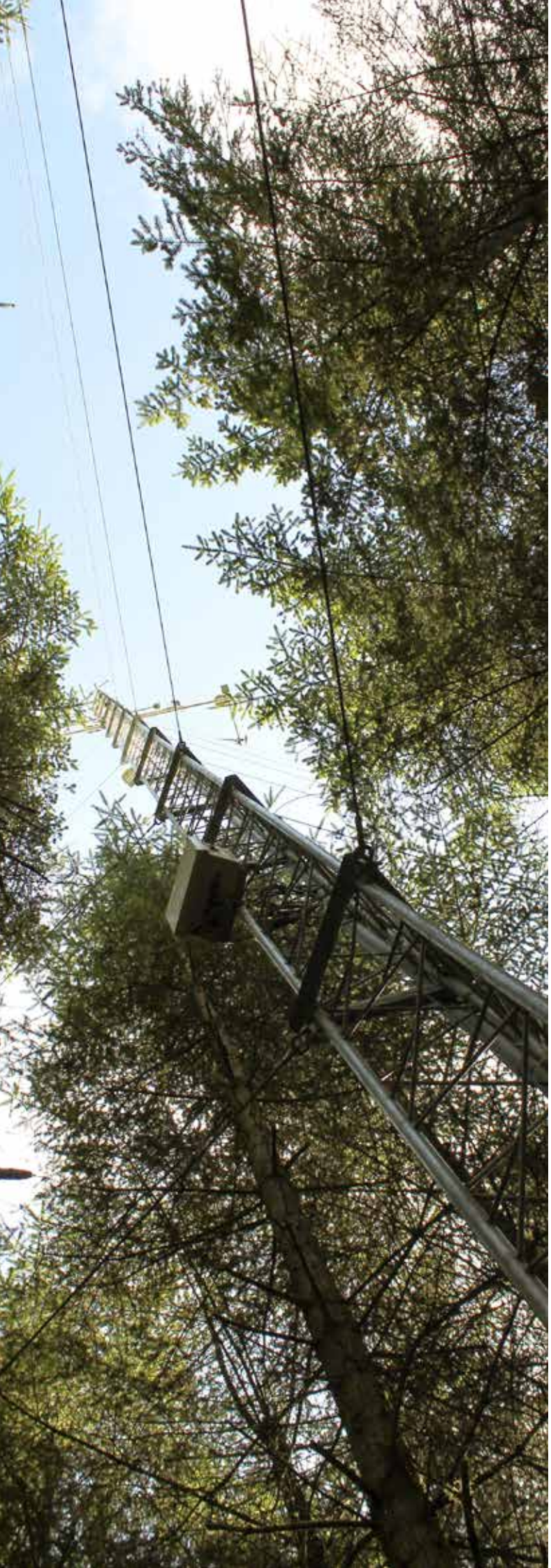

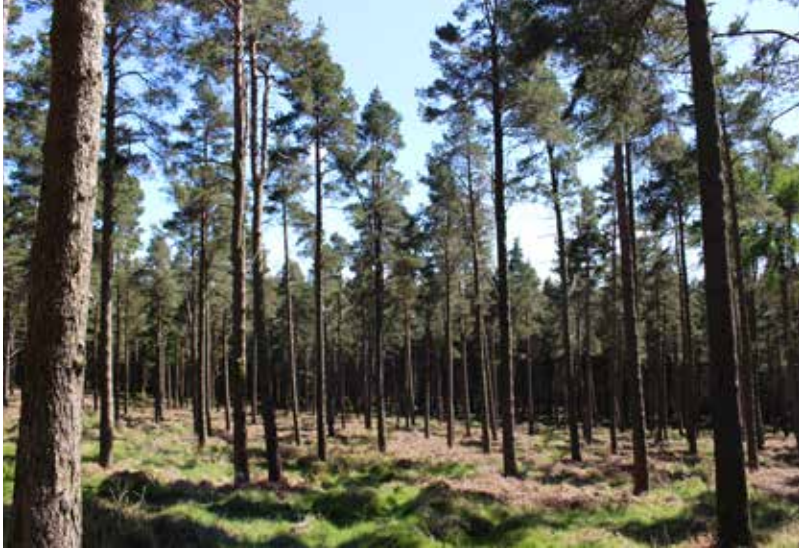

Longer Term Forest Research

Proposed structures for meeting the needs and opportunities of Ireland's forest sector through longer term research and innovation

Authored by
The COFORD Long Term Forest Research Working Group

COFORD
NATIONAL COUNCIL FOR FOREST RESEARCH & DEVELOPMENT

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Photos courtesy of Dr. Brian Tobin, UCD, and Brian Clifford, DAFM.

