



TITHE AN OIREACHTAIS

AN COMCHOISTE UM THALMHAÍOCHT, BIA AGUS MUIR

TUARASCÁIL MAIDIR LE ÚSÁID TALÚN: UASMHÉADÚ ACMHAINNEACHTA

HOUSES OF THE OIREACHTAS

JOINT COMMITTEE ON AGRICULTURE, FOOD AND THE MARINE

REPORT ON LAND USE: MAXIMISING ITS POTENTIAL

No. AFM 003

SEPTEMBER 2014

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Chairman's Foreword



As part of its work programme for 2014, the Joint Committee on Agriculture, Food identified the important theme of 'land use' as a high-priority topic which merited examination.

The Joint Committee was interested in learning more about how we can maximise the range of the benefits available from our agricultural land. In particular, the Joint Committee wanted to explore how best Ireland can reach our ambitious Food Harvest 2020 targets in a way that respects sustainability. In that context, the Joint Committee is conscious of the importance of complying with our environmental commitments in relation to agriculture, the importance of enhancing our climate change resilience and the need to maximise carbon sequestration.

Accordingly, the Joint Committee thought it timely to produce a well-researched report which engages with the policy and legislative-making EU process - bearing (in particular) in mind that the European Commission is preparing a land use directive aimed at dealing with the challenges facing agriculture, such as achieving and maintaining food security and sustainability. The Joint Committee were determined that the voice of the Committee and of a range of stakeholders from Ireland be heard at this early stage when outcomes can more realistically be influenced. As one expert pointed out to the Committee during its public hearings:

"Changing land use is a slow process, not only in Ireland but internationally, that requires early engagement because it is difficult to manage. The time horizon is between 2020 and 2050. The European Commission is preparing a land use directive aimed at dealing with the challenges we will be discussing today. We would like Ireland to be in a position to inform this process rather than respond to it in ten years' time."

That series of meetings began in February of this year and were held with a wide and representative range of stakeholders over several months. Those representatives included leading experts from Teagasc, Coillte and the Directorates General of the European Commission. However, the Joint Committee recognises that all of the stakeholders involved have played a key role in the formulation of this report.

Following the meetings with stakeholders, and having considered secondary research carried out by the Houses of the Oireachtas Library & Research Service (L&RS) and the outputs of two very relevant conferences, the Joint Committee prepared this report. The report identifies key issues (Chapter 7):

- Relevant ecosystem goods and services;
- Practical methods of sustainable land use – especially farm management tools; and
- Policy tools (including financial incentives).

The Joint Committee would like to emphasise that these are challenges which must be addressed from a national (or high level) but also concentrated on at farm-level.

In its conclusion, the Joint Committee acknowledged that reaching our Food Harvest 2020 targets while staying within our environmental limits will be a major challenge. However, the experts with whom the Joint Committee have consulted consider that, with the requisite Government commitment and support from the farming community, this should be possible.

Therefore, I would like to express our appreciation to all those who participated in this research and debate process and to record the fact that the Joint Committee greatly valued the opportunity to engage with the stakeholders. I would also like to express my appreciation to the Members of the Joint Committee and for the ever helpful and efficient support of the Oireachtas Library & Research Service, and the Committee Secretariat for their ongoing assistance.

Finally, the Joint Committee notes that this report was prepared shortly before an agreement was reached on a new EU Climate and Energy Policy Framework for the period to 2030 (European Council, held from 23-24 October). The conclusions of that meeting acknowledged the importance of a sustainable agriculture and land use sector, including afforestation, as a key consideration in ensuring coherence between the EU's food security and climate change objectives. In this context, I believe this report is a very important and worthwhile publication for the future, for example in drawing attention to research in relation to carbon sequestration through restoration of cutaway bogs and by soils and vegetation through changes in farming practices.

I commend this report to both Houses of the Oireachtas with a request that the report be debated in both Houses at an early date.



Andrew Doyle T.D.
Chairman

Glossary

BAT	Best Available Technology
BnM	Bord na Móna
CO ₂	Carbon dioxide
CAP	Common Agricultural Policy
DAFM	Department of Agriculture, Food and the Marine
DECLG	Department of Environment, Community and Local Government
DG	Directorate General
EFA	Ecological Focus Area
ETS	Emissions Trading Scheme
EC	European Commission
EEA	European Environment Agency
EPA	Environmental Protection Agency
FH2020	Food Harvest 2020
GHG	Greenhouse Gas
ha	hectare
HNV	High Nature Value
IFA	Irish Farmers Association
Kwh	Kilowatt hour
L&RS	Library & Research Service
NAP	Nitrates Action Programme
RE	Renewable Energy
RBMP	River Basin Management Plan
RDP	Rural Development Programme (of the CAP)
SAC	Special Area of Conservation for habitats and species
SFP	Single Farm Payment (of the CAP)
SPA	Special Protection Area for birds
SI	Sustainable Intensification
WFD	Water Framework Directive, 2000

1. Executive Summary

In light of both our agricultural commitments *and* our many environmental obligations, the Joint Committee on Agriculture, Food and the Marine (the Joint Committee) has, during 2014, undertaken a process of consultation and research aimed at identifying the best ways forward for Ireland to reach our food production targets in a manner that minimises environmental degradation.

In terms of agriculture and food production, Ireland's targets are taken from the strategic Food Harvest 2020 report which is the national vision and driver in terms of growth in the agri-food sector to 2020. The tag-line of Food Harvest 2020 (FH2020) is Smart, Green, Growth and the strategy includes targets for increased food production across the various agricultural sectors. However, the importance of sustainability and protection of the environment in reaching these goals is also a key part of the plan.

Nationally and internationally, Ireland has many environmental obligations, such as reducing greenhouse gas (GHG) emissions, increasing our renewable energy (RE) portfolio, improving water quality and protecting against further biodiversity losses.

As well as a review of the literature on the topic of sustainable land use, the results of this report are drawn from material examined by the L&RS at a conference hosted by Scotland Rural College (SRUC) and the Scottish Environment Protection Agency (SEPA) in April, attendance at expert presentations made to the Joint Committee by UCD, Teagasc, the Environmental Protection Agency (EPA), Coillte, Bord na Móna, Directorates General of the European Commission and a review of a European Commission (EC) conference attended by the Chairman of the Joint Committee, Mr Andrew Doyle T.D., and the Committee Clerk in June 2014. Conferences and presentations were all on the subject of sustainable land use.

Ecosystem services identified as being of particular importance to the goals of this report includes food and biofuel production from fertile soils, renewable energy, carbon sequestration and dispersal of agricultural pollutants from forestry, and pollination and biodiversity services from environmentally friendly farming practices such as agro-forestry and organic food production.

Practical ways in which farmers can increase food production while minimising environmental impacts and making cost savings include:

- Use of various low carbon farming tools such as the Carbon Navigator;
- Nutrient management planning; and
- Availing of best practice through participation in, *inter alia*, the BETTER farms programme and using SmartFarming recommendations.

At farm-level, increased use of high technology plans and the importance of knowledge transfer to farmers through upskilling for all agricultural and environmental farm advisors was highlighted. In addition, greater use of farmer discussion groups and demonstration farms were identified as key ways of increasing food production in a sustainable manner. On a higher national level, concepts such as sustainable intensification (SI) and offsetting (or land sharing) could be further assessed and put into practice where possible.

Policy tools include availing of Government grants for afforestation and bioenergy crops, complying with existing environmental legislation such as the Nitrates Directive and taking advantage of high-technology schemes and greening measures proposed under the new Common Agricultural Policy (CAP) 2014-2020 (due to take full effect in 2015).

This report concludes that Ireland can, in principle, reach our FH2020 targets and environmental commitments but that it will be an ongoing challenge. Work must be continued at both a strategic level and also on a farm-specific level if we are to succeed.

2. Overview

Background to this Report

The Joint Committee was interested in learning more about maximising the benefits from our land and in particular, the best path forward to increase food production from our land in a sustainable manner. The Joint Committee's focus on these issues is timely as FH2020 is focusing on increasing our agricultural outputs in a period when environmental requirements are becoming more stringent. In light of national and international concerns over climate change and other environmental issues such as biodiversity losses and poor water quality, and economic pressures arising out of the recession, the targets proposed in FH2020 must be reached in such a way as to minimise the impact on Ireland's environmental and social fabric while maximising our financial returns. This report may aid policy-making with regard to looking towards more sustainable uses of land and maximising the benefits of what our land has to offer.

Land coverage

According to the EPA¹, our total terrestrial land area (including water bodies, salt marshes and intertidal zones) is 7,111,785 hectares (ha). Of this total land area, in 2012, 61% (4,334,917ha) was under grass, 16.2% (1,149,377ha) wetlands, 10.4% forest (742,481), 5.4% (380,500ha) under crops, 1.6% (117,269ha) settlements and 5.4% (387,241ha) other land. From these figures we can see the importance of farmland in Ireland. Within these figures, 13% of our terrestrial land is also designated as of high biodiversity importance on a European level through the Natura 2000 network.

Of the land uses identified above, those of most importance to this report are agriculture and forestry. In addition, the report touches on bogs and watercourses and their importance to the environment.

Agricultural land – Land under grass and crops make up over 66% of our total land area which highlights the importance of agriculture to Ireland's economy and environment. The

¹ Land use categories in Ireland provided by the EPA as a part of their presentation to the Committee on sustainable land use during spring 2014.

latest factsheet on Irish agriculture (DAFM 2014²) indicates that the three main crops grown here are barley, wheat and oats, followed by potatoes. In 2012, barley made up almost two-thirds of total cropland. Land under grass includes pasture, hay and grass silage and rough grazing. Soil types, location, biodiversity, climate and management practices can all affect the level and type of farming undertaken with productivity and profitability of Irish farms varying across the country. Some land is more suitable to highly intense farming while other land may be of high nature value (HNV) and require more extensive farming methods.

Forestry - the most recent National Forest Inventory (NFI) was carried out in 2012 and concluded that:

- 10.5% of the country is afforested (this is one of the lowest rates in Europe which has an average afforestation rate of over 30%);
- 53% of Irish forests are in public ownership with the remaining 47% in private estates;
- Conifers are the dominant tree species representing 74.2% of all forests and broadleaved forests represent 25.8% (although the percentage of broadleaves in the mix is increasing). The main tree species is Sitka spruce.
- 56% of forests are less than 20 years old;
- The total standing stock of Irish forests is estimated to be over 97million m³;
- Ireland's forests are being harvested on a sustainable level;
- 51% of forests have one or more environmental designation;
- Afforestation on bogs is declining;³ and
- Coillte⁴ is the largest landowner in Ireland.

Concepts

There are a number of concepts used throughout this report which relate to, *inter alia*, sustainable land use. These are briefly described hereunder:

² DAFM, 2014. *Factsheet on Irish Agriculture – April 2014* [online]. Available at: <https://www.agriculture.gov.ie/media/migration/publications/2014/2014APRILFACTSHEET010514.pdf>

³ DAFM, 2014. *Forest Service News, Issue no. 11 – January 2014* [online]. Available at: <https://www.agriculture.gov.ie/media/migration/forestry/forestservicegeneralinformation/forestnewsletters/newsletterfinalversion20032014.pdf> [accessed on 26.06.2014]

⁴ Coillte Teoranta (Coillte) was established under the 1988 Forestry Act as the body with responsibility for public forests in Ireland. Coillte is a commercial private body with a number of functions including timber production, provision of forestry amenities, protection of the forestry environment and community engagement.

- Carbon sequestration – this refers to the capture and long-term storage of carbon dioxide (CO₂) from the atmosphere. CO₂ is naturally stored in soils and plants. Thus, when an area is deforested or a soil is disturbed, CO₂ is released in to the atmosphere adding to GHG emissions. CO₂ can also be sequestered artificially, for example, the capture of CO₂ from a fossil-fuel burning power plant and transfer into empty underground / undersea gas fields for long-term storage.
- Climate change resilience – *the capacity of a system to absorb disturbance, undergo change and still retain essentially the same function, structure, identify and feedbacks.*⁵ In agricultural terms, this relates to the ability of a farm to stand up to the force of climate change, to survive and respond to the change in climate patterns and to continue functioning at an acceptable level. For example, were rainfall to decrease, a farmer could change his choice of crops to drought resistant varieties, thereby increasing the climate resilience of his farm.
- Ecosystems – meaning ecological systems. An ecosystem is a community of living (biotic) organisms (plants, animals, microbes) in conjunction with the non-living (abiotic) components (air, water, soil) of their environment, interacting as a system. For example, a forest ecosystem is a community of trees and other plant life, insects, birds and animals in conjunction with the underlying soil, falling rainwater and air interacting as a system and producing various ecosystem services such as climate regulation through the absorption of CO₂ in the air by the trees. Ecology is the study of ecosystems.
- Ecosystem goods and services – *ecosystems provide essential goods and services, from fertile soil and multi-functional forests to productive land and seas, from good quality fresh water and clean air to pollination and climate regulation and protection against natural disasters.*⁶
- Sustainable development – although there are various definitions and opinions on this concept since its introduction by a 1987 Report from the World Commission on Environment and Development (Brundtland Commission), the Brundtland definition remains commonly in use, defining sustainable development as “*development for current generations without compromising the ability of future generations to meet*

⁵ Rockefeller Foundation, 2009. *Building climate change resilience* [online]. Available at: <http://www.rockefellerfoundation.org/uploads/files/c9725eb2-b76e-42eb-82db-c5672a43a097-climate.pdf> [accessed on 30.06.2014]

⁶ 2013. *General Union 7th Environmental Action Programme to 2020 'living well within the limits of our planet'* [online]. Available at: <http://ec.europa.eu/environment/newprg/> [accessed on 25.06.2014]

their own needs".⁷ The concept encompasses the three pillars of environmental, social and economic development.

- Sustainable land use – relates to maximising the benefits we can obtain from the land, such as the production of food, fibre and fuel while minimising any damage we may cause to ecosystem services associated with the land such as biodiversity, water purification and carbon sequestration.
- Sustainable intensification means *simultaneously improving the productivity and environmental management of agricultural land. The primary goals are a resource efficient agriculture with significantly higher environmental performance. Ecosystem degradation is itself reducing agricultural productivity. Intensification is **not** but will be a consequence of achieving those goals.*⁸

Note on Agriculture: GHG emissions and Carbon storage

GHG emissions

Under the EC Climate and Energy Package, Ireland is required to deliver a 20% reduction in non-ETS GHG emissions by 2020 (relative to 2005 levels). The non-ETS sectors cover those sectors that are outside the EU Emissions Trading Scheme (ETS), one of which is agriculture. Agriculture was responsible for approximately 32% of Ireland's total GHG emissions in 2012. In order to achieve the targets set out in FH2020, the EPA anticipates that GHG emissions from agriculture will increase by 12% between 2011 and 2020.⁹

It is important to note that the two most significant GHGs produced in agriculture are methane (CH₄) and nitrous oxide (N₂O). Enteric fermentation in ruminant livestock (i.e. the dairy and beef herd) is the major source of CH₄. Agricultural soils in the form of direct emissions from the application of chemical and organic fertilisers and indirect emissions as a result of nitrogen leaching and atmospheric deposition of nitrogen are the main sources of

⁷ UNECE, n.d. *Sustainable development – concept and action* [online]. Available at: http://www.unece.org/oes/nutshell/2004-2005/focus_sustainable_development.html [accessed on 30.06.2014]

⁸ Rural Investment Support for Europe (RISE), 2014a. *The Sustainable intensification of European agriculture (preliminary ideas)* [online]. Available at: <http://risefoundation.eu/images/pdf/rise%20folder%20on%20sustainable%20intensification.pdf> [accessed on 14.08.2014]

⁹ EPA, 2013. *Ireland greenhouse gas emissions projections 2012-2030* [online]. Available at: https://www.epa.ie/pubs/reports/air/airemissions/EPA_GHG_Emission_Proj_pub_2013_FINAL.pdf [accessed on 14.08.2014]

N₂O. Both CH₄ and N₂O are also released from slurry. In addition farm combustion of fuels releases CO₂, and precursors of N₂O. This represents about 5% of the total GHG emissions from the sector. *As such, reference to 'low carbon' farming in this report includes all of the above GHG emissions (N₂O, CH₄ and CO₂) in its scope.*

Carbon storage

Globally, soils contain roughly twice as much carbon as the atmosphere and three times as much as vegetation.¹⁰ As such, in addition to recognising forestry and peatlands as carbon sinks, the importance of agricultural soils as carbon sinks (depending on management practices etc.) should also be accounted for.

The importance of sustainable land use

The importance of sustainable land use cannot be underestimated if Ireland is to meet our FH2020 targets *and* comply with our environmental commitments. The interactions between agriculture and the environment must not be ignored and more and more pressure is being put on governments to ensure that countries consider the social, economic and environmental impacts of agriculture. To maximise the benefits of our farmland we need to become cleverer about how we use the land. Maximising output does not always require us to maximise inputs. For example, nutrient management planning is very important and farmers may put too much fertiliser on the land when a lower quantity could result in the same crop yields *and* reduce the risk of contaminated run-off into ground- and surface waters.

Case study: Scotland

Ireland does not currently have a national Land Use Strategy (LUS) and as such, the Scottish LUS has been reviewed for this report to help us identify how, in the future, an LUS for our country could be best developed.

Scotland's first Land Use Strategy (LUS) was published in 2011. Its origin was in the *Climate Change (Scotland) Act, 2009* and it will be revised at least every five years. The LUS has a vision, three key objectives embracing the three pillars of sustainability (environment,

¹⁰ IPCC, 2000. *A special report on land use, land use change and forestry* [online]. Available at: <https://www.ipcc.ch/pdf/special-reports/spm/srl-en.pdf> [accessed on 14.08.2014]

economy and society) and ten principles. Their vision is to fully recognise, understand and value the importance of the land and to ensure future policy and planning decisions take due cognisance of this.

The three objectives of the LUS are:

1. Land based businesses working with nature to contribute more to Scotland's prosperity;
2. Responsible stewardship of Scotland's natural resources delivering more benefits to Scotland's people; and
3. Urban and rural communities better connected to the land, with more people enjoying the land and positively influencing land use.¹¹

To secure these objectives, the LUS identified ten key principles for sustainable land use which public bodies are expected to consider when making plans and decisions on land use:

1. Encouraging opportunities to obtain multiple uses from the same land;
2. Minimising the burden on businesses while ensuring regulation protects public interests;
3. Recognising the suitability of land for a particular land use (where this is the case, e.g. food production, carbon storage etc.);
4. Ensuring an understanding of ecosystem services;
5. Manage land change in a sympathetic and positive manner;
6. Take climate change and GHG emissions into account;
7. Try to restore derelict or vacant land so it can be used for economically, socially or environmentally productive uses;
8. Encourage public access and outdoor recreation;
9. Provide opportunities for the public to engage in debates and decisions; and
10. Encourage opportunities to broaden the public's understanding of the links between land use and daily living.¹²

In addition to current policies, under the LUS, the Scottish Government commits to the following:¹³

¹¹ Natural Scotland, 2011. *Getting the best from our land, a guide to Scotland's first land use strategy* [online]. Available at: <http://www.scotland.gov.uk/Resource/Doc/346071/0115177.pdf> [accessed on 03.07.2014]

¹² *Ibid*

1. Publish an action plan;¹⁴
2. Provide annual progress statements;¹⁵
3. Align land use regulations and incentives with LUS;
4. Encourage land-based businesses to take actions which further reduce GHG emissions;
5. Use LUS objectives to influence further CAP negotiations;
6. Use demonstration projects;¹⁶
7. Identify more closely which types of land are better for afforestation;
8. Demonstrate how the ecosystem approach could be taken into account in relevant decisions;
9. Develop a methodology to take account of changes in soil carbon for carbon accounting services;
10. Investigate the relationship between land management changes and ecosystem processes;
11. Develop the land-use aspects of Scotland's climate change adaptation framework;
12. Identify and publicise effective ways for communities to contribute to land-use debates and decisions making; and
13. Provide a Land Use Information Hub on the LUS website.

As well as their LUS, Scotland already has a Forestry Strategy and Catchment Management Initiatives but these are limited in scope. The LUS encompasses national and local government and land owners and managers. It aligns incentives and regulations to the LUS, recognising the value of ecosystem services and the importance of natural capital.

Integrated sustainable land use is the prize, the challenge is in how to deliver and make this happen.

[Farming for a Better Climate \(FFBC\)](#)

One practical way in which Scotland has attempted to reduce the GHG emissions of their farms is through their FFBC Initiative. The FFBC Initiative combines ideas trialed by Scotland's volunteer Climate Change Focus Farms and information from up-to-the-minute

¹³ *Ibid*

¹⁴ Available [here](#)

¹⁵ Available [here](#)

¹⁶ Demonstration farms have been chosen and worked with to reduce GHG emissions and costs. Further information available [here](#)

scientific research. This is a targeted strategy designed to encourage farmers to adopt efficiency measures that decrease GHG emissions and help them adapt to climate change while at the same time having an overall positive impact on business performance.

Agricultural consultants offer practical advice to help farmers choose the most relevant measures to improve both their farm performance and resilience to future climate change effects. The aim is to help farms thrive in a carbon-conscious future and adapt to a changing climate to secure farm viability for future generations.¹⁷

UK status on sustainable land use

While Scotland has an LUS, there is no coherent framework for sustainable land use for the UK as a whole. This was recently highlighted with the 2014 publication of *The best use of UK agricultural land* by the Cambridge Natural Capital Leaders Platform (University of Cambridge).¹⁸ The report is about how best to manage the UK's agricultural land in the context of food and energy security for a growing population, climate change obligations and environmental protection. The report focused on various increasing demands to be placed on agricultural land as the population grows and on ways in which the supply chain could keep up with this demand. It also identified the lack of both information available and of collaboration between departments stating that work was being undertaken "piecemeal" with no one vision provided by Government. With the information available to them, the authors concluded that there would be a gap in the supply and demand of land, with a deficit of an estimated 7 million ha. Ways in which to mitigate this include meeting multiple demands with the same land. For example, certain bioenergy crops can provide carbon sequestration, wildlife habitat and flood reduction.

The key objectives of the report are:

- Improved food security;
- Increased UK energy security;
- Better protection of nature;
- Improved competitiveness; and
- Enhanced recreational space.

¹⁷ Information on this section available [here](#)

¹⁸ University of Cambridge, 2014. *The best use of UK agricultural land* [online]. Available at: <http://www.cisl.cam.ac.uk/Business-Platforms/Natural-Capital-Leaders-Platform.aspx> [accessed on 02.07.2014]

Additional demands to be placed on agricultural land by 2030 analysed were:

- Increased residential land needed for growing population;
- Land needed to meet bioenergy targets;
- Improving UK food security through replacing some imports and increasing certain exports;
- Improved wildlife and habitat protection;
- Increased forest cover; and
- Land dedicated to improved water management (wetlands and reservoirs).

Ways of keeping supply up with demand analysed were:

- Sustainable intensification opportunities;
- Increased livestock yields;
- Reductions in food waste; and
- Change in UK food habits (reduce meat and dairy intake).

The report concluded that maximising the use of agricultural land would bring the gap between supply and demand down to a deficit of 2m ha. This could be possibly further reduced by maximising the same land to provide multiple benefits. The Report recommended a number of actions for the UK Government as follows:

1. Develop an integrated action plan detailing how to bring various departments together, address policy gaps etc;
2. Identify the key land decisions to be made to help the UK adapt to climate change;
3. Support research into further analysis of sustainable land use; and
4. Use land use analysis to inform future negotiations on CAP reform.

To achieve these actions the author concluded that the UK Government would need to 'kick start' debate by raising awareness of the issues and to propose the creation of a joint Government and industry group to develop a decision making framework and action plan.

3. Reaching Food Harvest 2020 targets sustainably

Importance of Ireland's agri-food sector

The agri-food sector is Ireland's most important indigenous industry, employing a total of 175,300 people.¹⁹ Bord Bia estimated that Ireland exported €9,990 million (i.e. almost €10 billion) worth of food and beverages in 2013 (a 9% increase from 2012). Dairy products and ingredients (31%) and beef (21%) made up the largest share, followed by prepared foods (17%) and beverages (13%). The remaining 18% was made up of seafood, pig-meat (5% each), poultry, edible horticulture, live animals and sheep-meat (2% each). As the industry continues to grow, the UK remains the largest export destination for Irish food and drink with 42% of exports worth an estimated €4.1 billion reaching that market in 2013. Agri-food and drink exports to other EU markets also increased in 2013. Exports to the People's Republic of China grew over 40% with values trebling over the last three years to €390 million in 2013. China is now Ireland's sixth largest market overall, driven in particular by strong dairy and pork exports.²⁰

Food Harvest 2020

An industry-led Committee was established to prepare and present to the Minister for Agriculture, Fisheries and Food a draft strategy for the medium-term development of the agri-food (including drinks), fishing and forestry sectors. To achieve the development of the sector, the industry-led Committee made recommendations for the overall sector and also for the specific sectors. The result of this work was the launch in 2010 of Food Harvest 2020 (FH2020) by the Department of Agriculture, Food and the Marine. [Food Harvest 2020](#) is Ireland's strategic framework for the agri-food and drinks, forestry and fishing sectors of the Irish economy to 2020. For the purpose of this report, as the focus is on sustainable *land* use, we will not consider the fisheries aspects of the FH2020.²¹ The FH2020 tagline is

¹⁹ DAFM, 2014. *Fact Sheet on Irish Agriculture – April 2014* [online]. Available at: <http://www.agriculture.gov.ie/media/migration/publications/2014/2014APRILFACTSHEET010514.pdf> [accessed on 14.08.2014]

²⁰ Bord Bia, 2014. *Irish food and drinks exports approach almost €10 billion for the first time* [online]. Available at: <http://www.bordbia.ie/corporate/press/pages/ExportPerformanceProspects2014.aspx> [accessed on 14.08.2014]

²¹ However, some aspects of FH2020 were discussed by the Oireachtas sub-Committee on Fisheries in their report (January 2014) entitled *Promoting Sustainable Rural Coastal and Island Communities*, available online at:

Smart, Green, Growth – act **smart** by investing in ideas, knowledge and skills, think **green** by maximising the benefits from our extensive, low-input grass-based production systems and achieve **growth** through minimising input and distribution costs and increasing our production. In this manner, the Government aims to grow the agricultural sector in a sustainable and innovative manner.

The three principal growth targets identified under FH2020 are:

- Increasing the value of primary output in the agriculture, fisheries and forestry sector by €1.5 billion (a 33% increase compared to 2007-2009 average);
- Increasing the value-added in the agri-food, fisheries and wood products sector by €3 billion (a 40% increase compared to 2008); and
- Achieving an export target of €12 billion for the sector (a 42% increase compared to the 2007-2009 average).

To achieve the growth and competitiveness required if we are to reach the above goals, the industry must improve productivity, increase scale, target research and enhance skills and organisational capabilities. Sustainable growth must also aim to reduce waste, maximise renewables and embrace environmentally-friendly food production systems.

Competition and knowledge transfer at farm-level needs to increase and there are also industry-level challenges including the reduction of key inputs such as energy and labour.

Environmental sustainability is essential and we must find ways to decrease the carbon footprint from farming, improve water quality, contribute to the conservation of biodiversity and increase the use of renewable energy.

An in-depth knowledge of customer preferences and consumer focus will help the agri-food industry. Many customers are conscious of the environmental footprint of their food, animal welfare issues and authenticity which has led to a rising demand for organic produce, an area which offers potential growth opportunities. Branding is also very important and FH2020 recommends the establishment of an umbrella brand for Irish food and drink.²²

<http://www.oireachtas.ie/parliament/media/Draft-3-Final-Report-on-Promoting-Sustainable-Rural-Coastal-and-Island-Communities.pdf>

²² This has been achieved through the introduction of Origin Green, a brand which applies to Irish food and drinks which have met various sustainability criteria.

Another way to reach FH2020 targets is to add value to our food and drinks products, taking primary processing further by for example, making infant formula, deli meats and artisan foods.

As well as setting out overall goals for agriculture, FH2020 reviews the position of each sector and makes sector-specific recommendations²³ which include the following:

- Beef – this sector has strong export success and we must maintain this and keep our prices competitive. 20% growth in the sector is considered achievable by the Committee by 2020 (based on 2007-2009 figures). Recommendations include improving farm competitiveness with a focus on genetic improvement and product quality, increased technology and knowledge transfer, through for example greater use of the BETTER Farms programme and better production systems with reduced age at slaughter and improved feed conversion rates in cattle.
- Dairy – the medium to long-term outlook for dairy is good with the removal of quotas due in 2015 giving Irish farmers an opportunity to increase milk production and the growing demand for dairy products across the world. A target of 50% increase in milk production by 2020 is considered realistic by the industry-led Committee (from 2007-2009 average). Recommendations include consolidating the milk processing sector, improving farm competitiveness through increasing the quality of milk produced while protecting animal welfare and technology transfer by ensuring progressive dairy farmers are engaged in discussion groups. The sector could also improve R&D and marketing to promote strong brand recognition for Irish grass-based milk products and research ways to reduce GHG emissions.
- Sheep – the sheep sector has been struggling but demand is expected to outstrip supply in coming years which will hopefully offer Ireland an opportunity to increase sheep exports. A 20% growth in output value of sheep by 2020 is considered achievable by the Committee (in comparison to 2007-2009 average). Recommendations include improving farm competitiveness through improved breeding and product quality, ensuring processing capacity keeps up with demand and extending the product range.
- Horticulture (including potatoes) – this sector is mostly for the domestic market (with the exception of mushrooms, Christmas trees, nursery stock and cut foliage) and faces a lot of competition. Recommendations include restoring competitiveness

²³ Note that some sector-specific targets have already been met and subsequently revised.

through development of producer organisations to facilitate greater bargaining power and rectifying branding and marketing issues by promoting health benefits of fruit and vegetables and looking into the production of non-traditional fruit and vegetables.

- Organic – although relatively small in comparison to other sectors of the agri-food industry, there are opportunities for growth. It is considered that an ambitious increase in organic land use from over 1% to 5% will require actions but is possible. Recommendations include continuing support to the sector through grant-aided organic schemes, building consumer confidence and developing export markets.
- Pigmeat – makes a valuable contribution to farm income, employment and export earnings. Demand for pork is growing worldwide and for a target of 50% growth in output value by 2020 (from 2007-2009 average), the sector must increase profitability and likely increase unit size. Recommendations include adapting production methods while minimising environmental impacts, keeping Ireland disease free and ensuring compliance with EU animal welfare requirements.
- Cereals – albeit small, this sector makes an important contribution to the economy with two-thirds of grain produced here used for animal feed purposes and the remainder a vital ingredient for Ireland's brewing, distilling and flour-milling industries. Competition is strong but the outlook for EU markets to 2020 is good. In addition, domestic demand for feed will grow if herd numbers increase in line with the other FH2020 targets. Recommendations include placing greater emphasis on diversification in the tillage crops grown, improved branding and continued impartial research by Teagasc on genetically modified (GM) crops.
- Poultry – this is a domestically focussed sector and despite severe competition from imports, the sector has held up well. The industry-led Committee consider that this sector could have a 15% increase in value of output by 2020. Recommendations to protect the industry include rigorous implementation of zoonoses legislation, continued promotion of poultry and eggs Bord Bia Quality Assurance Schemes and provision of grant-aid for adaptation to enriched cages.

Note on Consumption vs Production

Please note that although issues such as changing diets (e.g. to reduce meat intake in developed countries) and reducing food wastage are very important in the context of reducing the negative environmental impacts associated with farming, they are not discussed in this report as FH2020 is focused on production rather than consumption.

FH2020 – Environmental Analysis Report

In order to assess the potential environmental impacts from the increased food production proposed by FH2020, Philip Farrelly & Co., Agricultural Consultants were commissioned on behalf of the Department to carry out an environmental analysis. Their report, [*Food Harvest 2020 – Environmental Analysis Report*](#) was published in January 2014.

The terms of reference of the report were to undertake an analysis of FH2020 and identify the likely environmental impacts arising from the achievement of the targets within FH2020. Mitigation measures to minimise adverse environmental impacts identified have also been proposed. In doing this, the study used the FAPRI-Ireland model²⁴ as the scenario upon which they based their assumptions. For a more detailed sector-specific analysis, the author also considered a number of other scenarios but overall, the identification of key pressures, likely impacts and proposed mitigation measures were based on the FAPRI-Ireland model.

The main conclusions of the report are as follows:

On a national / high level, reaching the targets set out in FH2020 will likely lead to a slight negative environmental impact²⁵ on biodiversity, flora & fauna, water quality, air quality and GHG emissions. These pressures, impacts and mitigation are broken down as follows:

- Biodiversity / flora & fauna – slight negative impact due to risks associated with projected increases in input of organic and chemical nitrogen (N) and phosphorous (P), loss of habitats, subsequent impact on certain species such as lowland farmland birds primarily as a result of expansion of the dairying, pigs and poultry sectors. High level mitigation measures include a system for environmental monitoring and reporting while farm appropriate advice is also important at a single farm or regional level.
- Natura 2000 sites – at a high level the potential impacts on Natura 2000 sites are generally non-significant and direct loss of Natura 2000 habitat is unlikely. However, potential pressures from implementing FH2020 include change in grazing regime,

²⁴ The FAPRI-Ireland model of the Irish agricultural sector was constructed and is maintained at the Rural Economy Research Centre (RERC), Teagasc. The model was developed to quantify the effects of various different policy scenarios within the agricultural sector (at an Irish, EU and world level). The model has the capability to provide valuable information to those outside of agriculture, for example, the interactions between the agricultural sector and the environment.

²⁵ A slight negative impact here means an impact which causes noticeable changes (negative) in the character of the environment without affecting its sensitivities.

impact on water quality, nutrient loading of terrestrial habitats and change in land management. Impacts from pressures could lead to alteration of nutrient status for sensitive habitats and species. Recommended mitigation measures include a monitoring programme, compliance with relevant environmental legislation and targeted knowledge transfer to farmers.

- Water quality including drinking water – under the Water Framework Directive (WFD) Ireland must achieve good status for all waters by 2015²⁶. Pressures identified here include nutrient enrichment, sedimentation and acidification of surface waters, nitrate and phosphate leaching into groundwater, microbial contamination and contamination from various farm chemicals. Pre-mitigation the overall impact is slight negative. Mitigation measures recommended include improved nutrient management planning at single farm and catchment level, ongoing monitoring of surface water, improved environmental monitoring and reporting and better knowledge transfer.
- Soils – soils are considered to be in a generally good state in Ireland. Key pressures include changes to land use patterns (intensification or abandonment) and land drainage issues which could lead to impacts such as erosion, compaction and contamination. Recommended mitigation includes knowledge transfer targeted at farmers, support for a legislative framework for protection of soils and further research into the impacts from land drainage.
- Air quality – overall Ireland has good air quality and the main pressure is from increased ammonia emissions as a result of higher livestock numbers leading to a slight negative impact. Mitigation measures include use of best available technologies (BAT) such as low-emission landspreading techniques and continued research and knowledge transfer.
- Landscape and buildings – key pressures identified include removal of landscape character through changes in farming practices and impacts caused by large agricultural buildings. Overall impact was found to be imperceptible.
- Climate change and GHG emissions – the impact on climate change from FH2020 is slight negative as a result of an increase in CH₄ emissions from livestock and emissions from fertilizer application. Key recommendations include the adoption of best technology in breeding and inputs and land use change for offsetting.

