisms by which the purchase of food stuffs below the cost-of-production can be introduced' (Houses of the Oireachtas, 2022c: 15) .

Second, **sustainability standards** are an avenue for creating clarity on what sustainability is intended to look like and for rewarding higher sustainability practices. While other measures for increasing sustainability, such as taxes or levies on food target either the producers or the consumers (with price increases), the European Environment and Sustainable Development Advisory Councils Network (2022) argues that the certification and labelling of products and processes can incentivise innovation and alter decision-making by the larger actors in the supply chain such as the input industry, food processors and retailers, and therefore has the potential to spread the costs for transition more equitably along the supply chain.

A European Commission initiative is developing a proposal for regulation around sustainable food systems that identifies the value of standards as having an important system-wide application.[30] It will lay down rules on the sustainability labelling of food products and the minimum criteria for the sustainable public procurement of food, governance, and monitoring. Certification is also identified in the European Commission (European Commission, 2021d) communication

[29] See https://www.oireachtas.ie/en/committees/33/agriculture-food-and-the-marine/documents/ [accessed 05/05/23].
[30] See https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13174-Sustainable-EU-food-system-new-initiative_en [accessed 05/05/23].

outlining actions on up-scaling carbon farming, which identifies the need for a regulatory framework for the certification of carbon removals.

The Bord Bia Farmer Feedback Report (replacing the Farm Carbon Navigator tool) includes a summary of farm performance under the following headings: General Farm Performance, Carbon Footprint, Greenhouse Gases, Nutrient Management, Grassland Management and Farm Health and Safety. The reported data will compare current farm performance against changes since the last audit and with similar production systems. The purpose of the new Farmer Feedback Report will be to demonstrate to members how their farming inputs and activities contribute to GHG production and will contain advice and feedback on how to mitigate against these emissions and improve production efficiencies.

Nature-based solutions that provide an integrated approach to addressing social, economic and environmental challenges represent a growing area of research. Reports by the International Labour Organization (ILO), United Nations Environment Programme and International Union for Conservation of Nature point to the potential for decent work, where incentives and direct investments produce positive biodiversity and social outcomes – especially if such policies explicitly draw on the Global Standard for Nature-based Solutions. This standard provides detailed guidance on the key characteristics of successful nature-based solutions, including policy coherence, stakeholder engagement, evidence-based decision-making, and sharing common themes with just transition guidelines (ILO *et al.*, 2022; IUCN, 2020).

Standards and certification can play a role in financially incentivising transition; Tirlán, the Kerry Group, Carbery and Dairygold have launched sustainability incentives. For example, farmers supplying milk to Tirlán under a sustainability programme receive a sustainability action payment of .5 cent per litre of milk. This represents a potential average payment of approximately €3,000 to Tirlán suppliers in 2022 (Tirlán, 2022). Since 2023, this payment has been conditional on farmers implementing 7 out of 18 possible sustainability measures such as the use of low emission slurry spreading, measuring grass, and planting native trees. The Kerry Group's Evolve Dairy Sustainability Programme also includes targeted payments to support more sustainable farming practices. While the current level of payment represents a small percentage of the average payment per litre of milk, such payments illustrate, in principle, that such a mechanism provides an avenue for supply-chain actors to play a larger role in incentivising transition.

The new Common Agriculture Policy allows for sustainability agreements between primary producers and other actors in the food value chain aimed at achieving higher sustainability standards than those required by law. A public consultation is underway to inform the design of sustainability agreements in agriculture as these represent a novel exclusion from EU competition rules (European Commission, 2023b).

Financial recognition for farmers who improve sustainability based on certified standards could be further supported by measures such as requiring a blending obligation for food processors and first-stage traders to source a certain percentage of the most sustainable products; paying farmers a price that offsets the extra cost of their sustainability measures; requiring food processors and retailers to report the sustainability aspects of their sourcing in their ESG reporting; or by government procurement policies (e.g. a requirement that government-procured food should only include sustainably certified products) (EEAC, 2022). Stakeholders have suggested that incentives such as direct or indirect market supports could be made conditional on more sustainable practices.

In the forestry sector, for example, processors seeking to export sawn timber and panel boards are required to ensure that at least 70 per cent of their output is certified by the Programme for the Endorsement of Forest Certification or by the Forest Stewardship Council in order to access these export markets (DAFM, 2022d). Buckley *et al.*, (2022) argue that although forest certification may not translate into higher timber prices, it will provide better access to national and international markets and lend a competitive advantage.

Third, sustainability **certification and labelling** based on robust standards could inform the labelling of consumer products, although the high volume of Ireland's food exports suggests that consumer preferences in key export markets (the UK, EU and the United States) are of more relevance to transition than Irish consumers. Convery (2022) suggests that robust sustainability standards are emerging in these markets, and that it is essential for Ireland to demonstrate leadership in this area in order to remain competitive. A survey conducted by the European Consumer Organisation (or BEUC, from the French Bureau Européen des Unions de Consommateurs) suggested that two-thirds of consumers are willing to change their eating habits as a way of contributing to environment protection and sustainable development

(ZKL, 2021). Research conducted by Bord Bia (2021) across nine markets indicated that 57 per cent of consumers are making more of an effort to reduce their carbon footprint/care for the environment more (up significantly from 2018 levels), and that 27 per cent are willing to pay more for food that is sustainably produced.

A recent ESRI study on food preferences in Ireland found that consumers preferred food products with better environmental attributes and the majority (over 60 per cent) were willing to pay a price premium for such products (Osawe et al 2023). It is important to note the gap between intent and action, and Osawe *et al.* (2023) conclude that the challenge for food policy is to effectively translate this interest into actual purchasing behaviours. The Citizens' Assembly on Biodiversity included the recommendation to encourage plant-based diets (Citizens' Assembly, 2023). Domestic-demand measures may have limited impacts on Irish agricultural production, but this shift, if achieved as part of a similar shift in key export markets, may significantly impact farming and the agri-food industry, moving environmentally sustainable food products from niche to mainstream.

13.2.4 Looking Forward

Effort sharing among primary producers will be influenced by policy decisions and policy planning. The current approach focuses on incentivising individual choice.

In the context of significant regional differences and different vulnerabilities among different age cohorts or size of farm enterprise, efforts may be required to avoid widening existing inequalities. The Council recommends more explicit attention to effort sharing at the collective level, particularly to ensure balanced regional development. Translating national targets to regional or local targets, with robust processes of stakeholder engagement and reflecting tailored land use together with balanced socio-economic development, could be one tool for ensuring effort sharing across regions.

The establishment of the Office for Fairness and Transparency in the Agri-Food Supply Chain is an opportunity for more robust oversight to increase transparency and fairness along the agri-food supply chain.

The European Commission initiative on a Sustainable EU food system[31] suggests that there will be greater emphasis on sustainability standards and certification for food in the future. Robust data monitoring, reporting and verification covering all farms and that will be suitable for inclusion in the national inventory is a core cross-cutting action that would support standards and certification and underpin other transition measures (Food Vision Dairy Group, 2022). Integrating biodiversity, water- and air-quality data in addition to integrating emissions data would provide a more comprehensive approach to reporting on agricultural production.

Ireland can build upon extensive experience already created in this area. Teagasc regularly collects sustainability data as part of its annual National Farm Survey. The Bord Bia Farmer Feedback Report is sent to all beef and dairy farmers who are signed up for the Bord Bia schemes, providing them their carbon footprint and other simplified advice on farm sustainability, based on Teagasc models. There have been 61,000 farm feedback reports since the launch in 2021.

The Council recommends that Ireland accelerates the further development of robust monitoring, reporting and verification of data on sustainability (including data related to emission reductions and carbon sequestration, biodiversity, air and water quality) in order to underpin robust standards and certification (See also Intervention 4).

The Council considers further development of robust standards and certification to support effort sharing along the supply chain is required, and that this should ensure that supply-chain actors increase the financial incentives for farmers who demonstrate higher standards of sustainable production, and the development of public procurement policies and market incentive conditionality based on sustainability standards.

[31] See https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13174-Sustainable-EU-food-system-new-initiative_en accessed [20/06/23].

13.3 Intervention 7: Identify and Provide Targeted Supports to Mitigate Costs

13.3.1 Introduction

Section 12.3 outlined the importance of financial supports to enable stakeholders to benefit from the opportunities of transition. Specific, targeted support will also be necessary for people facing costs due to transition policies or measures. This may include farmers or workers in agricultural supply chains who are particularly affected by the implementation of 'hard to do' measures such as reduced intensity on drained organic soils and voluntary reductions in livestock numbers.

Common types of supports include compensatory payments, enhanced social security, and regional transition funds for diversified local economies (Hepburn *et al.*, 2020). In a paper prepared as part of the Department of Agriculture–EIT Climate-KIC strategic initiative, the authors note the potential role for debt for nature swaps, as a financing tool to offer loan forgiveness in return for sustainability measures (DAFM-Climate KIC, 2023 forthcoming).

While it is critical to tailor supports to those most vulnerable to the impacts of transition in order to leave no one behind, there may be particular contexts in which a wider set of financial incentives are appropriate, including those for people who are impacted while not being particularly vulnerable.

13.3.2 Current Context

A specific group likely to be impacted by transition measures are farmers or landowners farming on, or connected to, areas impacted by the 80,000 ha target of soils to be managed with lower intensity. Teagasc research found that approximately 40 per cent of organic grasslands under agriculture are farmed under specialised cattle systems, 30 per cent are farmed by specialised sheep production systems, and 25 per cent by dairy farm systems, with the remainder under tillage production (CCAC, 2021a). The Climate Change Advisory Council (CCAC) suggests that, as cattle and sheep production systems are on average already relatively low-intensity systems, some level of further reduced-intensity agricultural activity could likely continue on rewetted land, with appropriate water table and land management. For more intensively farmed land on organic soils under dairy and tillage production systems, rewetting would more significantly curtail their current land use practices and the income losses could be more significant (CCAC, 2021a).