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Statement by the Chairmen

This Report follows on from the FORI Report (launched in October 2014) which set out a Strategic Research Agenda for forest research in Ireland and identified issues for long-term forest research.

Ireland needs to ensure sustainable management of natural resources, climate action and balanced regional development. Delivering such objectives requires the creation, sharing and implementation of new knowledge, new technologies, new products and new ways to organise, learn and cooperate.

To face current and future challenges national and regional policy makers, forest owners, farmers, foresters and forest-based industries need support from a research and innovation culture that is conscious of realistic and practical solutions.

There are big challenges and questions such as:

- How to improve production efficiency and competitiveness in an increasingly challenging economic environment, while securing the sustainable use of resources and eco-system services;
- How to foster and ensure sustainability and resilience;
- How to maintain and develop sustainable, innovative and competitive forest industries;
- How to cope with climate change and contribute to mitigation;
- How to support appropriate market development for bio-based products and processes;
- How to ensure that forestry can contribute to food security;
- How to empower and encourage rural communities to boost and diversify their economies;
- How best to provide ecosystem services and public goods while producing valuable commercial timber.

Most policy makers recognise that science can help address many of the challenges in the 21st century. Research and innovation are key to building a prosperous healthy future and to ensuring the protection and enhancement of the environment. Research and innovation can provide a boost to jobs, growth and investment and quality of life.

Ireland is at a tipping point with the risk of losing a forest research culture - and the risk of serious underutilisation of the existing and potential forest resource with economic, social and environmental consequences. That presents an opportunity – to build a virtual 'green field' and fit for purpose research capacity without significant capital outlay.

The COFORD Council presents in this report recommendations and the case for establishing a Forest Research and Open Science and Innovation Hub with a network of Centres of Excellence. The Council considers the proposed approach to be innovative and cost-effective by leveraging existing structures and collaborative opportunities. It is capable of being fully operational within three to four years.

We recommend and look forward to an urgent and renewed commitment to longer-term forest research and its contribution to achieving the full potential of the forest bioeconomy.

Michael Lynn,
Chairman, COFORD

John Phelan,
Chairman, COFORD Long Term Forest Research Working Group

August 2018

Acknowledgements

The Chairmen thank their COFORD Council colleagues and especially the members of the Long Term Forest Research Working Group (Appendix A) for their expertise and inputs.

We especially thank the speakers who gave generously of their time and presented so well to the Workshop held in September 2017 (see Appendix B) and to all who attended and contributed on the day.

We thank retired researchers who contributed their knowledge to the process as well as to representatives of the current forest profession.

We also thank Dr. John Colreavy, Director, Meat Technology Ireland and Declan Troy, Teagasc representative on the Steering Group of Meat Technology Ireland, who kindly met with the Working Group to share their experiences. This was facilitated by Enterprise Ireland who gave enthusiastic support to the process; we also wish to acknowledge the helpful contributions from Dr. Paddy Byrne, Technology Gateway Programme Manager with EI, who sat in on some meetings.

Finally, we thank staff in the Department of Agriculture, Food and the Marine, including Dr Eugene Hendrick (retired), Tom McDonald, Tony Quinn, Fergus Moore and Niamh Hennessy who facilitated and supported the processes of bringing this report to fruition and without whose inputs it would not have been possible.

Introduction

Summary

The Forest Research Ireland FORI Report prepared by COFORD and launched in 2014 identified several issues for forestry research. The report noted that because of the long-term and multi-functional nature of forestry, it takes time and complex analysis for research to identify and help the understanding of the full social, environmental and economic functions of forests. The report concluded that aspects of forest research, which support and inform policy and practice, should also have a significant long-term dimension. As a consequence of this, longer term funding mechanisms and commitment can be required. The report also identified capacity and linkage issues; it recommended that an examination of current commitment to forestry research projects and programmes be undertaken to identify and prioritise themes and areas for continuation over a longer-term programme, and that appropriate mechanisms to facilitate funding for forest research projects and programmes be proposed.