²⁶ Where this is not possible, reasons must be documented in RBMPs. Extended deadlines for certain waters are proposed to 2021 and 2027.

Many mitigation measures are already within the control of individual farmers, for example, compliance with environmental legislation such as the nitrates regulations and cross-compliance as a requirement for receipt of Single Farm Payment (SFP) under CAP.

As a result of the environmental analysis, the report states that:

The key mitigation measure identified is the adoption by as many farmers as possible of best available technology and a targeted environmental up skilling of advisors and a funded knowledge transfer programme is recommended. To this end it is recommended that a future agri-environmental scheme under the RDP 2014 to 2020 should target the procurement on an individual farm basis of best practice environmental and high technology plans. (pg xvi)

Of the key mitigation measures described above, the most effective mitigation measure is the adoption of high technology production changes. While the analysis acknowledges that some farmers are already using best practice, the challenge lies in extending this out across the country so that as many farmers as possible are farming to the highest efficiency levels possible. Other important recommendations made in the Environmental Analysis of FH2020 include:

- The design of future agri-environment programmes to deliver best practice and targeted environmental advice at farm level; and
- The creation of a formal structure to facilitate the dissemination of research results and technology innovations between Teagasc Research Service and all Approved Farm Advisors.

The report further concluded that negative impacts from increasing food production can be reversed and rendered neutral / imperceptible in most cases and lead to environmental gain in some instances if mitigation measures are implemented.

Reaching FH2020 targets sustainably

Environmental Analysis of FH2020

As identified in the FH2020 Environmental Analysis Report the attainment of a sustainable environment *and* the FH2020 targets are more likely given the following:

- The knowledge and experience of the industry-led Committee members who generated FH2020;

- Implementation of the mitigation measures proposed;
- Compliance with existing regulations, knowledge transfer and the nationwide use by farmers (in so far as is possible) of best available technology;
- The on-going support and monitoring of FH2020 by the HLIC;
- Annual reporting on the FH2020 progress to targets;
- Recent establishment of Agri-Research Expert Advisory Group; and
- Potential from decisions made on the RDP 2014-2020 for funding of targeted measures.

Sustainable farming initiatives

Farming initiatives developed by our agricultural and environmental bodies which will help Ireland achieve our FH2020 targets in a sustainable manner are outlined hereunder.

BETTER farm programme

A Teagasc / Irish Farmers Journal initiative, the BETTER (Business, Environment and Technology through Training, Extension and Research) farm programme brings Teagasc expertise to farmers by transferring knowledge from research into practice.

Knowledge transfer is achieved primarily in three ways – through research farms run by Teagasc research staff, demonstration farms whereby farmers of well-run commercial farms volunteer to use their farm for demonstration purposes and receive advice from Teagasc as to the best ways to improve efficiencies on farm and through farm discussion groups.

Currently the [BETTER farm programme](#) is available for beef, tillage and sheep enterprises but it is anticipated to expand into all major farming enterprises.

The focus for beef farms is on increasing profitability by reducing farm production costs and increasing farm output. This is achieved by focussing on improved breeding, better grassland management, performance monitoring and knowledge transfer. Results from Phase 1 of the programme have shown that with a focussed approach, beef farmers can make significant gains in improving their output and increasing their gross margin.

The Better farms crops programme involves advisors working with tillage farmers to help them avail of BAT and business methods, to improve profitability and to develop links between research, advice and tillage farms. This is being achieved through working with

selected tillage farmers, examining their production systems and implementing the latest research and technologies to maximise efficiencies.

The overall objective of the Better Sheep farms programme is to establish focal points for the on-farm implementation, development and evaluation of technology relevant to the sheep sector. The use of collaborating farms will help support the wider adoption of better grassland management, improved breeding and more efficient production methods with the aim of enhancing the future sustainability of Irish sheep farms.

SmartFarm programme

The [SmartFarm programme](#) is a collaboration between a number of bodies but principally between the EPA and the IFA (and driven by the IFA). Described as a way to help improve farm returns with better resource management, this is a voluntary on-farm resource efficiency and cost saving programme. There are seven major themes to the smart farming programme – soil fertility, grassland, machinery, time management, inputs, energy and feed. The approach includes top tips on how farmers can save money by doing simple things for little or no investment. It increases efficiency and production on farms and provides a double dividend in the forms of saving money and reducing the farms environmental impact. Knowledge skills are diffused across the farming sector through volunteer farms demonstrating benefits achieved from participation in the smart farming programme, farmers discussion groups and regional seminars.

Origin Green

A Bord Bia initiative, the [Origin Green](#) plan was launched in 2012 and encompasses both farmers and food and drinks companies. The Origin Green ambition is to make Ireland a leader in sustainable production of food and drinks. To do this, the plan is for:

- Developing tools for farmers to improve performance and reduce environment impacts in areas including GHG emissions, biodiversity, water and energy usage. To date, over 65,000 carbon assessments of Irish farms have been undertaken by Bord Bia; and
- Aiming to sign all Irish food and drinks manufacturers up to an environmental charter by end 2016. The voluntary sign up involves manufacturers setting targets in areas such as GHG emissions, water, energy and biodiversity. Once independently verified and approved, the companies can use the Origin Green logo in their marketing and

communications. So far there are 57 verified members of Origin Green with a total of 342 companies signed up to the programme.

Origin Green is an extensive and robust sustainability programme operating across all sectors including beef, pig meat, sheep, poultry and horticulture. By setting measurable and independently verified goals, the programme will enable Ireland to achieve the ambition of seeing 100% of Irish food and drinks exports committed to a sustainability charter by 2016. Information on output levels, grazing season length, fertilizer use, water conservation and farm ecosystems on an individual farm basis allows for the development of tailor made advice plans for farmers which help them identify areas for improvement. The implementation of Origin Green makes Ireland the first country in the world to introduce a sustainability programme for the entire food and drinks industry. It is a roadmap for the whole sector, bringing together Government, science and industry.

Carbon Navigator

Bord Bia and Teagasc have developed a Carbon Navigator tool which farmers can use to improve their financial performance while also reducing the carbon footprint of their farms. The Carbon Navigator is an online software tool which assists farmers in understanding their GHG emissions at an individual farm level. Sustainability information is gathered for the farm on grazing season length, breeding details, calving intervals, fertiliser & energy use, manure management and milk production. This information enables farmers to set themselves targets in each key area and see the potential impact of reaching these targets in terms of reduced costs and enhanced environmental performance.

To date, the Carbon Navigator has been accessed by over 65,000 farmers. If farmers take action based on the results of their individual farm reading, it is anticipated that the carbon footprints of Irish farms will reduce (in line with an increase in their profitability). The Carbon Navigator also links in with the Origin Green programme for farmers.

Policy tools

CAP 2014-2020

The most recently reformed CAP (2014-2020) will come into force across member states from 1st January 2015. The environment and sustainability have been placed at the core of the new CAP and 'greening' measures are now an intrinsic part of both Pillar I (direct payments) and Pillar 2 (rural development).

Under Pillar 1, farmers in receipt of direct payments will be obliged to comply with mandatory requirements in the areas of soil, carbon and biodiversity through the use of crop diversification, permanent grassland and ecological focus areas (EFAs).

Under Pillar 2, the Minister for Agriculture, Food and the Marine, Simon Coveney, TD submitted Ireland's draft RDP to the EC in July 2014. Within the proposals contained in our draft RDP, there is a clear coherence between the over-arching aims of FH2020 and the greening measures set out under Pillar 2.

Measures under the draft RDP for Ireland include GLAS (the Green Low-Carbon Agri-Environment Scheme), organic farming, Areas of Natural Constraint, TAMS (Targeted Agricultural Modernisation Scheme) II, Bioenergy, Knowledge Transfer, Support for collaborative farming, Beef data and genomics programme and LEADER programmes.

An example of the coherence between the CAP reform and recommendations from the Environmental Analysis of FH2020 is the provision of a suite of knowledge transfer measures proposed in the RDP with funding of €112 million. Measures include €2 million in support for the Continued Professional Development of advisors to ensure farmers receive the most up-to-date knowledge and that best practice underlies the operation of RDP schemes.

Sustainable farming strategies

Sustainable Intensification

As defined in Section 2, *Overview*, of this report, Sustainable Intensification (SI) of agriculture is a *concept which aims to steer farmers to land management which has a better balance between food production and the environment*.²⁷ This concept of SI runs through much of the literature reviewed and many of the presentations attended as a method of increasing food production without changing land from other uses such as forestry to agriculture. As such, the use of SI here could help Ireland reach FH2020 targets *and* comply with our environmental commitments.

²⁷ RISE, 2014b. *The sustainable intensification of European agriculture* [online]. Available at: http://www.risefoundation.eu/images/pdf/si%202014_%20full%20report.pdf [accessed on 14.08.2014]

An important publication to come out of Europe during summer 2014 was the Rural Investment Support for Europe Foundation (or RISE) report, [*The sustainable intensification of European agriculture*](#).²⁸ The following information is drawn from that publication.

The reasoning behind SI from a global aspect is that it would be unacceptably damaging to the environment if the necessary future expansion of world food production were based on further conversion of forest, grasslands and wetlands. As such, further increments in food production must come very largely from higher yields on **existing** agricultural lands.

Although most new pressures for food will arise outside of the EU, and agriculture in Europe is already amongst the most intensive in the world, the critical issue is that intensification of agriculture in Europe has been associated with negative environmental impacts in the past. As such, it is important for Europe to be able to show how high intensity, productive agriculture can be combined with much higher standards of environmental performance.

The prime objective of SI is not intensification *per se*, or an increase in environmentally harmful inputs, rather the aim is to improve the resource efficiency of the land. A key objective of SI is to increase knowledge per hectare.²⁹

In an international context the view with regard to SI / profitability has been described thus:

*[SI] should not be associated with any one approach to agriculture; it should be treated as a necessary paradigm shift, which must be applied to all agriculture, whatever its scale, to ensure that food systems can provide for the needs of future generations...One of the overwhelming outcomes of our roundtable discussion was the conclusion that for farming to be sustainable, it must also be profitable...for those people directly involved in it and must also be able to support and perpetuate rural communities.*³⁰

There is no simple or single formula for SI and it will mean increasing agricultural outputs in some cases and conservation outputs in others, and in some situations both. At a high level,

²⁸ During the video conference with the EC and the Committee in June, 2014, the EC also recommended that the Committee consider the RIS analysis when writing up this report.

²⁹ Statistics regarding the scope for SI in Ireland and Europe are summarised in the section dealing with the conference attended by the Chairman and Clerk of the Committee (see p.69 of this paper).

³⁰ Future Directions International (FDI) Workshop reports – ‘Sustainability, Agricultural developments and the World’s future food needs’ (8 October 2013) available online at: <http://www.futuredirections.org.au/workshop-papers/1365-sustainability-agricultural-development-and-the-world-s-future-food-needs.html>

strategic action needs to be taken by public authorities and the actions will primarily be the responsibility of the agri-food industry and farmers.

Ways in which farmers can initiate action include:

- Adopting environmentally-friendly systems such as organic farming;
- Opting for specific farming practices to tackle a particular problem of sustainability;
- Try to more actively improve the environmental performance of the farm;
- Collaboration with other farmers to improve environmental performance; and/or
- Consider if significantly higher environmental performance might be brought about through private sustainability certification schemes.

Land Sharing, Land Sparing and Offsetting³¹

Land Sharing - attempts to meet both agricultural and conservation needs within the same area. This approach aims to make existing farmland as hospitable to wildlife as possible by reducing pesticide and fertiliser inputs and retaining habitats such as trees, hedges and ponds. Land sharing aims to create a multifunctional landscape that attempts to integrate food production, nature conservation, biofuel production and other ecosystem services. However, it can limit yields, so more land area is required to produce a given amount of food. Land sharing can work, for example, through the use of agri-environmental schemes.

Land Sparing - Land sparing works on the basis that increasing yields on existing agricultural land can make it possible for other land to be 'spared' for nature conservation. In theory, this could provide larger areas of land dedicated for wildlife and has the potential to ensure large scale, high quality habitats. There are two key components to land sparing:

- Sustainable Intensification; and
- Protection of existing natural habitats, or restoration of natural habitat where it has previously been lost.

³¹ Information taken from House of Commons, 2012. *Balancing agriculture with nature* (postnote no. 418, September 2012) [online]. Available at: www.parliament.uk/briefing-papers/POST-PN-418.pdf [accessed on 14.08.2014]

Offsetting - In the context of land sparing, biodiversity offsetting principles could be used to link agricultural intensification to protection and/or restoration of 'spared' land.

Note on Carbon leakage

Carbon leakage occurs when there is an increase in GHG emissions in one country as a result of an emissions reduction by a second country with a strict climate policy. In the context of Irish agriculture and GHG emissions, due to our grass-based system, Ireland's milk and beef production operates on a low carbon and emission efficient model. As a result, Ireland has the lowest and fifth lowest carbon footprint for the production of milk and beef respectively in Europe.

A unilateral reduction in meat production from Irish agriculture in the face of growing global demand for livestock produce is likely to be substituted by increased production of livestock in other jurisdictions or regions of the world. Given the favourable ranking of Irish agriculture in terms of carbon-efficiency, there is a significant risk that substitution will take place in farming systems with a higher carbon-footprint. The net result of this 'carbon leakage' will be a reduction in national (Irish) GHG emissions from agriculture, but an overall *increase* in global GHG emissions from agriculture. As such, it is important to maintain a strong and sustainable agricultural base in Ireland to take account of the challenges ahead in meeting increased demands for food *and* minimising GHG emissions globally.³²

³² Teagasc, 2013. *Carbon neutrality as a horizon point for Irish agriculture* [online]. Available at: <http://www.teagasc.ie/publications/2013/3002/CarbonNeutrality.pdf> [accessed on 28.08.2014]

4. National and European obligations

There are a number of key national and EU strategic environmental policy instruments/concepts and RDP priorities which have the potential to impact on sustainable land use in Ireland and upon reaching our FH2020 targets. Most of the key instruments are included in the 7th General Union Environment Action Programme (EAP) to 2020 (Decision No. 1386/2013/EU).³³

These key instruments are briefly described hereunder as they relate to Ireland and/or at EU level:

Natura 2000 legislation & associated Irish Prioritised Action Framework³⁴

Natura 2000 is a pan-European network of habitats and species of ecological importance which are designated as Special Areas of Conservation (SACs) under the Habitat's Directive (92/43/EEC)³⁵ and/or Special Protection Areas (SPAs) under the Birds Directive (79/409/EC)³⁶.

Natural Heritage Areas

The basic designation for wildlife under national law in Ireland is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitats need protection.

Habitats Directive and Special Areas of Conservation

Special Areas of Conservation (SACs) are the prime wildlife conservation areas in the country, considered to be important on a European as well as Irish level. Most SACs are in the countryside, although a few sites reach into town or city landscapes, such as Dublin Bay and Cork Harbour.

³³ Brochure of the 7th EAP available at: <http://ec.europa.eu/environment/pubs/pdf/factsheets/7eap/en.pdf>

³⁴ Information on this section taken from: <http://www.npws.ie/protectedsites/>

³⁵ Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna, available [here](#)

³⁶ Council Directive 2009/147/EC on the conservation of wild birds (codified version of Directive 79/409/EEC), available [here](#)

The legal basis on which SACs are selected and designated (and then transposed into Irish law) is the Habitats Directive. The Directive lists certain habitats and species that must be protected within SACs. Irish habitats include raised bogs, blanket bogs, turloughs, sand dunes, machair (flat sandy plains on the north and west coasts), heaths, lakes, rivers, woodlands, estuaries and sea inlets. The 25 Irish species which must be afforded protection include Salmon, Otter, Freshwater Pearl Mussel, Bottlenose Dolphin and Killarney Fern.

The areas chosen as SAC in Ireland cover an area of approximately 13,500km². Roughly 53% is land, the remainder being marine or large lakes. Across the EU, over 12,600 sites have been identified and proposed, covering 420,000 sq. km of land and sea, an area the size of Germany.

Birds Directive and Special Protection Areas

Ireland is required under the terms of the EU Birds Directive to designate Special Protection Areas (SPAs) for the protection of endangered species of wild birds.

Every summer 24 species of seabird, numbering over half a million individuals, seek out suitable breeding habitat principally on mainland cliffs and on marine islands. These breeding sites are in close proximity to the rich foraging habitat of continental shelf waters. Ireland is particularly important for its breeding populations of Manx Shearwater and Storm Petrel.

Ireland's SPA Network encompasses over 570,000 ha of marine and terrestrial habitats. The marine areas include some of the productive intertidal zones of our bays and estuaries that provide vital food resources for several wintering wader species including Dunlin, Knot and Bar-tailed Godwit. Marine waters adjacent to the breeding seabird colonies and other important areas for seaducks, divers and grebes are also included in the network.

The remaining areas of the SPA network include inland wetland sites important for wintering waterbirds and extensive areas of blanket bog and upland habitats that provide breeding and foraging resources for species including Merlin and Golden Plover.

Agricultural land represents a share of the SPA network ranging from the extensive farmland of upland areas where its hedgerows, wet grassland and scrub offer feeding and/or breeding opportunities for Hen Harrier to the intensively farmed coastal polderland where internationally important numbers of swans and geese occur.

Irish Prioritised Action Framework for financing Natura 2000 sites³⁷

Lack of coordination and coherence has been identified as a key factor hindering the uptake of EU funds with respect to management of sites within the Natura 2000 network. In an effort to resolve this, the European Commission has established the requirement for national “Prioritised Action Frameworks” [PAFs], which should identify key issues that need to be addressed in the next EU funding period (2014-2020).

Such frameworks are provided for in Article 8 of the Habitats Directive:

The Commission shall adopt, having regard to the available sources of funding under the relevant Community instruments a prioritized action framework of measures involving co-financing to be taken when the site has been designated...

PAFs are intended to be strategic documents and it is envisaged that the Commission will use them as tools when assessing proposals for funding for the period 2014-20. These sources of funding include existing financial instruments: the European Agricultural Fund for Regional Development (EAFRD), the European Maritime and Fisheries Fund (EMFF), Structural and Cohesion Funds and the LIFE+ fund.

EU and National Biodiversity 2020 strategy

EU Biodiversity Strategy to 2020³⁸

Biodiversity is the variety in ecosystems and species which surround us. Biodiversity is under threat in Ireland, Europe and across the world. In 2011 the EC adopted a new strategy which lays down a framework to 2020. The framework aims to meet the EU biodiversity headline target set down in 2010 which is to halt biodiversity loss and the degradation of ecosystem services in the EU by 2020. The Strategy is built on six targets:

1. Fully implement the Habitats Directive and the Birds Directive;
2. Maintain and restore ecosystems and their services;

³⁷ Information on this section taken from: <http://www.npws.ie/news/name.14702.en.html>

³⁸ Information taken from: http://ec.europa.eu/environment/pubs/pdf/factsheets/biodiversity_2020/2020%20Biodiversity%20Factsheet_EN.pdf

3. Increase the contribution of agriculture and forestry to maintaining and enhancing biodiversity;
4. Ensure the sustainable use of fisheries resources;
5. Combat invasive alien species; and
6. Help avert global biodiversity losses.

Actions for biodiversity 2011-2016 – Ireland's 2nd national biodiversity plan³⁹

Launched in November 2011 Ireland's 2nd national biodiversity plan builds upon the achievements of the first plan and focuses on actions that were not fully completed and addresses emerging issues.

The measures Ireland will take are presented as 102 actions under a series of seven Strategic Objectives. Some of the actions within the plan are continuing elements of existing work and many are requirements under existing EU Directives. The objectives cover the conservation of biodiversity in the wider countryside and in the marine environment, both within and outside protected areas; the mainstreaming of biodiversity across the decision making process in the State; the strengthening of the knowledge base on biodiversity; increasing public awareness and participation; and Ireland's contribution to international biodiversity issues, including North South co-ordination on issues of common interest.

High Nature Value farming concept

The concept of High Nature Value (HNV) farming developed from a growing recognition that the conservation of biodiversity in Europe depends on the continuation of low-intensity farming systems.⁴⁰

In Ireland, the North West was identified by the European Environment Agency (EEA) as potentially having a high proportion of HNV farming. The Heritage Council has grant-aided the 'European Forum for Nature Conservation and Pastoralism' (EFNCP) to undertake work on HNV farming since 2010. The EFNCP has produced three reports on how HNV farming can be better supported in three case study areas: the Aran Islands, North Connemara and the Uíbh Ráthach or Iveragh Peninsula.⁴¹

³⁹ Information taken from: <http://www.npws.ie/legislationandconventions/nationalbiodiversityplan/>

⁴⁰ <http://www.high-nature-value-farming.eu/>

⁴¹ <http://www.heritagecouncil.ie/wildlife/our-initiatives/high-nature-value-farming/>

New EU Forestry strategy and sustainable forestry management⁴²

A new Forestry Strategy responding to the new challenges facing forests and the forest sector was published by the European Commission in September 2013, which underlines the importance of forest resources in the EU.

The EU currently contains 5% of the world's forests and EU forests have continuously expanded for over 60 years, although recently at a lower rate. EU forests and other wooded land now cover 155 million ha and 21 million ha respectively. This together means more than 42% of EU land area is covered with forest and other wooded land.

Area covered by forests in Europe has increased at a rate of approximately 0.4% per year since 1990, as a result of afforestation programmes, natural succession of vegetation and abandonment of farming. This is in contrast to the current global situation where the forest area continues to decline, with a global rate of deforestation still alarmingly high, impacting negatively on global climate and biodiversity.

Covering large parts of rural areas, forests are **vital for the rural population** because they support economic welfare and jobs. Forests provide a wealth of benefits and services to the European citizens; these are often referred to as forest ecosystem services (FES). FES include wood and non-wood products as well as services such as recreation, water and soil conservation, protection against natural hazards, biodiversity etc. Many of these benefits are difficult to quantify. Thus, the socio-economic importance of forests is often underestimated.

Around 60% of the EU's forests are in private hands, with about 16 million private forest owners and the remaining 40% is publicly owned. Public ownership dominates in most of the eastern and south-eastern EU Member States.

In the last years there has been an increased competition for forest products and services. For instance, European forests are the largest reservoir of biodiversity compared to other terrestrial ecosystems, while providing over 50% of the RE in Europe. Growing demands represents an opportunity for this sector, but, at the same time, poses a significant challenge for maintaining forest ecosystems, increasing the potential for conflicts. It is

⁴² Information taken from: http://europa.eu/rapid/press-release_MEMO-13-806_en.htm

important that SFM principles are applied to ensure in the long term the provision of multiple goods and services.

Sustainable Forest Management (SFM)

SFM is the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.

EU resource efficiency strategy⁴³

The flagship initiative for a resource-efficient Europe under the 2020 Strategy supports the shift towards a resource-efficient, low-carbon economy to achieve sustainable growth. Natural resources underpin our economy and our quality of life. The initiative provides a long-term framework for actions in many policy areas, supporting policy agendas for climate change, energy, transport, industry, raw materials, agriculture, fisheries, biodiversity and regional development. This is to increase certainty for investment and innovation and to ensure that all relevant policies factor in resource efficiency in a balanced manner.

National soil or soil related strategies

Nationally⁴⁴

The general consensus is that soil quality in Ireland is good and serious incidents of soil erosion are localised and rare here. The main threats to Irish soil are compaction, contamination and loss of organic matter. Soil compaction can arise following use of heavy machinery and high stocking rates at inappropriate times which can lead to an increased overland flow of nutrients and reduced agricultural output in the long term.

The EPA developed a discussion document called The Soil Protection Strategy for Ireland. This assembles existing information on soil resources and outlines the pressures and environmental impacts on our soil and was published in 2002. The document recommends the need to develop a soil protection strategy for Ireland, including a national soil quality

⁴³ Information from this section available [here](#)

⁴⁴ Information on this section available [here](#)

monitoring programme and the selection of a set of indicators which are representative of soil quality.

There is still no national soil strategy for Ireland. However, soil protection measures are in place. All agricultural soils are subject to the Statutory Management Requirements (SMR's) and the Good Agricultural and Environmental Condition (GAEC) requirements of the Single Payment Scheme (SPS) under CAP. In addition, Teagasc and the EPA are working on the completion of a soils map of the country. Further information on the Irish Soil Information System (ISIS) is available [here](#).

European wide⁴⁵

In 2006 the European Commission proposed a Soil Framework Directive, which addresses soil protection including its trans-boundary aspects. The Directive aims at ensuring soil productivity, especially for food production, limiting risks to human health and the environment, providing opportunities for climate mitigation and adaptation and stimulating business opportunities for soil remediation. However, the Directive is still being debated in the Council and the European Parliament. As such, while many European policies on the environment incorporate soil protection, no overarching EU soil policy is currently operational.

Water Framework Directive (WFD)⁴⁶

The WFD (2000/60/EC) is an important piece of EU environmental legislation which aims at improving our water environment. It requires governments to take an holistic approach to managing their waters. It applies to rivers, lakes, groundwater, estuaries and coastal waters. Member States must aim to achieve good status in all waters by 2015 and must ensure that status does not deteriorate in any waters. The WFD, *inter alia*, defines a planning, management and reporting system based upon River Basin Districts (RBDs) and international RBDs. These are based on large river basins or a combination of smaller neighbouring basins and include all rivers, lakes, estuaries, coastal waters and associated groundwaters.

⁴⁵ Information on this section is available [here](#)

⁴⁶ Information on this section available [here](#)

Floods Directive

Council Directive 2007/60/EC on the assessment and management of flood risks entered into force on 26 November 2007. The Directive requires Member States to first carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding. For such zones they would then need to draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by 2015. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU. The Directive also reinforces the rights of the public to access this information and to have a say in the planning process.⁴⁷

Nationally

The ‘Floods’ Directive was transposed into Irish law by the *European Communities (Assessment and management of flood risks) Regulations 2010, (S.I. 122 of 2012)*. The Regulations set out the responsibilities of the Office for Public Works (OPW) and other State agencies in the implementation of the Directive, on consultation, and details the process for implementation of the measures set out in the flood risk management plans.⁴⁸

EU Directive on sustainable use of pesticides

Under Council Directive 2009/128/EC establishing a framework for Community action to achieve the sustainable use of pesticides, the EU sets rules for the sustainable use of pesticides to reduce the risks and impacts of pesticide use on human health and the environment. Main actions include that Member States are required to develop a National Action Plan, setting objectives and targets to reduce the risks from pesticide use.⁴⁹

The Department of Agriculture, Food and the Marine published Ireland’s National Action Plan on sustainable use of pesticides in 2013.⁵⁰

⁴⁷ Information on this section available [here](#)

⁴⁸ Information on this section available [here](#)

⁴⁹ Information on this section available [here](#)

⁵⁰ Further information on National Action Plan available [here](#)

Nitrates Directive⁵¹

Council Directive of 12 December 1991 concerning the protection of waters against pollution by nitrates from agricultural sources (the Nitrates Directive) has the objective of reducing water pollution caused or induced by nitrates from agricultural sources.

In accordance with this Directive each Member State is obliged to put in place a Nitrates Action Programme (NAP) and to review and if necessary revise their action programme at least every four years. Article 10 of the Directive obliges Member States to report every four years to the European Commission on the implementation of the Directive in their country.

Ireland's first¹ NAP

Ireland's first Nitrates Action Programme was given effect through a series of Regulations, the most recent of which was the *European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2009* – commonly known as the Nitrates Regulations.

These Regulations provided strengthened statutory support for the protection of waters against pollution from agricultural sources e.g. by phosphorus or nitrogen. They required the avoidance of practices by farmers which create a risk of causing pollution to water courses and provide for inspections by local authorities. They also provided for strengthened enforcement provisions and for better farmyard management. They included provisions relating to times of the year, weather and soil conditions when the application of fertilisers is permitted, the minimum setback distances from water sources for the application of fertilisers and minimum storage capacity for manures.

Local Authorities, under the general supervision of the EPA, have primary responsibility for the enforcement of these regulations.

Implementation of the NAP was supported by an enhanced package of financial supports for farmers by the Department under the Farm Waste Management Scheme.

⁵¹ Information on this section available [here](#)

Ireland's second NAP

The NAP was reviewed in 2010 and after a comprehensive public consultation process the revisions to the NAP were given effect through the *European Communities (Good Agricultural Practice for the Protection of Waters) Regulations 2010 – SI No. 610 of 2010*.

The revisions did not fundamentally change the main provisions of Ireland's NAP but did introduce specific changes, including:

- a site-specific, risk-based approach for setback distances from drinking water abstraction points;
- a prohibition on the application of chemical fertiliser within two metres of a watercourse; previously this was 1.5 metres;
- new controls on storage of baled silage;
- amendments to the maximum nitrogen and phosphorus fertilisation rates for cereal crops including a measure to address the issue of low protein levels in malting barley;
- time-limited extension for transitional arrangements covering the use of pig and poultry manure and spent mushroom compost; and
- revision of certain dates where the establishment of green cover is required.

Ireland's third NAP

In accordance with the Nitrates Directive, Ireland's NAP was reviewed for a second time during 2013. On foot of public consultation and an extensive review of more up to date information which was not available in designing the second NAP, the new and revised NAP was given effect by the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014*.

EU strategy on adaptation to climate change⁵²

In April 2013 the European Commission adopted a strategy on adaptation to climate change which aims to make Europe more climate-resilient. By taking a coherent approach and providing for improved coordination, it will enhance the preparedness and capacity of all governance levels to respond to the impacts of climate change.

⁵² Information on this section available [here](#)

The [EU Adaptation Strategy](#) focuses on three key objectives:

- Promoting action by Member States;
- 'Climate-proofing' action at EU level; and
- Better informed decision-making.

EU-2020 targets on GHG emissions, RE and energy efficiency

The climate and energy package is a set of binding legislation which aims to ensure the EU meets its ambitious climate and energy targets for 2020. These targets, known as the "20-20-20" targets, set three key objectives for 2020:

- A 20% reduction in EU GHG emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%;
- A 20% improvement in the EU's energy efficiency.⁵³

Nationally

Renewables - Under an EU 'burden sharing' arrangement, Ireland's overall national target for the share of RE sources in gross final consumption of energy in 2020 is 16% to be met across transport, heat and electricity sectors. The National Renewable Energy Action Plan (NREAP) for Ireland requires that the 16% overall target be achieved by around 40% of electricity consumed being from renewable sources (RES-E), 12% of consumption in the heat sector (RES-H) and 10% consumption in the transport sector (RES-T).

GHG emissions – Ireland's EU 2020 targets for GHG emissions are set at a reduction by 20% over 2005 figures from transport, agriculture, residential, waste and non-energy intensive industry. However, the EPA is concerned that there is a significant risk that Ireland will not meet these targets.

Energy efficiency - Ireland's 2nd [National Energy Efficiency Action Plan to 2020](#) was launched on 28 February 2013. The 2nd Action Plan provides a progress report on delivery of the national energy savings targets implemented under current EU requirements, as well as

⁵³ Information on this section available [here](#)

energy efficiency policy priorities between now and 2020. The second Action Plan reaffirms Ireland's commitment to a 20% energy savings target in 2020 and a 33% reduction in public sector energy use.

CAP 2014-2020

The importance of the CAP has been highlighted in Section 3, *Reaching FH2020 targets sustainably* of this report so will not be repeated here. The CAP 2014-2020 is a key European policy tool in terms of the future of agriculture in Ireland and to achieving sustainable growth in the sector.⁵⁴

Low carbon farming

Sustainable farming initiatives including those relating to low carbon farming include Ireland's Carbon Navigator and have already been discussed in Section 3, *Reaching FH2020 targets sustainably* of this report.

⁵⁴ The L&RS together with the research services of the UK parliaments (Northern Ireland, Scotland, Wales and England) produced a cross-Ireland and UK paper on the CAP reform 2014-2020 last year which is available [here](#). The L&RS along with their UK counterparts are in the process of updating this paper. It will be made available to the Joint Committee as soon as it is completed (expected October 2014).

5. Expert views

The L&RS attended (where possible) and reviewed all meetings between the Joint Committee and relevant stakeholders during spring 2014. Information of particular relevance to this report has been identified and summarised here with a focus on practical solutions. The same has been done for the conferences on land use hosted by Scotland's Rural College (SRUC) and the Scottish Environment Protection Agency (SEPA) in April and by the European Commission conference in June. Transcripts of the Committee meetings are available in Appendix 1 of this report and links to presentations of the aforementioned conferences have also been provided at the end of this Section.

SRUC and SEPA Conference – delivering multiple benefits from our land: sustainable development in practice, Edinburgh

This conference was attended by the L&RS and covered a range of topics relating to sustainable land use. The messages of key importance and most relevance to this report are detailed here.

Land use - Scotland's first Land Use Strategy (LUS) was published in 2011. Its origin was in the *Climate Change Act, 2009* and it will be reviewed in 2016. The LUS has a vision and a number of objectives (already detailed in this report) and encourages low-carbon land use.

Water - As required under the WFD, Scotland has produced River Basin Management Plans (RBMPs) and identified key ecosystem services associated with the water environment which include hydropower, fish farms, agriculture, drinking water, pollution dispersal, natural flood management, habitats and recreation.

Forestry has also been reviewed and mapped in order to identify the benefits woodlands can offer as a tool for water management. These include semi-permanent cover, removal of fertiliser application, physical shelter and acting as a wind barrier, flood defence, enhanced floodplain storage, reduction in rapid rainfall run-off, riparian woodlands and improved water quality.

Forestry - It is acknowledged that forestry is one of the competing demands on land in Scotland and the importance of identifying which types of land are best suited to forestry was highlighted. The speaker noted that if the government supported productive and resilient

forestry there would be a more positive attitude towards it. Environmental benefits of forestry also include carbon sequestration and biodiversity. Loss of woodlands can lead to acidification of soils, low productivity and peat production.

Agriculture - With regards to agriculture, the speaker John Gilliland (Non-Executive Director of SRUC and Director of Agriculture Devenish Nutrition Ltd) focused on sustainable agriculture and the importance of making our farms more climate resilient. For a sustainable intensive farmer to succeed, profitability and being able to pass the farm onto the next generation as a profitable enterprise is very important. However, to be sustainable it is also important to improve biodiversity and water quality on the farm, to increase food production and use indigenous RE. The farm must also be able to adapt to and mitigate against climate change.

Scotland has introduced the Farming for a better climate (FFBC) initiative (already discussed in Section 2, *Overview* this report and further described later in this Section) which is their equivalent of our Carbon Navigator. The success of farmer discussion groups, when facilitated and mentored was also mentioned.