The Farm Carbon EIP is a two-year pilot programme aimed at quantifying the benefits of environmental improvement measures to establish viable sustainable farming options, and at informing the development of appropriate financial payments to owners of peatland farms and lands for measures that enhance carbon storage, biodiversity, and water-quality status.[32]

As noted in section 5.2.2, output and income estimates based on the Teagasc FAPRI model evaluated as part of the CCAC carbon budgeting process in 2021, identified implications for two scenarios close to the 25 per cent reduction target for agriculture agreed by Government. Under these scenarios (a 20 per cent reduction and a 33 per cent reduction), agricultural output would be 7–19 per cent lower at 2030 compared to a 2030 baseline scenario, while income would be 9–25 per cent lower at 2030 compared to a 2030 baseline scenario. Under these scenarios, the model estimates total cattle would be 9–28 per cent lower at 2030 and milk (cattle) output volumes would be 12–26 per cent (5–33 per cent) lower at 2030 compared to the baseline.

It is important to emphasise that these estimates do not take into account the potential development of alternative income streams, and they assume that there is no policy response to mitigate economic effects. The development of alternative income streams and/or financial compensation measures are essential considerations for mitigation options involving livestock reductions. The Climate Action Plan 2023 identifies emission reductions of 1.5 Mt CO_2eq. by 2030 based on mobilising the recommendations of the Food Vision sectoral groupings and supporting land-use diversification options for livestock farmers (such as anaerobic digestion (AD), forestry, organic farming and tillage) to incentivise voluntary livestock reductions. The report of the Food Vision Dairy Group (2022) includes a voluntary dairy exit/reduction scheme, which is likely to start in 2024. A similar proposal in the Food Vision Beef and Sheep Group

[32] See https://farmcarbon.ie/ [accessed 05/05/23].

(2022) was 'taken off the table' by the Minister for Agriculture, Food and the Marine, Charlie McConalogue, based on a consensus view among farming organisations and industry representatives (Forde, 2023).

Large-scale regional investments have been central to Germany's approach to supporting its coal regions. Examples of public–private collaborations to support Germany's coal regions in transition include the RAG Foundation, established by the Act on Financing the Termination of Subsidized Coal Mining (AFTSC) to use corporate investment returns to finance some of the structural transformation of the Ruhr area and to finance environmental remediation work (Furnaro *et al.*, 2021).

Targeted supports can also focus on strengthening collaboration across the agriculture and land-use sector in new ways. One EU example of doing this is the European Carbon+ Farming Coalition, an initiative that brings together organisations and stakeholders representing every step of the food value chain, in an effort to decarbonise the European food system while maximising other benefits such as soil health and farmer resilience (EIT Food, 2021).

13.3.3 Looking Forward

It is important to acknowledge the costs that are associated with some transition measures. Policy indicates an intention to incentivise voluntary action by making income and land use diversification options attractive, thereby minimising those costs. More research is needed on the economic opportunities of transition, into areas such as the practice of paludiculture to support agricultural practices on rewetted soils. Addressing the barriers to diversification is also key (see section 12.4).

Targeted supports should be co-developed can protect vulnerable groups (farmers, workers, consumers) and ensure that the costs of transition are fairly shared where these occur. There are examples in Ireland and internationally of the types of supports that could be further considered.

The Council emphasises the value of conducting further work on future economic opportunities and risks, identifying groups vulnerable to transition in agriculture and land use (among primary producers and along the supply chain, including workers and consumers) and exploring the co-development of potential compensatory measures to ensure that those groups identified as vulnerable are adequately supported during the transition process.

13.4 Intervention 8: Put in Place Social and Environmental Safeguards Against Unintended Impacts

13.4.1 Introduction

Transition measures, particularly measures related to land-use change such as forestry and on-farm production of bioenergy and renewable energy generation, can have positive co-benefits for biodiversity, water and air quality and contribute to diversified rural communities, but can also have significantly negative impacts if not managed effectively. For example, Scotland's Just Transition Commission in 2021 outlined how net-zero land-use change and investment in carbon sequestration (carbon farming) 'may risk new injustices emerging, but equally may introduce fresh impetus for reform and a fairer way of managing our land and spreading the benefits widely' (Just Transition Commission, 2021: 33). Despite commitments to avoiding unintended consequences in many land use policies, Ireland's biodiversity is worsening (DCHG, 2019; Duggan *et al.*, 2022).

Equally, policy measures, investments or market-based interventions to support transition, such as those designed to financially reward ecosystem services, also have risks, such as the danger of greenwashing. Measures to support an environmentally sustainable transition must pay due regard to the potential for unintended consequences for the environment and for communities impacted by large-scale land-use change.

Social and environmental safeguards are particularly important for traditional or large-scale forestry, given the scale of afforestation rates indicated by policy, and for the emerging bioeconomy, which may create unintended social or economic consequences as a result of competing land use.

It is important to ensure policy coherence and synergy with other legal environmental obligations, in order to avoid the potential negative socio-environmental impacts of climate actions carried out in agriculture and land use.

The concept of agroecology, which recognises agri-food systems as being coupled to social-ecological systems, is a potential framework for considering interconnections, especially its focus on land and natural resource governance and participation (HLPE *et al.*, 2019).

13.4.2 Current Context

Forestry in Ireland has often been managed in ways that have reduced the carbon sequestration services provided by peatlands and threated biodiversity. In participatory research exploring place-based approaches to transition, Moore-Cherry *et al.* (2022) found that participants consulted as part of the research in the North Leitrim identified forestry as promoted in Leitrim as being of significant concern for well-being and quality of life, where participants are unhappy with what they perceive to be an investor-led market approach for an activity that could, with the right approach, have been part of a sustainable solution for local farmers.

The new draft *Ireland's Forest Strategy (2022–2030)* for public consultation
acknowledges the challenges and aims to support the 'right tree in the right place for the right reason' (DAFM 2022j: 1). There are ongoing discussions about issues that concern stakeholders such as planting on peatlands and the subsequent impact on birds. In a submission to the public consultation on the draft forestry strategy and implementation plan, BirdWatch Ireland highlighted that insufficient mitigation measures are identified to avoid the negative effects experienced under the previous forestry strategy and called for amendments to the forestry plan and programme and for reforms to the screening system in order to stop and reverse forestry-related deterioration of important habitats (Duggan *et al.*, 2022). Full compliance with the Birds and Habitats Directives would help mitigate against further deterioration.

There are a number of open infringement and European court cases against Ireland for breaches of environmental law, mainly related to failures in implementing nature, water and Environmental Impact Assessment legislation (EPA, 2020).

A proposed European Commission Directive on Corporate Sustainability Due Diligence (European Commission, 2022a) will set out a framework for companies to respect human rights and the environment in their own operations and through their value chains, by identifying, preventing, mitigating and accounting for their adverse human rights and environmental impacts, and, to this end, by having adequate governance, management systems and measures in place. The proposed Directive would apply to companies operating in agriculture, forestry, fisheries (including aquaculture), the manufacture of food products, and in the wholesale trade of agricultural raw materials, live animals, wood, food, and beverages sectors, providing they have more than 250 employees and a worldwide net turnover of more than €40m (European Commission, 2022).

Policy mechanisms designed to support transition also have potential for unintended consequences. Noting the social risks arising from private investments in transition measures, including 'risks of inequitable effects for vulnerable groups, and pressures on land and other resources', the ILO and the London School of Economics Grantham Research Institute (ILO, 2022b: 5) highlights the importance of integrating verifiable and measurable just transition-aligned social metrics in KPIs in sustainability-linked financial instruments, and recommends the adoption of a place-based investment approach to address location-specific impacts and financing needs associated with supporting a just transition.

The EU Taxonomy Regulation is intended to increase transparency, facilitate decisions on investment, and tackle greenwashing by providing a categorisation of environmentally sustainable investments in economic activities that also meet a minimum social safeguard. Five environmental and consumer non-governmental organisations (NGOs) left the Platform on Sustainable Finance, the European Commission's expert group mandated to develop technical

recommendations for the EU taxonomy, over concerns that the Commission had ignored the Platform's recommendations on a number of areas including forestry (Birdlife International, 2022).

The European Environmental Bureau has highlighted risks related to the European Commission proposal (of November 2022) for the certification of carbon removals, noting that the proposal implies that certification is aimed at supporting the sale of carbon credits as offsets on voluntary carbon markets. The Bureau argues that offsetting on the voluntary carbon market is likely to disincentivise actual emissions reduction and invite greenwashing (as companies can claim to meet net-zero targets by buying credits rather than by tackling emissions), and has long-term risks of reversal.[33] There has been increasing interest from institutional investors in carbon credits and offsets to meet their net-zero commitments, but these are not without risks of uncertainty in delivering tangible emissions reductions (Hodgson, 2022). A joint investigation by *The Guardian*, the German weekly *Die Zeit*, and SourceMaterial, a non-profit investigative journalism organisation, based on new analyses of scientific studies of the rainforest schemes of one of the world's leading certifiers of carbon offsets, concluded that the majority were 'phantom credits' and may actually worsen global warming (Greenfield, 2023). The findings of the joint investigation were disputed by the company. Stakeholders emphasise that alternatives to market-based mechanisms, such as activity-based finance, could help avoid some of these risks (O'Neill, 2023).

13.4.3 Looking Forward

Systematic screening of projects and activities is important for identifying potential incoherence that have unintended consequences in practice. This can be complex where there are multiple priorities, such as the need to increase afforestation while also protecting and restoring vulnerable bird species and their habitats. However, safeguards such as regulatory compliance of environmental regulations and those protecting birds and habitats should be enforced.