The current COFORD Council undertook a process, chaired by John Phelan, to provide recommendations to address in more detail the issues related to Long Term Forest Research (LTFR) and related resources that were raised in the FORI report (Section 2.5). A number of meetings and discussions were held with stakeholders in forestry and related research facilities as well as discussions with DAFM staff and at COFORD Council meetings. As the process of reviewing longer-term research developed a spin-off sub-group of the COFORD Council was formed to address the structure and detail of recommendations (See Appendix A). A workshop was held in September 2017 (see Appendix B) with presentations and participation from forestry and other sectoral players.

Findings

The Group concluded that the sector does not have the forest research structure or capacity fit to meet the challenges and opportunities outlined above. The tradition of longer-term forest research has been largely lost. Capacity in Research Performing Organisations (RPOs) are under pressure. We are at a tipping point – and failure to address this would have almost immeasurable consequences. This canvas presents an ***opportunity*** to take a strategic view and devise a forest research capacity fit for future challenges and opportunities, responsive to emerging challenges and opportunities and to the needs of Ireland's economy, society and environment in whatever context the future provides or presents. There is an urgency about this need for research structures, capacity and competency to ensure that the forest sector, and the state commitment, is maintained, protected and developed to greater potential. Ireland can't, and does not need to do it all – there must be scientific co-operation within and between RPOs, collaboration at home and with external agencies and a science diplomacy. Researchers need to engage with stakeholder communities in the research process and with the outcomes of research; RPOs and researchers need to be innovative and open, supportive of innovation and be part of the innovative process; research results must get to markets, including those of public policy makers and society stakeholders. The COFORD Council approved the recommendations herein in July 2018. These recommendations will help to ensure that the full potential of this significant sector is realised for the benefit of all citizens.

Recommendations

1. DAFM take urgent steps to re-invigorate forest research, re-build capacity and look beyond traditional horizons to ensure competencies and structures appropriate to new technologies, capable of competing for scarce capital, capable of driving an innovative culture that will ensure that forests and their products will be a robust and resilient backbone to the Irish economy of our future.
2. Establish a Forest Research and Open Innovation and Science Hub – referred to herein as ***the Hub*** - with a team of expert researchers that through research, collaboration, a culture of innovation and knowledge transfer will contribute to: increased economic value from the forest sector, particularly from the rural bioeconomy; enhanced environmental and social outputs from the forest sector for all.