Bogs and Renewable Energy - Scottish bogs are carbon sinks, biodiverse (containing a high proportion of important bird species), provide water regulation and are culturally important. They are also windy spots and so are good for wind energy. In this context, with regards to developing wind farms on bogs, both Susana Sebastian (SEPA) and Alexa Morrison (RSPB Scotland) acknowledged the need for wind farms as a way of reaching Scotland's ambitious RE targets but also highlighted the importance of locating them in the right place. When constructing wind farms on bogs, the peat is disturbed which releases carbon (C) so one must measure the savings from renewables on bogs with the carbon emissions released during disturbance of bog. This can be done using a Carbon Calculator.

To calculate the carbon impacts they looked at C-losses which occur through construction, power back-up, loss of vegetation, disturbance of soil organic matter, possibly removing forestry etc –v- C-gains which occur through restoration of bogland around the site, improve degraded peat and any felled plantation, no drainage (carbon is released from bogs when the water table is affected through drainage).

Net emissions:

- Losses – Gains;
- Payback period; and

- Carbon intensity (tCO₂/KWhr) = net emissions (tCO₂) divided by KWhr.

Impacts from wind farms located on bogs include:

- Tracks, burrow pits, turbine bases, grid infrastructure;
- Associated drainage, loss of vegetation, peat removal;
- Loss of carbon, habitat and other ecosystem services;
- Could undermine the C-benefits of wind farm depending on location; and
- C-impact assessment.

Avoiding impacts:

- Avoid siting wind farms on bogs, but if this is not possible, it is important to avoid deep areas of peat and to try to minimise the amount of drainage required to keep payback period low;
- Consider long-term strategy for use of bogs, e.g. forestry removal and wind energy or forestry removal and bog restoration (forestry dries out bogs); and
- Good practice in construction, operation and decommissioning.

Agro-forestry - Jo Smith (Organic Research Centre) gave a lecture on agroforestry. There is a concern that food production may be compromised by agro-forestry and her presentation helped to explain the concept and identify the benefits as detailed hereunder:

What is it?

1. Silvoarable is when trees are grown in conjunction with crops and could help to e.g. reduce soil erosion; and
2. Silvopasture is when the understory of trees is used for grazing and the trees are used for e.g. timber or food production (apples, pears...), shelter etc.

How agroforestry works – the tree roots pull water and nutrients higher up the soil and make water available to crops. The trees are also a valuable shelter belt which is a positive for animal welfare and crop growth. Tree roots capture nutrients lost from crops through soil and pull them back up thereby reducing water pollution. You can also use nitrogen-fixing trees.

Results (from an ecosystem services perspective) included an increase in biodiversity, pollination, yield and carbon store:

- Increased abundance in biodiversity, e.g. in butterfly biodiversity;

- Pollination – insect abundance and diversity – bumblebees, solitary bees and hover flies – increased abundance in bumblebees between monoculture and silvoarable (not much difference between monoculture and silvopasture). Same for hoverflies;
- Yields – silvopasture – no significant difference in herbage yield. Silvoarable – no difference in cereal fields; and
- Carbon – depends on the system (if growing trees on short- or long-rotation etc.).

One of the barriers to take up is policy related in that agroforestry falls between forestry and CAP policies and therefore agroforestry is not eligible for direct payments. It also depends on what the trees are going to be used for (e.g. fruit trees).

Low-Carbon farming - Rebecca Audsley (SRUC) gave a presentation on [Farming for a Better Climate \(FFBC\)](#). This is a key tool being used in Scotland to help farmers reduce their GHG emissions and improve farm efficiency. They work with a focus farm network and range of stakeholders. Key agricultural emissions are CO₂ (5-10%, from burning fossil fuels), CH₄ (40%, from enteric fermentation of livestock), N₂O (50%, from use of fertiliser, cultivation practices).

Under FFBC, there are five key action areas:

- 1 Energy and fuel;
- 2 Renewables (e.g. anaerobic digestion, wind);
- 3 C-sequestration through vegetation and tree planting;
- 4 Better nutrient use; and
- 5 Livestock – improving productivity.

Under the programme, four Climate Change Focus Farms were advised and monitored for three years for their before and after carbon footprint through the implementation of practical solutions. Two examples are detailed hereunder:

Farmer 1 – land holding of 1,000ha – saved £11,000 and decreased C-footprint by 10%. Farmer had high fuels use so made small saving e.g. by reducing the time using the feed mixer wagon by 15mins/day – saved £500 on fuel. Silage analysis, calving at 24 rather than 36 months, decreased straw use with bedding from recycled wood chips for the cattle.

Farmer 2 – organic dairy farm – soil analysis and nutrient spreading important, reduced energy and fuel use, reduced soil compaction and improved drainage. Saved £37,000 and reduced C-footprint by 11%.

Summary of findings:

- Target measures at business efficiency;
- Even technically efficiency farmers can make savings;
- Monitoring and analysis key;
- C-footprint highlights areas for action; and
- Weather has a big impact.

Maximising the usage and potential of land: Teagasc

Teagasc firstly advised that the European Commission is preparing a land use directive which will be important with regards to the aims addressed in this report and secondly highlighted that the two greatest challenges facing agriculture on a global scale are maintaining food security and sustainability.

With regards to Ireland, Teagasc focused on how best we can maximise the multi-functionality of our land and identified the five high level demands on land use as:

1. Provision of food and fuel;
2. Carbon sequestration to offset GHG emissions;
3. Water purification;
4. Habitat for biodiversity; and
5. Home for nutrients from animal slurry and/or human sewage sludge.

Provision of food

Teagasc identified three ways in which Ireland can reach our FH2020 targets:

1. Intensification (keeping more animals on the same land and increasing output);
2. Increase land area intensively farmed but not average stocking rate; and/or
3. Resource efficiency (producing more from the same amount of input and same number of animals).

Teagasc anticipate the FH2020 targets to be met using a combination of the three options above.

Carbon sequestration

It will be difficult to reduce our GHG emissions from agriculture due to our ruminant dominated livestock industry. However, it is anticipated that in the post-Kyoto period, account will be taken of the advantages agriculture can offer in terms of soils' sequestration of carbon and the displacement of fossil fuels through the use of biofuel and bio-energy crops. Assessments by Teagasc indicate that Irish grasslands are currently sequestering carbon at a high rate. Future offsetting would require land use change, forestry and bio-energy.

Water purification

The WFD leads the way in legislating for clean water. Our agricultural catchment programmes indicate that the NAPs which have been in place for the past ten years are helping Ireland reach good water quality status across her water-bodies. However, it is a very slow process.

Habitat provision for biodiversity

The Natura 2000 network of sites identifies those areas of highest importance for biodiversity. Unfortunately, in Ireland, the outlook for many of these habitats is poor. There are also concerns about HNV farmland outside of these areas.

One way in which to try to best manage these competing demands on land is to target management based on soil types present as certain soil types are better at certain functions than others. For example, some soils produce higher yields of crops while others are better at water purification. In this way, resource efficiency could be used where it is cost-effective, intensification may be justified and desirable where the soils can cope with additional nutrient loading and expansion may be preferable where this competes with HNV farmland. Teagasc considers that this could be managed through soft incentivisation.

In this regard, Teagasc research has focused on the resource efficiency model – getting more value and more output out of the same amount of input and land base. Examples of this include the carbon navigator, grass wedge⁵⁵ and economic breeding index and best

⁵⁵ The grass wedge is a tool used in grassland management which gives a visual breakdown of the herbage mass available in each paddock on the farm.

practice on farms through utilising the aforementioned tools, nutrient management planning and biodiversity planning (where relevant). Additional relevant work ongoing at Teagasc includes a new sustainability farm at Kildalton Agricultural College, leading a proposal under Horizon 2020 called LANDMARK on soil quality and soil functions which is aimed at informing the new EU land use directive and the launch later this year of the Irish soil information system (ISIS).

While reaching FH2020 targets may lead to increased pressures on the environment, Teagasc acknowledged that the strategy has brought sustainability and agricultural production under the one umbrella. The use of best practice in farming and incorporating the most important fit for the various soil types through intensification / resource efficiency (where the soils can support it) while engaging in extensification in other locations (for example in areas with less fertile soils and higher biodiversity) should help us to comply with our environmental commitments as well.

Maximising the usage and potential of land: Coillte

As the largest landowner in Ireland with a portfolio of 445,000ha, Coillte is confident that efficient use of their land bank can help reduce Ireland's GHG emissions through increasing carbon sequestration, low-carbon energy efficient building products and encouragement of more afforestation by landowners. Reducing our GHG emissions would help to counter-act the expected increase in GHG emissions if we are to reach all of our FH2020 targets. Coillte is also strongly in favour of the introduction of a Renewable Heat Incentive (RHI) which would encourage the growth of a high-efficiency bioenergy market in Ireland and subsequently displace fossil fuels thereby also acting to reduce our GHG emissions. In addition, Coillte estimates that over 200 million tonnes of carbon are stored in its soils and forests. With regards to habitats and species protection, 20% of the estate is managed primarily for biodiversity purposes. Coillte's sustainability credentials are certified by the Forest Stewardship Council (FSC) and Coillte are also looking for endorsement for forest certification to the PEFC standard and to have their environmental management systems certified to ISO 14000.

Coillte also talked about the opportunities biomass could offer in helping increase our RE portfolio. The proposal of an RHI was again raised and highlighted as a way to encourage the development of the biomass (especially small diameter round wood which originates from our forests) industry. Further benefits include stimulating rural development and local

job creation. If there is a good market for biomass, some farmers may change part/all of their land use to growing short-rotation energy crops which could also help offset GHG emissions from agriculture.

Questions were raised as to the best tree species for sequestering carbon. Coillte advised that this was complex and was dependent on, *inter alia*, the soil type under the forest, the age of the trees and the species. For example, peatlands sequester more carbon than other soil types; in the early years, fast growing species like spruce sequester more carbon but because there is a longer rotation period for broadleaf trees, they tend to capture carbon over a longer period.

Maximising the usage and potential of land: EPA and Teagasc

One of the issues the EPA described in their presentation of particular relevance to FH2020 was the SmartFarming Initiative between the EPA and the IFA. Driven by the IFA, this is a voluntary on-farm resource efficiency and cost saving programme (already described in Section 3, *Reaching FH2020 targets sustainably* of this report). The approach includes top tips on how farmers can save money by doing simple things for little or no investment. It increases efficiency and production on farms and provides a double dividend in the forms of saving money and reducing the farms environmental impact. Knowledge skills are diffused across the farming sector through volunteer farms demonstrating benefits achieved from participation in the smart farming programme, farmers discussion groups and regional seminars. This is also in line with the aims of FH2020 and Origin Green – sustainable farming with low resource input production and with the recommendations of the Environmental Assessment of FH2020.

In the Teagasc presentation, Ireland's low carbon footprint for milk and beef (lowest and fifth lowest in Europe respectively) was highlighted. Following on from that, as a part of Teagasc's 2020 vision, the organisation created a marginal abatement cost curve for agriculture and specifically assessed what the options are to reduce GHG emissions. The three main options assessed relate to efficient farming (e.g. extend grazing season and better breeding), land use change (e.g. to biofuel production) and technological intervention (e.g. anaerobic digestion of pig slurry). Of the three options, efficient farming measures were the only ones which turned out to be cost beneficial to the farmer. It was concluded that FH2020 targets could be reached while keeping GHG emissions constant however, a lot of work is needed to make this happen.

Based on the results of the studies above, Teagasc produced the Carbon Navigator in conjunction with Bord Bia. This is a decision support tool for farmers that help them identify which of the measures (including extending the grazing season, nitrogen efficiency, increased economic breeding index and higher genetic merit for cows) is most appropriate for their unique farm. It is a very simply software tool which uses practical language and enables the farmer and his advisor to set targets for the following year which should help him reduce the carbon footprint of his farm and save him money. The C-navigator has also been detailed in Section 3, *Reaching FH2020 targets sustainably* of this report.

Teagasc then spoke on the topic of agro-ecology or the conservation of habitats and species. Approximately 13% of terrestrial land in Ireland is designated under Natura 2000 (as an SAC and/or SPA). However, there are also a lot of habitats and species which are not designated but should be conserved, many of which are present on agricultural lands. HNV farmland is extensive farmland which is species and habitat rich and therefore important from its biodiversity perspective. How can we protect this? Tegasc identifies two ways – through critical and/or strategic conservation measures. Critical conservation measures are more targeted and tend to focus primarily on the top three or four habitats and/or species on the list. These measures are more expensive as they are more targeted, for example, with the protection of the corncrake – where corncrakes are present, farmers must switch back to hay making rather than silage production which can have an impact on production. For strategic conservation there is less of a need for targeting and therefore less cost implications.

Funding options available for conservation include the proposed new GLAS (agri-environment) scheme under Pillar 2 of CAP 2014-2020 which could be used for critical conservation whereas the greening measures specified under Pillar 1 of CAP could be seen as more strategic conservation strategies.

The experts agreed with earlier views recorded in this report that education is a key part of maximising awareness and in the subsequent participation in resource efficiency farming by farmers. They identified the farm-based discussion groups as the most effective model for farmers to talk to each other and exchange experiences between them. The IFA and the EPA are encouraging greater use of farm discussion groups with the EPA putting funding of €100,000 in cash into this year's discussion groups and a further €70,000 in terms of people and human resources.

In addition, the EPA highlighted the importance of looking at the land use sector as a whole rather than just focussing on forestry when calculating our carbon sinks. This would require a change in the EU carbon accounting framework which is currently biased towards forestry.

Maximising the usage and potential of land: Bord na Móna and UCD

Bord na Móna (BnM) own 80,000ha of land across the country, mostly in the midlands but some in other areas, particularly, north-west Mayo. Three-quarters of the land is in peat production and one-quarter is either cut away or will not be used for production in the future. Current after-use options include wind energy, biodiversity, amenity uses and forestry. Developing wind farms on bogs is a key way in which Ireland could reduce her GHG emissions and reach her RE targets. In addition, once peat production stops the landscape left behind is bare but gradually recolonizes naturally. Based on mapping of emerging habitats on cutaway bogs, BnM estimates that roughly 30% of the land will revert to wetlands and the remainder to scrub-woodland type habitats. Rehabilitation of cutaway bogs through natural recolonization offers many benefits including carbon sequestration, improved biodiversity and water quality. Sites currently drained may continue to release carbon. BnM are undertaking studies to assess what happens when they re-wet a cutaway bog. Results have shown that this can return the bog to a carbon sink. However, to have any impact, this would need to be rolled out on cutaway bogs across the Bord na Móna landbank rather than just in the study area.

UCD experts identified the land sparing approach (which we have already touched on in Section 3, *Reaching FH2020 targets sustainably* of this report), as a way of reaching our FH2020 targets. With this approach, those areas with capacity are maximally intensified while other areas with less resilient and productive soils are extensified and used to make up for the loss in habitats and associated biodiversity. However, it is important to manage the process to ensure that both production and biodiversity objectives are met.

They then discussed resource use efficiency and introduced their recent research into the production potential of multi-species grasslands which may require comparatively lower levels of nutrient inputs (than monocultures). UCD consider this benefit has been underestimated. Through a Department funded study called SmartGrass, UCD are investigating the yields, quality of forage, biodiversity support value and ensiling value of multi-species versus monoculture swards. Preliminary results indicate that multi-species sward yields are showing potential at this stage.

One of the studies UCD were involved in was the INTERREG funded Dairyman project which examined nitrogen surpluses on a number of intensive Irish dairy farms and compared them to other published work internationally. The nutrient surplus (here nitrogen is used) is a widely used indicator of environmental performance of a farming system. Nitrogen is imported into the farm via feed and fertilisers and exported off the farm via milk, animals and crops. The remaining nitrogen left behind is the surplus and is either stored in the system or lost to the environment. Most Nitrogen can be expected to be lost to the environment. As such, the lower the nitrogen surplus the better, both in terms of cost savings for the farmer and environmental protection. Results from the Dairyman project showed that Irish dairy farms have relatively low nitrogen surpluses by international standards which are largely due to our low input dairy systems (based mostly on grazed grass and associated with our low carbon footprint of milk production). Nitrogen surpluses were also studied on a nationally representative sample and it was found that the results ranged from being quite high to very low. The most profitable dairy farms had the lowest nitrogen surpluses with the least profitable dairy farms exhibiting the highest nitrogen surpluses. This indicates the potential room for improvement. Better management practices such as lower inputs and more efficient use of nitrogen fertilisers can reduce a farms nitrogen surplus.

Again, the importance of education, dissemination of information from advisors to farmers, knowledge transfer and the encouragement of use of such tools through policy incentives was highlighted. UCD also repeated the argument that farm-specific management measures are a vital part of improving Ireland's farm productivity and sustainability.

In conclusion, UCD believe that the FH2020 targets as well as Ireland's commitments to GHG emissions and water quality can be met in principle. But they emphasised the challenge this would constitute, arguing that the optimisation of land use at the catchment scale and also soil and nutrient management at farm level would be key to success.

Maximising the usage and potential of land: European Commission

The Joint Committee met (by public video-conference) with representatives of the Directorates General (DG) Agriculture, Climate and Environment to identify what the European Commission felt would be important to take into consideration in drafting the report. The highlights of the meeting included the noted importance of the greening of the CAP and how this should help increase agricultural productivity while also protecting biodiversity, air, water and soil and minimising GHG emissions. In this respect, the 'greening' of the CAP (2014-2020) has introduced three mandatory measures (crop diversification,

EFAs and permanent pasture) linked to soil, carbon and biodiversity for all farmers in receipt on direct payments under Pillar 1.

The Commission highlighted the importance of the greening of the CAP to ensure that future agriculture is carried out in a sustainable manner. The greening of both Pillars 1 and 2 mean that public *and* private goods are supported across the breadth of CAP. It was also acknowledged that intensification of farming in one area could be offset by the provision of public goods such as biodiversity in other areas (land sparing). Again it was acknowledged that knowledge transfer, whereby farmers can avail of advice on how best to farm their individual land parcels in a way which respects good agricultural and environmental conditions could be improved.

The Commission also believes it is essential to have knowledge of the services ecosystems can provide. Under the EU Biodiversity Strategy 2020, information on the various ecosystem services provided is being gathered. Once this is fully understood, it will be easier to understand the trade-offs that are necessary and the ability to increase production in land suitable for intensification.

With regards to EFAs and the concern that this could lead to a reduction in productivity, the Commission advised that they are not seeking to remove working grassland from production, but rather wish to focus on those existing farm areas which are not in use (such as field margins and woodlands). Obligations only relate to farmers with >15ha of arable land and not to other types of farm.

Afforestation is also encouraged as it can be supported under Pillar 2 by afforestation grants and forest environmental measures. Forests offer biodiversity benefits, water purification, timber for building and carbon neutral fuel in the form of wood biomass and also act as carbon sinks.

Land as a resource conference, European Commission, Brussels

This conference was attended by the Chairman and the Clerk of the Committee and a link to the conference was made available to the L&RS. Unfortunately, video links to the presentations at this conference were not yet available on-line when finalising this report. The two presentations of most relevance to this report and which also have their slide shows available on-line are briefly described hereunder:

The presentation by Prof. Dr. Stefan Bringezu (Wuppertal Institute), entitled *A finite world and increasing land demands: a global perspective* included many of the same messages as those applicable to Ireland and already discussed in this report. The professor identified that, globally, firstly the conversion of land to croplands has been responsible for the largest emissions of carbon from land use change and secondly, habitat change, especially in tropical areas has been a major cause of biodiversity losses. Land degradation and soil erosion is a major problem across the world although there is still potential for crop yield increases in developing countries. It is expected that competition for land uses will increase in the future, with increased demands from, *inter alia*, food and non-food (e.g. biofuels) crops. To protect against further biodiversity losses it is important to target management to specific landholdings and improve agricultural production through the use of best management practices.

Strategies to steer consumption and improve land management include:

- Improve diets and reduce food waste;
- Halve biofuels targets;
- Control biomaterials demands;
- Improve land use planning; and
- Invest in regenerating degraded soils.

The presentation by Winfried E.H. Blum (RISE) on the *Potential and limits of sustainable intensification of agriculture* identified the fact that while we will need to produce more food to feed the world's growing population, to avoid further destruction of ecosystems, this increase in production must come from existing agricultural land in so far as is possible. As such, this land must be sustainably intensified so as to simultaneously improve the productivity *and* environmental management of agricultural land. Some soil types are more resilient to change and have greater capacity to produce over long periods than others. The aim of the RISE project on SI (as already described in Section 3, *Reaching FH2020 targets sustainably* of this report) is to delineate agricultural sites in Europe which have soils with good resilience and performance thus allowing for recommendations where sustainable agricultural intensification (SI) can be achieved. The key land and soil parameters when identifying these areas are soil depth, slope, clay & silt, pH, Soil Organic Carbon and Cation Exchange Capacity. Based on this system, four categories of land have been identified across Europe –

1. Land where no intensification is possible - extensification suggested;

2. In general good conditions but at least one indicator out of range – not recommended for SI;
3. SI possible with restrictions; and
4. Land recommended for SI.

Results of the study indicate that in Ireland no land is suggested for extensification, 12% of land is not recommended for SI, 31.5% of land is recommended for SI with restrictions and 56.5% of land is recommended for SI. Across Europe 41% of agricultural land is suitable for SI. However, local conditions must also be observed.

Further information

The full transcripts of all stakeholders meetings are attached in Appendix 1 and available online on the L&RS intranet In-focus page on Sustainable land use, [here](#).

Presentations of speakers at SRUC conference and conference notes from attendee are also available on our in-focus page on Sustainable land use, [here](#).

Although video links are not yet available for the Land as a Resource conference, the link to the general conference page is available on our in-focus page on Sustainable land use, [here](#).

6. Identifying ecosystem services & practical methods for sustainable land use

This section briefly draws together the ecosystem services and practical methods, together with policy tools already reviewed in this report and considered of most importance to Ireland in reaching her FH2020 targets in a manner which does not compromise our environmental commitments. Note that there is some overlap as some of the solutions proposed can be achieved through ecosystem services *and/or* practical farming methods etc.

Ecosystem services

As defined in Section 2, *Overview*, of this report an ecosystem is a community of living (biotic) organisms (plants, animals, microbes) in conjunction with the non-living (abiotic) components (air, water, soil) of their environment, interacting as a system. Ecosystem goods and services are provided by such ecosystems and include fertile soils, productive land and seas, good quality fresh water and clean air, pollination and climate regulation and protection against natural disasters.

Ecosystem services of relevance to this discussion which may also help to maintain (and increase where possible) food production sustainably includes:

- Increased food production from fertile soils through optimum nutrient management planning;
- Potential for greater crop / grass growth through use of multi-species swards while protecting the functions of the underlying soils;
- Increased crop pollination through the use of agro-forestry while maintaining similar crop yields to conventional farming; and
- Natural pest control of crops through retention of uncultivated field margins and/or the introduction of biological agents in a manner which can maintain yields while minimising the use of chemical pesticides.

Ecosystem services which may aid Ireland in reaching our climate change targets include:

- Carbon sequestration through afforestation (forestry, biofuel crops etc);
- Carbon sequestration through restoration and/or re-wetting of cutaway bogs; and
- Carbon sequestration by soils and vegetation through changes in farming practices.

Ecosystem services which may help Ireland achieve related environmental targets:

- Improved water quality from restoration of cutaway bogs;
- Improved water quality from afforestation;
- Increased biodiversity from afforestation and optimum tree species mix;
- Increased biodiversity from natural recolonization of cutaway bogs;
- Increased biodiversity through HNV farming, extensification where SI is not appropriate, organic certification and farm participation in agri-environmental schemes;
- Increased water, soil and air quality by better farm management and inclusion in agri-environmental schemes by farmers; and
- Biomass for RE from short-rotation bioenergy crops.

Practical methods of sustainable land use

Practical methods which will help Ireland in maximising the benefits of our agricultural land in a sustainable manner could include the use of some/all of the following:

- Use of sustainable and low carbon farming tools such as the Carbon Navigator, SmartFarming Programme and BETTER Farms Programme;
- Certification to sustainability programmes such as Origin Green;
- Sustainable Intensification of agriculture where appropriate;
- Land sharing and land sparing;
- Increased afforestation levels;
- Change of suitable land use to short-term rotation biofuel/bioenergy production;
- Use of best available technology and improvements in breeding and genetics across as many farms as possible;
- Greater knowledge sharing, maximise use of farmer discussion groups, demonstration farms and regional seminars;
- Provide upskilling for agricultural and environmental advisors so that farmers are receiving best available knowledge; and
- Farmers to work towards using best practice farming methods.

Policy tools and financial incentives

- Maximise the benefits of the new CAP (2014-2020) both for food production and for greening measures across Pillars 1 and 2;
- Increase food production through methods proposed under FH2020;

- Ensure continued compliance with various environmental regulations, including the Nitrates Directive and the benefits the NAPs have accrued to soil and water quality;
- Ensure proper protection of Natura 2000 sites;
- Take cognisance of the mitigation measures proposed in the Environmental Analysis of FH2020; and
- Avail of afforestation and bioenergy grants where land is suitable.

7. Conclusion and key issues

The key issues identified to help Ireland achieve our FH2020 targets in a sustainable manner relate to maximising the benefits from:

- Relevant ecosystem goods and services;
- Practical methods of sustainable land use – especially farm management tools; and
- Policy tools (including financial incentives).

It is necessary to focus on the challenge from a national or high level *and* also concentrate on the issues at farm-level.

Implementing those mitigation measures identified in the Environmental Analysis of the FH2020 report, in particular up-skilling all farm advisors in good agricultural and environmental management of farms, extending the audience for farm talks and discussions, increasing the amount of demonstration farms participating in Origin Green, and promoting knowledge transfer between farmers in any way possible is vital. In addition, the use of best available technologies across as many farm enterprises as possible will help increase sustainable and responsible food production.

Implementing those concepts considered of worth, including identifying the land most suited to sustainable intensification (SI), land sharing, use of low-carbon farming methods, nutrient management planning and resource efficiency all work towards maximising food production with the minimum inputs possible. Across the agri-food sector, there are various programmes in place, numerous studies on-going and it has been highlighted again and again that education is the key. Emphasising financial rewards for farmers as well as environmental benefits of the various methods detailed will all help to maximise land use potential.

In conclusion, it is acknowledged that reaching our FH2020 targets while staying within our environmental limits will be a major challenge but that the experts with whom the Joint Committee have consulted with in public session consider that, with the requisite Government commitment and support from the farming community, this should be possible.

Appendix 1 Membership of the Joint Committee

Deputies:

Tom Barry (FG)

Pat Deering (FG) [Vice-Chairman]

Andrew Doyle (FG) [Chairman]

Martin Ferris (SF)

Martin Heydon (FG)

Willie Penrose (LAB)

Michael McNamara (LAB)

Éamon Ó Cuív (FF)

Thomas Pringle (IND)

Senators:

Michael Comiskey (FG)

Denis Landy (LAB)

Paschal Mooney (FF)

Mary Ann O'Brien (IND)

Brian Ó Domhnaill (FF)

Pat O'Neill (FG)

Appendix 2 Terms of Reference

a. Functions of the Committee – derived from Standing Orders [DSO 82A; SSO 70A]

(1) The Select Committee shall consider and report to the Dáil on—

(a) such aspects of the expenditure, administration and policy of the relevant Government Department or Departments and associated public bodies as the Committee may select, and

(b) European Union matters within the remit of the relevant Department or Departments.

(2) The Select Committee may be joined with a Select Committee appointed by Seanad Éireann to form a Joint Committee for the purposes of the functions set out below, other than at paragraph (3), and to report thereon to both Houses of the Oireachtas.

(3) Without prejudice to the generality of paragraph (1), the Select Committee shall consider, in respect of the relevant Department or Departments, such—

(a) Bills,

(b) proposals contained in any motion, including any motion within the meaning of Standing Order 164,

(c) Estimates for Public Services, and

(d) other matters

as shall be referred to the Select Committee by the Dáil, and

(e) Annual Output Statements, and

(f) such Value for Money and Policy Reviews as the Select Committee may select.

(4) The Joint Committee may consider the following matters in respect of the relevant Department or Departments and associated public bodies, and report thereon to both Houses of the Oireachtas:

(a) matters of policy for which the Minister is officially responsible,

(b) public affairs administered by the Department,

(c) policy issues arising from Value for Money and Policy Reviews conducted or commissioned by the Department,

(d) Government policy in respect of bodies under the aegis of the Department,

(e) policy issues concerning bodies which are partly or wholly funded by the State or which are established or appointed by a member of the Government or the Oireachtas,

- (f) the general scheme or draft heads of any Bill published by the Minister,
 - (g) statutory instruments, including those laid or laid in draft before either House or both Houses and those made under the European Communities Acts 1972 to 2009,
 - (h) strategy statements laid before either or both Houses of the Oireachtas pursuant to the Public Service Management Act 1997,
 - (i) annual reports or annual reports and accounts, required by law, and laid before either or both Houses of the Oireachtas, of the Department or bodies referred to in paragraph (4)(d) and (e) and the overall operational results, statements of strategy and corporate plans of such bodies, and
 - (j) such other matters as may be referred to it by the Dáil and/or Seanad from time to time.
- (5) Without prejudice to the generality of paragraph (1), the Joint Committee shall consider, in respect of the relevant Department or Departments—
 - (a) EU draft legislative acts standing referred to the Select Committee under Standing Order 105, including the compliance of such acts with the principle of subsidiarity,
 - (b) other proposals for EU legislation and related policy issues, including programmes and guidelines prepared by the European Commission as a basis of possible legislative action,
 - (c) non-legislative documents published by any EU institution in relation to EU policy matters, and
 - (d) matters listed for consideration on the agenda for meetings of the relevant EU Council of Ministers and the outcome of such meetings.
- (6) A sub-Committee stands established in respect of each Department within the remit of the Select Committee to consider the matters outlined in paragraph (3), and the following arrangements apply to such sub-Committees:
 - (a) the matters outlined in paragraph (3) which require referral to the Select Committee by the Dáil may be referred directly to such sub-Committees, and
 - (b) each such sub-Committee has the powers defined in Standing Order 83(1) and (2) and may report directly to the Dáil, including by way of Message under Standing Order 87.
- (7) The Chairman of the Joint Committee, who shall be a member of Dáil Éireann, shall also be the Chairman of the Select Committee and of any sub-Committee or Committees standing established in respect of the Select Committee.
- (8) The following may attend meetings of the Select or Joint Committee, for the purposes of the functions set out in paragraph (5) and may take part in proceedings without having a right to vote or to move motions and amendments:

- (a) Members of the European Parliament elected from constituencies in Ireland, including Northern Ireland,
- (b) Members of the Irish delegation to the Parliamentary Assembly of the Council of Europe, and
- (c) at the invitation of the Committee, other Members of the European Parliament.

b. Scope and Context of Activities of Committees (as derived from Standing Orders [DSO 82; SSO 70])


- (1) The Joint Committee may only consider such matters, engage in such activities, exercise such powers and discharge such functions as are specifically authorised under its orders of reference and under Standing Orders.
- (2) Such matters, activities, powers and functions shall be relevant to, and shall arise only in the context of, the preparation of a report to the Dáil and/or Seanad.
- (3) It shall be an instruction to all Select Committees to which Bills are referred that they shall ensure that not more than two Select Committees shall meet to consider a Bill on any given day, unless the Dáil, after due notice given by the Chairman of the Select Committee, waives this instruction on motion made by the Taoiseach pursuant to Dáil Standing Order 26. The Chairmen of Select Committees shall have responsibility for compliance with this instruction.
- (4) The Joint Committee shall not consider any matter which is being considered, or of which notice has been given of a proposal to consider, by the Committee of Public Accounts pursuant to Dáil Standing Order 163 and/or the Comptroller and Auditor General (Amendment) Act 1993.
- (5) The Joint Committee shall refrain from inquiring into in public session or publishing confidential information regarding any matter if so requested, for stated reasons given in writing, by—
 - (a) a member of the Government or a Minister of State, or
 - (b) the principal office-holder of a body under the aegis of a Department or which is partly or wholly funded by the State or established or appointed by a member of the Government or by the Oireachtas:

Provided that the Chairman may appeal any such request made to the Ceann Comhairle / Cathaoirleach whose decision shall be final.

Appendix 3 Transcripts of Joint Committee meetings

Transcripts of Joint Committee meetings on Sustainable Land Use

Overview of Land Use: Teagasc, 18th February 2014

Chairman:  I welcome from Dr. Rogier Schulte, principal research officer, Teagasc, and Mr. Réamonn Fealy, spatial analysis unit, Teagasc, who will discuss land use with the committee.

I invite Dr. Schulte to make his opening statement.

Dr. Rogier Schulte: I thank the chairman and members for this opportunity to present to the committee.

It is timely to discuss emerging demands on land use. Changing land use is a slow process, not only in Ireland but internationally, that requires early engagement because it is difficult to manage. The time horizon is between 2020 and 2050. The European Commission is preparing a land use directive aimed at dealing with the challenges we will be discussing today. We would like Ireland to be in a position to inform this process rather than respond to it in ten years time. Our work is based on numerous reports and scientific papers but this presentation will be a whistle-stop tour.

At global level there are two grand challenges facing agriculture, namely, achieving and maintaining food security and sustainability. By 2050, the world population will have risen to 9 billion. Particularly in emerging countries, there is an increase in demand for livestock produce. The demand for food is expected to go up by 60% by 2015. With sustainability, there is the impact of greenhouse gas emissions and climate change on agriculture. Globally, agriculture is the largest consumer of fresh water. There is also pressure on biodiversity. Wherever agricultural areas expand, it commonly comes at the expense of biodiversity such as with the Amazon rain forests or high nature value farmlands in Europe.

The question we are facing is how we can maximise multi-functionality of our limited land resources. Ireland is no different in this respect and can be considered a microcosm of these global challenges. Food Harvest 2020 is an agricultural policy in response to food security concerns. We also have a raft of environmental policies coming from Brussels and national level.

What do we expect from our land? There are five high level demands on land use, namely, the provision of food, fibre and fuel, water purification, to sequester carbon to offset greenhouse gas emissions, to provide a habitat for biodiversity and a home for nutrients in the form of cow or pig slurry or sewage sludge from human waste. Over the past five years, Teagasc has conducted a scoping study on the extent to which we are likely to meet all these demands. Over the short term, up to 2020, there is a real potential to meet these competing demands for land but only if the process is managed from the very start. That was also the conclusion of the independent environmental analysis of Food Harvest 2020, published by the Department of Agriculture, Food and the Marine in the past fortnight.

How can we achieve the targets set out in Food Harvest 2020? It can be done through intensification, keeping more animals on the same intensively farmed land base to achieve more output.

Alternatively, the same targets can be reached through expanding the land area intensively farmed and increasing the total number of animals but not the average stocking rate. The third pathway is what we call resource efficiency where we produce more from the same amount of input and the same number of animals. In reality, we expect that Food Harvest will be achieved through a combination of all three pathways.