The National Policy Statement on the Bioeconomy (Government of Ireland, 2018) recognises the potential risks associated with an increased demand for biomass as part of developing the bioeconomy and four principles (sustainability, cascading use, the precautionary principle and food first) have been developed in response, in order to avoid unintended consequences.[34] The European Environment and Sustainable Development Advisory Councils Network (2022) highlights the role of robust standards in supporting the implementation of such principles. It argues that standards in all sectors using biomass (e.g. agri-food, energy, construction) should be harmonised to ensure safeguarding the biosphere against competing pressures on land. Teagasc has noted the importance of meeting certification standards in the area of forestry, highlighting their role in providing evidence of compliance with environmental and social principles (Buckley *et al.*, 2022).

To avoid unintended consequences, the Council considers the value of more robust screening of policies and measures of transition in agriculture and land use, the full implementation of existing standards, and further exploration of social and environmental safeguards as new business models (such as carbon farming) emerge.

[33] See https://eeb.org/certifiably-problematic-commissions-plans-for-carbon-removals/ [accessed 05/05/23].

[34] The principles outlined in the National Policy Statement on the Bioeconomy are: Sustainability principle: products developed should not exceed the capacity of the environment to replenish itself should not degrade resilience or biodiversity. Cascading principle: higher value applications are preferentially derived (e.g. food, bio-based materials and chemicals) prior to their use in energy and fuel generation. Precautionary principle: risk management to prevent policies or actions causing harm to the public or the environment. Food first principle gives priority to food and nutrition security (Government of Ireland, 2018).

PART 5 Co-Ordinating Action

Chapter 14

Co-Ordinating Action and Driving Ambition

14.1 Introduction

Delivering a transition in agriculture and land-use systems will require robust governance structures, policies and processes (Baker, 2009; de Boon *et al.*, 2022). This is reflected in one of the Climate Action Plan's just transition principles that emphasises the importance of an 'integrated, structured and evidence-based approach to identify and plan our response' (Principle 1, *Climate Action Plan 2021*; Government of Ireland, 2021a: 40).

Part II of this report explored how bringing about transformation in the agriculture and land-use sector is a non-linear, society-wide process, where interventions to alter one part of the system can produce costs and benefits elsewhere. Transition disrupts established investments, jobs, behaviours, knowledge and values, posing significant challenges for governance processes that have traditionally been more linear and siloed.

Chapter 9 of this report identified the importance of continuous learning and just transition as means of navigating these challenges. These ideas informed the integrated framework for action and the eight interventions, and Chapter 14 explores how these inform the fourth area of action from the framework – co-ordinating action and driving ambition.

First, continuous learning points to the importance of a governance approach that combines co-ordination and 'directionality' in navigating the multiple objectives, processes and stakeholders, on the one hand, with a greater emphasis on facilitating and enabling experimentation and learning to navigate uncertainty and complexity, on the other (EEA, 2019). While co-ordination and directionality refers primarily to State-led governance, the experimentation and learning emphasises the critical role of involvement and leadership from all stakeholders, including farmers, the agri-food industry and civil society organisations.

Second, arguably the most critical feature of the approach to governance of the transition needed in agriculture and land, is a commitment to just transition principles and the mechanisms that can deliver it. At the heart of just transition is a commitment to leave nobody behind. This is an important guarantee for farmers, workers and rural communities. It requires a comprehensive and formalised governance approach to navigating the equity of the process and outcomes in order to manage vulnerabilities. Transition depends on social acceptance: in the current context of polarised debate and a lack of trust in policies for agriculture and land transition, dialogue and engagement are critical. Building governance of the agricultural transition around a focus on justice can make the transition more acceptable for society and thereby reduce potential barriers to the implementation of the required changes (de Boon *et al.*, 2023).

As noted, there is a strong commitment in Government and EU policy to the principles of just transition and to the development of mechanisms to achieve it. The mechanisms that can help deliver a just and effective transition in agriculture, would not stand alone, but will augment those already set out in Irish and EU climate policy.

Government needs to be supportive and willing to provide resources commensurate with the scale of the challenge. The core function of the governance system is to co-ordinate action, some of which is already underway; to ensure that further action occurs; and, in overall terms to drive ambition across the entire agriculture and land sector.

Effective climate action is enabled by political commitment, well-aligned multilevel governance, institutional frameworks, laws, policies, strategies, and enhanced access to finance and technology (IPCC, 2023). Clear goals, co-ordination across multiple policy domains, and inclusive governance processes facilitate effective climate action.

Drawing on the guiding ideas of continuous learning and just transition, and the views of stakeholders and experts together with recent NESC work on just transition and employment vulnerability (NESC, 2020), Chapter 14 sets out the core features of the governance system needed for an effective and fair transition in the agriculture and land-use system.

Socially inclusive processes of decision-making and participatory approaches to implementation are an important part of governance. These are dealt with in Chapter 11 as two specific interventions and are understood to feed into each of the four components identified in this chapter.

The chapter outlines four components needed for fair and effective governance in the agriculture and land-use system and how many of the elements are already either in place or are emerging, and identifies opportunities to further develop them in order to enhance their co-ordinating actions and ambitions. These four components are:

i comprehensive and multi-level oversight;

ii to be proactive, forward-looking and responsive;

iii consistent and coherent communications; and

iv transition finance mechanisms.

14.2 Comprehensive and Multi-Level Oversight

First, effective governance for transition needs to include comprehensive oversight of actions right across the relevant sectors, departments and agencies, bringing 'horizontal' coherence to different sectors and 'vertical' coherence between local and national structures.

The following existing commitments and actions relate to climate, agriculture and land use, and just transition.

- Under the Climate Action Plan 2023, DAFM will have oversight of the agriculture and land-use sector in terms of how it is meeting climate targets, complying with relevant sectoral ceilings and performing its functions in a manner consistent with the most recently approved Climate Action Plan. This oversight includes monitoring how effectively the principles and practices to deliver a just transition are being delivered in agriculture. Broader national and sectoral scrutiny in relation to climate policy will be delivered by Government and the Minister for the Environment, Climate and Communications.

- Under the Climate Action and Low Carbon Development (Amendment) Act 2021, Government and the Minister for the Environment, Climate and Communications 'shall have regard to the requirement for a just transition to a climate-neutral economy which endeavours, in so far as is practicable, to—(i) maximise employment opportunities, and (ii) support persons and communities that may be negatively affected by the transition', and just transition principles must be considered by departments as they develop and implement climate policy and report on progress to the Oireachtas on how the principles for a just climate transition are being addressed [35](Government of Ireland, 2021a).

- The Just Transition Commission, when established, is expected to provide evidence-based, independent advice to the Government on the just transition implications of policy development for the Climate Action Plan and will make recommendations to Government on how policy can further the just transition (Government of Ireland, 2023b).

Given the significance of agriculture and land use in Ireland's climate transition and the need for this transition to be fair, the Council considers the agriculture and land-use sector an obvious area of focus for the future Commission.

Second, a core overarching activity is to help develop a shared vision for transition in the food and agricultural system. This is a foundational element of governance, particularly when the vision is developed with strong stakeholder engagement, so it is an achievable, consensus-based transition pathway and set of goals. As explored in Chapter 8, the key elements of such a vision are already articulated in Irish policies. These point to a fair and inclusive transition in agriculture and land use towards a circular, low-carbon, biodiversity-rich sector, meeting climate, water- and air-quality targets, while ensuring the livelihoods of farmers and agri-food workers and supporting vibrant rural communities. Section 11.2 emphasised the importance of engaging a wide range of stakeholders in a process of national dialogue to

[35] See Climate Action and Low Carbon Development (Amendment) Act 2021 at https://data.oireachtas.ie/ie/oireachtas/act/2021/32/eng/enacted/a3221.pdf accessed [20/06/2023].

explore the implications and priority actions needed to achieve a sustainable agriculture and land-use system and to build a greater sense of shared direction (Recommendation 1).

Third, in order to make a vision concrete, as well as incentivising action towards it, it is necessary to translate it into targets and plans, including setting appropriate time frames for achieving it. The system governing the achievement of sectoral climate obligations include the sectoral ceilings set as part of timebound carbon budgets through the work of the CCAC and the Government. Each accountable department is required to establish taskforces or other appropriate structures to ensure that the policies and programmes necessary for complying with sectoral emissions ceilings are expedited with ministerial accountability. A core function and responsibility for departments will be to have oversight across the sector in terms of how it is meeting climate targets, but also how effectively the principles and practices to deliver a just transition are being delivered in agriculture.

Governance processes are also in place for other key environmental areas including delivering biodiversity targets (such as the Habitats Directives) and Water (through the Water Framework Directive). The Environmental Protection Agency (EPA) points to the challenge of achieving desired environmental objectives that require pollution-prevention and control measures and actions to be fully incorporated across sectoral decision-making; for example, in agriculture, fisheries, the built environment, tourism, forestry, energy and transport (EPA, 2020).

Some gaps remain, such as targets on emissions reductions for the Land-Use, Land-Use Change and Forestry (LULUCF) sector (which will follow the completion of the land use review) and bioeconomy goals and targets. Each area's targets and plans are crucial but in addition, there is a gap in ensuring horizontal coherence across sectors. Without such coherence, it is likely that core targets and agency plans will not be aligned and may have different key performance indicators. More robust mechanisms could bring greater coherence between sectoral plans; for example, in the areas of agriculture and renewable energy.

Fourth, oversight should ensure monitoring and reporting progress towards targets. There is a robust national system of monitoring and reporting GHG emissions, underpinned by economy-wide carbon budgets and sectoral emissions ceilings. The Climate Action Plan sets out Government policy and actions to deliver on our climate targets. There are gaps in data and indicators across biodiversity and land use. The CCAC draws on a wide range of indicators in preparing their annual reviews and in 2022 pointed to the value of broader environmental indicators related to implementing measures to maintain and enhance biodiversity. Water and air quality may also be useful in assessing the transition of the agriculture and land use sector towards low-carbon, climate-resilient status (CCAC, 2022). The CCAC has an important role in monitoring and evaluating compliance with these legally binding targets.