3. To enable the best leverage from existing organisational, research, communications and funding expertise ***the Hub*** should be hosted in an existing state sponsored organisation (RPO) with proven research capacity. This should provide opportunities for synergies, cross cutting research, leveraging from existing and future research and have the capacity to leverage funding at national, EU and international level.
4. ***The Hub*** should have a board comprising, *inter alia*, scholarly expertise, sectoral leadership and relevant stakeholder presence and with overall control of research policy. Its research agenda should be driven primarily by, and responsive to, the needs of policy and markets, including timber and forest products.
5. Facilitate and develop Centres of Excellence within ***the Hub*** and in/between RPOs with the aim of building forest research capacity in key strategic research areas and providing excellent and collaborative science.
6. Ensure retention and maintenance of essential physical data plots with open access to researchers. This may require an evaluation of field stations, decisions on merit of retention, cataloguing and arrangements for continued open access for researchers and a programme of maintenance.
7. The permanent forest sample plots for the National Forest Inventory also provide a rich data source and the potential to derive useful research data in addition to or from the assessment extent and nature of Ireland's forests should be regularly reviewed with the scientific community.
8. Collaboration needs to be encouraged and facilitated with an emphasis on scientific co-operation within and between RPOs, collaboration at home and with external agencies and a science diplomacy.
9. Consider collaboration and possible co-location of a Forest Bioeconomy Centre at or near the National Bioeconomy Campus at Lisheen, Co. Tipperary. This could provide a centre for collaboration and a field station for field trials and practical demonstration.
10. Research results must get to markets, including those of public policy makers and society stakeholders. Researchers need to engage with stakeholder communities in the research process and with the outcomes of research; RPOs and researchers need to be innovative and open, supportive and part of the innovation process.
11. The 2017 workshop at Backweston (Appendix B) was part of the process of developing this position paper and was successful in opening and renewing dialogue between members of the research community and markets. Such a workshop should be repeated, perhaps every two to three years, to facilitate and encourage the essential, currently limited, dialogue between research stakeholders, including the research community. This would be in addition to dialogue around the competitive research programme.
12. There is mutually beneficial co-operation with the Northern Ireland Forest Service which shares many of the same challenges. The departure of the United Kingdom from the European Union may have the capacity to frustrate that unless formal structures are put in place to maintain and develop this important linkage; it is recommended that this is pursued by DAFM and DAERA, Northern Ireland and the relevant agencies.
13. Given the required level of state support, the major potential benefits and societal needs from forestry, the known market failures, primary long-term research needs to be under the auspices of the state. DAFM determines policy for much of the land use and stewardship in Ireland and is the appropriate parent for longer-term land use research. Other Departments, including DBEI and DCCAE, and Government Agencies - including EI, EPA, IBF, IRC, Teagasc, SFI - have significant roles. A collaborative approach needs to be at the heart of further forest sector development; the same needs to apply to research.
14. Funding for longer-term forest research must be ring fenced within the sponsoring and host organisations.
15. To progress these recommendations will require more detailed specifications and call for detailed, costed proposals from interested RPOs together with contractual arrangements. That the process should commence immediately given the capacity issues with forest research.
16. DAFM to provide funding in 2019 to enable establishment and recruitment to proceed rapidly and to enable commencement of field data retention management. Funding for the initial phase is unlikely to exceed €0.5 M.

Strategic intent of recommendations

- Ensure the realisation of the enormous potential of the resource and the sector.
- Support proposals for growing a vibrant forest bioeconomy (COFORD, 2017).
- Address the current critical state of forest research capacity.
- Have a "go-to" Hub for technical knowledge and support.
- Build a culture of collaboration and innovation within the sector and across sectoral interests.

Context and process

The FORI report (DAFM, 2014) was published in October 2014. The COFORD Council Forest Research Working Group (CCFRWG) chaired by John Phelan and working with Research and Codex Division DAFM produced the report. Issues were raised in Section 2.5 of FORI, in the context of the long-term and multi-functional nature of forestry – social, environmental and economic - about the significant long-term dimension and complex analysis of some aspects of forest research required to support and inform policy and practice.

The CCFRWG recognised in FORI "*that from a funding perspective, support for aspects of forest research requires a sustained and on-going national investment to address long-term needs and ensure continuity"*.

FORI recommended (2.5.1) that DAFM "*should examine its current commitment to forestry research projects and programmes to identify and prioritise themes and areas for continuation over a long-term programme and propose a mechanism to facilitate funding for forest research projects and programmes over both the long and short term with adequate controls…. and progress reporting...*".

The current COFORD Council (2015-2018) initiated a process to consider recommendations on how to address these issues. This process has also been chaired by John Phelan. Meetings and discussions were held by the Chairman with stakeholders in forestry and related research facilities as well as discussions with DAFM staff and at COFORD Council meetings. A COFORD Workshop on longer-term forest research needs was arranged by the Chair supported by Research and Codex Division DAFM and took place at Backweston on 25 September 2017 (see Appendix B).

Matters arising from meetings, discussions, workshop presentations and dialogue included:

1. Most funding resources for forest research are now channelled through competitive research calls organised through the Research and Codex Division of the Department of Agriculture, Food and the Marine.
2. There has been a loss of capacity for various reasons with little or no LTFR structure remaining in place.
3. There is a significant legacy of excellent research data and research resources that are already under threat.
4. The need for longer-term forest research to support the resilience, productivity and profitability of the forest estate and its ability to also provide a wide range of ecosystem services.
5. Evolving policy (national, European and international), markets for public goods and services, markets for timber-based products and evolving environmental science are creating significant demands for science based sectoral responses that go well beyond silvicultural practice.
6. Research and innovation solutions are evolving and that there needs to be consideration of whether the traditional model employed in Ireland through Forest Service when it owned state forests and for some years after is the model best suited to current and future policy and market needs.
7. The need to build permanent national forest research competence in the state sector, with the emphasis on strategic research, allied with a flexible approach to address future issues. Career development and succession planning need be included in the structure of new or additional facilities.
8. Funding for future research may be directed by Government and European agencies towards Open Innovation processes that embrace the Quadruple Helix Model where Government, industry, academia and civil participants work together to co-create the future and drive structural changes far beyond the scope of what any one organisation or person, or perhaps even sector, could do alone. This Open Innovation process would include key elements such as Networking; Collaboration - involving partners, competitors, universities, and users;

Corporate Entrepreneurship: enhancing corporate venturing, start-ups and spin-offs; Proactive Intellectual Property Management: creating new markets for technology; Research and Development (R&D): achieving competitive advantages in the market.

9. The multi-faceted and cross cutting aspects of forestry with various elements of society - economic, social and environmental bring challenges. There are major strategic issues for Ireland and Europe as well as specific mission and business led issues where robust science, data capture, retention and accessibility are crucial to optimal resource utilisation and where the competitive research model does not provide all solutions.
10. Funding must come from the state. The current national competitive forest research model should continue at least at the current level of annual funding.
11. The need for structured engagement and better communication of research needs and research findings, particularly between private goods and services and researchers and the need to mandate researchers to communicate and, with a view to innovation, advocate research outcomes to the sector.
12. The role of science-based advocacy and national expertise and professional competency readily available to the Minister would be a significant part of the Manager/Chief Researcher of any LTFR unit.
13. Capability to demonstrate the capacity to protect and enhance the forest resource and ensure best value through national policy as well as leadership in any risk situation would be part of the brief.
14. In addition to timber/fibre thematic areas would need to be established in areas such as climate change, technology and forest protection strategy.

Section 1: Forestry in Ireland

The forest resource

- The national forest estate is 11% of the total land area (DAFM, 2018) and expanding.
- Almost 50% of the forest estate is in private ownership with Coillte CGA owning most of the public ownership forests.
- The forest sector is a major indigenous industry with gross annual output of around €2.2 billion, €350 million exports p.a. and around 12,000 people employed.
- Timber output is projected to double over the next fifteen years.

The potential

The Irish Forestry Sector has the capacity to deliver:

- Output of €8 billion by 2050 supporting rural employment, driving value added exports and become a central pillar of Ireland's National Bioeconomy[1];
- Continued and increased climate change mitigation through carbon sequestration and maintenance of existing carbon pools capacity;
- Enriched biodiversity and water protection resource;
- Added leisure, health and amenity benefits.

To achieve its potential strategic planning and management will be crucial. Public policy decisions will be vital components of the long-term strategy as will best practice, scientific knowledge and early adaption.

The sectoral contribution

In addition to its proven and demonstrable economic benefits Irish forestry uniquely provides significant financial and ecosystem services to the broader bioeconomy – such as sequestering an average of 3.8 Mt of carbon dioxide equivalents (CO_2 eq.) per year (DAFM, 2017), providing 9 million Gj of energy from biomass, close to 20 million recreational visits a year, protecting biodiversity and with potential for flood mitigation and water protection.

The sector is aligned with European Union and national priorities such as the National Planning Framework and National Development Plan for jobs, growth, energy and climate change and has the potential to benefit from the single market post Brexit.

There are significant benefits for the economy, agriculture, the environment and rural areas from an expanding forest sector. The forest sector comprises a range of industries and businesses that form a complete supply chain from farmers and forest owners, forest management to sawmills and processors and the manufacturers of forest products. Long established, it was the bioeconomy before the philosophy of substituting sustainably produced biomass for fossil resources and recognising the benefits of decarbonisation emerged into mainstream policy.

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[1] An implementation framework for Ireland's Bioeconomy was set out in the National Policy Statement on the Bioeconomy (Rialtas na hÉireann February 2018), and there are ongoing developments around the EU Bioeconomy strategy.