What are the implications for land use categories and land use change? We are not going into the detail of these figures here. These are historical figures from the CSO on the broad land use

categories and our projections to 2020. The bottom line is that our projection is that Food Harvest 2020 *per se* will have limited impact on the broad land use categories in Ireland. The caveat is that within grassland, we expect an expansion of the intensively managed grasslands at the expense of the extensively managed grassland, mainly through new drainage schemes.

The second demand we are facing relates to greenhouse gases and climate change. This is where we expect our land to sequester carbon. The context of this debate is that, as we now know, it is extremely difficult to reduce agricultural greenhouse gas emissions *per se* and that it is simply a reflection of our ruminant dominated livestock industry. It is very difficult to reduce methane emissions from ruminant animals. At best, we can aspire to flat line our agricultural greenhouse gas emissions in the context of achieving the Food Harvest 2020 objectives. Half of that story is good news because it means a decoupling of production and emissions. Within the current Kyoto framework, we are stuck with reducing agricultural emissions.

Post-Kyoto, new thinking is emerging to allow agriculture to take credit for the good things it does in terms of greenhouse gas emissions, mainly sequestering carbon in the soil and displacing fossil fuel emissions or imports through bio-energy and biofuel crops. We have carried out an assessment of the potential of this off-setting and currently our grasslands are sequestering carbon at a high rate. Our first generation forestry is also sequestering carbon. Our arable lands are considered neutral whereas our drained organic soils are a source of carbon emissions.

We also assessed the future potential. We may or may not be able to increase our grassland sequestration. It will be difficult because the rates are already so high. There is real potential to expand our first generation forestry area and hence increase carbon sequestration. There is also real potential for bio-energy crops as a sink for carbon. In December, we published a comprehensive report about it that is available on our website. The overall conclusion is that there is real potential for agricultural off-setting of greenhouse gas emissions but this will require land use change, forestry and bio-energy. Before that becomes a reality, there are many obstacles. These obstacles are regulatory, social and economic, particularly in respect of bio-energy. There is real potential here for competition with both food production and biodiversity objectives.

A third demand we ask of our land is the provision of clean water. Here we are led by the EU water framework directive, which is a very complex directive, but, ultimately, it comes down to two objectives. The first is to achieve good water quality status for all water bodies across the EU. If we have a quick look at how Ireland is faring - there is a slide with the 17 original EU member states with Ireland highlighted - we can see that the directive ultimately requires that all the bars are either green or blue. At the moment, Ireland is not in a bad starting position. It is in fourth place in the EU in terms of the amount of water we consider to be of good quality. From our agricultural catchments programme, we know that the nitrates action plan that has been in place for the past ten years will go a long way towards achieving good water quality status. One important caveat is that this is a very slow process. Our farmers have implemented many measures to protect water quality under the nitrates directive but it may take many years - ten or 20 years - before this translates into good water quality. This simply due to legacy effects in our soils.

The second objective of the water framework directive is more challenging. Wherever there is pristine water quality, this must be maintained. This is better than good water quality. Of particular relevance in Ireland are the freshwater pearl mussel and the catchments in which this shellfish is found. It is a very rare shellfish that is threatened with extinction across the EU and worldwide. These are the water bodies where we require pristine water quality to be maintained. Our overall conclusion here is that additional actions may be required to maintain these pristine water bodies. One caveat is that any actions must be assessed for cost-effectiveness. Often one can get the same result for an order of magnitude difference in the cost. In other words, some actions are very cost-effective and cheap while others can be very expensive.

This leads us neatly to our last demand, which is to provide a habitat for biodiversity. Here we are led by the EU habitats directive and the birds directive which have led to the designation of Natura 2000 sites across Ireland in which biodiversity is prioritised. That is the good news. The bad news is that

according to the National Parks and Wildlife Service survey, the outlook for many of these habitats is either bad or poor. There are also concerns about high nature value farmland outside these areas. This has culminated in a negative judgement against Ireland by the European Court of Auditors, which has been well documented. Our conclusion is that additional action may be required to maintain the rich natural heritage of our landscape but, again, any actions must be assessed for cost-effectiveness.

This leads to the question of how we can manage these competing demands for land. We have a limited land base. How can we manage that? We know from our work that all our soils perform all functions in response to these demands but some soils perform some functions better than others. Some soils are better than others at producing agricultural output and some soils are better than others at purifying water. A solution could lie in the targeted management of our three scenarios - roll out resource efficiency where this is cost-effective. Intensification may be justified and desirable where we have the soils that can process the additional nutrient loads. Expansion may be the preferred option where this competes with high nature value farmland.

The next logical question is how this can be managed. A particular challenge we are facing is that it is often assumed this can only be managed through command and control or red lining areas for agriculture, sequestration or forestry, but this is not necessarily the case because it can also be managed through what we call soft incentivisation. Indeed the EU and Ireland have a very long history and tradition of managing land use through schemes like the Common Agricultural Policy; the less favourable areas, LFAs; agri-environmental schemes; and the forestry scheme. There is no reason this could not also be applied to manage land use in a future context.

How is Teagasc addressing these issues? It is fair to say that most of our research, knowledge transfer and education programmes have focused on the resource efficiency scenario - getting more value and more output out of the same amount of input and land base. Examples are the carbon navigator, the grass wedge and the economic breeding index. We have a new programme called a soil quality assessment and research programme, which is funded by the Department of Agriculture, Food and the Marine, where we will quantify these five soil functions for more than 150 farms throughout the country. Another new development is our new sustainability demonstration farm, which we launched in October 2013 in Kildalton, where we will bring together all our knowledge in education, research and knowledge transfer on this resource efficiency. We also engage with policy. Our submissions to the review of the nitrates action plan, the climate policy and the development of the green low-carbon agri-environment scheme, GLAS, are well documented. We are also engaging at EU level. We have worked with the Commission on the bio-physical criteria of the new LFAs and are now leading a proposal under Horizon 2020 called LANDMARK which is aimed at informing the new EU land use directive.



The final point that may be of note to the committee is that, this year, Teagasc will launch the Irish soil information system, ISIS.



It is a five and a half year collaboration between Teagasc and the Environmental Protection Agency which produced the new high resolution soil map of Ireland. All of our soil information will be publicly and freely available on the web. The scale will be 1:250,000 which makes it applicable for use at national and regional level. It is not applicable at field or farm level.

We have two headline conclusions: in the short term it looks like there is an opportunity to manage our land resources to meet all targets but only if we manage them from the start. After 2020, however, hard choices on our land use may be required. These might even be choices between sustainability indicators and we might face questions such as do we want to offset our agricultural or greenhouse gas emissions, for example, through forestry. This may come at the expense of biodiversity, or *vice versa*, do we want to protect all biodiversity which will reduce the opportunity for carbon offsetting? Then we have to throw in the other demands, food production and water quality and we may be faced with very difficult choices. The one thing that is clear is that we can no longer address these challenges one at a time. We cannot deal with water quality this week and greenhouse gases next week. It requires a coherent response. This is a good opportunity for



engagement, as we have started, but it is a slow process. We have heard the first discussions on a successor to Food Harvest 2020, named Food Harvest 2025. That may be a good opportunity to start thinking about these competing demands for land use to bring it into the process. This is a timely moment to engage with the EU process. We would like Ireland to be in a position to inform that process, rather than in ten years time having to respond to its outcome.

I thank the committee for its time. We will welcome whatever questions members may have.

Chairman:   I thank Dr. Schulte. That was very informative. His work has identified many of the areas that this committee realises need to be addressed and dealt with in some detail. A debate needs to start, even on some of the choices to be made. That is the aim of the committee's work and Teagasc is our first witness. We said we would start where the preparatory and scoping work was being done to help us to navigate and the information provided is very helpful. I have some questions, but I will first call members to speak.

Deputy Martin Ferris:   I thank Dr. Schulte for his presentation. The Chairman has outlined its importance. The target of 9 billion people by 2050, a 60% increase in food production in order to provide food security and a huge effort towards further intensification of production will create their own difficulties in respect of environmental quality. The problem is that in many parts of the world food will never be produced, unless some revolutionary way to irrigate desert and so forth is found. How does Teagasc hope to manage this? It is all a question of management. Professor Schulte mentioned incentives. The option is to use the green low-carbon agri-environment scheme, GLAS, etc. That shows the market side, on which the European Union and the CAP create incentives to manage and direct production.



I did not hear any mention of GM production, but I may have missed it. What are the delegates views or opinions in that regard? Do they see it as part of food security in the future and what are its consequences?

Deputy Thomas Pringle:   I thank Dr. Schulte for his presentation. It is a big subject and it would probably take more study than an afternoon meeting to try to come up with some reasonable questions in response.

Are the goals of Food Harvest 2020 and the various environmental policies with which we must comply mutually exclusive? Is it possible to satisfy all of them through correct land usage? Dr. Schulte has said measures in the water framework directive need to be assessed for cost-effectiveness. Does that mean that we need to decide it is too expensive and that we should not do it and justify this, or what does it mean?

In respect of carbon sequestration in agriculture, we hear a lot about the amount of methane cattle produce, but can it be measured against how much is absorbed by growing grass? How will this be achieved in the future?



Dr. Schulte has said soft incentivisation is preferable. Are there studies of how effective that has been under the CAP and how was it achieved? Does he foresee farming practices being officially restricted based on soil type in an area, for example, it might be desirable to allow intensive or resource-efficient farming on soil that can manage it and restrict it on other soils, rather than allowing the market to decide?

Deputy Willie Penrose:   The last time I saw a paper like this was in University College Dublin given by some of Dr. Schulte's predecessors. The focus obviously has to be on soil type and land use and, broadly, how soils function. That is one of the challenges. There are gleysols, heavy soils, limestone soils and deep soils. I appreciate Dr. Schulte is trying to aggregate them in averages, but how can he be more specific about the different soil types across the country in a way that will help achieve the 2050 goal? The most important thing he said was that in September this year the soil type identification would be updated. There have been changes owing to drainage and so on which have created different types of soil. How will that input into his process? In respect of carbon



sequestration, habitat diversity and water purification, he has indicated that forestry has a significant role to play as a carbon sink. We only have 7,500 ha and aim to have in excess of 10,000 ha in forestry. Does he have any view on how we will achieve this?

The real challenge is to explore the compatibility of achieving a 60% increase in world food production by 2050 and the central and important issue of sustainability. Does Dr. Schulte agree that is the nub of the problem? We have so often been behind the ball in dealing with the European Union. Did Dr. Schulte say it was bringing out a land use directive for 2019?

Dr. Rogier Schulte: It is starting to prepare it now.

Deputy Willie Penrose:   I salute Dr. Schulte because we have been notoriously slow. We should be making a major input into formulating this directive and be proactive, rather than standing on the sidelines, being reactive, until all hell breaks loose.



How much of an input will this research have into the shape and form of the directive? Let us be honest; some of the proposals that emanate from Brussels are well endowed with theory, but it is a challenge to apply them on a practical level.

Senator Susan O'Keeffe:   I thank the delegates for bringing clarity to an enormous body of work. As Deputy Thomas Pringle suggested, we would probably have to lock ourselves in this room for a week to do justice to their research, but we will start where we can. The global soil challenges are big issues, but there is no mention of the almost 1 billion people we currently fail to feed. That is important to be put on the map alongside all of the other important matters.

Deputy Willie Penrose referred to wanting Ireland to inform the EU directive. I agree that Ireland should play a role in this regard. Are the delegates having to fight their way into that process or insert themselves into it? Why would we not be invited to become involved? Surely the European Commission would have an interest in what we and others might have to say. I wonder, therefore, where we stand in terms of our European counterparts. The soil map of Ireland is welcome, but we are late to the table in developing it.

In regard to Food Harvest 2020 and what is imaginatively being called harvest 2025 - that is for politicians to ensure we do not get too confused - do the delegates think the body of work they have produced is compatible with these strategies? Do they also need to insert themselves into that debate and, if so, how much support can we offer them?

My final question is whether the cattle on the page are bugged. I observe that they are wired.

Chairman:   I ask the delegates to provide further details on the sustainable model farm at Kildalton College. What trials and experiments will be conducted there? Has any thought been given to renewable energy that is land sourced to mitigate the output increases under Food Harvest 2020?

Dr. Rogier Schulte: I thank members for their excellent questions. I wrote them down but do not hesitate to tell me if I skip any.

The 60% increase in demand for food is a global figure, but there are very different challenges and demands around the globe. There is great potential for developing countries to increase yields through the use of science and technology and the application of simple things such as fertiliser. We are working closely with Irish Aid to lend our expertise in agricultural production and have established an international food security committee to co-ordinate that expertise with Irish Aid. Senator Susan O'Keeffe is correct to point out that 1 billion people are undernourished or hungry. That is one of the main drivers of our collaboration with Irish Aid.

There is a certain degree of confusion about the targets set under Food Harvest 2020. It contains

only one volume target, that is, an increase of 50% in dairy and milk volume in response to the phasing out of the milk quota. All of the other targets are value based. The changes in the demography of the national herd and land use will be less dramatic than they may appear at first glance. For example, the projection from our Teagasc FAPRI Ireland model is that we will see an increase in milk volume and the number of dairy cows, but it will be partially offset by a projected contraction of the national suckler herd. As these additional dairy cows produce more calves, they will offset some of the suckler cow production.

On whether intensification under Food Harvest 2020 will increase pressures on water quality, this is where management comes in. Our agriculture catchment programme aims to measure the impact on water quality of intensive agricultural production in compliance with the nitrates directive. This is a complex programme, with complex outcomes, but the headline is that the nitrous action plan will go a long way towards ensuring good water quality across the board. When we bring our paper into the equation, a wide range of soils have the capacity to process additional nutrients. This is reflected in the good water quality status we enjoy in Ireland compared to many other EU member states. However, certain soils are approaching their maximum capacity for processing these nutrient loads and purifying water to quality standards. This is where target management comes into play. Some soils can cope with additional nutrient loads, whereas others cannot. The most important achievement of Food Harvest 2020 is that it has brought sustainability and growth in the agriculture industry to the same side of the table. The environment is no longer considered a constraint on production. We are now building on our green credentials. Bord Bia is promoting this as a point of differentiation on international markets. The sustainability of our systems will allow us to grow the industry. Clearly, we cannot afford to sit still because other countries are catching up with us rapidly. We have to keep working on sustainability.

That leads me to the question of genetically modified organisms, GMOs. This is a complex area. Perhaps members saw the most recent episode of "Eco Eye" which featured some of Teagasc's research on GMOs. We maintain a completely scientific position on the subject. There are clear benefits from GMO crops, but there are also perceived risks. We are researching both the potential benefits and the potential risks in highly controlled and regulated conditions and will await the outcome of our research before taking further steps. It is worth noting that the field of genetic modification is developing very rapidly and the distinction between conventional breeding and genetically modified breeding is beginning to blur in laboratories. It may become increasingly difficult to tell one from the other.

I will ask Mr. Fealy to speak on the issue of incentivisation.

Mr. Reamonn Fealy: I thank everybody for their questions. There is a comprehensive list for us to deal with. I agree with Senator O'Keeffe that we would want to be here for some time to adequately address them all but we will do our best.

On the notion of incentivisation, Deputy Pringle's question referred to the effectiveness of incentivisation in terms of soft incentivisation versus hard incentivisation. Most of the work in that area is conducted by my colleagues in the socio-economic area of Teagasc where the effects of different types of incentivisation are rolled out. However, as a general principle, we view the construction of a framework that avoids red-lining - another question we got a short time ago was on restricting areas of land for particular types of activity - as a particular path that should be avoided.

Traditionally, the way we have implemented changes and moves towards best practice was through the incentivisation model. Ultimately, if we are to expect our farm stakeholders to be the arbiters and those responsible for maintaining our land to the best possible quality in a manner that will lead to the best economic outputs and the best agricultural production outputs while maintaining environmental quality, we must have cognisance of the fact that it is a public good and a service to the public good, and

incentives must be designed to meet that end. That is what is engendering the approach we are now examining with regard to a framework for moving into the future. A framework needs to be built that takes account of the multiple outcomes of agricultural land use in Ireland, be they for environmental quality or for agricultural productivity. To date, incentives have been designed with a singular outcome in mind and while the incentive is designed in such a manner that would bring one to that end, it has created what are termed perverse outcomes in that there have been negative impacts that might not have been considered previously.

Two examples come to mind. Traditionally, perhaps our management around upland areas and sheep has been shown in retrospect to be misguided, and the issue around overstocking has created some problems, particularly in the western areas. Also, in retrospect the expansion of forestry onto deep peatland soils with a singular species was not the most productive and useful way to go in forestry, but we are learning. As research, time and resources are put into these problems we are learning that there are better ways to approach the way we incentivise land management.

One or two questions were asked about soils. Soils and soils mapping is a particular area for spatial analysis in Teagasc. If I understand his question correctly, Deputy Penrose asked how we take account of the finer detail of soil variability in Ireland in a national mapping. It is a good question and one I have had to deal with for nigh on 16 years in my career in Teagasc. It is a challenging task. Depending on the classification system we use there are ten or 11 major soil groups in Ireland, and nine of them have been recorded as occurring in one field in Cork. Without referring to Cork, that suggests how difficult the task is of mapping our soils.

In terms of the way we approach this problem, with the production of the 1:250,000 map, we show soils in their generality and we show soils with the proportions that occur in a particular region. These are called soil associations. That is the classic industry standard, so to speak, in terms of the way soil mapping should be approached. We would always add a caveat when people are using the data that soil maps are not to be used for sight-specific purposes. For any reason, be it for the positive side of farm productivity or a farmer making an assessment within field or regulatory efforts, a national soil map should not be used at point or field scale.

Senator O'Keeffe asked if we are ahead or behind the curve. Interestingly, when I started in Teagasc we had drifted behind. We are now coming towards the front, particularly in light of the near completion of phase 1 of the Irish Soil Information System, ISIS, project. This is an opportune time to answer this question because we are at the end of phase 1 and it is due to be presented towards the beginning of March. For the first time we will have a comprehensive database containing all our soils information that has been developed over many years, since the mid-1950s, which will be available to the public via a web browser interface.

In this regard we have European colleagues and peers on our steering committee, and colleagues of mine have been invited to present to European organisations on the way we have developed that system. We are using leading edge technology to both store and disseminate the information, and at this stage we are coming back into a position where we are beginning to lead the curve.

Dr. Rogier Schulte: If I may follow up on that regarding another question posed on our access to the Commission and feeding into that process. It is because of initiatives like the

Irish Soil Information System, and a representative from the European Commission is chairing the steering committee of that project, that we now have a good working relationship with it, particularly its soils unit in Ispra, in Italy. Also, the paper the members have before them has been read and commented on by the European Commission. The landmark proposal to which I referred is a very large Horizon 2020 proposal on soil quality and soil functions that we are leading for that very reason. We are reasonably satisfied, therefore, with our working relationship with the Commission.

One of the benefits of being a relatively small country is that we have fairly short lines of communication here compared to other countries in that we have good collaboration between the State agencies and the various Departments that are involved. It is relatively easy to get a group of people together and come to a position compared to the position in some of the bigger member states that have to go through more layers, so to speak.

Deputy Penrose asked about the offsetting of carbon emissions. Our figures suggest that, currently, the offsetting equals one third of agricultural emissions in Ireland and that without action that will not improve because our first generation forestry that was planted after 1990 is beginning to mature. We will then go into second generation forestry etc., and the potential for carbon sequestration of those is lower. However, in a report on carbon neutrality as a Horizon point, we also identify actions that can be taken to rectify that, and increasing of forestation is an option in that regard. There is a difference in terms of the physical land base that in theory is available for additional forestry. However, the reality is very much restricted by regulation and social dimensions. It involves forestry, a change of enterprise type, a complete change of business, and there are also social barriers.

A question was asked on the bio-energy side. If as a country we want to seriously get involved in bio-energy, it requires a change in our energy infrastructure, and there would be significant economic costs involved in that. When we talk about bio-energy, like many other countries the thinking is moving away from liquid biofuels because liquid biofuels are considered in direct competition with food production. When we talk about bio-energy now we are talking about either bio-energy crops - willow, miscanthus - where there is less competition with food production.

We are also at a very early exploratory stage of anaerobic digestion of grass in combination with slurry. The one thing this country can produce very well is grass. If we chose to we could produce much more grass than we currently do, which could be used for bio-energy without undue competition for land. There are many obstacles to overcome before that becomes a reality. Again, it would require a change in the infrastructure of our energy distribution network. In terms of Horizon 2020, we should not pin our hopes on that but when we are talking about Horizon 2050, it is one of the options that could be explored.


Chairman:  And Kildalton?

Dr. Rogier Schulte: Apologies, it is an exciting initiative. Kildalton, as the committee will be aware, is our largest college. We have chosen Kildalton as the preferred site of our sustainability demonstration initiative because it is where we are training the next generation of farmers. When we talk about 2020 or 2050, it is the students who are in Kildalton now on whom we will be relying to make all these discussions a reality. Also, the Kilkenny area, or the wider catchment area there, is where we see a lot of movement in terms of Food Harvest 2020 - many new entrants into dairy production. What we are doing there is bringing together all our research on sustainable farming from all our research centres - our dairy production centre, our beef research, our tillage, our rural economy and our soil centres - to showcase options for best practice in sustainable farming. It is always difficult in our line of work to make that link, from proving options at research level in

experiments to achieving it on the ground on a large number of farms. This will be the focal point where we will demonstrate different options for different farms. There is no one blueprint for sustainable farming. We will demonstrate options - going back to the paper - on how to maximise what we get from the land, in terms of food production, water quality and greenhouse gas emissions.

As to whether we can capitalise on that natural capital that we have there, it will involve a large KT programme bringing both farmers and food business on board. Where Bord Bia has its Origin Green programme, this will be a focal point where all the stateholders can come and see at first hand what sustainable farming looks like. That will be rolled out over a seven-year period.


The first year, this year, what we are doing is a baseline survey. If we want to show progress over time, we have to know the baseline information. This year we are simply measuring everything and as from next year, we will introduce, step by step, further measures to improve efficiency.

Chairman:  Will it include habitats?

Dr. Rogier Schulte: We include habitats. There will be three phases. Phase one, which will be next year and the year after, we are simply implementing best practice which we would recommend anyway, that is, the grass wedge, the carbon navigator, the five-point nutrient plan and the ten-point biodiversity plan.


In phase two, we start looking at the infrastructure in the college. In terms of bio-energy, there is, for example, a large woodland in the area that is currently and traditionally largely unmanaged. We propose to manage that for it to have two functions - a public amenity function and a producer of energy for the college as a client. Bio-energy crops may be an option also for the college as an energy client.

In the third phase, we will look at emerging technologies. The ICT area in agriculture is developing fast. We expect that in five or six years' time it may become affordable for real-time monitoring of, for example, both soil conditions and animal movements, and we will start implementing those emerging technologies.

Deputy Thomas Pringle:  I have a couple of supplementary questions.

I was not sure how effective were incentives. Dr. Schulte stated that if it is tailored correctly it can be effective, but we do not know whether it has been tailored correctly until it is too late. I also question the cost-effectiveness of measures under the Habitats Directive.

I would make one last comment about the paper, which states, under Towards Functional Land Management, that, "reductions in greenhouse gas emissions do not need to be locationally bound – the spatial origin of reductions is irrelevant in the context of their global warming potential". It refers to it on a global level as well. Is that a dangerous concept to be giving to the EU in the context that one would export global warming reductions to the Third World and continue as before? Perhaps the question is not relevant to today but it is one that came to mind when I was looking at it.

Senator Susan O'Keeffe:  Dr. Schulte mentioned additional action may be required to maintain pristine water bodies. I refer to the freshwater pearl mussel. It is a big qualification, that it "may be required". I wonder why it may be required. I understand the cost, but I wonder whether that the only consideration.

Dr. Rogier Schulte: These are good questions also.

Let me start with the cost effectiveness and then I will come to the pearl mussel as an example. We conducted a study in the Lough Melvin area. Lough Melvin is one of these pristine water

bodies. It was a North-South collaboration because it is a cross-Border lake. We looked at approximately 20 different options to reduce loss of phosphorus, from the land to the water. Phosphorus was the biggest threat to that pristine water quality. We found that, in theory, many of the measures would be effective in reducing phosphorus flow, from the land to the water, but the difference in cost was significant. To give two extreme examples, one measure proposed in the scientific literature is to stop access of animals to the water bodies. In the Lough Melvin area, the challenge is that there is water everywhere and the stocking rate is low, and one would need miles of fencing to keep each cow out of the water. If one considers the cost effectiveness of stopping that one cow from standing in the water, it is an expensive option. Another measure we looked at was soil testing for phosphorus and customising the fertiliser management accordingly, which came out as a cheap option.

It is worth noting though that such difference in cost effectiveness is catchment specific. The reason fencing was so expensive on Lough Melvin is miles per cow. If one goes to a different catchment with well-drained soils, few rivers or streams, and a high stocking density, that equation changes completely. Also, if one looks at other risks, such as transfer of pathogens, then in that equation for keeping the cows out of the water one comes up with a different figure for cost effectiveness, but it can differ by orders of magnitude. In fact, in the Lough Melvin scenario, and if the objective is to reduce phosphorus, then the fencing option turned out to be 100 times more expensive than soil testing if one compares kilo for kilo of phosphorus lost to the water. It is a real issue.

On the additional actions for the pristine water quality, the pearl mussel is a peculiar case study. A map in the presentation shows the catchments where the pearl mussel is found. It is a slow-growing animal. It is particularly the young pearl mussels, the juveniles, that are sensitive to both nutrient loss and sediment loss. Basically, if there is excess nutrients and excess sediment, they get buried and suffocate at the bottom of the stream. Once they grow to adulthood, they can live for a long time. They can live for over 100 years. The challenge is that in all of these blue catchments shown the slide the pearl mussel has been found but in some of these catchments we - by which I mean the National Parks and Wildlife Service, as it, not Teagasc, conducts the surveys - find only adults remaining. These adults are almost relics of when those waters were pristine, whereas in some of the western catchments there are still viable populations that have a chance of breeding and continuing themselves.



This leads us to a peculiar challenge. Under the Habitat Directive, we are obliged to protect this species but nobody knows whether it is technically possible for these old pearl mussels to start breeding again in some of the more intensively used catchments - hence our hesitation in making straight statements on what should be done. To the best of our knowledge, the National Parks and Wildlife Service has now also prioritised the catchments accordingly. It has put the highest priority on those catchments where the pearl mussels are still breeding and there is a chance of success. That brings me back to cost-effectiveness.

We are better off putting money into small catchments, where there is a chance of success, rather than spreading it over a large area where it may be difficult.

The first point we are trying to make is that some of the soil functions are tradeable between areas while others are not. Water quality is a soil function that is not tradeable because we require good groundwater conditions for drinking wherever we are. We cannot increase the pressure on water quality in one area at the expense of another area and vice versa. Carbon sequestration is the other side of the extreme. Technically, from the point of view of the atmosphere or from a global warming point of view, it is irrelevant what catchments, area or even what country the carbon comes from. The reason we mention it in the paper is that at regional and national level it may not be the most prudent approach to expect every farmer to put all his energy into soil everywhere for the purpose of carbon sequestration because not all soils are suitable for further carbon sequestration. We may get more benefits from trading between catchments or regions where people target carbon sequestration and food production. That is an

area we are currently conducting research on so we do not have the final word on it. It will be a number of years before we are finished. We are doing a number of scenario analysis projects.



Deputy Pringle is correct to point out the potential difficulties at international level. Scientifically, the concept holds internationally and, just like in the energy market which we were discussing before we came in, there is a move for southern Europe to produce solar energy in summer and northern Europe to produce wind turbines in the winter. This can then be traded and it makes the most of our resources. The same could apply to carbon sequestration if we identify areas that are good at the carbon sequestration and areas that are good at producing grain. It is a very difficult area will prove difficult even within the EU. How do we value it and how do we incentivise countries? Will we export our problems to developing countries? That is a question mark that can be already placed over the reducing emissions from deforestation and forest degradation, REDD, vehicle under the UNFCCC where, as a country, we can invest in credits in developing countries. There is merit in it and it is a win-win scenario but there is a valid question as to whether we are exporting our problems. As a scientist, I am reluctant to say as there is no scientific answer to it. It is a matter of values.

Senator Susan O'Keeffe:   One point we did not touch on is the green, orange and red table in the presentation. Do we have the prospect of turning the red area to green? I could put the question better but witnesses know what I mean.

Dr. Rogier Schulte: I will defer to the National Parks and Wildlife Service, which produced the table. Our understanding from the report is that Ireland has met its obligations in terms of designating areas for Natura 2000 sites. Within those areas, the outlook for the future status of many of the habitats is poor to bad. This is the column on the right hand side of the graph. That is where the challenge lies. In our conclusion, we say that additional actions are required.

Senator Susan O'Keeffe:   Scientifically, is it possible?


Dr. Rogier Schulte: Scientifically, protection is always preferable over restoration. The restoration of ecosystems is difficult, slow and expensive. It makes more sense to protect it in the first place if that is the objective.

Chairman:   This is the most important challenge in respect of the future direction the country takes with regard to its agri-industry. It is a major challenge. We wanted to invite the witnesses to appear to establish a well of knowledge. Resource efficiency and balance are the key issues. The diagram showing the same number of animals and the same amount of feed, with extra food at the end, is the optimum. If we can do that and use science and good management practices to do it, then we can argue the case about trading. We can ask what is the point in us not increasing our production in an area we happen to be good at just to achieve a percentage reduction in overall output, when other countries can do other things better than we can. There should be a certain level of re-evaluation, without compromising it. Our 20-20-20 targets need to be looked at in that light. The question is what to use to factor in mitigating allowances against energy, bioenergy and off-land wind energy. That is a hot topic but it is a land-based use while hydroelectric energy is a river-based use. Science and management will form a key part of this.

The project will take longer than the lifetime of this Dáil. It would be worth the time of the committee to see a host farm in the south east. We have a proposal to see a host farm for another reason. We could do worse than go to Kildalton to gather information. Trial work on forestry is also being done there. It is taught in the college and some information may be available. We could do worse than see what they are scoping out.

I thank the members. Although not many committee members were present, the questions show there is interest. We cannot overestimate the subject for the future of because we have put great stock in Food Harvest 2020, to be followed rapidly by food harvest 2025. We must also deal with the other issues. Perhaps the witnesses can make the slides available to us.

Maximising the usage and potential of land: Coillte, 3rd April 2014

Chairman:  We will recommence our deliberations. This part of the meeting will involve a discussion with Coillte on maximising the usage and potential of land. I welcome Mr. Gerry Britchfield, acting chief executive, Mr. Gerry Egan, group director of strategy and corporate affairs, Mr. Gerard Murphy, managing director of Coillte Forest, and Mr. Mark Foley, managing director of Coillte Enterprise. As they are probably aware, the committee has commenced a series of meetings with key stakeholders and experts in order that they might assist it in examining the current policy relating to and options available in respect of land use and to consider how best to maximise land use and the potential of land across Ireland. We look forward to hearing from our guests about our forestry and its role in reducing the country's carbon footprint.

I invite Mr. Britchfield to make his opening statement.

Mr. Gerry Britchfield: I thank the Chairman and members for giving us the opportunity to make a presentation to the committee. Coillte is the largest landowner in Ireland, with an estate extending to some 445,000 ha or 7% of the land area of the country. We have a presence in every county and we employ over 900 people directly. Our log supply is the lifeblood of the Irish forest products sector, which supports 12,000 jobs mainly in rural locations. We export our forest products to over 32 countries worldwide. We are at the heart of Ireland's drive to deliver 40% of electricity generation from renewable energy sources by 2020. We provide valuable public good benefits to the people of Ireland, ranging from recreational facilities to landscape protection to nature conservation.

Our understanding is that the committee is considering how to optimise the potential of Ireland's land, particularly in the context of achieving the targets set out in Food Harvest 2020. The overall vision relating to this is to act smart, think green and achieve growth. One of the key challenges set by Food Harvest 2020 is how to achieve the targets envisaged in respect of growth - for example, an increase in the value of primary agricultural output of €1.5 billion by 2020 - while also delivering on Ireland's environmental commitments, such as a reduction in our greenhouse gas emissions. We are of the view that Coillte's land bank can play an important role in squaring this circle.

Our natural resource assets and skillsets can be deployed to support the objectives of Government with regard to Food Harvest 2020 and to underpin other key policy objectives in a number of ways. In the first instance, our forest asset can deliver a range of benefits for Ireland including increased carbon sequestration from the trees we grow; low-carbon energy-efficient building products from a vibrant sawmill and panel products sector; and by enabling the development of a highly efficient supply chain from forest plants to harvesting to routes to market in order to encourage more afforestation by landowners. In addition, our land is ideally placed to support the roll-out of the Government's renewable energy agenda, which, in itself, will contribute strongly to lowering our greenhouse gas emissions by 2020. Coillte has substantial wind energy potential and a pipeline capable of producing 500 MW will be constructed in the envisaged timeframe. We will facilitate the build-out, by third party developers, of significant additional wind energy capacity in the coming years through the provision of lands, rights of way over access routes or way-leaves. We are also working to enable the growth of a high-efficiency bioenergy sector in Ireland. To this end, we recently made a strong case to the Department of

Communications, Energy and Natural Resources in respect of the introduction of a renewable heat incentive.

I will now hand over to Mr. Gerard Murphy, the managing director of our forest business, who will expand on the benefits which our forest asset can deliver for Ireland. Mr. Mark Foley, managing director of our enterprise business, will then provide more detail on the renewable energy benefits we can contribute.

Mr. Gerard Murphy: I wish to take the committee through the activities of the forest division of Coillte and its role in helping to achieve the objectives relating to Food Harvest 2020, particularly in respect of climate adaptation, carbon mitigation measures and biodiversity. The forest division is responsible for the management, protection and stewardship of the State's forests, a resource which is very important in helping to mitigate the effects of climate change. This assertion is underpinned by a national forest inventory statistic which shows that the Coillte estate has a stock of over 200 million tonnes of carbon locked in its forests and soils. In the context of the 445,000 ha it manages, the division carries out a wide range of activities from planting, tending and protecting the company's crops to forest road building, the harvesting and sale of roundwood and providing public goods.

I have included a number of statistics in slide No. 4 to illustrate the scale of our operations and the importance of what we do in supporting the wider forest industry and rural development. The lands for which Coillte is responsible represent over 7% of Ireland's landmass and the company sells almost 2.5 million m³ of roundwood to a diverse range of industrial users. This accounts for approximately 80% of the total roundwood available in the market. Each year we plant approximately 6,000 ha of forests with 15 million trees. We maintain 9,500 km of forest roads and trails, building a further 100 km of new roads each year. In total, we reinvest over €30 million into our forests every year in the context of replanting and tending trees and building roads. Some 18 million recreational visits are made to our forests annually. A total of 20% of our estate is managed primarily for the purposes of biodiversity. Our sustainability credentials are certified by the international and independent Forest Stewardship Council, FSC, which is very important in the context of accessing international markets for the industry's finished products. This year, we hope to be endorsed by the programme for endorsement for forest certification, the PEFC standard, and to have our environmental management systems certified to ISO 14000 standard.