Monitoring and reporting on the social, economic and environmental impacts of transition measures will also be important for considering equitable effort sharing (Intervention 6), as well as highlighting the potential, negative, unintended social or environmental impacts (Intervention 8). The CCAC addresses just transition issues in its annual review and as part of the carbon budget development process for future carbon budgets. The Government's Land Use Review recommends developing a more comprehensive set of land-use indicators based on a capitals approach. Transition will be highly context-specific, with capacity for transition varying among people and depending on location.

The proposed Just Transition Commission is intended to monitor the implementation of the just transition principles set out in the Climate Action Plan 2021; report on progress; commission research on sectoral impacts and mitigation solutions; and advise and support social dialogue processes to effectively integrate just transition considerations. Specific indicators will be developed to measure progress in relation to ensuring a just transition. There is value in widening the scope of monitoring transition, which could include (beyond GHGs), biodiversity, air and water, as well as the socio-economic impacts. It is important to develop data at local or regional scales in support of tailored approaches to transition, given the significant regional differences in social, economic and environmental contexts and differences in the potential impacts of transition. The commitment by Government to develop just transition indicators outlined in the Climate Action Plan 2023 will support this process.

In many respects, the elements described here demonstrate that Ireland can provide leadership in thinking about and approaching agricultural and land-use transition. However, this is at an early stage. There continues to be value in engaging with work that is underway in other countries, particularly in Scotland's just transition developments.

Over time, Scotland has put in place a variety of regulatory and governance structures and processes (see Box 14.1). These include legislation embedding principles of just transition; independent advice and scrutiny through the Just Transition Commission taking a broad lens to economy and society, not just energy; and policy and planning structures with ministerial oversight via the Minister for Just Transition, Employment and Fair Work. Agricultural transition has increasingly been focused on policy development, but this is still at a development stage.

Box 14.1: Just Transition – Scotland

In Scotland, just transition governance comprises different elements including:

- the independent Just Transition Commission, now in its second iteration, which focused first on key priorities to achieve a just transition in Scotland and is now providing more detailed advice on effective monitoring and evaluation as well as concrete recommendations;
- the Scottish Government is establishing a robust monitoring and evaluation framework that enables just transition delivery and helps to prevent unjust outcomes (Scottish Government, 2022);
- the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 embeds the principles of a just transition; and
- the Government held a consultation, 'Agricultural transition – first steps toward our national policy', in 2021 to inform the development of agriculture and land-use policy.

Ireland has not yet developed mechanisms and structures to the same extent as Scotland has to underpin its commitment to a just transition approach in national climate policy. Importantly, there is a commitment to embed just transition in Irish policy but, without the Just Transition Commission, appropriate social dialogue, and a process of scrutiny and oversight, this commitment is not yet reflected in practice. To support the comprehensive and multi-level oversight explored in section 14.2, the Council recommends that the Just Transition Commission be established as soon as possible and comprise representatives of Government, trade unions, employers, affected communities and civil society. It also recommends that the Commission should be charged with developing the national framework and blueprint for Just Transition for the entire economy, in line with the ILO guidelines for a just transition, and that the Commission focuses on just transition in agriculture and land use a key priority.

The key functions and activities that are outlined in relation to oversight and governance can help shift the focus of just transition from principles to practice.

14.3 Proactive Forward-Looking and Responsive Evidence Base

Effective governance of transition in complex systems should integrate foresight and anticipation with a learn-by-doing, experimental approach. It needs to be responsive to local contexts, and capable of tailoring policy, regulation and advice to reflect learning.

First, the governance system needs to include anticipatory governance and horizon-scanning to help utilise the insights in reducing or avoid negative outcomes that were gained from foresight. This includes identifying climate risks, patterns and potential impacts for the agriculture and land-use system in Ireland, as well as identifying the distributional impacts from policy measures to protect the most vulnerable groups and ecosystems.

The capacity to look forward and identify potential threats and opportunities is supported by the significant amount of research on agriculture, land use and climate action that is happening in universities, research institutes, DAFM and Teagasc. The EPA recently announced over €1.2m in funding for four research projects on agriculture, land use and climate change, identifying the need for an integrated, cross-sectoral approach. Governance structures can ensure that research covers the breadth of issues that are needed as well as the identification of specific priorities for 'deep-dive'

research into key areas including those identified as gaps in this report (see Intervention 3), for example the economic opportunities for diversification, regenerative agricultural approaches and nature-based solutions.

Evidence generated in modelling is critical to forward-looking governance. As part of the carbon budget-setting process, the CCAC has established a working group to inform its process, including to consider just transition and climate justice as well as a range of modelling to underpin the process. This spans all sectors and provides a critical expert lens to consider how emissions reductions will impact on the agriculture sector economically, socially, and environmentally.

A forward-looking approach will need to factor in the likely impacts of climate change and to integrate adaptation and resilience. There will be increased consideration of climate adaptation and resilience within a just transition approach across land use and all sectors going forward. Most farmers who participated in NESC research as part of this project reported witnessing increasing climate-related impacts on their farms. Considerations of the impacts of climate change on the sector need to include extreme weather events but also the resilience of the sector to adapt to climate changes. The National Adaptation Framework, published in January 2018, will be updated in 2023 and seeks to reduce our vulnerability and increase our resilience in response to climate change (Government of Ireland, 2018).

In terms of adaptation, it is important to consider what a just transition approach means for Ireland's response to climate change. This has not yet been considered in Ireland. However, in 2022, the UK's Climate Change Committee published advice for Scotland on the role of adaptation in a just transition, referring to a just transition as the distributional consequences of both climate impacts and adaptation measures to address them and drawing on a map of the social vulnerability classification index for Scotland and looking at flood risks, for example (CCC, 2022). In considering Ireland's climate adaptation, performing this type of exploration, data and analysis for flood, drought and coastal erosion in Ireland will be increasingly important and require the application of a just transition lens to climate adaptation in agriculture, forestry and other land use.

Second, the policy and governance system needs flexibility to ensure its responsiveness to scientific developments and that it learns from developments in practice, in order to revise policy, regulations and incentives based on new evidence. For example, following peer review, Teagasc research to improve the accuracy of quantifying soil emissions in Ireland may be reflected in updated inventory accounting (Teagasc, 2021c). Periodic reviews and independent appraisals enable policy learning, providing an opportunity to improve, adapt and 'course-correct'. The CCAC issues annual reports and periodic reviews on progress in achieving the national transition objective. The EPA supports climate research to inform policy, such as the recent evidence synthesis in the Land Use Review (Haughey *et al.*, 2023).

A key message from stakeholders is the highly context-specific nature of the land and soil and the priorities and practices of farmers as well as the wider catchment and community. A key challenge is to ensure locally appropriate transition planning, acknowledging the specific local context, challenges and past experiences, and identifies place-sensitive opportunities (Moore-Cherry *et al.*, 2022). For example, the European Innovation Partnerships (EIPs) provide examples of farmer-led research, innovation and learning, which has informed best practice and shaped new approaches under the Common Agriculture Policy Strategic Plan 2023–2027. Section 11.3 highlighted this approach of locally based interplay of experience with expertise, feeding back learning and innovation, and recommended prioritising this approach to include farmers' voices and experience in shaping policy (see Recommendation 2). This learn-by-doing approach will enhance governance capacity through advancing social learning, bringing in new actors and helping to accelerate the diffusion of new solutions (Bos and Brown, 2012; Matschoss and Repo, 2018).

The first phase of the Land Use Review identifies the overarching goal of 'getting the right thing, in the right place' (Haughey *et al.*, 2023: 84) and identifies gaps in the degree of precision of data and knowledge supporting this goal, which will be developed as the recommendations of the review are carried out.

In the context of the urgent action required, processes of engagement based on just transition as outlined in this report can support the future development of a land-use strategy. Interventions to support exploration by farmers and other land users of alternative, workable ways of using land differently, could explore with stakeholders in a specific area the best currently available scientific knowledge to set specific, fine-grained, land-use change targets, and identify the supports needed to ensure that these targets are realised. Such work would endeavour to engage, as the work to date on land use has done, with a broad range of stakeholders including farmers, rural groups, social entrepreneurs and

other local actors. The Council suggests that there is value in exploring how this NESC work on transition in agriculture could contribute to the development of the Land Use Review.

There is also a need for agility within the governance system, given the changes in the wider context and the unpredictability of the pressures and impacts arising from the Russian invasion of Ukraine, extreme weather events, and weather-related risks from heat-waves, droughts and flooding. Those elements, together with adaptive or experimental governance, can form part of iterative cycles of policy-making, planning, implementing, evaluating, and learning (EEA, 2019).

14.4 Consistent and Coherent Communication

Clear, consistent and coherent communication of a whole-of-society vision for transition is important for governance of transition. Such communication shapes beliefs and attitudes and must be based on facts and plausible pathways for achieving targets. Emmet-Booth *et al.* (2019) note that incoherent messages in conjunction with a potential knowledge deficit on specific mitigation measures may exacerbate barriers to adoption and temper the potential willingness for action.

Inspiring narratives that inform and clearly communicate the benefits of transition are also important. Acknowledging and addressing costs are a critical part of transition (see Chapter 13, Interventions, 6, 7 and 8), but inspiring narratives and framing also play an important role in building public support and strengthening the political mandate for action, drawing on a shared vision and understanding. In a report on framing climate action in Ireland, NESC (FitzGerald, 2019) highlighted resilience framing as potentially positive for climate action in Ireland. Resilience framing may be particularly helpful in framing transition in the agriculture and land-use system, given the connections between the resilience of soils and ecosystems for crop and animal resilience and in supporting economic and social resilience (see Section 6.4).

Conducting careful public information campaigns and monitoring public attitudes and behaviour can also be helpful for understanding changing attitudes and practices over time and informing policy-making. There were some effective public communication campaigns and monitoring of attitudes during the COVID-19 pandemic,[36] and a 'Reduce your Use' energy campaign during the cost of living crisis (Government of Ireland, 2022d). As part of 'Climate Change in the Irish Mind', the EPA conducted a nationally representative survey of 4,000 Irish people, the first of its kind in Ireland, which provided rich insights in relation to rural communities' attitudes to transition, including identifying opportunities that could be accelerated (EPA, 2021). The National Dialogue on Climate Action will have a key role as the primary vehicle for engaging stakeholders and the public in climate action across Ireland.

The elements of communication highlighted in section 14.4 are important for climate transition overall but are particularly important for agriculture and land use, as evidenced by the negative media coverage of the carbon budget-setting process for the sector. The development of a climate communications strategy, co-ordinated by the Department of the Taoiseach, will work to build a shared climate focus and purpose. The agriculture and land-use transition is a valuable focus for dedicated communication in the future.

14.5 Transition Finance Mechanisms

The Common Agriculture Policy is a significant source of financial support for increasing the sustainability of the agriculture sector. Wider sources of funding are required, as identified in section 12, to support the transition and increase support for climate and biodiversity action.

As section 9.3 highlighted, the significant policy and financial support in the EU for just transition through the European Green Deal has, to date, largely focused on energy. In Ireland, the focus of significant just transition resources have been directed to the use of peat in the energy sector and on workers and their communities in the Midlands.

[36] The Social Activity Measure, a behavioural study led by the ESRI in collaboration with the Department of the Taoiseach, recorded the public response to the risk of COVID-19 infection. Data from a nationally representative sample of 1,000 adults were collected every two weeks, with reports published until 2022 after 36 iterations (ESRI, 2022).

Throughout the research informing this NESC report, stakeholders have emphasised the scale and importance of the transition required for agriculture and land-use and have suggested that mechanisms for financially supporting just transition in agriculture may require a scale and extent of support comparable to that provided by the LEADER programme for Rural Development, including regionally focused transition teams and resourcing.

Ireland's carbon tax and green budgeting reforms will increase the availability and effectiveness of taxation revenue. The use of carbon tax revenues for the transition in agriculture will provide an important mechanism to support action.

While EU and national just transition funding to date has focused on the energy transition, this will potentially expand to other sectors, given the economy-wide scale of transformation required. Fairness and solidarity are defining principles of the European Green Deal and the social and economic impacts of transition are being considered beyond energy; for example, in the recommendation adopted by the European Council in 2022 that invites Member States to adopt measures to address the employment and social aspects of climate, energy and environmental policies (European Commission, 2021c).

The establishment of a Just Transition in Agriculture and Land Use fund, consolidating available carbon tax revenues and other public resources, could provide certainty and clarity on the supports for farmers in transition.

14.6 Conclusion

Building on emerging practice and research, this chapter has considered the key governance components for an effective, fair and inclusive climate transition in agriculture drawing on existing national and sectoral structures, institutions, policies and processes. Only by adopting a proactive and integrated approach can the transition be both effective and just.

The chapter highlighted the structures, institutions, policies and processes required for an effective national approach that are in place or are emerging, with a commitment to further developing just transition governance mechanisms. When established, this national approach can provide Ireland with a leadership role in demonstrating how fairness and inclusion can shape the conversation for climate action.

The distinctive characteristics of the agriculture and land-use sector governance of transition will require particularly careful consideration and oversight, and the Council considers the agriculture and land-use system as a priority focus for just transition institutions, processes and resourcing in Ireland.

The approach outlined in Chapter 14 should inform the work of Government in developing policy responses to just transition in agriculture and land use.

Chapter 15

Recommendations

15.1 Introduction

This report has examined, in practical terms, how an effective, fair and socially inclusive and sustainable transition can be achieved in the Irish agriculture and land use sector.

This is a complex challenge, with risks and opportunities, but it is necessary and urgent. The twin crises of climate change and biodiversity loss require a society-wide transformation across all sectors. The risks and threats to society, business and human life that arise from ecosystem services under pressure are increasingly observable in Ireland.

A just transition approach in the agriculture and land use sector is a new area of national enquiry, practice and governance, to which this report aims to make an important contribution.

The nature of transition in the agriculture and land use sector should reflect its unique characteristics, including the diversity of objectives and actors, its strategic economic, social and cultural importance, and its unique capacity as not only a source but also as a potential sink that is capable of sequestering carbon. Importantly, this is not a transition *out* of agriculture, but a transition *into* making optimal use of our land and agricultural resources for environmental, economic and social sustainability.

NESC research finds that farmers are already taking significant actions to reduce emissions and enhance biodiversity and water quality. They are willing to engage in transition and are interested and open to measures that can increase their income and contribute to the transition.

This chapter outlines NESC's recommendations across four main areas identified in the integrated framework for action as follows.

First, it focuses on how the actions and interventions can be co-ordinated with the overall governance of the transition in agriculture and land use. Second, it explores how socially and inclusive processes can be enhanced. Third, it examines how people could be enabled to benefit from the opportunities of transition. Fourth, it explores how the approach to sharing and mitigating the costs of transition could be improved. Action across all areas taken together that enables 'low-hanging fruit', 'uncertain' and 'hard to do' measures to be progressed is required for a balanced, effective and fair approach to transition.

15.2 Co-Ordinating Action and Driving Ambition: Recommendations

Recommendation 1: The Council recommends, as outlined in Climate Action Plan 2023, that an Implementation Group for Climate Transition in Agriculture be established in 2023 to consider the recommendations arising from this report.

This Group will be key to the effective follow-through on these NESC recommendations and is an overarching means of co-ordinating and governing the transition, combining elements of national and sectoral structures, policies, and processes. Delivery through existing structures should be prioritised where possible.

The Council outlines an approach to governance focused on four key components: comprehensive and multi-level oversight; a proactive, forward-looking and responsive evidence base; consistent and coherent communications; and transition finance mechanisms. The Implementation Group will be a key means of examining how these components can be operationalised, including their translation into targets and plans with appropriate time frames for achieving just transition.

The Group should include Government representatives together with farming, scientific, ecological and civil society members and should develop suitable responding actions for inclusion in the CAP 24 implementation report, with a focus on engagement, resources and policy.

Recommendation 2: The Council recommends that this NESC research into transition should inform and shape the next stages in the development of the Land Use Review.

The first phase of the Land Use Review identifies an overarching goal of 'getting the right thing, in the right place' (Haughey *et al.*, 2023: 84), and identified gaps in the degree of precision of data and knowledge available to support this goal, which will be developed as the recommendations of the Land Use Review are carried out. In the context of the urgent need for action, processes of engagement based on just transition as outlined in this report can support the future development of a land use strategy.

Interventions to support exploration by farmers and other land users of alternative, workable methods of using land differently could examine with stakeholders in a specific area based on the best currently available scientific knowledge to set specific fine-grained, land-use change targets, and identify the supports needed to ensure that targets are realised. Such work would endeavour to engage, as the work to date on land use has engaged, with a broad range of stakeholders including farmers, rural groups, social entrepreneurs, non-governmental organisations, scientists, consumers, and other local actors. While covering only a small percentage of the land, the management of State-owned land has an important leadership role in demonstrating best practice in land use for transition.

Recommendation 3: The Council recommends that the agriculture and land-use transition should be the focus of current and future dedicated, climate communications work.

Communication shapes how people understand and think about the challenges of, and solutions to, climate change and should be resourced appropriately. There is a need for clear and coherent communication on the challenges and opportunities associated with transition in the agriculture and land-use system, and in support of behaviour change, which will be essential to transition.

Recommendation 4: The Council recommends that the agriculture and land-use system should be a priority focus for just transition institutions, processes and resourcing in Ireland, notably in the work of the forthcoming Just Transition Commission, which should be established as soon as possible.

The Council acknowledges the commitment to just transition in climate policy in Ireland and that governance mechanisms are at an early stage of development. Scotland's experience points to the value of a range of structures, institutions and processes that underscore policy and practice. Ireland is well placed to develop its just transition approach nationally and provide leadership in its development of just transition practices for agriculture and land use. The Just Transition Commission should include representatives of Government, trade unions, employers, farmers, affected communities and civil society.

Recommendation 5: The Council recommends the establishment of a Just Transition in Agriculture and Land Use fund, consolidating available carbon tax revenues and other public resources.

This would provide certainty and clarity on the supports available for farmers in transition. Governance of a Just Transition in Agriculture and Land Use fund should facilitate local decision-making and should include support for biodiversity restoration as part of transition.

Recommendation 6: The Council recommends that a just transition lens be applied to climate adaptation in agriculture, forestry and other land use.

This type of exploration, data collection and analysis in Ireland of flood, drought and coastal erosion will be increasingly important.

Recommendation 7: The Council recommends a wide scope in monitoring transition, including the economic, social and environmental aspects and data in support of place-based transition at the local scale.

In addition to GHGs, this scope should include biodiversity, air, and water, as well as the socio-economic impacts, particularly regionally, in order to reflect a just transition. The commitment by Government to develop just transition indicators outlined in the Climate Action Plan 2023 will support this.

15.3 Enhancing Socially Inclusive Processes: Recommendations

Recommendation 8: The Council recommends that a deep and wide process of further engagement with stakeholders should be undertaken in order to build a greater sense of shared direction for transition in the agriculture and land-use system.