Coillte has a presence in every county in Ireland and is a very important contributor to rural development. The forest division alone employs over 450 staff and engages approximately 460 contractors who, in turn, employ over 1,300 people. The division is organised into regional units - business area units, BAUs - in order that decision making is decentralised as much as possible. We developed a new strategy for the division last year and our ambition is to become recognised internationally as a leading sustainable and commercially successful organisation - delivering roundwood and public goods in a manner that will be highly valued by the shareholder, our customers and our stakeholders - in the next five years. There are five central themes to our strategy and these are very closely aligned to the Food Harvest 2020 themes of acting smart, thinking green and achieving growth. These themes include being more efficient, investing in our people and systems and ensuring we are competitive on a sustainable basis. We are aiming to be smarter in what we do in the context of improving the performance of our estate, mainly through optimising the use of our estate through a flexible set of silvicultural regimes and plant material, improving the productivity of our estate and aligning all our compliance and

certification requirements. We provide significant public goods to society. Our strategy is to seek recognition for these goods and thereby ensure that the value of the forest estate will be recognised in a more substantial manner.

We want to unlock the considerable value of the private forest estate through supporting the mobilisation of the private supply which is due to become available during the next ten years. I will elaborate on this strategy, particularly in terms of how it supports and assists in the development of the carbon stock in our estate.

The mitigation benefits of forests as a carbon resource and a sink for carbon sequestration is well documented but also forests can provide a role in offsetting the negative impacts of climate change such as reducing flood risks. We have seen that in the recent months with the level of flooding that has occurred here. I have identified four areas of Coillte forests that can support the State's policy on carbon mitigation and sequestration. It is well documented that establishing forests increases the capacity of carbon sequestration. For example, for every hectare planted three to 15 tonnes of CO₂ per annum is removed from the atmosphere but, obviously, that depends on the soil, the species and the age of the crop. We plant 5,500 to 6,000 hectares annually under our reforestation programme which ensures that the carbon pools locked in our estate are maintained and enhanced. We also support the national afforestation programme, which is driven through incentive schemes, to encourage farmers to plant their lands by providing specialist management services, markets for their thinnings, advice and access to our road network. The latest wind blow is an example of where we have worked very closely with local forest landowners to deal with the aftermath of the storm. We also have more than 700 farm partnerships in managing approximately 12,000 hectares of forests.

Another area that is very important in increasing carbon sequestration, especially as land becomes more difficult to source for forestry, is to increase the productivity of the existing forest estate. This can be achieved by utilising the right species and using properly adapted forest reproductive material. We have found that improved material of the right provenance can improve growth productivity of the estate by 20%. There is a direct correlation between forest productivity and increased carbon sequestration. Coillte has an advanced tree improvement programme for our major species that have been developed over 25 years as well as maintaining a range of seed orchards, the seeds of which are available for the wider industry. I believe there is significant uplift potential in the productivity of both the private and public estate through the proper use of the right forest reproductive material. Another way of increasing forests productivity, as well as the benefits of replacing fossil fuels, is to investigate the possibility of using fast growing forest energy crops. We have hundreds of hectares of trials in eucalyptus and other species which produce significant yields of wood in short rotations. We are investigating whether they are adaptable to Irish conditions.

To ensure that forests capture carbon on a net basis, it is also crucial that there are sustainable supply chains developed across the industry. Having a strong chain of custody in independent schemes like SFC or PFC gives the confidence that forests are being managed on a sustainable basis. Over the last ten years we have also supported the development of a viable contractor base in harvesting and haulage and work to ensure that proper training regimes are in place, especially in health and safety. Training in harvesting and haulage will remain a key challenge for the sector over the next number of years. We are also developing supply chains for energy wood that replaces fossil fuels and my colleague, Mr. Mark Foley, will expand on this later.

The final pillar of carbon mitigation is in the use of low carbon building products. Wood after harvesting continues to lock in carbon, as is the case with sawn wood produced by our sawmill customers or panel boards produced by our Coillte panel board mills. The increasing demand for energy efficient construction is driven by carbon mitigation measures such as the EU directive on energy performance in buildings. We believe concepts such as zero carbon construction in reducing carbon emissions are driving significant change in the market. This concept seeks to have a yearly net carbon footprint of zero and is achieved, first, by reducing the energy consumption needed in buildings and, second, utilising materials with low carbon emissions related to the manufacturing process. The OSB and MDF products that we produce contribute very favourably to this type of construction due to their use in highly thermal efficient off-site construction systems and through the carbon locked in the material.

I would like to conclude by showing how the forest estate further contributes to the "thinking green" theme of Food Harvest 2020 in the area of public goods. While more than 25% of our forest estate has statutory environmental designations, nearly 40% of our estate is managed with some form of environmental designation. We manage and protect these areas using an environmental management system which we proactively develop and improve. However, our strategy is to be even more proactive and to create a greater awareness of the type of public goods we provide and to seek recognition for them. In association with the Heritage Council, we commissioned an independent study to quantify the economic value of biodiversity, cultural heritage and landscape protection. The study, which has just been published, calculated that the value of these public goods was more than €500 million. A previous study on forest recreation showed a direct value contribution of €97 million and a further €270 million generated to the local community in terms of visits to the forests.

Our policy is to work with local communities and local authorities in developing these facilities. A number of significant examples in this area on which we have worked include the Ballyhoura Mountain trial bikes, Lough Key forest park, the Dublin Mountains Partnership, Wild Nephin and the Cavan Burren Park. Another good example of biodiversity work, which has strong links into the area of carbon sequestration, is the work we have been doing in restoring bogs under an EU Life funded project. More than 5,000 hectares are being restored back to their original state of bogs. We believe there is a need to develop innovative means of recognising the value of these initiatives in order to use the potential of these public goods to further drive rural development.

In conclusion, we believe that forestry and Coillte's key role in the sector provide important contributions to the national agenda on climate adaptation. We continue to be committed to playing a constructive part in national policy. I will hand over to Mr. Mark Foley who will take the members through other contributions we make in reducing our carbon footprint, particularly in the area of renewable energy.

Mr. Mark Foley: I am responsible for the division of Coillte which seeks to create additional value in terms of the land under our management where forestry is not the primary use. This is primarily in areas such as wind energy, biomass, providing land for infrastructure projects and other land uses as well as telecommunications mast sites. Slide 10 shows a map of Ireland and members will note that Coillte's 6,000 plus discrete properties reach far and wide into the heart of rural Ireland. Attributes such as location, local geography, topography and elevation combine to make Coillte's land assets highly desirable for a wide range of end applications.

Turning to renewable energy, particularly wind energy, it is not widely known that Coillte has been a key player in the development of Ireland's renewable ambition since the pioneers of this vibrant sector unfolded a new vision for sustainable green energy in Ireland as far back as 20 years ago. Before I talk about Coillte's portfolio and our five-year strategy, I will remind members why renewables are so important to Ireland, a peripheral country on the western tip of Europe with very limited natural resources. There are four reasons renewables are important. First, the 2009 renewables directive from the EU sets out a very clear and unambiguous ambition for Europe to achieve legally binding targets for 2020 and that European ambition cascades into very specific targets for individual countries including Ireland. We have three targets. Our targets for electricity from renewable sources is 40%, the target for heat is 12% and the target for transport is 10%. I will deal with the first two in my presentation, which are relevant to Coillte.

The second reason renewables are important is our excessive dependence on imported fossil fuels which today still exceeds 90% of all energy needs. I do not need to spell out to the committee what this means in terms of the risk to Ireland from both the perspective of security of supply and that of the cost of energy. The third reason is climate change. The members no doubt will have read that the International Panel on Climate Change reported again this week with a very clear statement that "It is extremely likely that human influence has been the dominant cause of the observed warming of the planet since the mid-20th century". Therefore, arguably, the preservation of our planet and the stewardship of our natural resources may very well be the greatest issue facing mankind in the 21st century. The final reason renewable energy is important is economics. The Redpoint study for IWEA and, more recently, the Poyry study, The Value of Wind Energy to Ireland, which was produced within the last two weeks, confirms that the increased deployment of wind energy does two things - it reduces the wholesale cost of electricity and, crucially, it stimulates employment.

I will move on to slide 12. I have included on this slide a screen shot from EirGrid's website at 5 p.m. on Wednesday, 26 March. Members will see that renewables accounted for 20.6% of all energy generated in the preceding 24 hours. That is a very good story for Ireland. Coillte has enabled 40% of current installed generation capacity, 2,000 MW of renewables, which blows on the grid today. The way we have done that is by selling upland sites to wind farm developers to facilitate the construction of new generating plant. We facilitated access to sites for construction and maintenance through the provision of rights of way across our lands. We have provided way-leaves for developers and we have supported the ESB, as the distribution system operator, and EirGrid to connect wind farms and build grid capacity. We have completed in excess of 80 transactions in this sector in the past 15 years and the revenue from this activity has enabled Coillte to fund the development phase of our own portfolio of projects.

One could ask what is Coillte's role as we look to Ireland's ambition to 2020 and beyond. First, we intend to capture more of the value in this particular sector for our shareholder by developing and operating some of our own projects, including partnerships with strong companies such as the ESB and SSE plc, formerly Scottish and Southern Energy plc. Coillte's development portfolio comprises nine projects across seven counties in Ireland with the potential to generate more than 500 MW of operating capacity. Developing the projects will provide Coillte with secure REFIT-backed income streams for the next 15 years, helping to balance our income profile which is currently over-dependent on the construction sector.

The second point in terms of Coillte's role is that we will continue to be one of the largest suppliers of land to the sector in the form of high-quality sites, rights of way and way-leaves enabling the industry to deliver the necessary electricity generation and grid capacity to allow

Ireland to reach its 2020 targets. In that regard the next four years are absolutely vital as the REFIT incentive ceases at the end of 2017.

The third role for Coillte is that it is committed to open and transparent presentation of all facts and the best scientific data relating to its wind farm developments. We believe that early engagement with communities is absolutely essential. We believe that communities have a right to be heard and that an appropriate form of community benefit provision should be an integral part of all development projects.

Fourth, much has been spoken about the potential for a major export project whereby renewable energy from land-based wind farms in Ireland – the midlands in particular – would be deployed to provide green energy to the UK. We believe such a project merits deep consideration as it offers the potential for very significant investment in the indigenous economy with the attendant benefits in terms of job creation, economic activity and returns to the Exchequer. We are mindful of Government policy in respect of this particular area.

We believe that Ireland has a unique and exceptional opportunity to drive the renewables ambition to best-in-class levels giving real leadership in this space in Europe, maximising our potential for what is a free, natural resource and helping to mitigate CO2 emissions in other sectors of the economy. Today, we are talking about the potential benefits we could achieve in mitigating the effects of agriculture. Our provisional estimate suggests that 1,300 MW of newly installed wind generation capacity has the potential to mitigate a substantial proportion of the incremental emissions arising from the projected increase in the national herd between now and 2020 as part of the Food Harvest 2020 strategy. In that regard, we would welcome a new gate process which prioritises projects of scale and with low planning risk which are capable of being delivered in the medium term for the benefits of Ireland Inc.

I will move on to slide 14 and talk about biomass, in particular small diameter round wood which originates from Ireland's forests and how it can contribute to the development of a vibrant and competitive manufacturing sector which generates its process heat requirements from a renewable feedstock rather than fossil fuels. In that regard, I will turn to the Government White Paper on energy policy which sets a target of 12% of thermal energy to come from renewable energy sources by 2020. The renewable heat sector, however, remains largely underdeveloped having grown very slowly to 5.2% in 2012, mainly as a result of wood waste utilised in the timber processing sector. Based on our current renewable electricity standard – heating, RES-H, trajectory, Ireland's 2020 target will prove very difficult to achieve.

We believe that the introduction of a renewable heat incentive, RHI, is now essential. An RHI is a payment system for the generation of heat from renewable energy sources similar to the REFIT scheme for electricity. Generators of renewable heat are paid an agreed rate per kilowatt hour for hot water or steam which they generate and use themselves. The payment is for an agreed period and index linked. We believe such a scheme would be self-funding from an Exchequer perspective. The scheme was introduced in the UK in 2011 and has resulted in more than 611 MW of installed thermal capacity spread over nearly 3,000 accredited biomass installations. The source of the data is the Department of Energy & Climate Change, DECC, in the UK. The resulting benefits have been recycled through the UK national economy, stimulating economic activity, creating new jobs in engineering, design, installation and maintenance of biomass boilers themselves and through the associated operations such as logistics required to process and supply the local biomass.

There is now an imperative for Irish industry to adopt green energy solutions. However, project economics for large-scale renewable heat investments are proving very challenging. The relatively high costs of biomass boiler technology present a significant barrier. An RHI would offset the higher capital investment required, thereby improving project economics and encouraging the wider deployment of biomass renewable energy technologies. The benefits are very clear. First, a reduction in Ireland's reliance on fossil fuels, a reduction in our greenhouse gas

emissions and improving domestic fuel security. Second, improving and strengthening the competitiveness of Irish industry by minimising carbon taxes, replacing fuel costs and protecting against fossil fuel price volatility. Third, stimulating rural development and local job creation because it is a labour-intensive business and is very much rooted in the local community; providing a vital outlet for our growing private timber resource which will come to market in the next decade, giving it a market and a channel for growers of short-rotation energy crops; and reducing the future level of EU fines which may manifest in a situation where 2020 targets are not met. The final point relates to helping offset emissions in other sectors such as agriculture.

Coillte is underpinning the future energy supply of one of Ireland's leading pharmaceutical plants. It is biomass in action in the real world. This is our flagship case study. Having secured a five-year biomass fuel supply agreement with Astellis Ireland Limited in Killorglin, County Kerry, we now supply the plant with all of its biomass renewable energy requirements and have done so for the past 28 months. We are successfully delivering both security of supply and lower energy costs to a world-class company. Astellis is one of the top 20 pharmaceutical companies in the world and employs 1,600 people globally. It operates a modern finishing facility in Kerry where it manufactures organ rejection drugs.

I will now turn to land generally and how Coillte has responded to the needs of customers and stakeholders alike through the deployment of our land asset for a wide range of end uses. Coillte has a long and proud tradition of adding value to our land asset, thus ensuring that additional value is captured for the shareholder over and above that which our forestry activities generate. Members will see from slide 19 that value creation is not just restricted to a Coillte context but of equal importance is the value we have brought to a range of sectors, customers and communities in the past decade. I will refer to some of those sectors. In terms of infrastructure, where our primary customer base has been State-owned local authorities, Coillte's land asset has helped unlock solutions to key infrastructure provision including water schemes, the construction of new roads and motorways, county road upgrades and various utility schemes. Activity in this sector has been low since 2008 due to the recession. However, we are very pleased to see activity recommencing in both County Donegal and County Galway as key county roads are being prioritised for improvement in 2014.



In terms of development, our activities have extended across many aspects of the sector.

Irish Distillers' soon-to-be-commissioned state-of-the-art facility for the maturing of its branded Irish whiskey products near Midleton, County Cork, is a prime example. These lands for this signature development were sold by Coillte to Irish Distillers Limited in 2012 and we are proud to be associated with such a successful export brand for Ireland. Clearly, this market sector was buoyant pre-2009 but there are still occasional once-off transactions in this sector of which Irish Distillers Limited is a case in point. Since the onset of the recession, activity in aggregate in residential property has been limited. However, Coillte continues to support local communities in the form of land for sports and community facilities, such as the example illustrated in the slide on display, where Coillte provided allowance for Emo GAA club in County Laois.

Turning to agriculture, Coillte is mindful of Ireland's ambition, as articulated in the Food August 2020 strategy, and we have seen significant activity and strong pricing in this sector in recent years. Our activities, in the main, relate to small to medium-scale transactions with farmers who seek to increase their holdings and thus increase their own output, typically by acquiring adjoining lands from Coillte. Last year, approximately 85% of all land transactions were in the agricultural sector. Coillte also plays an important role in connecting communities through the deployment of its land asset in support of telecommunications infrastructure across the length and breadth of Ireland. Coillte has a portfolio of 429 telecommunications towers on its lands, of which 116 are owned directly

by the company. These new structures were built by Coillte to support 3 Ireland's requirements to deliver the national broadband scheme between 2009 and 2012. The remaining sites are leased in the main to the major telecommunications operators. I have no doubt but that Coillte's land assets have and will play a key role in realising Ireland's ambition to ensure that rural Ireland is not disadvantaged in securing high-performance broadband connectivity into the future. I will conclude by drawing members' attention to a recent innovation whereby Coillte joined forces with a company called OCMS Ireland to market Coillte's estate as a prime location for film and television ventures, both home-based and, in particular, the big budget US productions. This initiative was welcomed warmly by the Irish Film Board and the Department of Arts, Heritage and the Gaeltacht.

Mr. Gerry Britchfield: To wrap up, having heard from my colleagues, I hope the joint committee will agree that Coillte is highly relevant to this debate and as the largest landowner in the State, has a significant role to play in support of the Government's objectives under Food Harvest 2020. By deploying our natural resources and our skills sets, we can deliver increased carbon sequestration from our forests, low-carbon energy-efficient building products, confidence for those landowners who wish to plant new land that an efficient supply chain is in place and renewable energy from wind and biomass, each of which will contribute to reducing Ireland's greenhouse gas emissions, thereby providing headroom for growth in agricultural output to meet the Government's Food Harvest 2020 targets. We have left members with a number of recommendations we believe could enhance further our ability to contribute, including a renewable heat incentive to encourage the growth of bioenergy, a clear signal of the Government's ambition for wind energy post-2020 and recognition for the provision of valuable public goods. We hope the joint committee has found our submission to be useful and we will be happy to take any questions members might have.

Deputy Tom Barry:   I thank the representatives from Coillte for their highly informative presentation. I am delighted Coillte has put so much stock into its renewable incentive scheme, to which I will turn in a minute. If possible, it would be nice to have sight of Coillte's submission, which is a subject on which I have lobbied the Government extensively. While I believe the future lies there, it is not without its problems. Before returning to this issue, I have a few other questions. First, have the recent storms caused much damage to Coillte's crop? On a small albeit highly relevant housekeeping issue, I farm a lot of land close to Coillte properties and the quantities of wild deer and wild horses are becoming an absolute nightmare. They are damaging produce and are very difficult to remove. Has Coillte a policy to deal with this problem? I ask because with these creatures coming out onto the roads on a regular basis, it will eventually become a public hazard. Do the witnesses have any comment to make on the early plantations from 1995 onwards? Many people, including myself, planted forestry back then and quite simply, we planted for the grant. We did not have the skills of forestry management we should have had and, in hindsight, many of us are disappointed that we did not choose better in respect of tree type. Is there a mechanism whereby this could be considered in the future or does Coillte have ideas in this regard?

As for wind energy, I am not being negative here because I agree with the witnesses that it has great potential and there certainly are highly positive arguments for it. However, I have attended many anti-pylon, anti-transmission line or you-name-it meetings and as the witnesses are aware, certain people hold very strong feelings and have fears in this regard. They do not like wind turbines or transmission cables. Some people make the point that they do not want them, either underground or overground. In fairness to such



people, they attend such meetings, where they make highly valid arguments. The problem I perceive is that people such as the representatives from Coillte do not attend such meetings, although they should. They should be giving the counterargument because the public is there to be informed and eventually people will make their own decision. I believe that when they become aggressive, people are losing the argument. I have been attacked physically at these meetings and it is just unbelievable. However, if Coillte intends to make this a major part of its policy, it must attend such meetings and must begin to disseminate the facts because eventually, that is what people will deal with.



On climate change, while everyone has heard about it, most people are not too bothered. They might see a television programme and so on but when getting on with their general daily lives, they do not worry about climate change. They worry about how to pay the bills. I hear people talking about production and recently, one heard that wheat production would fall and no one would have enough wheat for their bread and so on. The facts and the reality in Ireland is that last year, the price of one tonne of wheat fell by €80. That is what it meant to be a wheat farmer in Ireland. Cereal farmers were almost forced out of existence until the crisis in Ukraine arose and introduced instability, thereby leading to the price of wheat rising by €15 per tonne. It is terrible to believe that one's existence is based on some other country having a crisis. However, in respect of climate change, the world still is producing plenty of food and until I see differently and the price increases, that argument will still be there.



On infrastructure, many of the argument put forward by those who oppose pylons are based on their perception that all these developments are for the benefit of developers collecting money. They argue they receive no benefits themselves from it. As for wood gasification, I bought a wood gasification boiler a few years ago. I apologise the Chairman but I will be finished in a minute. Of the wood gasification boilers brought in through the SEAI scheme a number of years ago under which one received €2,000 in grant aid, only 30% of them still are in use. The rest of them have been scrapped and that scheme has been closed. The reason that scheme is finished is because there was complete exploitation of people buying boilers. No expertise was available to fit them properly or maintain them. I eventually bought a 75 kW boiler but initially was given a quoted price of €7,000 by one person. I was obliged to travel to Northern Ireland to get a person in the scheme to sell it to me for €3,000. This is unbelievable stuff and one cannot have differences in price of more than 100%. It strikes me that Coillte may need to get into the selling and servicing of such boilers to make them work. Moreover, on the introduction of the renewable heat incentive scheme in England, it was commercially-based at the outset but it then was discovered that 80% of total use was in the private sector. Coillte should become involved in getting it into people's homes.



As for Structural Funds from Europe at present, through the Common Agricultural Policy there is a push for small to medium-sized enterprises to become more carbon-friendly. I believe submissions in that direction would be highly positive.



One aspect I note - I have been involved in this in trying to get one of them off the ground - is that banking is a significant issue. The banks view anything to do with a renewable project, because one must co-fund the Structural Fund, as a problem. They are writing it off and they want full equity brought in. They do not value the equipment because it is novel technology. When one has this equity issue, there will have to be some way to credit-guarantee the investment by private companies. While it is a great idea - so is world peace - the question is how we get to that point. At present, for small businesses, it is difficult to do.

Chairman:   In fairness, I am not quite sure what that last point has to do with Coillte.

Deputy Tom Barry:   I am sorry. My point is-----

Chairman:   The Deputy should put it back into context here.

Deputy Tom Barry:   It is the renewable heat incentive scheme. If they are promoting it, they will have to start joining up the thought process of how businesses achieve funding to put these in place.

Deputy Willie Penrose:   I thank the representatives of Coillte for their presentation. No doubt the Coillte land will play an important role in land utilisation in the future.

I will focus upon it as somebody who has been involved in this and has not been aggressive, but has argued logically against the invasion of people's space by corporate entities, which I hope is not done in collusion with Coillte. I note Coillte has nine projects over seven counties in order to contribute to the 500 MW portfolio of renewable energy. Everything is grand, except when things are imposed upon communities with no community dividend or benefit.

More particularly, we all are aware of the additional guidelines, and that there are planning guidelines, and there are reviews of all of those taking place. That is grand to a point. Previously, the wind turbines that Coillte was looking at were approximately 54 m in height. Now they are stretching up to 180 m or 185 m, which is 600 ft., and these are to be 500 m from a home. There is fear about the impact and the diminution of value. All of this happens without any strategic environmental assessment and disregarding the Aarhus Convention. They just walk in as corporate bullies. I want to ensure that Coillte will not be part of this corporate bullying that occurs. It is corporate bullying. Many of my colleagues will not understand that, but when one lives in one of the five counties of the midlands, one will see it at play. There is sneakiness, with deals being signed overnight and behind people's backs, and neighbours being taken out of the system. There is family against family. This is what has resulted. Nobody seems to appreciate it. I have made the Minister acutely aware of this.

The important point is this. Coillte has lands way out in rural areas, well away from communities, where there is no problem. Bord na Móna has also. It is all right provided they comply with the planning standards that are brought in, but one must have respect for everything, including the habitats, the SPAs, the SACs, the NHAs, etc. An ordinary farmer must have respect for these, and I hope the corporations that are involved with wind energy have it too. Obviously, they can utilise the land for those projects and give wayleaves. How many of these have taken place to date? Have there been many of them in the midlands? That is important.



Is Coillte aware that we may not have any energy for export? Let us look after ourselves first. Coillte will be aware of what is happening in Britain. I hope it is not devising schemes in isolation. We all will be aware that in Britain they are moving to a different way. They are now looking again at nuclear energy. Surely, as a semi-state company, with the shareholder being the State in the person of the Minister for Agriculture, Food and the Marine, Coillte will be aware of the importance of this situation in a context in which the British Government will not allow its rural landscape to be devastated and destroyed. The UK Minister for Energy and Climate Change, Mr. Davey, MP, has had to change course.

The UK Prime Minister, Mr. Cameron, MP, has changed course. They are now looking at fracking and nuclear power. They now have all the other options. That is why this intergovernmental agreement has not taken place, and with God's help it will not take place. Let us look after what we have at home.

Wind energy is 25% to 30% efficient. When there is plenty of wind one gets nothing, and it needs a carbon-based, or fossil-fuel-based back-up to ensure continuity of supply. Is it as big as all this great profession of achievement that is being laid out for it? If it was not subsidised, would it be on the park at all? These are questions that I hope Coillte is examining and I hope it is taking cognisance of the wider community view. Otherwise, it is heading for trouble.

Deputy Barry is correct; we are there at meetings. Now I have a view. I do not believe in this wind energy concept. It was brought in in 2009 under the National Renewable Energy Action Plan. There was no strategic environment assessment. There was nothing on it. It was merely foisted on us by then Minister, Mr. Ryan, and those people. There is no use in Coillte heading down into the logjam. For example, in one county 6,000 residents took out their pens and wrote to Westmeath County Council objecting to it. That is considerable. In any county development plan, most here who were councillors will be aware that there would not be 20 submissions. In this case there were 6,000. They reflected the community view.



Coillte has a lot of land in Westmeath. I am aware of it because my late uncle worked in the company. It is right beside me. I do not have any difficulty as long as Coillte works with Bord na Móna - which, I note, has a role - and as long as it complies with the various standards. However, I want Coillte to know that this is not a done deal. There is a lot of work to be done with Coillte and all the others, and I do not anticipate that there will be any more chance of going around and imposing projects on people. They will have to bring the people with them and show the benefits. They should show that there is a community dividend in it at the end of the day and it is not all for corporations to make plenty of money and then sell off in a couple of years' time and leave us carrying the baby. We are already recovering from unfinished estates. We will have another type of ghost estate, consisting of lands blighted with turbines, across the country - including, if Coillte is not careful, some of its land. Who will pay the dividend then?

Deputy Michael McNamara:   I am not entirely sure I agree with my colleague, Deputy Barry, that people are as indifferent to climate change as he claims. As a result of storms, there are many frightened people living on the western seaboard of Clare. Of course, it is difficult to pin down whether or not the storms are a result of climate change, but there is a considerable amount of scientific evidence to suggest that they are going to become more prevalent in the future.

I am interested in much of what the witnesses said, particularly in regard to carbon sequestration from forests. Do they have any statistics on how that compares to other carbon sequestration - for example, in hedgerows? Are certain species better at carbon sequestration? Are the native broadleaf trees better at carbon sequestration than Sitka spruce? There is the Coillte estate, there is whole forest estate and then there are hedgerows. What percentage of the total carbon sequestration is allotted to each of those sectors?

I presume the majority of trees in Ireland are in forests but I would not be as certain that the majority of native broadleaf trees are in forests. One might find a greater number of

native broadleaf trees in hedgerows than in the forest estate. Do they have any statistics on that? I accept that much of what I have asked goes far beyond the strict mandate of Coillte, which is why they came here.

Deputy Richard Boyd Barrett:   I have a few questions, one of which follows on from the questions on species mix and biodiversity. I would like to hear the delegates' views on the trade-off between heavily emphasising the production of Sitka spruce, because of its short-term commercial value, and developing forestry as an amenity and environmental asset. It is self-evident that broadleaf trees have a much greater amenity value for walkers and visitors. We are under-performing in this area given that Ireland used to be covered in oaks and other broadleaves. What will be done to expand in this area? This is very important at all sorts of levels. Native species are far more conducive to ensuring biodiversity than conifers, in addition to their having a tourism and amenity value. Sitka spruce is not particularly conducive to promoting biodiversity.

Very serious questions must be asked about the impact of the overemphasis on Sitka spruce on soil and water. It results in acidification. A doctor in Galway has suggested the outbreak of cryptosporidium-related illness in the Galway water system had something to do with the acidification of water and soil around Lough Corrib. I am no scientist and do not know whether this is correct. However, I have certainly heard plausible arguments that the acidification of water and soil is bad for fish, biodiversity, and soil quality. This has a knock-on effect in terms of flooding. Trees could be extremely helpful in holding riverbanks together. They prevent soil erosion and the more devastating effects of flooding. It has been suggested to me that native species are far better at achieving this. They have deeper roots and they are better for the soil because they enrich it. Sitka spruce, on the other hand, essentially impoverishes the soil and does not have the same qualities and strengths that native species would have along riverbanks, etc. What do the delegates have to say about that?

Following on from that is the question of agroforestry. This is linked to what Deputy Tom Barry was stating about farmers not having the expertise that is required. The advocates of agroforestry say that if one plants native species in and around pasture fields, it results in a great improvement because the trees serve as a windbreaker, enrich the soil and increase biodiversity in a way that is actually good for farming. Often, however, farmers do not see it that way. They see forests as taking up land that could be used more productively although agroforestry has the opposite effect. If one lines fields and areas that might not be best suited to cultivation with forests, it can have an enriching effect.

I drove to Donegal via the North. It was noticeable on driving through County Tyrone that, in the middle of farming land, there are big clumps of native species. They were on the uplands and in places where one might not be able to grow anything else, or places that might not be suited to more commercial farming practices. This phenomenon was much more evident than in County Donegal or elsewhere in the Republic, where I simply noticed field after field with very few trees. What are the delegates' views on this? What can Coillte do to encourage tree planting?

On the wider issue of afforestation, when Coillte is asked what its role could be in reaching the European average of 30%, which should be the absolute minimum in a country such as ours, it states there is nothing it can do because it cannot get the grant aid and does not have the land. That is crazy. If this is the case, we will never meet the targets. It is pretty self-evident that we are not meeting them. It will cost the State if we do not meet them in the longer term. How can we sort out this problem? The body that owns

50% of the forest estate in this country — the biggest owner of land — is saying it can contribute nothing to meeting what are absolutely vital targets for afforestation. Do we need to restructure Coillte? Must we remove the commercial aspect? I do not know what we have to do but it seems we have to do something if Coillte is to contribute to meeting our afforestation targets. If we do not, those targets will simply never be met.

Mr. Gerry Britchfield: I shall answer the questions in the order they were asked, beginning with those of Deputy Barry. With regard to the RHI, we would be more than happy to provide the Deputy with a copy of the presentation we made to the Department of Communications, Energy and Natural Resources. We believe there is a pretty compelling case for introducing an RHI to encourage bioenergy use in Ireland.

With regard to the storms and the damage to our estate, I will hand over to Mr. Gerard Murphy, who will say little about this.

Mr. Gerard Murphy: We are still doing aerial reconnaissance and do not have an absolutely accurate estimate at this stage. We estimate that between 4,500 and 5,000 ha of forest have been damaged, mainly in the southern part of the country. We also estimate that there is probably 1,500 to 2,000 ha of private forest down, mainly in the western package. The material that came out was planted in 1995 and onwards. Our estimate of the total volume damaged in our estate is approximately 1 million cu. m, which is less than half of an annual cut. While the damage is very serious, we can manage it. We had storms before, in 1997 and 1998, and while they caused significant issues, it was a matter of trying to manage the supply to our customers while protecting potential future supply. Unfortunately, many of the crops damaged were close to the age of full production. We are working with the national task force, which is chaired by the Minister responsible for forestry. We are trying to obtain more accurate figures on the damage.

Mr. Gerry Britchfield: The next question concerns our policy on wild deer. Once again, I will turn to Mr. Gerard Murphy.

Mr. Gerard Murphy: I share the Deputy's concerns. There is no doubt that the deer population in certain parts of the country presents issues. We have heard this from many landowners. We have a policy on managing wild deer in our estate according to accepted principles of sustainable deer management. This means balancing the conservation, control and use of the species in a way that actually makes sense. A very important aspect is collaborating with other landowners because deer are very mobile. Unless we collaborate to deal with the issue, it will be very difficult to address. We have had some good success in County Wicklow, where collaborative approaches have worked. We certainly support the inter-agency deer policy group. I understand a national deer policy is due to be launched shortly, and we certainly would welcome it. A national view is required on how best to control deer populations. In every area of the country, we have deer-management plans. As part of our forest management plans, we have deer-management plans that require monitoring and, if necessary, culling.

Mr. Gerry Britchfield: The third question concerned afforestation species selection. Does Mr. Murphy have any comment to make on the approach taken to that issue?

Mr. Gerard Murphy: In some ways, it is a little difficult to answer that question because once they are established, there is not a lot one can do until the clear fell stage. It is about managing the crop as efficiently and productively as possible. Silviculture management becomes crucial in the case of these stands and ensuring they are thinned. There are

various agencies, including Teagasc, that provide advice. We offer management services to landowners if they wish to get advice on how best to manage these areas. I agree that species mix is very important, including ensuring one has the right species. As regards climate change, it is extremely important to ensure one has resilient species.

Mr. Gerry Britchfield: I will gather together some of the questions on wind energy, including those of Deputies Willie Penrose and Tom Barry. If I do not answer them fully, they can come back to me. As we are led by Government policy, our objective is to try to support the policy of our shareholder - the Government.

Deputy Richard Boyd Barrett: 🗣️🔍 It would be great if the banks did that, would it not?

Mr. Gerry Britchfield: There are two elements. The targets to 2020 are related to domestic electricity generation. In the context of wind energy, we are trying to assist in meeting by 2020 the target of 40% of domestic electricity generation using renewables. We are completely focused on that objective. As regards how we approach it, we are rooted in communities and have to get on with them in order to be able to carry on our business. We put a lot of time and effort into trying to achieve this. When we are applying for planning permission for our wind farm sites, we are certainly on the ground and attend public meetings in communities in an endeavour to explain why and the benefits. We have a clear view that there has to be a community gain, with which we agreed. There is room for improvement concerning how much goes back to the community. We are working on trying to develop better ways of doing this in the future. In terms of our planning applications, we have been reasonably successful. One cannot satisfy everybody and we are not pretending that we can. There will be opponents of what we are proposing to do, but we make a real effort to engage with communities. We try to explain why we are doing it and there is a planning process whereby those who disagree with us can put their views on the table.

If exporting wind energy supplies is not Government policy, we will not pursue it. We are certainly seeking a lead from the Government in terms of whether this will get off the ground. If it is to have traction, the first thing that needs to happen is that the intergovernmental agreement will have to be sorted out. The Taoiseach and the British Prime Minister, Mr. Cameron, have agreed that there is a period of three months in which to try to come to a conclusion and a solution, if one can be obtained. If one cannot be obtained, we will not be exporting wind energy supplies. If it becomes Government policy and the Government has taken it on as a key objective, we will try to deploy our land to achieve that objective. We are a player because of the fact that we own 7% of the country's land area. We have lands adjacent to Bord na Móna's lands and are working closely with it to see, if this thing gets legs, whether we can join forces to put some impetus behind it. We work with people whom we regard as reputable players. We work closely with the ESB which is a partner on three of our projects. We also work closely with Scottish and Southern Airtricity on one project. We want to ensure what we do meets our standards of corporate governance, that we engage with people and are not seen - as Deputy Willie Penrose described it - as corporate bullies. We are certainly not in that space, as we understand people have concerns. These items are very large and can be up to 180 m in height. We realise these are issues and that we have to engage on them.