This would involve a wide range of stakeholders, including farmers and rural communities, NGOs, scientists, consumers and the wider public in a process of dialogue to build a greater sense of shared direction and explore the implications and priority actions needed to achieve a sustainable agriculture and land-use system.

It should be based on clear and coherent communication on the scale and urgency of the challenge, explore the multiple objectives, synergies and trade-offs from the agriculture and land use sector, and include a focus on effort sharing and distribution. It should enable and inform ongoing action and decision-making.

Opportunities for such a process include actioning the recommendation in *Ag Climatise* for a dialogue on the future of farming, the next phase of the Land Use Review, opportunities for dialogue around the Shared Island initiative, and the potential for a Citizens' Assembly, or series of regional Citizens' Assemblies, focused on this issue.

Recommendation 9: The Council recommends that a strand of shared-island collaboration and dialogue should cover climate and agriculture, and just transition in particular.

Recent NESC research highlights the similar focus on establishing a Just Transition Commission both North and South, with Northern Ireland also establishing a Just Transition Fund for agriculture.

There would be mutual benefit in engaging farmers and other key relevant groups in dialogue on areas of common interest and future opportunities in this area.

Recommendation 10: The Council recommends building on local and context-specific participation and experimentation to ensure that approaches that have been impactful locally are successfully scaled up nationally.

Change will be enabled by local champions, and activities and examples to build upon include the Agricultural Sustainability Support and Advisory Programme (ASSAP); the Burren Programme; the EIP-AGRI projects; and – if effectively delivered – the new ACRES programme, particularly the Co-operation Project.

15.4 Enabling People to Benefit from the Opportunities of Transition: Recommendations

Recommendation 11: The Council recommends that farm advisory services should scale up and more fully align with environmental objectives and should ensure that bespoke ecological expertise can be provided at the farm level.

Building on localised processes (Recommendation 10), this would help support all farmers in adopting the measures most relevant to their local context for reducing emissions and protecting biodiversity, air and water quality and for navigating land-use diversification options.

There is also considerable scope to increase research and knowledge in promising areas that have so far received less focus, such as regenerative agricultural approaches, paludiculture, and agroforestry.

Recommendation 12: The Council recommends that more research is needed on the opportunities and implications of transition for workers in the supply chains and downstream activity associated with agriculture and land use.

This would consider economic implications on an ongoing, dynamic basis as the transition progresses, and should consider costs, and areas of job loss, creation and opportunity.

Recommendation 13: The Council recommends that work on accounting for nature should be accelerated. This is an area where NESC can play a role and work is already underway.

Better accounting for nature and payments for ecosystem services (PES) have the potential to address the 'invisibility' of nature, re-balancing incentives in agriculture and land use and supporting a potential new business model for agriculture.

Activities to address data issues that are underway include adoption of the UN System of Environmental Economic Accounting, the establishment of an Ecosystem Accounts Division in the Central Statistics Office, ongoing Teagasc research into improving accuracy and reliability of sequestration on Irish soils suitable for inventory inclusion, INCASE (Irish Natural Capital Accounting for Sustainable Environments) research into farm ecosystem accounting, and the new Bord Bia, Teagasc and Irish Cattle Breeding Federation (ICBF) farm sustainability data initiative.

Recommendation 14: The Council, while recognising the importance of existing schemes, recommends that the financial resources available from EU, public and private sources to reward farmers for protecting and enhancing ecosystem services should be significantly increased.

With sufficient attention paid to risk (see Recommendation 20), this would help ecosystem service provision to become a viable alternative business model for farming, which could build on the successful experience in Ireland with results-based payments as part of agri-environment schemes and the learning from pilot programmes such as the FarmPEAT Project. This would complement existing schemes supported by CAP, which should be effectively implemented to achieve environmental objectives.

Recommendation 15: The Council recommends further research to reduce uncertainty around diversification options experienced by farmers and other stakeholders.

This should examine issues such as differing social and cultural perspectives, policy incoherence or barriers, sharing risk and guiding investment in emerging markets. Government has an important role in bringing policy and regulatory certainty to enable new market development, and policy can help to reduce uncertainty and share risks as well as guide investment.

15.5 Sharing and Mitigating the Costs of Transition: Recommendations

Recommendation 16: The Council recommends developing a strategy on effort sharing based on additional investment in research, data collection, evidence and monitoring of the distributional impacts across the agriculture and land use sector.

This should help identify the differing impact of costs across the agriculture and land-use system; for example, across individual farm enterprises of different scales, sizes and levels of viability, regional impacts, and impacts on supply-chain actors including large companies and workers in low-wage jobs, and should help tailor measures based on vulnerabilities, such as considering different approaches for older or younger cohorts or approaches based on the size of enterprises.

This would help people's perception and experience of the fairness of transition.

Recommendation 17: The Council recommends that the strategy on effort sharing (Recommendation 16) should also be informed by new research to consider existing and potential effort-sharing mechanisms across the agriculture and land-use system.

This work would examine current approaches to effort sharing among primary producers based on voluntary, farmer-led decisions, reflecting individual contexts.

It would also explore the role of power along the supply chain; explore emerging approaches such as efforts to increase transparency and fairness in the supply chain (such as those in the Agriculture and Food Supply Chain Bill 2022); to

support a fair return on production; putting value on higher standards of sustainability and supporting consumers in making more sustainable food choices and tackling food waste.

Recommendation 18: The Council recommends that more robust standards and certification should be developed to support effort sharing along agriculture and land-use supply chains.

This work should also include an examination of how financial incentives could reward farmers who demonstrate higher standards of sustainable production and of the development of public procurement policies and market incentive conditionality based on sustainability standards.

Recommendation 19: The Council recommends an examination of how the spectrum of supports for those vulnerable to transition in agriculture should be conducted and progressed to ensure that no one is left behind.

This could include voluntary compensation payments; regional investment funds; measures to support consumers in the event of higher food prices research; and the development of diversification and alternative business models.

Recommendation 20: The Council recommends more robust screening of policies and measures of transition in agriculture and land use and greater compliance with regulations in order to avoid unintended consequences.

It is important that there is a full exploration of social and environmental safeguards as new business models (such as carbon farming) emerge, in order to protect against unintended consequences.

Appendix A

Terms of Reference and Membership of the Working Group

The aims of the working group were to:

i Bring a practical, stakeholder-informed and solutions-focused perspective to explore how Irish agriculture can achieve climate targets to deliver transition to a net-zero economy and society, that considers social equity and inclusion, environmental resilience, and economic well-being.

ii Advise on consultation with a wide variety of stakeholders, using bilateral interviews, focus groups and participatory stakeholder workshops.

iii Deliver a report on agriculture and climate action for Council approval by March 2023.

A multi-stakeholder NESC working group will support and provide guidance on the work. Members will be drawn from the Council and a wider range of stakeholders, while staying at a manageable size for effective discussion (see Table A1). The working group will meet four to six times in 2022 and once in 2023, online initially but in person where possible.[37]

[37] These members were part of the Working Group in its initial phase of work until June 2022. Individuals from NESC Independent Members did not remain on this working group as the term of the Council of which they were members expired in 2022.

Table A1: Working Group Members

Organisation	Name
Cork University Business School	Professor Thia Hennessy (Chair of NESC Working Group), Head of School, Head of the Department of Food Business and Development and Chair of Agri-Food Economics
NESC Pillars	
Business	Conor Mulvihill, Director | Dairy Industry Ireland
Trade Union	Macdara Doyle, Campaigns Officer | Irish Congress of Trade Unions
Environment	Fergal Anderson, Farmer | Leaf and Root Farm Dr Ollie Moore, EU Co-Ordinator | Sustainable Ireland Cooperative (trading as Cultivate) Shane Downer, Executive Officer | Hedge Laying Association of Ireland
Community and Voluntary	Michelle Murphy, Research and Policy Analyst | Social Justice Ireland
Farming	Damian McDonald, Director General | Irish Farmers' Association T.J. Flanagan, Chief Executive | Irish Co-Operative Organisation Society John Enright, General Secretary | Irish Creamery Milk Suppliers Association
NESC Independent Members	
TU Dublin Dublin City University Massachusetts Institute of Technology (MIT)	Prof. Paul Donnelly Prof. Edgar Morgenroth Prof. Sinead O'Flanagan
External Experts	
EPA	Mary Frances Rochford, Programme Manager | Office of Environmental Sustainability
Bord Bia	Deirdre Ryan, Director | Sustainability and Quality Assurance
Teagasc	Dr Kevin Hanrahan, Head of Research Department | Rural Economy & Development Programme
Food, Farming and Countryside Commission	Sue Pritchard, Chief Executive
University College Cork	Dr Hannah Daly, Lecturer | Sustainable Energy and Energy Systems Modelling
University College Dublin	Dr Edel Kelly, Lecturer/Assistant Professor | School of Agriculture and Food Science
Trinity College Dublin	Dr Catherine Farrell | Botany
University College Dublin	Prof. Kevin O'Connor | School of Biomolecular and Biomedical Science
	Matt Crowe | former Director of the Environmental Protection Agency
Government Departments	
Department of the Taoiseach	Conor Ó Raghallaigh | Head of Climate Action
Department of Environment, Climate and Communications	Frank Maughan, Principal Officer | Just Transition, EPA and Sectoral Policy
Department of Rural and Community Development	Pat Henry, Assistant Principal | LEADER Unit
Department of Agriculture Food and the Marine	Anthony Cawley, Assistant Principal Officer
Secretariat to the Group	Niamh Garvey Dr Jeanne Moore Elaine Kennedy

Appendix B

Table Summary of Potential Measures Discussed in Focus-Group Workshops with Farmers

NESC is hoping to hear farmers' perspectives on a wide range of measures as outlined below. NESC is particularly keen to hear perspectives on barriers and enablers in relation to those measures highlighted in bold.

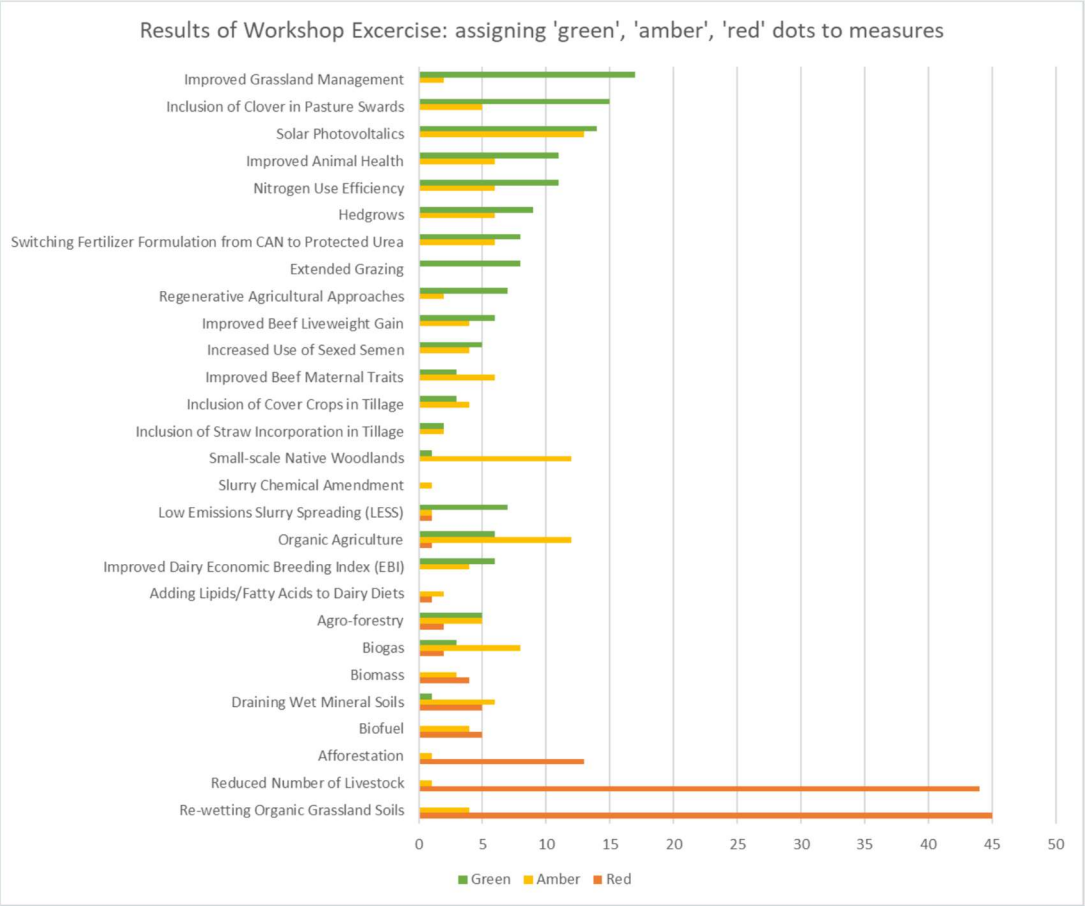
Table B1: List of Potential Measures Discussed

Potential soil and land management measures	Potential measures for reducing emissions from livestock
Draining wet mineral soils	Improved beef liveweight gain
Slurry chemical amendments	Improved beef maternal traits
Low-emission slurry spreading	Improved dairy Economic Breeding Index
Improved grassland management (increased time to reseeding, increase in legumes, less frequent use of heavy machinery, pasture management plans)	Extended grazing
Rewetting organic grassland soils	Improved animal health
Inclusion of cover crops in tillage	Increase use of sexed semen
Inclusion of straw incorporation in tillage	Adding lipids/fatty acids to dairy diets
Set of measures that reduce fertiliser use:	**Reduced number of livestock**
• Nitrogen-use efficiency	
• Inclusion of clover in pasture swards	
• Switching fertiliser formulation from calcium ammonium nitrate to protected urea	
• Organic agriculture	
• Regenerative agricultural approaches	

Potential measures in forestry	Potential measures in renewable energy/biomass production
Afforestation	Biomass (wood; willow; miscanthus)
Small-scale native woodlands	**Biogas** (AD of slurry and grass)
Agroforestry	Biofuel (oil/beet for energy production)
Hedgerows	**Solar renewable energy generation** and energy efficiency on farm

The results from the farmer focus group workshop assessment of potential measures is presented in Figure B1.

Figure B1: Results from the farmer focus group workshop assessment of potential measures



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Publications

Council Reports					
No.	**Title**	**Year**	**No.**	**Title**	**Year**
1	Report on the Economy in 1973 and the Prospects for 1974	1974	14.	Population Projects 1971-86: The Implications for Social Planning—Dwelling Needs	1976
2	Comments on Capital Taxation Proposals	1974	15.	The Taxation of Farming Profits	1976
3	The Economy in 1974 and Outlook for 1975	1974	16.	Some Aspects of Finance for Owner-Occupied Housing	1976
4	Regional Policy in Ireland: A Review	1975	17.	Statistics for Social Policy	1976
5	Population and Employment Projections: 1971-86	1975	18.	Population Projections 1973-86: The Implications for Education	1976
6	Comments on the OECD Report on Manpower Policy in Ireland	1975	19.	Rural Areas: Social Planning Problems	1976
7.	Jobs and Living Standards: Projects and Implications	1975	20.	The Future of Public Expenditure	1976
8.	An Approach to Social Policy	1975	21.	Report on Public Expenditure	1976
9.	Report on Inflation	1975	22.	Institutional Arrangements for Regional Economic Development	1976
10.	Causes and Effects of Inflation in Ireland	1975	23.	Report on Housing Subsidies	1976
11.	Income Distribution: A Preliminary Report	1975	24.	A Comparative Study of Output, Value-Added and Growth in Irish and Dutch Agriculture	1976
12.	Education Expenditure in Ireland	1976	25.	Towards a Social Report	1977
13.	Economy in 1975 and Prospects for 1976	1975	26	Prelude to Planning	1976

27	New Farms Operators, 1973 to 1975	1977	42	Report on Policies for Agricultural and Rural Development	1978
28	Service-type Employment and Regional Development	1977	43	Productivity and Management	1978
29	Some Major Issues in Health Policy	1977	44	Comments on Development: Full Employment	1978
30	Personal Incomes by County in 1973	1977	45	Urbanisation and Regional Development in Ireland	1979
31	The Potential for Growth in Irish Tax Revenues	1977	46	Irish Forestry Policy	1979
32	The Work of the NESC 1974 - 1976	1977	47	Alternative Strategies for Family Support Income	1980
33	Comments on Economic and Social Development; 1976 - 1980	1977	48	Transport Policy	1980
34	Alternative Growth Rates in Irish Agriculture	1977	49	Enterprises in the Public Sector	1980
35	Population and Employment Projections 1986: A Reassessment	1977	50	Major Issues in Planning Services for Mentally and Physically Handicapped Persons	1980
36	Universality and Selectivity: Strategies in Social Policy	1978	51	Personal Incomes by Regions: 1977	`1980
37	Integrated Approaches to Personal Income Taxes and Transfers	1978	52	Tourism Policy	1980
38	Universality and Selectivity: Social Services in Ireland	1978	53	Economic and Social Policy: Aims and Recommendations	1980
39	The Work of the NESC: 1977	1978	54	The Future of the National Economic and Social Council	1980
40	Policies to Accelerate Agricultural Development	1978	55	Urbanisation: Problems of Growth and Decay in Dublin	1981
41	Rural Areas; Change and Development	1978	56	Industrial Policy and Development: A Survey of Literature for the Early 1960s to the Present	1981

57	Industrial Employment and the Regions, 1960-62	1981	72	Social Welfare: The Implications of Demographic Change	1984
58	The Socio-Economic Position of Ireland within the European Economic Community	1981	73	Health Services: The Implications of Demographic Change	1984
59	The Importance of Infrastructure to Industrial Development in Ireland: Roads, Telecommunications and Water Supplies	1981	74	Irish Energy Policy	1984
60	Minerals Policy	1981	75	Economic and Social Policy 1983: Aims and Recommendations: A Review of Recent Changes for Education, Social Welfare and the Health Services	1984
61	Irish Social Policy: Priorities for Future Development	1981	76	The Role of the Trading Sectors	1984
62	Economic and Social Policy 1981: Aims and Recommendations	1981	77	The Criminal Justice System: Policy and Performance	1985
63	Population and Labour Force Projections by County and Region, 1979–1991	1981	78	Information for Policy	1985
64	A Review of Industrial Policy	1982	79	Economic and Social Policy Assessment	1985
65	Farm Incomes	1982	80	The Financing of Local Authorities	1985
66	Policies for Industrial Development: Conclusions and Recommendations	1982	81	Designation of Areas for Industrial Assessment	1985
67	An Analysis of Jobs and Losses in Irish Manufacturing	1982	82	Manpower Policy in Ireland	1986
68	Social Planning in Ireland: its Purposes and Organisational Change	1983	83	A Strategy for Development 1986–1990	1986
69	Housing Requirements and Population Change; 1981 - 1991	1983	84	Community Care Service: An Overview	1987
70	Economic and Social Policy 1982: Aims and Recommendations	1983	85	Redistribution Through State Social Expenditure in the Republic of Ireland, 1973 - 1980	1988
71	Education: The Implications of Demographic Change	1984	86	The Nature and Functioning of Labour Markets	1988