We regard wind energy as an important component of Ireland's energy mix. Going back to Government policy, security of supply is a key element. Studies back up the fact that the use of wind energy as part of the mix reduces the wholesale price of electricity. That is our position on the issue, of which we have recently completed a study.

Mr. Gerard Murphy: We will be happy to make it available to any member of the committee who may request a copy.

Mr. Gerry Britchfield: Other questions concerned wood gasification boilers. Our RHI policy is mostly focused on industrial heat generation. That is where Ireland can gain most in terms of traction and bioenergy. Many pharmaceutical and dairy companies have big requirements for industrial heat that are being satisfied by fossil fuels. We see a good position on renewable energy solutions for these industrial users. We are focused more on the industrial rather than the domestic end.

Deputy Michael McNamara asked about carbon sequestration in our forests and what different species could bring to the mix. I will ask Mr. Murphy to elaborate on that issue.

Mr. Gerard Murphy: I am not a scientist and this area can be complex. National statistics have been produced in terms of the Kyoto Protocol for carbon stock in different areas. The question concerning species is a good one. The rate of carbon sequestration depends on factors such as soil type. For example, peatlands will hold more sequestered carbon. There are also factors such as age and species. For instance, in the early years faster growing species like spruce will sequester more carbon. However, because there is a longer rotation period broadleaves tend to capture it over a longer period. It depends on at what stage one measures the rates of carbon sequestration. I am not aware of statistics for hedgerows, but we need to look at all of the different sources in accounting for total carbon produced. They tend to look at forests - above and below the ground and what is captured in the soil. That is my understanding of how carbon is measured.

Mr. Gerry Britchfield: Mr. Murphy had a figure which showed the overall position.



Mr. Gerard Murphy: For our estate, it is 200 million tonnes of carbon, a lot of which is in the soil. Because a lot of our forests are located in peatlands which tend to sequester much more carbon it is quite interesting that the carbon is not only retained in the forest but also in the soil.

Mr. Gerry Britchfield: I will move on to Deputy Richard Boyd Barrett's questions about biodiversity, how the species mix flows into landscape design, the tourism benefits and the impact of conifers on soil and water. I will ask Mr. Murphy to talk about our policies on species mix and some of the initiatives we are taking on life projects to try to improve the mix.

Mr. Gerard Murphy: As regards our overall management, we strive to do things from a sustainability point of view. We are seeking all the time to balance the economic, social and environmental elements of the estate in a way that makes sense. In the last few years we have been certified independently by the FSC and the PFC to try to achieve that balance. We have a number of policies on our management of the estate.

For example, 20% of our estate is managed primarily for biodiversity. We recognise that there are areas we need to manage primarily. They are not limited to native woodland, but include open spaces and a range of other material. Approximately 15% of the trees we plant every year are broadleaf. That is not on an area basis. Not only do we plant dedicated areas with broadleaf trees, we plant them in buffer zones. Deputy Boyd Barrett mentioned water protection. Where we are managing conifer plantations, we create buffers in sensitive stream areas with broadleaf trees to mitigate the possibility of acidification. We use best practice to manage these areas to



minimise the environmental impact, including acidification.

Deputy Richard Boyd Barrett:   Does Coillte use sampling for assessment purposes?



Mr. Gerard Murphy: Yes. We take samples as part of our environmental management systems, particularly in sensitive areas where we are required to do so to assess different attributes on a before-and-after basis to monitor the overall impact of our operations. There are also long-term studies on acidification and other areas. Acidification is not easy to monitor and must be looked at over a long period of time. UCD and UCC have commissioned a number of studies to monitor acidification, but we monitor streams, particularly sensitive ones, for any environmental damage.

Deputy Boyd Barrett made a number of points on flooding. I agree with him that forests have a very important function which is often overlooked. There is a need to consider more proactively and progressively the ways we can use trees to mitigate flooding such as we have seen in the last number of months. There is work to be done in the area of agro-forestry to come up with more innovative ways of using agriculture and forestry. In other countries, agro-forestry systems have been introduced to benefit livestock and improve and enhance soils. It is a matter of providing the necessary incentives.



The issue to which I come back is what more we can do in these areas. It is all about balancing the issues. I mentioned earlier the greater need to recognise public goods. We have started to be much more proactive about valuing public goods, including biodiversity, landscape protection and cultural heritage. Our intention is to gain more recognition for those values, and we have done some studies with the Heritage Council in that regard. When one obtains recognition of the economic value of these elements, it helps to drive more work. It is about the balance struck, economic recognition and feedback to do more work.



Deputy Richard Boyd Barrett:   Is that a diplomatic way of saying that if we can get the awareness and the knowledge out there, we can shift Government policy? Mr. Murphy made the point earlier that he is led to a considerable extent by Government policy. In other words, does the change in culture and attributes and a particular emphasis on forestry have to come from us and the Government for things to change with Coillte?



Mr. Gerard Murphy: The Deputy is absolutely right to say we are led by Government policy. What we are trying to achieve with our public goods is to ensure that there is an improved awareness of what we are delivering in terms of biodiversity benefits, nature conservation, landscape protection and recreation. The first step is to ensure that the public and those in political life recognise the contribution we are making. We consider that if there is recognition, people put value on it. Given the country's economic circumstances, we are not looking right now for large wads of money. We saying simply "Let us recognise the value of what we have." If that recognition exists, we can say that not only is Coillte paying a monetary dividend to the State of a couple of million per year, it is also paying a large dividend to the public at large by way of the provision of public goods. Our objective is to raise awareness of our contribution, which will lead to more being done. That is our strategy.



Deputy Richard Boyd Barrett:   The last question was on Coillte's contribution to afforestation.



Mr. Gerry Britchfield: The grant aid for afforestation is not directed at Coillte. We are excluded from that, particularly in relation to the premium elements. Our role is to support landowners, whether they be farmers or others, and give them the confidence to plant. We do that in a number of ways, including our recent work with the private sector on windblow in the context of the crisis of the last number of weeks. We are trying to create a harvesting infrastructure to facilitate farmers who want to thin their crops. We encourage and support that. We are also providing routes to market. We have two very large panel mills with good demand for pulp wood at a good price. It is a very important support.

Deputy Richard Boyd Barrett:   Coillte has repeated its contention that it cannot do anything because it does not get the grants and, therefore, can only facilitate private farmers. Of course, Coillte should play its role in that regard. Does Coillte honestly believe, however, that the number of private farmers contributing to afforestation will be sufficient to meet the targets and objectives we should have of reaching an average afforestation level of 30%? I certainly do not. It will not happen without-----

Chairman:   The target is not 30%; it is 17%.



Deputy Richard Boyd Barrett:   The short-term target is 17%. There is an aspiration, which has been outlined, to at least reach the European average. It is crazy not to aspire to that.

Chairman:   That is an opinion. Others might not agree. It is land use in total that we are looking at. The Deputy should bear that in mind.

Deputy Richard Boyd Barrett:   I do, but with agro-forestry and the other approaches, we can do it. Is there any way around this problem?



Mr. Gerry Britchfield: Ultimately, it is a question of convincing the people who own the land that forestry is the best option for them. The State already owns 10% of the land area of the country and we do not see it getting involved in going into the market to buy more for planting.

Deputy Richard Boyd Barrett:   I favour that.

Chairman:   That would require CPOs.

Mr. Gerry Britchfield: We are in favour of saying landowners must be convinced to plant the land.

Mr. Gerard Murphy: There is a fundamental issue involving land availability for forestry. Irrespective of who does it, there is a question of how much land is becoming available. On the one hand, there is increasing resilience in agriculture, and on the other there is, rightly, the matter of environmental designations in respect of enclosed lands. Traditionally, forestry would have been a matter of the latter. The availability of land is driven by economic factors in agriculture but also by competing land schemes. There are also socioeconomic factors to consider in respect of persuading farmers to lock into forestry for a long period. Coillte getting involved itself would not magically release more land into forestry. It is much more an issue of land-use policy and strategy approaches to encourage afforestation.

Chairman:   There are also restrictions on Natura sites which should perhaps be re-examined to permit native woodland species to be developed. They have been prevented. A great deal of the additional requirement could be dealt with that way. It would not necessarily involve commercial afforestation but one could certainly add to the forest estate if the rules on protected zones - Natura sites - were changed. It is very simple. It might be the National Parks and Wildlife Service, which is the larger owner, in collaboration with Coillte, that ended up adding forests, given the competition for land. It is the unenclosed definition that prevents almost all afforestation in designated sites.

We have had a fair thrashing out of the main issues involved. The committee is trying to inform itself on this matter so it can provide suggestions to the Government on carbon emissions.

I took on board some of the points raised about wind energy. I believe it has a critical and strategic part to play in this matter, subject to proper planning procedures and due process, as well as having regard for the local communities where wind turbines will be set up. This issue, however, has to be examined logically and sensibly.

What was presented to the committee today is very valuable. The point about 200 million tonnes of carbon sequestration really struck me. The recent agreement on the review of the Common Agricultural Policy was based on green principles. There are ecological focus areas, as well as green and environmental practices in Pillars 1 and 2. Whether one accepts climate change or not, agricultural policy is all based on a green common sense to work in harmony with the environment while ensuring sustainable food production.


For Deputy Boyd Barrett's information, the thinking green concept is about giving a monetary value for the percentage of land in designated areas apart from the carbon sequestration value. If the European Commission claims Ireland's emissions have grown, we have to be able to argue that through land use we are actually reducing our net emissions. The committee is trying to collate such information to provide a report for the Government.

Whether we agree with it or not, last week's report from the IPCC, the Intergovernmental Panel on Climate Change, will put international focus back on this subject. We will have to play our part in defending ourselves. I thank the delegation for attending the committee and those members who remained for the entire meeting.

Overview of Land Use: EPA and Teagasc, 13th April 2014

Chairman: I invite Dr. Derham to make an opening statement.

Dr. Jonathan Derham: I thank the Chairman for the invitation today. With his permission, because of the integrated nature of the activities of our colleagues in Teagasc and ourselves in the EPA, we propose to give four brief presentations and then take questions. The committee will find a degree of synergy between the presentations and it might be the logical way to proceed.

Chairman:  I should have made clear that I propose to get all the presentations first and then take questions.

Dr. Jonathan Derham: We are pleased to have been invited before the committee to discuss the issues of greenhouse gas emissions, climate change and smart farming.

I will, as the Chairman mentioned, by my colleague, Mr. Phillip O'Brien, who is a research fellow in climate change issues.

By way of introduction, we circulated our EPA strategy to members. They can see from this that there are three main elements to what the EPA does and that these relate to regulation, knowledge and advocacy. What we are presenting today relates to two of those, namely, knowledge and advocacy, in the context of measuring, preparing inventories on greenhouse gas emissions, examining Ireland's performance, carrying out research and developing knowledge. In the context of advocacy, we are focusing on smart farming. This is a concept to which I will refer later. Our vision is for a clean, healthy and well-protected environment supporting a sustainable society and economy. We are of the view that this is not an unreasonable ambition.

This meeting is extremely useful coming, as it does, hot on the heels of the recently-published fifth assessment report from the Intergovernmental Panel on Climate Change, IPCC, particularly that part produced by working group II, which has responsibility for assessing impacts, adaptation and vulnerability. The report in question reinforces our role in the area of knowledge,

research and advocacy.

Dr. Eimear Cotter: I thank the committee for the opportunity to come before it in order to present our work on greenhouse gas emissions. I will provide a brief introduction in respect of the EPA's work in this area and I will then refer more generally to greenhouse gas emissions in Ireland, before moving on to outlining the agency's climate-change specific vision for 2020 and the potential role of land use in this regard.

As the third slide in my PowerPoint presentation indicates, we published our strategic plan - copies of which have already been circulated to members - last year. The plan sets out the priority activities that we will undertake to deliver in the context of our mission to protect and improve the environment as a valuable asset for the people of Ireland. Within the strategy, there are nine priorities which range from developing a holistic way of managing our water right through to driving positive behavioural change at individual, business and societal levels. Two of the strategic priorities to which I refer are particularly relevant to these proceedings, the first of which relates to evidence-based decision making. In that context, we are interested in producing national greenhouse gas inventories - that is, information relating to our historical emissions - and projections for the future. The production of this data is absolutely critical. It is also a key priority for the EPA in terms of informing evidence-based decision making. The other strategic priority I wish to highlight is that which relates to maintaining a vibrant research programme. The climate change pillar of this is absolutely integral in the context of identifying climate-change specific issues within the Irish context, particularly in terms of how it is affecting the country. We also want to ensure that we can engage with the climate change debate at EU and international level.

The main sources of greenhouse gas emissions are illustrated on the doughnut chart contained in the next slide. The chart shows that 32% of our emissions come from the agriculture sector. This means that just under one third of our emissions emanate from agriculture, which makes us quite unique across the EU. Typically, emissions from agriculture across EU member states are approximately 10%. Agriculture in Ireland is, therefore, a significant source of emissions. The chart also shows that the energy sector - mainly energy generation - is responsible for 22% of our emissions. In addition, transport is responsible for 19% of our emissions. In total, agriculture, energy and transport account for just under three quarters of the country's emissions. The remainder of our emissions come from the industry and commercial, residential and waste sectors.

The next slide refers to trends in greenhouse gas emissions and shows that the profile of our emissions during the period 1990 to 2012. Again, one can see that agriculture has made a sizeable contribution - shown in green and along the middle of the chart - as has transport, the level of the emissions from which is outlined in blue. These two sectors contribute quite significantly to our emissions profile. We are of the view that emissions from both sectors will increase as we move towards 2020. In the case of the agriculture sector, this will be on the back of Food Harvest 2020 and the lifting of the milk quota in 2015. Emissions from the transport sector will increase as the economy recovers and as we begin to move ourselves and increasing numbers of goods around the country.

The next slide refers to land use, land use change and forestry. We are compiling emissions data for this sector, which is an important carbon sink. The graph shows that our land and forests absorb CO₂ from the atmosphere. The sink mainly comprises the forestry sector and its impact has been increasing during the past 22 years. This is because the area of land under forestry in Ireland has increased as a result of afforestation grants. As forests mature, they have a greater impact in terms of absorbing carbon dioxide. During the Kyoto period - the five years from 2008 to 2012 - the land use, land use change and forestry sector has absorbed 16 million tonnes of CO₂. This represents 5% of our emissions over the period. This is a very important sector for Ireland because it provides a vital carbon sink.

Up to now I have outlined the sources of and levels of emissions in Ireland. The EPA has a climate change specific vision for 2050, the basis of which is that we will have a carbon-neutral and carbon-resilient Ireland. This will require transformation on a number of levels in the context of how we produce energy, how we use it, how we transport ourselves, how we produce food and how we manage our consumption systems. In the context of delivering on that vision, we have identified a number of goals. I will not discuss all of these but there is one in particular on which I wish to focus. I refer to the need to ensure that positive sequestration practices are recognised, promoted and sustained. What this means is that we would like to see the development of a system or framework that will bring the agriculture and the land use sectors together. At present, agriculture is very much seen as being separate to the land use sector and they tend to operate in separate silos. We would like them to be combined and accounted for together because this would recognise the inherent link between them. As a result, activities that are taking place on the land would be connected to changes within soil carbon and carbon pools. This would provide a potential way forward and it is something we would like to see happen.

I referred earlier to the land use, land use change and forestry sector. We would like the land use sector to be considered in its entirety. As it is currently accounted for and defined under international accounting rules, it is viewed in quite narrow terms and the focus is very much on the forestry sector. As stated, we would like it to be considered in its entirety and all of the potential sinks that exist to be recognised. What we are seeking is a strategic approach to the optimisation of land use in Ireland. We must examine the potential and economic benefits of recognising ecosystem services and how they might be included in mitigation costs and benefits. We must consider all of the sinks that exist in our managed land systems and assess ways in which they might be maintained and enhanced. We must also examine the accounting rules, which are currently quite narrow in scope, and ensure that they are as broad as we require. We must also ensure that we realise the full potential of our land use sectors.

The holistic approach whereby agriculture and land use would be considered together under one system would recognise that these two sectors are very closely linked. As stated, greenhouse gas emissions from the agriculture sector are projected to increase and they already account for just under one third of our overall emissions. We are already obliged to meet demanding EU targets in this area and these are likely to become even more onerous. In that context, we have a land use sector which could possibly offer access to a very large potential sink. I refer here not only to what we are already accounting for, but also to, as EPA-funded research shows, the even larger sink that exists. In 2050, there could be a potential net sink of 9 million tonnes. Grasslands have the potential of increasing this figure even further. The sink is not captured in our current accounting model and we would like it to be broadened. We must work at international level in order to facilitate this development.

The EPA has allocated a significant level of resources in respect of these issues. In the context of our climate change research programme, I have highlighted one research project, the Irish soil information system, ISIS, to which the representatives from Teagasc will refer in greater detail during their presentation. This project shows the collaborate effort between two State agencies and it involves some extremely important research in respect of the classification of Irish soils and their properties. The investment we have made in this regard is going to give rise to a very high return. We would like resources to continue to be allocated in respect of this project into the future.

In the context of next steps, it is vital that the research be supported because it will play a critically important role in helping us to manage our resources - in this instance, our land use resource - effectively. We will be obliged to engage at international level in order to shape the accounting rules and ensure that they evolve in a manner which will be of benefit to Ireland.

It is not only an issue at international level. We must also recognise at national level that land use is one way to achieve climate change objectives. It is about more than forestry. We must consider

it in a broader context. I hand over now to Dr. Jonathan Derham who will talk us through other ways to mitigate climate change with particular reference to sustainable food production.

Dr. Jonathan Derham: My presentation is on resource efficiency. A copy of it should be included in the circulated handout. I will discuss an initiative called "smart farming", but to set things up members can see from my first slide that we face a perfect storm on a worldwide basis of diminishing resources, increasing population and increasing demand for industrial output. It is beyond the capacity of the planet to provide the resources we need to live in the way we do in the developed world. Resource efficiency is about adopting a model of living better while using less. It is a well-recognised policy in Europe, the OECD and UN as a means of identifying the impossible balance of prosperity, progress, development and living within the boundaries of the planet as given to us.

The EPA's model for resource efficiency addresses energy efficiency, clean technology, which is making products more cleanly and with less harmful substances, water conservation, eco-design, which involves designing better products that last longer, are easier to dismantle at end of life and are repairable with replacement parts, and behavioural change, which is a big part of it. We are trying to adjust people's consumption and production behaviours. On the energy efficiency side, we work hand in hand with our colleagues in the SEAI to deliver energy efficiency services into the State and industry.

The next slide features examples of a number of behavioural change activities. Members can see that smart farming is one of a suite of programmes we offer. Members are probably well aware of "stop food waste", which is advertised on radio and television. We throw away 30% of the food we produce. Part of what we must do to be more resource efficient in agricultural production is to stop people wasting the food that is grown and delivered to them. If one piled up all the food waste produced in Ireland annually, it would make a column 150 m high with a base the size of the Aviva stadium pitch at Lansdowne Road. It is a lot of food waste.

The smart farming initiative is a collaboration between the IFA and the EPA. Our normal approach to behavioural change activities in different sectors is to work with a sectoral champion or leader. The IFA came forward and has taken up the baton. The IFA is very keen to drive the matter itself and we are really a supporting agency. It is being delivered by the IFA and represents a successful start to the programme. It is a voluntary programme which is not locked in to any grant aid, obligation or regulatory compliance issue. It is a voluntary, on-farm resource efficiency and cost saving programme. Why did we do it? A gap was identified in our national resource efficiency programme. We have activities in the hospitality sector, industrial manufacturing, the social pillar, homes and communities but did not have a particular activity in the farming sector. That was the gap. In our national recovery plan, farming and food production are a key sector. We felt we had to address it to address the national recovery plan. Food harvest resource efficiency is a strong theme running through that. The cost of inputs to Irish farms was €5.5 billion in 2013. If we only manage a modest 1% efficiency gain, it saves the farming sector €55 million. There are clear gains.

Members will see from slide 7 on page 4 that it is not just the EPA and the IFA that are involved. The programme was put together, led by the IFA, in collaboration with UCD's school of agriculture, the Sustainable Energy Authority of Ireland, Teagasc, the Fertilizer Association of Ireland, the National Federation of Group Water Schemes, the Irish Grasslands Association and the Farm Tractor and Machinery Trade Association. There are seven major themes in the smart farming programme: soil fertility, grassland, machinery, time management, inputs, energy and feed. The approach includes top tips on how farm enterprises can save money by doing simple things better for little to no investment. It increases the efficiency and production of farms and leads to a double dividend. It generates a financial dividend for farms while reducing the overall environmental burden and resources input. An example is soil fertility. Members will see from the handout that this is about lime and the proper pH of soil. My colleagues from Teagasc are probably more expert than me in this regard but I note that low soil pH reduces the availability of nutrients. This is about getting the right soil tests to improve the use of fertiliser. The yield is €20 per acre in savings on fertiliser in getting the pH balance right. It is a question of linking the

environmental gain with the clear economic gain.

Members can see the sheets on farm machinery. We have found that many small farms are over-mechanised with tractors and machinery that are far too powerful for the size of the farm unit. One of the challenges we have in addressing this as a national policy issue is determining how to match machinery size to the scale of the farm. Simple things can be done on machinery such as addressing the waste of fuel associated with low tyre pressure and travelling to distant and isolated blocks of land. Dr. Schulte has more comments on those sorts of issues.

Members can see, if they go through the sheets, that there are useful and straightforward tips for farm enterprises to reduce their environmental burden while saving money. This is all available on the web as a free resource regardless of whether one is a member of the IFA. Any farmer can access the material. We held a very well-attended national conference last year to launch the initiative accompanied by an excellent 12 page supplement in the *Irish Farmers' Journal*. The initial phase involved resource efficiency assessments or cost saving studies on five candidate farms in autumn 2013. We saved an average of €5,000 per farm, a not insignificant sum for these small farm enterprises for no or low investment. These are young, engaged and highly motivated farmers who believed they were doing as good a job as they could up to that point. There is clearly plenty of scope across the sector. It is very positive. In 2014, we are looking at undertaking 30 on-farm assessments with volunteer farms. These are clustered around farm discussion groups operated by the IFA. This is about diffusion of skills through discussion groups and regional seminars. We do not need to work hard to find candidate farmers as they are queuing up to get involved. There is high interest and uptake.

The benefits for farmers are financial. It is clear income and revenue. The initiative also underpins and supports the ambitions of Food Harvest 2020 and Origin Green with low resource input production and sustainable farming enterprises. It benefits our overall economy and environment and reduces inventories.

This will again lead in to some of Dr. Schulte's comments.

The final slide states that smart farming fits into a sustainable consumption and production cycle. It is part of an overall national cycle that we have. It is an essential part of primary production but it does not exist on its own. It cannot solve the whole problem of delivering a sustainable consumption and production in society.

Dr. Rogier Schulte: I am contributing on behalf of my colleague, Mr. Daire Ó hUallacháin, a research officer in the area of agri-ecology and I bring apologies from Dr. Rachel Creamer and Dr. Gary Lanigan, who, unfortunately, had prior engagements today. I thank the committee for inviting us to elaborate on our initial presentation last February.

I will begin with one slide from that presentation. We spoke about the emerging demands on land use going into the future, contrasting demands from an agronomic perspective as specified in the food harvest strategy and from an environmental perspective as specified in many different environmental policy frameworks. We were invited to elaborate on three subjects - the greenhouse gas policy framework, agri-ecology and soils.

Greenhouse gases have been prominent in public debate this week on foot of the publication of the IPCC report and when we talk about public debate, I start with what we call the Irish paradox when it comes to agriculture and greenhouse gases because we often hear two contrasting statements. On the one hand, we hear that agriculture in Ireland accounts for a large proportion, 32%, of national emissions while, on the other, we hear that agriculture has one of the lowest carbon footprints in the world. Both statements are true at the same time. A large proportion of emissions come from agriculture. The average in Europe is 10% whereas it is 32% in Ireland. Part of that can be explained by the fact that we do not have a large heavy industrial sector nor

do we have a large population of cattle. This means that in Europe agriculture emissions are often masked by industrial and residential emissions but this is not the case in Ireland.

Second, we rely on ruminant farming in Ireland - cattle, dairy cows and sheep - which is largely a reflection of our soils and climate. It is simply what we are good at. The next slide contains data from the Commission which compare the carbon footprint of a litre of milk for every member state. The green circle is Ireland and shows that it has the lowest carbon footprint for milk in the EU. When we look at beef, we are again in a relatively good starting position. We have the joint fifth lowest carbon footprint. That is a good place to start. However, there is no room for complacency.

The next slide features screen grabs from the Internet of some of our main competitors. Each has proactive sustainability programmes both at national level and at processor level. For example, last week we were in FrieslandCampina in the Netherlands, Europe's largest dairy processor and it is making a serious effort to reduce the carbon footprint of its milk. In other words, we have to find ways to continue to reduce our footprint to maintain our position. Teagasc has a greenhouse gas working group where we pool together all the different expertise from our research centres and advisory services and over the past number of years we have produced three significant reports, two of which I have circulated. In 2012 we published our vision for 2020 and our research and development strategy. That report is in front of members. Last year we published our long-term vision for 2050 and that is the colourful report in front of members. If they prefer not to read long reports, we wrote a two page summary in our research magazine, *TResearch*, which we have also circulated.

I will focus on our 2020 vision. We produced a marginal abatement cost curve. This is a normal tool in the wider sense of the economy to assess what the options are to reduce greenhouse gas emissions. We are one of the first in the world to use it for agriculture. The curve contains a number of bars, which represent options for agriculture. The width of each bar tells us how much impact each measure will have on reducing emissions whereas the vertical axis tells us how much it would cost. Bars that are below the axis pay for themselves and are cost beneficial whereas those above the axis cost money. Of all the options we assessed, we broke them into three groups, which we colour coded. The green measures relate to efficient farming, for example, an increased economic breeding index, higher genetic merit for cows, extending the grazing season and nitrogen efficiency. These measures, as we calculated them, turned out to be cost beneficial. The yellow measures relate to land use change and they are largely the production of biofuel and bioenergy. We see two things. First, they are cost neutral, which means there is no financial impediment or incentive for farmers to take them up. Second, under the current Kyoto accounting framework any carbon credits associated with biofuels and bioenergy are not credited to the agriculture sector. Instead, they end up in the power generation or transport sectors. The blue measures relate to technological intervention, for example, anaerobic digestion of pig slurry or slurry spreading equipment, and these turned out to be quite expensive.

The headline conclusion of our 2020 vision is that it is possible to achieve the food harvest strategy targets while, at the same time, keeping greenhouse gas emissions from agriculture constant. Part of that is good news because if that were to materialise, that would represent a decoupling of production from emissions meaning we could increase production while keeping emissions constant. That would mean a further reduction in our carbon footprint through efficiency alone. However, the other half of the story is this will not happen by itself overnight and I will come to that.

The theory is that increased efficiency will reduce carbon emissions but does this work in practice? This is where we look at the Teagasc national farm survey. This is a proper statistical survey, which has been operating for decades through which we collect economic indicators on more than 1,000 farms across the country on an annual basis. As of last year, for the first time, we are also collecting environmental indicators. I will highlight one graph from the report which shows the carbon footprints of the dairy farms in our survey. We split them into three groups - the one third of dairy farms that are most profitable, one third that have average profitability and the one third that are least profitable. The most profitable farms also have the lowest carbon footprint and *vice versa*.

The question is how will we make this happen. We teamed up with Bord Bia and we asked ourselves how we can maximise the adoption of these green measures. This is when we produced the carbon navigator, which is a decision support tool for farmers that helps them to identify which of the measures is most appropriate for their unique farm.

It uses very practical language. We do not talk about nitrous oxide emissions or methane but about grazing season length, nitrogen fertiliser rates, etc.

Third, we put a lot of emphasis on the distance to target rather than on the carbon footprint. I will elaborate on that distinction because it is important. The slides show two hypothetical farms, one in Wexford and one in Donegal. Each has a carbon footprint associated with its produce. There is a good chance that the carbon footprint of the farm in Donegal would be higher, simply reflecting the wetter soils, which result in greater nitrous oxide emissions. The lower productivity of the land also increases the carbon footprint. When we talk about individual farms, the carbon footprint is not the most important metric, however. This is because each farm has what we call the biophysically minimum footprint. There are and will always be some greenhouse gases associated with food production; that is the minimum footprint. The important question concerns the distance to target. How much has the farmer reduced his or her footprint towards the minimum? As in the example, it is entirely possible that a farmer in Donegal will have progressed more towards the target than a farmer in Wexford. Again, I emphasise that the example is hypothetical.

The carbon navigator, which is probably clearer in the slides shown to the members, is a very simple software tool. On the left of the slide, members will see the green measures, from our marginal abatement cost curve. The top example, on extending the grazing season, shows the farmer's current performance based on existing data in existing databases. The right-hand side shows that the farmer, together with his adviser, sets for next year a target, in days, for the extension of the grazing season. The farm is then benchmarked against the top performance within his or her county where the soil type is the same. The reduction in greenhouse gas emissions arising from this change in practice is shown in the slides. Most important, the financial benefit that would accrue is shown. The carbon navigator will be rolled out in all the discussion groups on the beef and dairy side in Teagasc in 2014.

Our EPA colleagues have already referred to the fact that the United Nations and European Commission have agreed that after the expiry of Kyoto accounting mechanism that runs until 2020, a new one will be required. In this regard, I have to hand an extract from the European Commission's latest communication to the European Parliament. Basically, it is inviting member states to come up with ideas or suggestions specifically on how to treat agriculture differently in the future. We are working very closely with our colleagues in the EPA, the Department of the Environment, Community and Local Government, the Department of Agriculture, Food and the Marine and the National Economic and Social Council to produce a coherent Irish proposal.

We already mentioned soils in the context of greenhouse gas emissions. On the last occasion, I announced that we would finalise the Irish soil information system. I am very pleased to be able to announce today that we have done so. The members are the first to see this, and the viewer is evident on their screens. It will be operational on the Internet. This occurs on foot of a very large programme funded by the EPA and co-funded and operated by Teagasc. We completed the 1:250,000 soil map of Ireland and have put all the information, including the databases, into the public domain and onto the Internet. The study is based on an extensive field-sampling campaign using over 10,000 augur points and over 200 full soil-profile descriptions.

I will outline what the soil map can and cannot be used for. It is important to do so in today's context. Any 1:250,000 soil map will be based on associations. Associations are groupings of soil types that often occur together in a landscape. These soil types can be quite different. A slide shows glacial and brown soils that occur together in a group in a particular landscape. There can

be two soil types in an association, or there can be three or more. What does this mean in terms of the use of the soil map? We are not able to drop a pin on the soil map and pinpoint soil types A or B because, as the animation available to members shows, we do not know which of the soil types we have actually hit with the pin. We can use the map to click on a polygon that tells us which soil types occur in the area in question. This means that when our advisers visit our client farmers, instead of bringing a list of 200 soil types, they will know they can expect to find one or more from a list of three or four. All the information in the databases will be available to them. Of course, the holy grail is to come up with soil-specific management strategies.

The soil map can also be used to regional and national levels, for example, in respect of river basin district management plans, the tier-3 Kyoto accounting of greenhouse gas emissions and habitats. This is a good moment to hand over to my colleague, Dr. Ó hUallacháin.

Dr. Daire Ó hUallacháin: Táim buíoch as an deis seo a bheith agam. I will speak a little about agro-ecology. Dr. Schulte, in a previous presentation, mentioned the various demands on land use in Ireland, one of which concerns agro-ecology and the conservation of habitats and species, or the conservation of biodiversity. Approximately 10% of the terrestrial land of Ireland is designated as a special area of conservation under the habitats directive. Approximately 6% is designated as a special protection area under the birds directive. There is some overlap between the two designations. Therefore, in total, approximately 13% of the terrestrial area of Ireland is designated under Natura 2000. This is probably the *crème de la crème* of our biodiversity, species and habitats, and it is afforded the highest conservation priority under European legislation. However, it is important to conserve and enhance other aspects of our biodiversity.

There are habitats and species eligible under the habitats and birds directives but which are not yet designated. Approximately 50% of eligible habitats are designated under Natura 2000. How should we go about conserving the other 50%? There are also species and habitats that are rare or threatened on a national scale. There is high-nature-value farmland. This is a new term that has been banded out for the past 20 years or so. It is important from its biodiversity prospective. I refer to extensive farmland with highly diverse species and habitats. There are also more common farmland habitats, such as hedgerows, ponds, streams and watercourse margins. There is also a semi-improved grassland and improved agriculture land and forestry. It is important that we aim to conserve not only the *crème de la crème* at the top of the list, namely, the habitats designated under Natura 2000, but also the biodiversity associated with the large proportion of land comprising agricultural land and forestry. It is important that we conserve the biodiversity associated with those habitats because they feature widely throughout the country.

Consider the addressing of the conservation status of these habitats. We can target through two methods, namely, critical conservation, focusing primarily on the top three or four on the list, and more strategic conservation measures. It is a question of using critical or strategic conservation strategies to target the various habitats. There will be different effects in respect of each habitat and species.

The next slide shows differences in regard to how we engage in targeting and the impacts of critical and strategic conservation. For example, there is a difference in regard to the cost-effectiveness of measures. Critical conservation measures will be more costly because they are specific. We can consider more general cost-effective measures for strategic conservation. Any measure that we select must be supported by landowners. There will be an impact on the productivity of landowners as critical conservation measures are likely to have a greater impact on landowners than more strategic measures.

For critical conservation, there is a need to target species and habitats, in addition to specific locations for these species and habitats. A good example concerns the freshwater pearl mussel. We have approximately 27 catchments designated under the special area of conservation, SAC. It is unlikely that we can have conservation measures to target all these catchments.

There will be a report saying that it is better to target where one is most likely to receive or gain the most rewards in terms of conservation strategy. By targeting the top eight or so catchments, we are most likely to see the conservation strategy make an impact.



For strategic conservation there is less of a need for such targeting. There are also differences in designation and policies to address habitats and species under critical conservation and those under strategic conservation. There are also differences in the funding available and funding streams that can be used. For example, for critical conservation there is Pillar 2 under the Common Agricultural Policy. The new proposed GLAS scheme, which is a new agri-environment scheme, could be seen as one area for targeting funding towards critical conservation. For strategic conservation there are also opportunities under Pillars 1 and 2. Under CAP, for example, there is the greening of CAP or the greening measures which could be seen as more strategic conservation strategies.



There will also be an impact on landowners if we target critical and strategic conservation. For example, in the case of flagship species such as the corncrake, which has declined for a number of different reasons, one of its main threats has been the change in agricultural practices and the switch from traditional hay meadows to silage production. Let us consider the conservation of the species, as we are obliged to do under the birds directive. There is a requirement, where these species occur, to switch back towards more traditional measures, and these will have an impact on production.

Another species is the freshwater pearl mussel. There may be historic reasons for its decline but one of its main threats is sediment. Conservation of the species would impact on the landowner as he or she would have to implement mitigation measures such as buffer strips or sediment traps.

Species rich grassland has declined massively over the past 50 or 60 years and one of its main threats has been abandonment. Therefore, if we want to conserve such habitats, we need farmers to actively manage and farm the land.



From a strategic conservation point of view, these matters are less resource affected. For example, hydro conservation benefits biodiversity and agriculture because it provides shading, shelter and drainage. Let me give the example of species associated with riparian margins, which benefit the margin and the biodiversity associated with the watercourse and also intercept nutrients and sediment, thus preventing them from getting into watercourses. There are also opportunities to target strategic conservation strategies to more marginal areas of land. For example, a farmer can target areas that are less productive, thus benefiting biodiversity and ensuring a reduced cost for agriculture. The last slide provides a summary and heralds the end of the Teagasc presentation.

Chairman:   I thank both delegations for their comprehensive presentations which dovetail quite a lot. Before calling other speakers, I wish to ask Dr. Ó hUallacháin a question on his last comment regarding the carbon calculations. He said that there are win-win options available. How do we get the credit and have it act as part of the overall carbon calculation? I hope he does not mind me saying so but to me that element of his presentation seemed unfinished. I ask him to consider my question while the members ask their questions.



Deputy Éamon Ó Cuív:   I have only one simple question. It was said that agriculture produces 33% of emissions. Does that mean greenhouse gases? Does that include nitric

oxide, methane and carbon dioxide?

Perhaps the delegations can explain the following example to someone like me. If one grows a tree it will take in carbon, but if one grows other plants, like grass and so on, they will not take in carbon. When an animal eats the plants the gas will be expelled again. How does constantly putting out a lot of greenhouse gases not deplete the carbon amount? Where is it all coming from? There is a permanent carbon cycle. Is there an accounting issue? Have I missed the point that was made about the greenhouse gas count? It has been said that one type of plant takes carbon in and holds it, but when one kills the tree and burns it, one lets out what was brought in, although it is kind of neutral by then. However, other plants take in carbon, animals feed on them and then the animals release gases and so on both at the front and the back. The carbon count seems to take account of what comes out but not what comes in and I am curious to hear how it is calculated.



Senator Susan O'Keeffe:   I must leave in a moment to vote. Does the Chairman mind if I ask a simple question?


Chairman:   The Senator can go ahead.


Senator Susan O'Keeffe:   I thank the Chairman. A lot of information has been given and I ask the delegations to forgive us because it will take us a moment to get our heads around it.

With regard to the 32% rate for agriculture, what is the reduced target we must aim for? Is 32% okay if we change other things? How might the GLAS scheme help us to reach our target? GLAS was mentioned but it did not get a big mention. Perhaps that is just the way the delegation has given us particular bits of information and not other bits. How important is GLAS to the activities of Teagasc?

Mention was made of the single overarching need to get people to change their behaviour. We have seen the EU *safe food* operate the Operation Transformation scheme and the EPA mentioned smart farming. Can the GLAS proposals change our situation?

Chairman:   I ask the delegation to answer the Senator's questions.

Senator Susan O'Keeffe:   I thank the Chairman. I must leave because I have to vote.



Chairman:   I refer, in particular, to her first couple of questions, after which I will call other members.

Deputy Éamon Ó Cuív:   I suggest the delegation answer the second question first.



Dr. Jonathan Derham: We will answer the second question first and it will be a double-barrel answer as we will answer it between us. I refer to the Senator's questions on whether we must get down to 32% and if there is an overall national emissions target.



Dr. Eimear Cotter: Agriculture is responsible for 32% of our emissions but the EU target is a 20% reduction in national emissions and agriculture and transport are the two big sectors in that target. It is an overall 20% target by 2020 which has not been apportioned across sectors and individual sectoral targets have not been set. It is 12% growth up to 2020 for the agriculture sector. Projections have shown that the emissions will grow by 12% but overall we need a 20% reduction, which is a very large gap. Agriculture will have a very big part to play in helping us to achieve that target. I hope I have answered the first

part of the Senator's questions.

Senator Susan O'Keeffe:   Yes. I thank Dr. Cotter. I also asked whether GLAS or the GLAS proposals will go some way towards improving the situation.

Dr. Rogier Schulte: I will answer that part of the question. GLAS by its very name refers to low carbon agriculture. To the best of my understanding, the GLAS proposals have not been finalised and are still being developed. We have made a submission to the public consultation process conducted by the Department of Agriculture, Food and the Marine. One of the things we proposed in our submission, for example, is to use the carbon navigator as one of the GLAS methods to promote the measures, raise awareness among farmers that carbon efficiency equals economic efficiency and start the debate. Using the carbon navigator, we can spring the green measures, as we refer to them, that will reduce the carbon footprint. The scheme is being developed as we speak but the thinking is there.

Senator Susan O'Keeffe:   I interpret that to mean not yet but maybe. I appreciate the answers supplied.



Chairman:   The delegations can now answer Deputy Ó Cuív's questions.

Dr. Rogier Schulte: My colleague, Dr. Cotter, will start to answer the Deputy's questions.

Dr. Eimear Cotter: The Deputy asked at the beginning of his questions which agricultural emissions we referred to. I can tell him that methane and nitric oxide emissions come primarily from the agricultural sector. A small amount of CO₂ comes from combustion which is produced by machinery and so on, but predominantly it is methane and nitric oxide. My Teagasc colleagues will answer the second part of the Deputy's question.

Dr. Rogier Schulte: The Deputy asked a pertinent question about the carbon cycle. He is right that agriculture does both things. Agriculture takes up carbon and sequesters it in soils, plants and trees. It also emits carbon

There are a number of reasons that it is not a zero sum game. One of the dominant reasons is that our ruminants converge one form of carbon into another. They converge what was carbon dioxide taken out of the atmosphere into methane. The problem is that methane is a much more powerful greenhouse gas than carbon dioxide. We often hear about carbon dioxide as a greenhouse gas but methane is much more powerful. Nitrous oxide is more powerful again in terms of the amount of heat it traps. This is why it is not a zero sum game. In the framework that we and our EPA colleagues refer to for the post-2020 period, we are aiming to at least bring these emissions from agriculture which are currently counted together with the credits in terms of the carbon uptake so that at least the positives and negatives are accounted for in the same framework. It is unlikely to ever become a zero sum game.

Deputy Éamon Ó Cuív:   What is the ratio in respect of the pure greenhouse effect of one molecule of methane versus one molecule of carbon dioxide?

Dr. Rogier Schulte: They change from year to year. I will defer to our EPA colleagues.

Dr. Eimear Cotter: It is 21 times more warming than CO₂ for methane and 310 times more warming for nitrous oxide.

Deputy Éamon Ó Cuív:   310 times?

Dr. Eimear Cotter: Yes. As Dr. Schulte says, this changes and they are about to change the warming potential soon in our accounting.



Deputy Éamon Ó Cuív:   Upwards or downwards?

Dr. Eimear Cotter: Both. Methane will be more warming and nitrous oxide will come down ever so slightly.

Dr. Rogier Schulte: One interesting detail - my EPA colleagues can correct me if I am incorrect - is that a distinction is made at UNFCCC or IPCC level between the global warming potential of animal methane and fossil methane. They subtract one from that number of 21 in the case of animal methane because of that one molecule of CO₂ taken from the atmosphere.

Mr. Phillip O'Brien: This is in the most recent IPCC working group 1 document produced in September. It provided the revisions for the greenhouse warming potentials for these gases. That is the first time it made this distinction. This is new information coming into the policy framework. A scientific distinction is being made between methane coming out of fossil fuels and bio-genic sources. This is a very interesting development and should certainly be considered at a policy level.



Chairman:   Does Deputy Ferris have a question?



Deputy Martin Ferris:   I thank all the witnesses for their presentations. There is a lot of information in them. My head is spinning trying to figure out which question I want to ask. The factors that come across from all the contributions are education, efficiency, the joined-up approach by the various agencies and, in particular, working with farming organisations because that is where many of our problems come from. The smart farming, whole farm approach to soil fertility plays a huge role. When one comes from that type of background and travels around the country, particularly the more marginal and weaker areas, one can see that things could be more efficient from a production perspective and in terms of what we are trying to achieve on the carbon issue. If this efficiency and education were available to many of the weaker and poorer sections of the farming community, it could help to address the problem in some way.

I welcome the fact that 30 farmers will be included in an educational discussion. When will this be rolled out, how widespread will it be and where will the concentration be? If the witnesses are to achieve what they want to achieve, the concentration must be within sectors of the farming community that are most vulnerable and most in need.



The witnesses talk about critical and strategic conservation. When they talk about critical conservation, they are talking about land that is probably sterilised for that to happen with the loss of income to the farmer involved. There are no more relevant areas than parts of west Limerick and north west Cork where whole areas have been sterilised because of the hen harrier. In these areas, people entered into an agreement, did not have the contract and have no income. We must make it attractive through a support mechanism.

I think about 7% of forestry is managed by Coillte while forestry takes up 11% of land nationally. Obviously, that must be increased to meet targets. This goes back to supports. How do we get that extra take up? The witnesses take about efficiency in respect of food waste. This comes back to education for the consumer and producer.

Chairman:   Deputy Deering indicated that he wished to speak.

Deputy Pat Deering:   I thank the witnesses for giving us a lot of very detailed information at the same time. As we approach 2020, a year we have serious targets for, is the bus slow in taking off as regards information and education regarding greenhouse gas emissions? Sixty years is a

very short time span. There have been significant efforts to try to reach the Harvest 2020 targets. Are we going to miss them? What are the implications of missing those targets?

Deputy Martin Heydon:   I also thank the witnesses for the varied and very detailed presentations we received. We must go away and take a bit of time to digest all of the information they have given us. It strikes me that agriculture in Ireland is paying a price because of the lack of industrialisation across the rest of the country. There is probably a fear that agriculture will be inadvertently and disproportionately hit compared to other countries even though it is quite efficient because it contributes 33% and because of the 20% reduction on a national level that needs to happen. That is probably more of a comment than a question.

It might not be politically correct to say this but given our size, we will put ourselves to great measures to try to make ourselves as efficient as possible when much larger countries with much larger populations and other less developed parts of the world are doing untold damage to the environment. Our little impact will not have any impact on the larger scale. How would the witnesses respond to this statement? What would they say to the ordinary farmer who is going to see the impact of further changes and measures? It is important to reiterate that Irish farmers strongly embraced the likes of REPS and the agri-environment options scheme, AEOS, and will continue to do so. Farmers are custodians of the land and have always taken measures in that regard. I am not saying they want to go out and wreck it but I can see the argument. When it is sent back to one, it is very hard to argue against us bringing in all these measures that will have no impact on other parts of the country that are slower to sign up to the measures.

Dr. Jonathan Derham: The questions will run between us. Deputy Ferris is quite right. Education is a founding element of this resource efficiency model. We have certainly proved that the joined-up approach has been very successful across State agencies and sectoral organisations. Clearly, it is the way to go. At the root of all of this, behavioural change is a sociological issue and probably in some cases a psychological issue for individuals and groups.

Why do groups have difficulty with change? The following elements should be considered, namely, the economic element and the cost of change. Age is a factor when individual farmers reach the age when they think about retiring they do not want to have to reinvent themselves. The scale of the farm is another element, with very small scale farms having low-cost effectiveness. Habits and culture also dictate people's behaviour. It is a complex sociological problem.

We in the State agencies have found that telling people what they should do is not terribly successful. The most effective model has been the farm-based discussion groups in which farmers talk to farmers. There is a direct exchange of experience between them. I am not from a farming background but through my professional life I have a great deal of interaction with the farming sector and we are very pleased that the IFA is coming forward with the farm discussion group model. Members will see at the top of page 7 of the slides, the indicative farm discussion groups are spread across the country. There will be some fine tweaking based on farm types but they will look across the tillage, beef and dairy farms. There will be a range of different farm types and different farm enterprise types within the discussion groups. We will continue this process in the following years, money permitting. The EPA is putting funding of €100,000 in cash into this year's discussion groups and about another €70,000 in terms of people and human resources. That is a modest sum but the impact is significant.

I will comment very quickly on the 2020 targets. My colleagues might add further to them. I do not think there will be a *pro rata* reduction in agriculture. These are national targets and it is for the State to decide on the most successful policy arrangement between the different sectors. In some sectors we might be able to achieve greater

reductions that do not result in the same *pro rata* reduction in the farming sector. I do not believe it will be so straightforward that there will be a disproportionate cut in the agricultural sector.

Dr. Eimear Cotter: I will address what we can do in the forestry sector to increase our carbon sinks at national level.



Our message is that more carbon sinks exist than just forestry. We would like the land use sector to be looked at in its entirety. At present the accounting framework is very fixed and biased toward forests. We think there is potential in looking at the land use sector in its entirety.

What would need to be done to make that happen? We need to recognise the potential of the land use sector at national level. We have been very focused on a conversation on afforestation, but there needs to be national recognition of the role of the wider sector. We would have to engage at an international level and try to influence change in the accounting rules. That will take a great deal of work across State agencies and Departments over a long period.

Agriculture and transport are the two key sectors for our 2020 targets, accounting for 75% of emissions in 2020. Our projections show us exceeding our annual limits in 2016 so it will be very challenging. Dr. Jonathan Derham has stated we do not have sectoral targets and the national target will be split up and divvied out between the sectors. We are awaiting the publication of the climate change Bill which will set us on the path for 2020 and out to 2050.

We have to consider the environmental impacts of the agricultural sector. We would not view working for better environmental conditions for the farmer as mutually exclusive. Dr. Derham referred to smart farming, this is about resource efficiency, by using resources on the land more productively, there are savings and win wins for the farmer and equally environmental benefits.

We sell our products to export markets by telling the story of environmentally compatible agricultural production and that green, sustainable produce is interwoven with Irish agriculture. We have to create a compelling message for the markets.

Deputy Éamon Ó Cuív:   We have a fixed amount of land, which is decreasing as good agricultural land is being built on. The storms also added to the loss of land.

From the figures for output, it seems that by increasing cattle number, one increases methane gas. If the ratio is 21:1, I would be interested to hear how the EPA proposes to deal with the dilemma with Harvest 2020. Do different types of cattle produce different levels of methane gas? Is there a genetic issue with different breeds? What affects the output of methane gas from cattle? Is there anything we can do to produce the same amount of beef yet generate less methane? It would be a major boon if one could do that. If it were possible to do that, should it become part of the genomic scheme and part of the measure when doing DNA testing?

If we are to put more and more cattle on the land and try to offset the methane gas by forestry or other sinks, what is the ratio per hectare, allowing that one is putting CO₂ in and generating methane gas when one has cattle. Is it a big disadvantage that so much of our agriculture is based on animal production rather than on tillage?


Has the EPA a measure of whether the normal 80:20 rule that seems to apply to everything in life applies to greenhouse gases so that 80% of methane and greenhouse gases is generated by 20% of the farmers? If one concentrated one's efforts on reducing their output, it would have a disproportionate effect and one would not need to get to the very extensive farmers who in the greater scheme of things are probably generating very small amounts. Is it a question of having to focus on those in intensive farming and to work with them on the factors that could mitigate the output of greenhouse gases? Am I correct that 20% of farmers produce 80% of the output? In other words of the 120,000 farmers, do the top 30,000 farmers produce 80% of the net greenhouse gases?

Dr. Rogier Schulte: I will address Deputy Ó Cuív's questions in the order they were raised. There is some confusion in the public debate about the impact of Food Harvest 2020 on total bovine numbers. The results from our economic modelling unit, the Frappery Island model, which projects these animal numbers forward up to 2020, suggest that the number of dairy cows will increase in response to the phasing out of the EU milk quota. However, as these additional dairy cows produce additional calves, the model output suggests a contraction of the suckler cow herd. The change in total bovine numbers, dairy cows plus suckler cows, will be very small. It will be a change in the composition of the national herd rather than a growth of the national herd. Sometimes in the public domain we see questions on what will we do with the 50% additional slurry, the increase in the amount of slurry will be in single digits.

That puts the challenge in context.

There are small differences between breeds in terms of methane output. Interestingly, there are greater differences between breeds in terms of milk and meat output. If we are considering efficiency in terms of CO₂ per litre of milk or kilogram of meat, there is much to gain from breeding. As is evident from our marginal abatement cost curve, one of the largest potential gains is in the economic breeding index, EBI, which is a composite indicator of the genetic merit of a dairy cow. This includes not only output indicators, but also efficiency indicators and so on.

We are disadvantaged because of our type of farming. The fact that we rely on ruminant farming poses a major challenge to our greenhouse gas balance sheet. Having said that, the debate in the Irish context is different from the debate in the continental context. In Europe, farmers theoretically have a choice between tillage and grassland farming. In Ireland, we must take food security into account. If we do not have ruminants on our grass, what are we going to do with it? This important question is now being taken into account by the European Commission in the post-2020 framework on greenhouse gases. For the first time, the term "food security" appears in the Commission document under the agriculture heading in the context of greenhouse gases. The fact that we export between 80% and 90% of our produce has opened the door at the Commission to ensure that any new policy or accounting framework recognises this contribution to food security. How this will be worked out in the details is open to negotiation.

Chairman:  I may be wrong, but did a UN report last week criticise Food Harvest 2020 for being an export-based model that took no account of international food security?



Mr. Phillip O'Brien: No, that was not my reading of last week's document. Working group II of the Intergovernmental Panel on Climate Change, IPCC, was examining adaptations and impacts. It pointed to the fact that global food security was threatened, particularly by



how climate change would impact on the ability of developing countries to produce food for themselves and others.

Chairman:   It was not critical of our Food Harvest 2020.

Mr. Phillip O'Brien: It did not mention Ireland in that context. That is more a matter for working group III, which is being convened in Berlin at the moment and deals with mitigation. Its discussion document will not specify particular countries. It refers to consumption-based accounting and production-based accounting. Ireland takes account of all of the methane we produce because we produce the food whereas other people eat it. Under consumption-based accounting, that methane would be accounted for in the country of consumption. There are pros and cons in the discussion, but the document that will be published next week will not show a major differentiation. The Chairman must also bear in mind that we consume a high level of embedded emissions in other products within our economy, for example, cars.

Dr. Daire Ó hUallacháin: I will address an outstanding question asked by Deputy Ferris. He suggested that critical conservation would have an impact on the landowner, leading to the possibility of sterilising land. Ireland's biodiversity and variety of habitats are predominantly the result of centuries of agriculture. To maintain them, farmers must actively farm land. The Deputy was right that, to achieve this, farmers must be incentivised. It is encouraging that the proposed green low-carbon agri-environment scheme, GLAS, has prioritised habitats and species of high conservational concern. Hopefully, this will incentivise farmers to manage habitats actively.

Chairman:   If public good is counted in terms of carbon sinks, recreational amenities, etc., one is entitled to be rewarded for that work. We learned from our meetings with groups from the Burren that the best people to do this work are the ones who are always there, namely, the farmers and landowners.

Deputy Éamon Ó Cuív:   I wish to make a supplementary point. We have not seen GLAS, but the agri-environment options scheme, AEOS, was task driven. Is Dr. Ó hUallacháin saying that a high-conservation status area requires the right level of farming to be maintained, that being, what was done traditionally and no more or less? In places like the Burren, farming went from one extreme to the other, for example, over-intensification on the hills in the west and under-intensification to the point that everyone was concerned about land abandonment, etc. Prior to the incentives, though, generations of farmers farmed that land in a sustainable way because they knew what they were about.



Has Teagasc suggested that GLAS should focus on the output instead of the task? Judging by the little information we have on GLAS, it seems to be task driven, in that one must maintain X number of walls and so on. It could instead be concerned with telling farmers with high-status farms to maintain them in very good environmental order and that, if this meant doing nothing more than farming land sensibly, they would then get money.

Dr. Daire Ó hUallacháin: We have not seen GLAS. We are working from its proposed recommendations. A new element in GLAS that was not included in previous schemes is the active prioritisation of certain habitats and species. Natura 2000 sites, which account for approximately 14% of the species in question, are deemed to be included among the prioritised sites.



Some of the problem may lie in the fact that GLAS targets habitats and species of conservational concern and that farmers can only be rewarded for income forgone. Undoubtedly, there is a need for further discussion on this matter. If active measures are not incorporated, how will farmers be incentivised to farm as they did heretofore?

Deputy Éamon Ó Cuív:   Teagasc accepts the question.



Dr. Daire Ó hUallacháin: In the context that we have not seen the finalised GLAS.

Deputy Éamon Ó Cuív:   Neither have I. However, Teagasc accepts that this issue has not been resolved and could become a concern depending on how GLAS is designed.

Dr. Daire Ó hUallacháin: Without having seen GLAS, it would be difficult to respond.

Deputy Éamon Ó Cuív:   What has been published refers to priority actions, for example, stone walls and God knows what else. Therefore, GLAS seems to be action driven as opposed to requiring a composite. To a certain extent, I have always believed that we should revert to the way farming was done up to the 1950s or even the 1970s, which was sustainable. Farmers figured out how the land worked and had plenty of labourers, which allowed them to keep their stone walls in order, their farms tidy, etc.- some of them at any rate. Thirty years ago, we had the best quality of farmer for the sensitive landscapes in question where there is limited capacity and both overgrazing and undergrazing lead to serious trouble. An incredible balance is necessary. This is not achieved through positive action, but farming knowledge, yet there appears to be no reward for that. Indeed, there can be none under an action-driven plan.

Dr. Rogier Schulte: Deputy Ó Cuív has made an excellent point. As we understand the new Common Agricultural Policy, CAP, scheme, Pillar 2 payments can only be used to offset income forgone. This is a European rule rather than a national one. This issue does not only relate to biodiversity, though, as we have encountered the same issue with the carbon navigator that we presented. That all of the navigator's measures are cost effective and cost beneficial means that we cannot include it under Pillar 2. However, some of the other issues to which the Deputy referred, such as education, knowledge transfer and their cost, can be considered under Pillar 2. It is a question of designing the approach in a smart way.

Chairman:   I think Pillar 2 could have discussion groups on areas of national constraints, which will be better defined by the soil test analyses.


I expect it will be used as part of the review of those later in the year. There are also smaller but specific output-based environmental schemes. There are other aspects that might be able to compensate. The discussion groups are very simple and very effective, and represent a very efficient transmission of information.

I thank the witnesses and all the presentations are very good. Ms Cotter made a very relevant point that goes to the heart of it. It is about getting recognition of total land use. That has been the driving force behind what the committee has been trying to do. Ultimately we want to endorse a policy which would form part of an Irish argument for a total land-use framework that an international accounting system would recognise. Regardless of whether the Government takes it to a commission on agriculture or a commission on climate change in Europe in the first instance the Oireachtas Joint Committee on Agriculture, Food and Marine would have pulled all

together. We will hear submissions from representatives of UCD and Bord na Móna to conclude our hearings. We then hope to go to Europe with a preliminary document and make an argument, as a committee, on the basis of what is being done. The various aspects to it from food security to efficiency of production and everything else would be part of our argument or defence depending on one's point of view.

Deputy Eamon Ó Cuív: Is it possible for the witnesses to provide us with a "Ladybird" guide? We have been told that 7% of land use is forestry and every year that sequesters a certain number of tonnes of CO₂. Approximately 4% of or land is used for tillage crops and another percentage is used for animals. All the figures the witnesses gave are very useful. However, if we want a total land-use approach we need to know the pluses and minuses, and the approximate number of hectares for each land use. We could then have a ready reckoner of where we are going and it would give us the total picture. We do not want pages, but want it to be concise.

Dr. Jonathan Derham: We will do that.

Chairman:  Last week the representatives of Coillte advised us that the country's forest estate sequesters approximately 200 million tonnes of CO₂, but that other countries in Europe have a higher percentage of forestry than we have. On the other hand, since 1990 our rate of afforestation has been much greater than any other country because most of them have either established or not bothered. As we have, we need to get that factored into it. The post-1990 figure is probably the most relevant one.

Maximising the Usage and Potential of Land: (Resumed) Bord na Móna and UCD, 13th May 2014

Chairman: I invite Mr. Ryan to make his opening comments.

Mr. Gerry Ryan: I thank the Chairman and members of the committee for giving us the opportunity to make a presentation today on Bord na Móna's land use. As the Chairman said, I am responsible for land and property at Bord na Móna. I am joined by my two colleagues, Mr. Pat Ring, head of property development, and Dr. Catherine Farrell, senior ecologist.

As the Chairman and the committee will know, Bord na Móna is 95% owned by the State and was originally established in 1946 to develop some of Ireland's extensive peat resources, primarily at that time for fuel and energy. Today, we are active in a number of industrial sectors, including conventional and renewable energy generation, commercial and domestic fuels, horticultural growing media, wastewater treatment and air pollution abatement, as well as a resource recovery facility in north Kildare.

We employ a core workforce of approximately 1,800 people and a seasonable workforce of around 600 people during the summer months. Last year our average employment numbers were just over 2,000 and the turnover made by the company was just over €425 million. Our head office is located in Newbridge and we have operations in Ireland, the UK and the US. We sell our products into more than 20 countries.

Today's meeting is related to maximising the usage and potential of land so we will focus primarily on our lands, in particular our views on potential uses for cutaway bogs. Our lands extend in total to about 80,000 hectares throughout the country, mainly located in the midlands but in some other areas, particularly north-west Mayo. This vast resource is characterised by fragmentation. We have in excess of 130 individual bogs, many of which comprise numerous individual land parcels.

We have made a submission to the committee and, in addition, we have submitted two reports that we believe are relevant for the committee's consideration. One is entitled the Strategic Framework for the Future Use of Peatlands and the second is our biodiversity action plan. I will hand over to Mr. Ring who will expand further on our land bank and plans for future land use options. He will be followed by Dr. Farrell who will provide more detail on our bog restoration projects and ecosystem services. We will take any questions that arise during the meeting.

Mr. Pat Ring: I will provide further information to the committee on Bord na Móna's land bank. I will also provide information on a framework that we have developed to help us examine potential future uses of peatlands, particularly peatlands at the cutaway stage.

Bord na Móna owns approximately 80,000 hectares of land and it is important to say that this is predominantly peatlands. In other words, it is quite different from mineral soil even when it reaches the cutaway stage.

The land bank consists of 130 bogs units, mainly in the midlands with some on the west coast. The bogs are large in scale and complexity and have the potential to revegetate. The depth of peat that remains after production will vary considerably, and some bogs, particularly those in the Shannon catchment area, are under the water table so they are supported by bog pumping operations.

Slide No. 3 provides an outline of current land use in Bord na Móna. It shows that three quarters of the land is involved in peat production activities and this supports our energy, fuels and horticultural businesses and factories. One quarter of the land is either cutaway or will not be used for production in the future. Current after-use options include wind energy, biodiversity, amenity uses and forestry.

It is useful to provide some background on how thinking has evolved in respect of peatlands and their use. Originally, in the 19th century, peatlands were seen as wastelands with potential for agriculture if they could be drained. In the 20th century, the value of peatlands for industrial development became obvious, and subsequently large areas were developed on an industrial scale. With that, the question arose of what would become of the land when the peat production phase came to an end. At the time, the view was that the use would be for agriculture and horticulture. However, the reality proved to be more difficult and complex. Extensive trials had been carried out over many decades by Bord na Móna working in collaboration with partners such as Coillte, COFORD and UCD. For economic and technical reasons, the use for agriculture and horticulture is realistically unviable and the potential for forestry is limited. More recently, there is huge growth in recognition of the biodiversity value of peatlands. Cutaway bogs present a range of complex issues that require to be considered bog by bog. To that end, we have carried out a body of work reviewing the work done over the decades and seeking to develop a framework to assist us in examining future land use options.

Slide No. 5 provides a broad outline and overview of what we refer to as a strategic framework for future land use. Each of the 130 bog units will be assessed on the basis of eight key factors, which are shown in the diagram. Number 1 refers to the physical nature of the bog, the second refers to its location in comparison with key infrastructure, which is critical, as is No. 3, the timeframe for peat extraction. No. 4 refers to the economics of any after-use proposal and No. 5 refers to the national and regional needs. Bord na Móna is of the view that our cutaway peatlands have an important role to play in meeting national requirements for renewable energy, water storage, amenities and biodiversity. No. 6 refers to legislation and regulation, and any future development must

comply with relevant legislation. No. 7 relates to land use planning policies, and any future land use must conform with national, regional and local policies. No. 8 is the local issues and local consideration, which are very important. These include providing employment and places for amenities and recreation. All these factors and the complex issue of projecting future land use is covered under the land use review system, which will be dynamic in nature and will allow for changes in regulation or land use policy in future years.

In terms of overall land use strategy, the object of Bord na Móna is to balance and optimise the commercial, social and environmental value of its resources. Bord na Móna will actively pursue the full potential of its land bank for a variety of appropriate future land uses. The land bank will be developed with regard to commercial benefits and the national interest. Bord na Móna will interact with other policy-making bodies, such as regional and local authorities, to achieve it. Cutaway bogs present a range of complex options that require to be considered bog by bog.

Biodiversity and ecosystem services comprise an important issue when considering future land use options. Biodiversity provides a contribution to wealth and health through the ecosystem services and consequently has economic value. Bord na Móna lands identified as having high biodiversity value or priority habitats will be reserved for that purpose as the principal future land use. Some level of remediation, with consequent cost, is required for all future land use and many of the options we look at are compatible and can be co-located. For example, biodiversity is compatible with and can be co-located with wind energy, and water storage options are compatible with amenities.

I will summarise with some of the key land use options under consideration. Wind energy is a key land use option at present. Bord na Móna has been active in wind energy projects for 20 years and we believe cutaway peatlands have significant potential to meet Ireland's renewable energy targets. Cutaway peatlands typically have a good wind regime and they are remote, with no residences within the bog and, typically, a low number of residences on the periphery. We also look at amenities and tourism as important options. To date, we have focused our resources in developing the Lough Boora site in County Offaly. It is a cutaway bog that has been developed for amenity and biodiversity purposes and it has cycleways, walking tracks, lakes and a sculpture park. It is a fine local amenity and we are working to develop Lough Boora further for improved visitor facilities for local visitors and people from further afield. High value biodiversity is a key consideration and my colleague Dr. Farrell will talk about that in more detail. Industry and infrastructure have a place in the future land use of cutaway peatlands. Some examples include Drehid Resource Recovery Park in County Kildare and a smaller development in Derryarkin Sand and Gravel Limited, a joint venture with Roadstone Holdings.

I also mentioned forestry, and significant areas of land have been leased to Coillte since the 1980s. However, growing performance has been disappointing and while forestry considers to be considered, at this stage it seems unlikely it will present major opportunities in terms of after-use options. My final slide seeks to paint a picture of what a future peatland landscape may look like, showing renewable energy being garnered from wind, wetland areas, and an area rich in biodiversity and amenities for local communities and employment creating opportunities.

I will hand over to my colleague, Dr. Catherine Farrell, who will talk about ecosystem services

and bog restoration projects in Bord na Móna.

Dr. Catherine Farrell: I will say a few words on the mapping system in terms of how we plan our land use and get to grips with what is out there across the full holdings of 80,000 hectares. I will hint at some of the other ecosystem services benefits, such as biodiversity, carbon and then, of course, cultural landscape.

What is a cutaway bog? What sort of landscape does that present to us? For the most part, that is what we are talking about today. It is very different from a raised bog. A lot of people might confuse cutaway bogs. We cannot restore these bogs to active raised bogs. For the greater part of it, one essentially has a new landscape. Peat has been removed so what one has is a very different landscape which has varying depths of peat and varying drainage regimes and, as Mr. Ring hinted, significant areas moving towards wetlands into the future.

When peat production stops in an area, generally, what one is left with is a bare landscape. Within a couple of months of production stopping, we start to see natural colonisation happening across the peatland. This gives rise over time to a range of different habitats, and at this time we are mapping the habitats emerging on the cutaway bogs with a view to determining how all of our bogs will develop in terms of whether they will be wetland or woodland habitat and how those habitats can contribute in lots of senses to carbon services and benefits into the future and also to biodiversity networks. At this point in time, we are of the mind that roughly 30% of our lands would be going towards wetland and the remainder towards scrub-woodland type habitats. The benefits to natural colonisation and, where necessary, targeted rehabilitation is that our lands will be environmentally stabilised and we will have this rich diverse landscape. Also, that will have an impact on other services such as water quality into the future.

I will show members an example of one of the sites we have. Ballycon bog is adjacent to the Mount Lucas wind farm site, which some members may have been on. It is roughly 200 hectares and has been out of peat production for more than ten years. We have zoned this area as a biodiversity area. In terms of how we map these areas, we have an extensive GIS database. We have a layer which identifies the generic land use in the area. This is a biodiversity area, with some Coillte plantation to the west of the site. The map on the top right shows the current habitats on the site, so it is a mosaic of wetland and emerging scrub. The map on the lower left is a lidar map that can inform us as to where wetlands will form. The one on the lower right is basically the future of this particular site and how it will look. We have a database and knowledge on more than 130 of our bog areas. We have a lot of information as to how these sites will develop into the future.

We talked about the cutaway bogs. We also have in our land bank roughly 2,500 hectares of bog that was never brought fully into peat production. We have identified those areas and have started a process of bog restoration on these sites. The benefits in terms of restoring active raised bog habitat is that a lot of these sites have been incorporated into the national network of special areas of conservation and natural heritage areas. The other side of it is the potential to use these sites for carbon offset into the future. The sites currently drained may continue to release carbon, but once one rewets these sites, one restores the carbon sequestration potential of the areas.



In terms of the carbon issue, obviously we will leave a lot of peat in the ground on our cutaway sites. We want to see what can happen when we rewet those areas. Can we maintain the carbon on site and, where possible, can we start to return these areas to carbon sequestration sites? We have invested in a number of greenhouse gas monitoring projects which link up with UCD and the Environmental Protection Agency. Hopefully, they will inform our land use decisions into the future.

Deputy Éamon Ó Cuív:   I thank the witnesses for their presentations. I was under the



impression 20 years ago that all of this land would be put to some commercial use, but what the witnesses seem to be indicating is that much of the land will return to some semi-natural state and that we will have wetlands, scrublands and so on. Is it the intention to use these lands as environmental areas and areas which people will study - in other words, as a national resource without a particular crop? I accept a certain amount of forestry is being done but I am talking about the areas that will be left in their natural states and that these will become an environmental resource. What proportion of the total land do the witnesses see as winding up either as wetlands or as other kinds of environmental areas but not cropped in any way?