87	A Review of Housing Policy	1989	102	Population Distribution and Economic Development: Trends and Policy Implications	1997
88	Ireland in the European Community: Performance, Prospects and Strategy	1989	103	Private Sector Investment in Ireland	1998
89	A Strategy for the Nineties: Economic Stability and Structural Change	1990	104	Opportunities, Challenges and Capacities for Choice: Overview, Conclusions and Recommendations	1999
90	The Economic and Social Implications of Emigration	1991	105	Opportunities, Challenges and Capacities for Choice	1999
91	Women's Participation in the Irish Labour Market	1992	106	Review of the Property Proofing Process	2001
92	The Impact of reform of the Common Agricultural Policy	1992	107	Benchmarking the Programme for Prosperity and Fairness	2002
93	The Irish Economy in a Comparative Institutional Perspective	1993	108	National Progress Indicators	2002
94	Association between Economic Growth and Employment	1993	109	Achieving Quality Outcomes: The Management of Public Expenditure	2002
95	Education and Training Policies for Economic and Social Development	1993	110	An Investment in Quality: Services, Inclusion and Enterprise, Overview, Conclusions and Recommendations	2002
96	A Strategy for Competiveness, Growth and Employment	1993	111	An Investment in Quality: Services, Inclusion and Enterprise	2003
97	New Approaches to Rural Development	1995	112	Housing in Ireland; Performance and Policy	2004
98	Strategy into the 21st Century: Conclusions and Recommendations	1996	113	The Developmental Welfare State	2005
99	Strategy into the 21st Century	1996	114	NESC Strategy 2006: People, Productivity and Purpose	2005
100	Networking for Competitiveness Advantage	1996	115	Migration Policy	2006
101	European Union: Integration and Enlargement	1997	116	Managing Migration in Ireland: A Social and Economic Analysis	2006

117	The Irish Economy in the Early 21st Century	2008	132	Quality and Standards in Human Services in Ireland: Disability Services	2012
118	Ireland's Five-Part Crisis: An Integrated National Response	2009	133	Quality and Standards in Human Services in Ireland : A Synthesis Report	2012
119	Well-Being Matters: A Social Report for Ireland	2009	134	The Social Dimensions of the Crisis: The Evidence and its Implications	2012
120	Next Steps in Addressing Ireland's Five-Part Crisis: Combining Retrenchment with Reform	2009	135	Five-Part Crisis, Five Years On, Deepening Reform and Institutional Innovation	2013
121	The Euro: An Irish Perspective	2010	136	Ireland's Environment Data: Inventory, Assessment and Next Steps	2014
122	Re-finding Success in Europe: the Challenge for Irish Institutions	2010	137	Jobless Households: An Exploration of the Issues	2014
123	Supports and Services for Unemployed Jobseekers: Challenges and Opportunities in a Time of Recession	2011	138	Social Housing at the Crossroads: Possibilities for Investment, Provision and Cost Rental	2014
124	Quality and Standards in Human Services in Ireland: Overview of Concepts and Practices	2011	139	Wind Energy in Ireland: Building Community Engagement and Social Support	2014
125	Promoting Economic Recovery and Employment in Ireland	2012	140	Homeownership and Rental: What Road is Ireland On?	2014
126	Draft Framework for Sustainable Development for Ireland: NESC Response	2012	141	Ireland's Rental Sector: Pathways to Secure Occupancy and Affordable Supply	2015
127	Quality and Standards in Human Services in Ireland; Policing and the Search for Continuous Improvement	2012	142	Housing Supply and Land: Driving Public Action for the Common Good	2015
128	Quality and Standards in Human Services in Ireland: Residential Care for Older People	2012	143	The Dynamics of Environmental Sustainability and Local Development: Aquaculture	2016
129	Quality and Standards in Human Services in Ireland: The School System	2012	144	Moving Towards the Circular Economy in Ireland	2017
130	Quality and Standards in Human Services in Ireland: Home Care for Older People	2012	145	Urban Development Land, Housing and Infrastructure: Fixing Ireland's Broken System	2018
131	Quality and Standards in Human Services in Ireland: End-of-Life Care in Hospitals	2012	146	Moving from Welfare to Work: Low Work Intensity Households and the Quality of Supportive Services	2018

147	Climate-Change Policy: Getting the Process Right	2019	162	Just Transition in Agriculture and Land Use	2023
148	Transport-Orientated Development: Assessing the Opportunity in Ireland	2019			
149	Addressing Employment Vulnerability as Part of a Just Transition in Ireland	2020			
150	Housing Policy Actions to Deliver Change	2020			
151	The Future of the Irish Social Welfare System: Participation and Protection	2020			
152	Grounding the Recovery in Sustainable Development: A Statement from the Council	2021			
153	Shared Island: Projects, Progress and Policy Scoping Paper	2021			
154	Digital Inclusion in Ireland: Connectivity, Devices & Skills	2021			
155	Ireland's Well-Being Framework: Consultation Report	2021			
156	Collaboration on Climate and Biodiversity: Shared Island as a Catalyst for Renewed Ambition & Action	2021			
157	Shared Island: Shared Opportunity NESC Comprehensive Report	2022			
158	The Covid-19 Pandemic: Lessons for Irish Public Policy	2022			
159	Private Rental in Ireland	2023			
160	Understanding the Irish Economy in a Time of Turbulence	2023			
161	Social Enterprise on the Island of Ireland	2023			

Secretariat Reports					
No.	**Title**	**Year**	**No.**	**Title**	**Year**
1	Ireland's Economic Recovery: An Analysis and Exploration	2011	15	Cost-Benefit Analysis, Environment and Climate Change	2018
2	Understanding PISA and What it Tells us About Educational Standards in Ireland	2012	16	Multistakeholder Agreements in Climate Governance and Energy Transition: The Dutch Energy Agreement	2018
3	Towards a New Climate Change Policy	2012	17	The Framing of Climate Action in Ireland: Strategic Considerations	2019
4	Ireland and the Climate Change Challenge: Connecting 'How Much' with 'How To'. Final Report of the NESC Secretariat	2012	18	Urban Structure, Spatial Planning and Climate Emissions	2019
5	Review of Developments in Banking and Finance	2013	19	The Transition to a Low-Carbon and More Digital Future: Supporting the Needs of Vulnerable Workers and Enterprises	2020
6	Employment and Enterprise Policy	2013	20	Approaches to Transition	2020
7	Greening the Economy: Challenges and Possibilities for Integrating Sustainability into Core Government Policy	2013	21	Shared Island Consultation: Climate and Biodiversity Challenges and Opportunities	2021
8	Activation Policy	2012	22	Community Call: Learning for the Future	2021
9	Consumer Prices	2012	23	Shared Island: Projects, Progress & Policy The Good Jobs Agenda	2021
10	Review of Irish Social and Affordable Housing	2014	24	Housing and Urban Development Policy Priorities	2021
11	Financing of Social Housing in Selected European Countries	2014	25	Shared Island: Projects, Progress & Policy The Island Economy	2021
12	Reflections on Infrastructure Policy and Institutional Developments in the UK	2017	26	Building a New Relationship between Voluntary Organisations and the State in the Health and Social Care Sectors	2021
13	Land Value Capture and Urban Public Transport	2018	27	Shared Island: Projects, Progress & Policy A Regional Perspective on Ireland, North and South	2021
14	International Approaches to Land Use, Housing and Urban Development	2018	28	Shared Island: Projects, Progress & Policy Sharing Knowledge and Lessons in Combatting Poverty	2021

29	Shared Island: Projects, Progress & Policy, A Shared Island Perspective on Mental Health	2022		
30	Towards Transformative Outcomes: Examples of how Well-being Frameworks have been Embedded into Policy Making	2022		
31	An Opportunity to Review and Reframe Collective Bargaining and the Industrial Relations Regime	2023		

Research Reports				
No.	**Title**	**Year**	**No.**	**Title**	**Year**
1	Cluster in Ireland: The Irish Dairy Processing Industry: An Application of Porter's Cluster Analysis	1997	12	Low Work Intensity Households and the Quality of Supportive Services: Detailed Research Report	2018
2	Cluster in Ireland; The Irish Popular Music Industry: An Application of Porter's Cluster Analysis	1997	13	Advancing the Low-Carbon Transition in Irish Transport	2019
3	Cluster in Ireland: The Irish Indigenous Software Industry: An Application of Porter's Cluster Analysis	1997	14	Transport-Orientated Development: Assessing Opportunity for Ireland Background Case Studies	2019
4	Profit Sharing Employee Share, Ownership and Gainsharing: What can they Achieve?	2000	15	Four Case Studies on Just Transition: Issues for Ireland	2020
5	Sustaining Competitiveness Advantage: Proceedings of NESC Seminar	1998	16	Modelling the Zero-Carbon Transition: International Approaches and Lessons for Ireland	2020
6	Ireland's Child Income Supports: The Case for a New Form of Targeting	2007	17	Energy Transition Pathways and the COVID-19 Pandemic; An analysis of the 'green recovery' responses in Denmark and Ireland	2020
7	State of Play Review of Environmental Policy Integration Literature	2015	18	The Impacts of COVID-19 in Ethnic Minority and Migrant Groups in Ireland	2021
8	Socially Integrated Housing and Sustainable Urban Communities: Case Studies from Dublin	2016	19	Economic Resilience in Sustainable Communities: Innovative Approaches in Public Spending to Maximise Local Benefits	2021
9	The Burren Life Programme; An Overview	2016	20	Challenges and Opportunities for Rural Ireland and the Agricultural Sector	2021
10	Nature's Values; From Intrinsic to instrumental	2017	21	Gender and COVID-19 in Ireland	2021
11	Valuing Nature; Perspectives and Issues	2017	22	Building Long-Term Resilient and Sustainable Cities	2021

23	Perspectives on Micro-Generation: Public Participation in the Low-Carbon Transition in Ireland (MISTRAL)	2021	
24	Exploring Place-based Opportunities for Policy and Practice in Transition	2022	
25	Exploring Shared Opportunities in the North West: Findings from Focus Groups	2023	

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