Europe wants all these SACs and if so many people are so interested in preserving them, presumably people will be interested in looking at them, walking across them and studying them. We can bring all sorts of universities in and do long course on the biodiversity of Irish bogs and raised bogs and so on. I understand we will wind up with cutaway bog that will return to some kind of regenerative state. Bog that was never cut is a very high quality SAC and well worth protecting because it is very scarce in the European context. I mention all the things wetlands bring.

I do not know if it is an appropriate question to ask witnesses but in view of the land bank left and the nature of that land bank, would I be right to think that only a large semi-State body like Bord na Móna could possibly handle this, in particular since it will not result in a very direct commercial benefit? In other words, the benefit might be more a national pay-off rather than a pay-off for the company. Would the witnesses comment on that issue that these lands will not give the company a direct pay-off but, of course, they will be of huge national importance if we are to have all of this biodiversity, carbon sinks and so on which are important nationally but will not necessarily pay the company?



Deputy Thomas Pringle:   I thank the representatives of Bord na Móna for their presentations. I have two questions, one of which relates to what Deputy Ó Cuív said about the biodiversity element of future land use. Is Bord na Móna obliged to commercialise that or how does it see that developing in the future? It was said that ecosystem services have an economic value. Where does it see that being achieved?

I have a question on biomass production and I was surprised that was not in the presentations. I would have thought Bord na Móna would be ideally placed to carve out a role for itself in terms of the delivery of biomass in the economy. Renewable energy and renewables are something we need to look at for the future. What consideration has been given to the production of biomass in Bord na Móna's future development plans?

Deputy Thomas Pringle:   I acknowledge that the situation has improved greatly in recent years in terms of being able to use biomass in electricity generation. I see potential for the economy to develop an industry to provide biomass for renewable energy production, particularly electricity production. That would be a lot more productive than using the land for wind energy. The use of land for wind energy and forestry is passive in the context of the role of Bord na Móna. Finding some productive use for the land other than for wind energy would be more advantageous and beneficial to society.

Deputy Tom Barry:   I thank the witnesses for their presentations. The witnesses referred to lands being "environmentally stabilised". Will they explain what that means? When these lands are vacated, will they be wet or dry? I have the mindset that one would normally try to dry out wet ground. Diversity was also mentioned but is the idea of creating a national park just an easy way out? Should we not be looking at the possibility of producing food? Can animals graze some parts of this land? Can we develop biomass crops? If we do, have we any way of harvesting them if the ground is very wet?

I am certainly in favour of wind energy but have the witnesses done any analysis of the impact of getting 400 kV of energy from those sites? This is very topical at the moment with many people objecting to overground cables and pylons. Has this been examined thoroughly in the context of the concerns of the public? The picture on the presentation is lovely, with sailing boats, people strolling around and so forth, but realistically how much of the countryside do we need for boating and strolling around? I do not do much boating. Is there something sustainable here that will create wealth?

Chairman:   On the question of carbon sequestration, have the witnesses quantified that or put a value on it? If it was seen as a public good, in the context of what Deputy Ó Cuív said earlier about the value to the nation as opposed to Bord na Móna, what value would it have?

Mr. Gerry Ryan: I thank the Chairman. I will deal with biomass first because it came up a number of times. We have examined in considerable detail the possibility of using our land bank to produce or grow biomass. Unfortunately, the efficiency of the crop which is produced relative to the input costs means it is not economically feasible. We have tried on a number of occasions to produce reasonable quantities of a number of different biomass crops on our lands, including willow, alder and miscanthus, but it is not economically feasible to grow it on our land bank after peat production. It would be fantastic for us if we could use the land for that purpose but it is not feasible to do so on an economic basis, unfortunately. Having said that, Bord na Móna has been a champion of the use of biomass in the energy sector in Ireland. In our Edenderry power station in county Offaly, more than 20% of the energy produced comes from biomass which is sourced almost entirely from within the Irish market. We also have a programme to encourage farmers to grow biomass on our behalf for use in the power station in Edenderry. That is on a small scale at the moment. It would be very helpful if more supports were available from the State in the context of renewable energy in general. Nevertheless, we have a programme up and running and a small number of farmers have undertaken to grow biomass on our behalf for use in the power station. Unfortunately, using our own land for biomass production is not an economically feasible proposition.

On wind energy, we have conducted a number of studies and developed two major wind energy farms in Mount Lucas and Bruckana in the midlands on our own lands, based on the normal planning regulations and permissions which apply. They are nearing completion and are very successful. Of course we do not envisage a situation where all the 80,000 hectares will be covered with wind farms, and the picture was certainly not meant to convey that. The vast majority of our land will be wetland of the type described by Mr. Ring and Dr. Farrell, and I will ask them to comment on that aspect.

Mr. Pat Ring: There was a question from Deputies Ó Cuív and Barry on the value of future cutaway peatlands. Our overall strategy is to seek to generate commercial, environmental and social value. There is a clear focus on that in the sense that we are not just focused on amenity value and biodiversity. We fully accept and understand that commercial value must also be created. In our view, that would be driven by Bord na Móna and the value would accrue to the company. However, we understand that value should also accrue to the State in the context of the national interest, and we would see that the cutaway peatlands would have a value in terms of providing biodiversity and carbon storage while also providing solutions in the context of green energy and possibly water storage. The focus of Bord na Móna and this unit within the organisation is to look into the future at the emerging lands that will become available post peat production and to seek to generate value from them, whether commercial, environmental or social. We feel that getting the balance right is very important.

Dr. Catherine Farrell: In response to Deputy Ó Cuív, interaction with these sites is very important and can be enormously beneficial, as can be seen clearly with the site at Lough Boora which has attracted a large number of visitors. We have a range of local community projects right across from Kildare to Galway and from Roscommon down to Tipperary. It is a

great opportunity for communities to take ownership of a piece of cutaway bog, to have a walkway and to use the area productively, through interaction with local schools and so forth. The great thing about those sites is that rare species are coming in and using them and then people can get up close and personal with these species, which is very different from learning about them in a classroom. There is great potential from that perspective.

In terms of the national network of special areas of conservation and natural heritage areas, it is meant to be a robust network. It is not meant to be a network of isolated units that are expected to survive on their own. We are very aware of green infrastructure, connecting up the sites and trying to sustain the populations of these habitats and species into the future. We are working with the National Parks and Wildlife Service on that aspect.



In terms of putting a value on it, I take Deputy Barry's point. As a company we have tried to look at the value in terms of carbon and biodiversity. There are several international studies examining the economics of ecosystems and biodiversity, most notably the TEEB study led by Pavan Sukhdev. We are trying to lead on that front in Ireland and recently organised a meeting on the topic of natural capital and how we can start to put a value on very intangible benefits such as well-being, using the wetlands for filtration to obtain clean water and so forth. We do not have the accounting structure in place at this time to account for that.

We are working on that with other people. Carbon is a complex element, in particular in peatlands. We know that peat is a high carbon value product. When a peatlands is drained, there is carbon in the peat on site. We have a range of studies. In our study in County Mayo we are looking at what happens when we re-wet the cutaway bog. The cutaway is unique because it is an acidic peat medium which lends itself to the regeneration of bog mosses and therefore one can restore functional aspects of peatlands. The study has shown that we have returned the site in Mayo to a carbon sink. That is a great result if we can roll it out across the 6,500 ha of our bogs. We have shown that we can do it in core areas and we need to replicate that across the entirety of the site. Some figures put together tentatively would suggest there is some economic value. We work with the EPA on that. Mr. Phillip O'Brien, who I understand has come before this committee, is the person we engage with on that front and look at it as a potential offset from a national perspective.

In the midlands sites we are looking at re-wetted cutaway, which is re-wetted fen peat. In these cutaways the vegetation is typically sedge or reed. We do not know the answer to that yet. We will have data for two years in 2015. Intuitively one would think that the peat is still in the ground, so that means it is held *in situ* carbon. We have the reeds on top and that is accumulating biomass. The question is whether that is creating another carbon sink. We will know that in 2015, although with all these things, it is always a case that we need more studies to verify the data.


The other site we set up with the EPA in 2013 was a restored peatlands site. In the big picture, there will be a massive restoration programme in terms of the SSEs and NHAs, Again we will have two years data in 2015. I cannot answer the question, but we are building up the knowledge to feed into the answer.

Deputy Barry had a specific question on what we mean by the term "environmentally stabilised". When one has an active peat production unit, one essentially has bare peat fields. The words "environmentally stabilised" is the term used in our IPC licensing. Condition (10) of our IPC licence states that we need to have a rehabilitation plan for each of our bog units to ensure that the site is environmentally stabilised. That is to assure the licensing authority - in this case it is the EPA - that Bord na Móna does not walk away and leave what can only be described as "an open cast mine". Stabilisation is to ensure the soil is stabilised and there is no potential run off in the future.


Deputy Tom Barry:   I vaguely understand that point. When I asked the question I was

wondering if we could ever produce food in the cutaway. Obviously this land has produced an economic return from the employment generated by turf cutting. Other than using the cutaway for using up carbon, can we put sheep or other animals on it? Other than stabilising the site, is there any possibility of commercial agricultural activity on any of the 80,000 ha?


Mr. Gerry Ryan: That is a good question, indeed it has exercised the minds of people in Bord na Móna ever since the 1940s. In the 1970s, we recruited people specifically with agricultural qualifications and degrees to determine whether it would be possible to create an agricultural enterprise from cutaway peatlands. We have a number of projects, not only the project close to Lough Boora which was formerly cutaway peatlands and is now agricultural grassland. The simple fact is that the economics of creating an agricultural grassland from cutaway peatlands does not justify the investment that is required to transform the landscape into an agricultural landscape. We would be delighted if the opposite was the case but unfortunately this is not our experience. That experience has been hard fought by investment and by trials of different types of agriculture, not just animal husbandry but also crop production, such as cereal crops. We have tried different things at different times since the 1970s and unfortunately none has proved to be economically viable. There is no agricultural use in that sense.

Chairman:  Moving on from biomass, we told about converting grass to gas. Bioethanol is probably the most efficient way of doing it because one can have a crop that can be produced three, four or five times a year depending on the variety, but one needs a critical mass of 200 ha to 300 ha for production. It is not something that one can bring the product very far to by use of anaerobic digesters. I presume that will be dependent on the value refits that would be applied. which will determine the economic value.

Mr. Gerry Ryan: Clearly the support are -----.


Chairman:  The reason we asked specifically about the carbon value of sequestration is that if we are to produce off the other land that we can produce food from and we know we can do it, we are looking for a counter credit argument. Between Bord na Móna and Coillte, there is more than 500,000 ha of land, there is in the order of 2 million ha in pasture production and whatever is in arable production. Deputy Barry would probably have a better idea than I have about that. It could be a couple of hundred thousand hectares. There is a significant percentage of land that is in non-agricultural use and there is potential carbon storage sequestration that should be a mitigating factor for Food Harvest 2020.

The next presentation will be on the sustainable way of achieving that but the main purpose of our meeting is to produce an argument for Ireland's case. Bord na Móna is a key player as we see it.

Deputy Thomas Pringle:  Have reports been published on the potential or lack of potential for biomass?


Mr. Gerry Ryan: We have material, but I am not sure we published it, on the viability of producing biomass on our own.

We had a project in association with academic experts from Waterford in relation to this and that report is available for perusal. We can make it available to the committee.

Deputy Thomas Pringle:  Is the economic viability only in terms of a refit tariff? Is it just not economically viable?


Mr. Gerry Ryan: The cost of the input to produce a reasonably dense crop of biomass is very significant. Obviously the refit is how one gets paid for using biomass in the power station. Clearly one is related to the other. If there was a higher refit regime, that would affect the

economics of it. Based on the current regime, it is not economically feasible.

Chairman:  It might be useful to get that research and we could get it on the Library and Research page. It might form part of a justification, if things stack up. If we were to up production of biofuels of some description, using either grass, willow or miscanthus and that would benefit Ireland's greenhouse gas targets, one would need an incentive to so do. One could make an economic argument for the incentive being put in place because of other factors.

It might be useful if we were to have a look at that data. I anticipate that we would recommend in our submission that it would be looked at.

I thank the delegates and members. Two Senators had to speak in the Chamber, and had apologised earlier that they would not be able to stay for the whole meeting.

Chairman:  I welcome Dr. Helen Sheridan and Dr. Paul Murphy of the UCD School of Agriculture and Food Science. I thank them for coming before us today to brief the committee on the issue of land use, which we are considering. I know they were in the Gallery when I read the privilege notice earlier in the meeting, but I am obliged to do so again. Witnesses are protected by absolute privilege in respect of their evidence to the joint committee. However, if they are directed by the committee to cease giving evidence on a particular matter and they continue to so do, they are entitled thereafter only to qualified privilege in respect of their evidence. They are directed that only evidence connected with the subject matter of these proceedings is to be given and are asked to respect the parliamentary practice to the effect that, where possible, they should not criticise or make charges against a person or an entity by name or in such a way as to make him, her or it identifiable. Members have already been reminded of what is expected of them. I understand that both Dr. Sheridan and Dr. Murphy will make opening statements. I invite Dr. Sheridan to address the committee.

Dr. Helen Sheridan: I thank the Chairman and the members for this opportunity to make a presentation to the committee. Agriculture has probably never before faced so many potentially conflicting challenges at global and national scale. We need to increase food production while reducing our reliance on fossil fuels and maintaining and in some cases improving the status of our natural resources. I have tried to depict some of these challenges in the first slide.

From a national perspective, Food Harvest 2020 sets out a vision for smart and green growth in agricultural output in the case of the dairy sector, and value-added growth in the case of the beef and sheep sectors. In terms of the green dimension, the document states:

Ireland can become synonymous with the production of environmentally sustainable and welfare friendly products. This should result in consumers in key markets recognising implicitly that, by buying Irish, they are choosing to value and respect the natural environment.

Essentially, we need to achieve this to prove our green credentials. When we discuss meeting our production targets, we naturally look to areas in which we have a competitive advantage to help achieve this. I suggest that the exact same approach is required if we are to prove our green credentials. We need to identify areas in which we have a natural competitive advantage and focus our marketing campaigns on them, to some degree at least.

Obviously, we cannot measure all components of biodiversity. We have taken the approach of using semi-natural habitat cover as an indicator of wider biodiversity. We know we have major issues and challenges surrounding much of the approximately 13% of terrestrial land that has been designated as a Natura 2000 site. This has been reported to the EU Commission. We will have to work very hard to comply with the requirements of the habitats directive in this respect. I do not want to dwell on this today, however, as many of the species and habitats of concern will require detailed site and species conservation plans which will need to be developed and implemented on a case-by-case basis. I will focus on habitats that are not afforded protection under the habitats directive. These occur on farms throughout the country. While they might not be rare from a national or international perspective, their continued existence is fundamental to

the provision of ecosystem services that underpin agricultural production systems.

Our research group has undertaken habitat surveys on approximately 170 grassland farms throughout the country to date. During this work over 6,000 ha of land were mapped in terms of their habitat composition. The results of this work revealed that, on average, approximately 14% of grassland farm area is under semi-natural habitat. As members can see from the next slide, this level of semi-natural habitat cover varies by region and farming system. However, the overall data show we have retained a good base of semi-natural habitat in our farmed landscape. This gives us a competitive advantage over some other European countries, such as the Netherlands, France and Poland. The Netherlands is estimated to have estimated to have 2.1% of farm area under semi-natural habitat cover. The figure in France varies between 2% and 12% depending on the region. The figure in Poland varies between 1% and 4%. As these countries have a greater proportion of arable land, a direct comparison is impossible.

The challenge for us is to create a link between biodiversity and Irish produce in the minds of consumers. Research we are undertaking along with our colleagues in Teagasc is focusing on the development of a user-friendly, non-specialist method of recording this diversity, such that a biodiversity index could be generated for farms. This type of approach has a role to play in terms of providing justification to EU taxpayers for the continuation of CAP payments. As the next slide illustrates, CAP expenditure as a proportion of the overall EU budget has decreased by approximately 30% over the last 25 years. It is likely that there will be pressure to continue this downward trend in the coming years. This is particularly relevant in an Irish context. Results from the national farm survey suggest direct payments comprise an average of 81% of total farm income, with beef and sheep farms operating at a loss in the absence of these payments. While the implications of greening have largely been limited to arable farms within this round of the CAP, it is quite conceivable that the requirement to retain ecological focus areas might be extended to grassland farms in the future. I must also caution against complacency, however. While the habitats are present at the moment, the ecological condition of some of them is dubious. For example, approximately 50% of the field margins and field boundaries surveyed were in poor ecological condition. Therefore, retention alone will not secure the long-term future of these habitats - the development of appropriate management regimes is also necessary.

The land sparing approach may seem like an attractive proposition as we seek to achieve the targets outlined in Food Harvest 2020. This approach involves certain areas of the country being maximally intensified while other areas, which might be less amenable to intensification due to soil type, etc., are used to make up for the loss in habitats and associated biodiversity. Ecosystem services take place at different scales. We know that organic matter breakdown, nutrient cycling, etc., are necessary at the field scale. Therefore, it follows that the biodiversity necessary to facilitate these processes must also be present at field scale. While a degree of intensification and expansion will inevitably take place, it will be necessary to manage this process so that both production and biodiversity objectives can be met. This is known as the land sharing approach. In some cases - the dairy sector, for example - a degree of land use intensification and associated habitat removal relative to other sectors has already taken place. The restoration of biodiversity may be important in these instances.

The next slide indicates that we have a good degree of knowledge about some techniques to restore at least some degree of biodiversity within these types of situations. I refer, for example, to the use of sown field margins. These techniques can be very effective because they take up a limited proportion of the farm area, and therefore have a minimal impact on productivity, while delivering on biodiversity. It is important to point out that this knowledge has been gained over a series of postgraduate studies undertaken as part of a long-term experiment that was initially established in 2002. I refer to this to make the point that research in agro-ecology is a slow

process.

[Dr. Helen Sheridan:] While results of experimental work are generated in a three or four year PhD, it is longer-term research which provides much more reliable information in terms of persistence of treatment effects. This is particularly important when we consider the development of measures for inclusion within agri-environment schemes.

I will now address the issue of resource use efficiency. Much of the grassland research which has been undertaken in the past 50 years or thereabouts has largely focused on varieties of a couple of species, with perennial ryegrass receiving by far the most attention. While perennial ryegrass varieties show many desirable agronomic traits, this is a highly nitrophilous species. Singular reliance on high input grass monocultures is becoming less economically viable and socially acceptable. The ability to produce high yields of good quality forage, at minimal cost to farmers and with minimal impact on natural resources, is fundamental to the sustainability of future growth in Irish grass-based farming systems. As the next slide shows, recent research has found that the production potential of multi-species grasslands, which may require comparatively lower levels of nutrient inputs, appears to have been greatly underestimated.

Our research groups is investigating the yields, quality of forage, biodiversity support value and ensiling value of multi-species versus monoculture swards through a Department funded project known as SmartGrass. I must stress that the results presented in this slide are extremely preliminary, as they are based on dry matter yields from the first harvest taken from plots in April this year. However, members will note that the multi-species sward yields are showing potential at this stage. We will continue to monitor the plots over the next three years to get a handle on how persistent this effect is. Dr. Murphy will continue the presentation.

Dr. Paul Murphy: I thank the Chairman and members for this opportunity to present to the joint committee. Picking up where Dr. Sheridan left off, I will focus more on water quality and, to a lesser extent, greenhouse gases, with more of a focus on more intensive systems in the agricultural sector, in particular, the dairy sector. As one of the key targets of the Food Harvest 2020 report is a 50% increase in output from this sector and with the milk quota system ending in 2015, the dairy sector deserves particular attention.

As the previous contributions from Teagasc and the Environmental Protection Agency have covered many of the salient points, I will not recap these. Instead, I will highlight some of the research in which I and my colleagues have been involved that may contribute to the work of the joint committee.

I will first introduce a widely used indicator of the environmental performance of a farming system, namely, the nutrient surplus. If we take the example of nitrogen, this surplus is equal to the import of nitrogen on to the farm in fertilisers and feed, for example, minus the nitrogen export off the farm in, for example, milk, animals and crops. The remaining nitrogen is the surplus and this will be either stored in the system or lost from the system to the environment. In the case of nitrogen, most of the surplus can be expected to be lost to the environment. This loss can have impacts on water quality through eutrophication and on greenhouse gas emissions when it is emitted as nitrous oxide, a potent greenhouse gas. Therefore, a lower nitrogen surplus for a farm indicates a lower pressure on the environment and a more sustainable system of production. There is a double dividend here in that lower surpluses also indicate more efficient use of nitrogen and a potentially more profitable system as nitrogen inputs in feed and fertiliser are one of the main variable input costs on any farm.

As part of the INTERREG funded Dairyman project, we examined nitrogen surpluses on 21 intensive Irish dairy farms and compared them to other published work internationally. The first slide shows this comparison across a number of countries. The reference to this work is provided at the bottom of the slide. It is clear that Irish dairy farms - shown on the left of the slide - have relatively low nitrogen surpluses by international standards. The first bar shown is

from some further work I was involved in using data from 195 Irish dairy farms in the national farm survey. It shows the average surplus for Irish dairy farms at 143 kg of nitrogen per hectare, N/ha. The results of studies in other countries are also shown. The figure for Ireland is largely due to the relatively low input systems of dairy production that operate here, which are based mostly on grazed grass. This low nitrogen surplus is also associated with the relatively low carbon footprint of Irish milk production that was pointed out in a previous submission to the committee by Teagasc. Lower inputs and more efficient use of nitrogen fertilisers lead to lower surpluses and losses to the environment as the greenhouse gas nitrous oxide or to ground and surface water systems.

As I stated, we also studied nitrogen surpluses on a nationally representative sample of 195 Irish dairy farms. The reference to this work is provided at the bottom of the second slide. In this figure, we plot milk production per hectare on the horizontal axis against nitrogen surplus on the vertical axis. Members should bear in mind the average surplus of 143 kg N/ha we saw in the previous slide. We can see that this average value hides a range extending from less than 50 kg N/ha to more than 400 kg N/ha. I will highlight a few key points from this figure. First, if we look at a production level of 10,000 litres of milk per hectare, l/ha, as represented on the blue line on the slide, there is a range from farms operating a surplus of less than 50 kg N/ha to farms operating a surplus of almost 300 kg N/ha. This gives an idea of the range of variability in our production systems.

Second, this also indicates the potential room for improvement within our systems. What is the farmer with a nitrogen surplus of 50 kg N/ha doing that the farmer with a surplus of 300 kg N/ha is not doing? Many factors determine the surplus, some of which are beyond the direct control of the farmer. However, the management of the system is clearly a critical factor. In that case, what better management practices could be implemented to bring farmer A's nitrogen surplus closer to farmer B's surplus? Our research needs to identify these better management practices, our education and advisory services need to disseminate them and our policy framework needs to encourage them and give credit for them in areas such as greenhouse gas inventories, water quality programmes and even product labelling and marketing.

Third, in the context of the ending of quotas in 2015 and the Food Harvest 2020 targets for increased dairy production, if we consider a farmer who is currently producing at 5,000 litres of milk per hectare and plans to increase production to 10,000 litres of milk per hectare, we could consider, within the range of observable outcomes for Irish dairy farms, three different scenarios for achieving this increased output. The first of these, as shown on the second slide, would result in an increased nitrogen surplus. The second would result in no change in nitrogen surplus, while the third would result in a decrease in nitrogen surplus. Obviously, the third scenario is the optimal one in terms of the sustainability of the system and likely impacts on greenhouse gas emissions and water quality. Again, many factors influence the efficiency of nitrogen use and the resulting nitrogen surplus on a farm, some of which are beyond the control of the farmer. However, a large part of this is down to management.

I suggest that metrics such as nitrogen surplus could act as an indicator of the performance of a farm and could be used as management targets for farmers to try to achieve and to compare themselves to the top performers in their sector. This could be done in the context of farmer discussion groups, for example, in a similar way to the agronomic indicators such as herd economic breeding indexes, EBI, are done at the moment.

This approach was indicated in the previous Teagasc submission to this committee. Metrics such as this also have potential to be incorporated into more integrated measures of sustainability that could form the basis of some certification and product labelling that could allow Ireland to capitalise on the relatively low environmental footprint of its dairy production system.

The third slide deals with the fate of nitrogen and phosphorous on farms. Whether these result in

greenhouse gas emissions or losses to water is dependent not just on management but on biophysical conditions. To illustrate this, I will show some results from the agricultural catchments programme. The reference to this work is provided at the bottom of the slide. This was a research programme in which I was involved and which was based primarily at Teagasc and funded by the Department of Agriculture and Food. In this case, we compared two catchments dominated by arable farming. The catchments are instrumented to monitor nutrient loss in the stream draining the catchment. Under the nitrate regulations, soil phosphorous concentrations are divided into four indices.


As can be seen on the slide, index 4 is considered excessive and a potential risk for phosphorous loss to water. The two catchments have similar proportions of soils in index 4, indicating a similar level of pressure for phosphorous loss to water, from soils at least. We might expect in that case that they might have a similar outcome in terms of phosphorous loss to water. However, the result is that over the period monitored, the losses from one catchment were much higher than the other, roughly three times higher. What we found was that the principal apparent reason for this difference was that one catchment had predominantly well-drained soils while the other had predominantly poorly drained soils. The pie chart displays this result and indicates the area distribution of the different soil types and their drainage characteristics.



The catchment with the more poorly drained soils is more prone to generating overland flow run-off and this makes it more vulnerable to phosphorous loss, particularly during heavy rain events. This illustrates, and this is the reason I am showing this, the fact that biophysical conditions need to be accounted for and that one size does not fit all in terms of identifying better management practices to reduce emissions to air or water. The suite of better management practices that might be most effective may vary depending on factors such as soil type, climate and topography.



On the pressing question of whether the Food Harvest 2020 targets as well as Ireland's commitments on greenhouse gas emissions and water quality can be met, I would suggest that, in principle, they can. However, I would emphasise that this is only in principle. These targets pose a significant challenge to agriculture and other sectors of the economy and I would not under-emphasise these challenges. I would argue that management will be key to determining whether these targets can be achieved. In this, I refer to both the optimisation of land use at the catchment or landscape scale and also soil and nutrient management, which occurs more at farm level. The correct better management practices need to be identified and implemented. Ultimately, management on the farm determines the fate of nutrients, whether they are taken up in crops and animals or lost to the environment with a resultant impact.

Effective policy, therefore, needs to encourage better management practices that are effective at this scale. Already, the national action programme and the nitrates regulations target nutrient losses to water from farms, but there may be further scope for development of more integrated catchment or landscape management approaches addressing the full range of ecosystem services, land uses and stakeholders. I would argue that advisory, education and knowledge transfer will also be critical. Initiatives such as the Teagasc Better Farms, discussion groups and the SmartFarm programme point at innovative ways to encourage adoption of better management practices.



It is important that Ireland and the agricultural sector are able to get credit for improvements that are made - in greenhouse gas inventories and product labelling, for example. Emissions estimates, whether for greenhouse gases or emissions to water based on simple measures of intensity, can be misleading. Further work is required in this area. In terms of identifying suitable best management practices for different production systems and biophysical conditions, one size does not fit all. Future policies may need to be more flexible in this regard.

Chairman:  I thank Dr. Sheridan and Dr. Murphy for their presentation.



Deputy Éamon Ó Cuív:   I, too, thank them for their presentation.



Deputy Tom Barry:   That was a very interesting presentation. We should give more recognition to what is going on in the universities. I have been arguing for some time that as part of our new REPS, GLAS and GLAS+, we should have a greenhouse gas emissions inventory. We should be measuring the greenhouse gas footprint of farms now. I would like to have a copy of the slides describing best management practices, if possible. They show how farmers can get increased yields without necessarily increasing greenhouse gas emissions. We need to start somewhere. If each farm has a management programme, this will help farmers get in the right frame of mind on this. Fertilisers have become incredibly expensive. We must try to persuade the Minister to look at this and to give farmers the extra moneys GLAS+ will bring for doing something which will have major benefits down the road for the reasons the witnesses have given.

In regard to phosphorous, I was always of the opinion that it was reasonably immobile in soil. Is Dr. Murphy suggesting that when a farmer spreads phosphorous, it is washed on and pellets go into the stream? The problem we have with phosphorous when spreading it is that it binds up and we find it difficult to get it into the plants. Now we are using a chemical called phosphite to try to promote root growth in the autumn. Has Dr. Murphy any recommendations in that regard? Often when we put in our P and K in the autumn if it is dry, we are afraid it might get bound up in soil. When Dr. Murphy spoke about poorly drained soils was he talking about clay soils? Most tillage is on reasonably good ground. Will he elaborate a little on this?

Chairman:   Before the witnesses give free economic advice to Deputy Barry-----

Deputy Tom Barry:   I am just curious.

Chairman:   Sorry, it is relevant. I was just being flippant. In regard to the chart showing this April's yields, is there a question in regard to sustainability? Rye grasses are known to be fairly resilient generally, but one of the rye grasses is described as having a yield of 90,000 per hectare. This is quite low. I presume the reference is to chemical fertiliser rather than organic. In general, the yields are significantly better. I presume there are some timing issues with regard to when the grass becomes available in the grazing season and the length of it. If the figures given transpire to be true, this will obviously have a huge impact on us meeting our targets in regard to the nitrates directive. Also, do the other mixtures incorporate other species, such as red clover? What are the simple and complex mixtures normally - the six species and the nine species? Dr. Murphy may now give Deputy Barry the advice he wants.

Deputy Tom Barry:   It is only a minor matter but I believe we should have a measurement.



Chairman:   We need to know.



Dr. Paul Murphy: The issue with phosphorus is somewhat counter-intuitive in that way. Phosphorus is strongly bound in soils and for decades it was considered that phosphorus was not lost to water. The issue with phosphorus and water quality arises because although the quantities of phosphorus lost in the run-off of a field are rather small relative to the total amount of phosphorus the farmer is applying, the receiving water systems are very sensitive to even small concentrations. This is why when the farmer applies phosphorus it can and will get bound in the soil.

Let us consider the loss rates in the graph before the committee. The rates in kilogrammes per hectare are all well below 1 kg per hectare whereas a farmer could be

applying 14 kg or 15 kg of phosphorus per hectare per year. Agronomically, it is not a loss to the farmer and he will not notice it but the impact is material. Surface water systems in particular are rather sensitive to phosphorus loss. That is the reason for it.



The classification of soils into poorly-drained and well-drained soils is sometimes related to clay content. The heavy clay-rich soils in some parts of the country mean that these soils are predominately poorly drained. However, it can be due more to the landscape position and whether the water table is close to the surface as well. It is not the case that only heavy clay soils are poorly drained. It can also be the landscape position. Does that answer the question?

Deputy Tom Barry:   Yes, it does. I would like the chairperson to note that I believe a measurement of greenhouse gas emissions per farm is not a bad idea as part of our environment scheme.

Chairman:   You will note in Dr. Murphy's presentation that he refers to giving credit to the greenhouse gas inventories for certification for product labelling and marketing. That is referred to at least three times. This goes back to what Dr. Sheridan said earlier about biodiversity. Apart from anything else we have a higher percentage if we simply ensure it happens.

Dr. Sheridan made an interesting point about some of the existing hedgerows being in poor repair. After four rural environment protection schemes and two agri-environment options schemes and all the resulting hedgerows that were built I am surprised at that. Perhaps Dr. Sheridan can offer an observation.



Dr. Helen Sheridan: The committee was inquiring about the other species in the mixes. We chose three functional groups of species with similar traits: three grass species, namely, perennial ryegrass, cocksfoot and Timothy; three leguminous species, namely, white clover, red clover and birdsfoot trefoil; and three herb species in the maximally diverse or nine species group, namely, ribwort plantain, chicory and yarrow. We do not know a great deal about grass availability during the year but we chose each of these species and we had three varieties of each species included in the mix, where possible. We have tried to get as broad a spectrum as possible with these varieties in terms of early, mid and late season yielding varieties. Time will tell. One of the main issues for us is the need to examine the digestibility and nutritional value of this forage for animals and that is something we will be examining. It is not enough to produce more, it must be of a suitable quality.



Deputy Tom Barry:   Reference was made to hedgerows. In the ecologically focused areas we have many hedgerows but they are more the butt of a ditch than anything else. At the moment we are not allowed to do much to poorly formed hedgerows containing only a few alders. These are not even hedgerows and they do not block cattle and so on. Is Dr. Sheridan suggesting we should go back and try to renew them by planting whitethorns and blackthorns and make them functioning ditches? Would that increase their biodiversity or make them more valuable?



Dr. Helen Sheridan: Yes, but first I will deal with the other question in respect of the REPS and AEOS programmes. They have been in place and they have done a good deal. However, participation in the schemes was not mandatory; farmers did not have to go into them. The work we undertook was across the board and not necessarily on farms



involved in agri-environment schemes.

Reference was made to the quality of the hedgerows. If we are going to extend their lifespan then we have to intervene because hedgerows have a limited lifespan if we do not intervene. This may involve coppicing, implanting etc. The decision will be on whether we do that or whether we base a marketing campaign around having all of these habitats in place. If we do that, then we must ensure the habitats included in any marketing campaign are of good ecological quality and not simply dying-out gappy hedgerows.

Deputy Tom Barry:   While we were involved in REPS we did a good deal of internal hedging for existing hedges but we could not take down the boundary ditch. The boundary ditch could have been in a terrible mess and good farming practice would suggest striping it down and plant a proper hedge in its place which could be managed subsequently. Many boundary hedges are simply scrub, weeds and bushes but not proper hedges. However, if a farmer touched his boundary fence he would have been prosecuted under the REPS. I always took the view that we should have examined this. Generally, farmers can see the practicality of having a proper hedge which increases biodiversity and so on. Anyway, we need to examine it more closely.

Chairman:   The GLAS scheme offers an opportunity. Hedgerows were not initially in the scheme but I understand they are now.

Deputy Tom Barry:   Yes, but you know what I mean. In some cases a farmer has to wipe a ditch to start it again.

Chairman:   I accept that. It was because they were too wide and not really functioning. Let us reflect on the two presentations. There is some ongoing work in the trialling but by 2015 or 2016 we will have a better idea. The same applies in the Bord na Móna case with regard to the ecological reinstatement and its value from the point of view of carbon sequestration. The company is unsure whether it can reinstate it. We are in the same position with the long-term efficiency of grass and amending or changing the traditional method of grass production.

I thank both deputations for coming in. It is clear that there is a good deal of work under way and many areas of expertise from organisations. We are trying to bring a central focus to it in order that we can present something to the Commission. The idea is to present Ireland's case and have it bound up, pulling together all the research and trialling that is under way and to put all the arguments together. The research service in the House has been helping us. This has been very useful. There are three farmers left in the meeting and therefore it has probably been more technical in nature than many of our presentations. The two Senators who are farmers were unable to remain but that is not to say we are not interested. This is most useful. The final slide, which is still before the committee, is the case for the defence. In a way it summarises how this is manageable and how we can make the case. It is important that we try to hone in on the principles in that summary slide as the backbone and what we are trying to build around it. For that, I thank you.

The joint committee adjourned at 4.20 p.m. *sine die*.