Challenges

Notwithstanding the many significant benefits and opportunities, the sector faces significant challenges:

- Brexit – to a greater degree than most sectors, due to a large percentage of UK exports;
- Lack of expansion at strategic rates and to a sustainable level;
- Constraints to wood mobilisation;
- Lack of integrated national land use and timber strategy;
- Need for market and innovative product diversification;
- Inefficiencies – land use, species, crop yields, genetic resources, logistics, wood and fibre use;
- Climatic change adaptation;
- Increasing biotic risks;
- More frequent and severe abiotic challenges.

Technology

There have been dramatic advances in technology, data capture, data analytics, modelling techniques in recent years and there is further great potential for land and forest related uses. The challenges of the future will be around the application of existing and emerging technology, design of research models and data analysis as well as the deployment of results. The future needs a strategic approach, aligned with European and national goals, with the capacity to respond flexibly and innovatively to emerging opportunities as well as challenges.

Competitiveness

Timber is the primary return for most forest owners, including Coillte, and the source of the economic activity that creates, primarily rural, employment. Enterprise Ireland has identified that the whole supply chain, from forest growers to the industrial sectors, and out to the end market, needs to strategically position itself in a way that is complementary to all parts of the chain to achieve commercial wins from start to end. Enterprise Ireland also recognises that product innovation is necessary to achieve higher value-added output and market acceptance.

Section 2: The case for Longer Term Forest Research

Best public policy decision making needs a strong evidence base together with excellent communication and knowledge transfer systems, particularly so in a sector where policy changes or lack of change or response generally have significant long-term implications. Responsible innovation, recognising realistic supply projections and competitive forces, needs to be an integral part of research policy.

Context

Over the period 1990-2030, it is estimated that €3.5 billion will have been committed by the state in the expansion of the forest estate with upwards of another €0.5 billion for forest infrastructure and various support measures. It is vital that the state also has the appropriate mechanisms to optimise societal return on this commitment and that of farmers, growers, processors and service industries who have also invested considerable capital.

The All Ireland Roundwood Production Forecast anticipates that production on the island will increase from four million cubic metres in 2016 to close to eight million by 2035. There is considerable scope for further expansion of the forest sector and its outputs, although with various obstacles.

The strategic goal of '***Forests, products and people – Ireland's forest policy – a renewed vision*** (DAFM – 2014)' is to develop an internationally competitive and sustainable forest sector that provides a full range of economic, environmental and social benefits to society and which accords with the Forest Europe definition of sustainable forest management.

The renewed strategy, which represents a consensus view among a wide range of forest sector stakeholders, foresees expansion of the forest area (from 11% currently to 18% by 2046), in order to provide for increased and sustained levels of wood production, together with environmental benefits, including climate change mitigation, and the continued sustainable management of the national forest resource including cost effective mobilisation of the forest resource.

The sustainability of these increases and benefits is paramount. Policy and planning need to be responsive to the recommendations to support the strategic goal of the renewed vision. To ensure value for investment now and into the future, it is vital to have scientific knowledge and support for policy enablers.

Identified research needs

The recent COFORD study **Species Mixtures in Irish Forests** (Keane, et al. 2018) noted that research effort (in relation to mixtures) needs to be increased and adequately resourced in order to provide the necessary scientific data to inform policy and practice. It goes on to suggest, given the immediate need for information on best practice in relation to mixtures, that research effort should initially be focused on the practical aspects of the silviculture of mixtures.

The sector needs to ensure a deeper understanding of the bio economical - economic, social and environmental - benefits of the sector among decision makers and the public and that needs to be supported by rigorous science.

The COFORD report on **Growing the Irish Forest Economy** (COFORD, 2017) included a key proposal (No. 9) in this regard, that a well-resourced forest bioeconomy centre of excellence is established in Ireland and that public and private investment in forest bioeconomy research is increased. Other proposals in that report, all directed at growing a vibrant forest bioeconomy in Ireland, will require the support of research to ensure best outcomes.

The COFORD report on **Land Availability for Afforestation** (COFORD, 2016) made research and innovation

recommendations and identified the need for national and company-led research and innovation to support the implementation of a number of its recommendations. Some issues can be addressed by policy and administrative changes, informed and supported, where necessary, by competitive research and innovation programmes.

The recently completed Forest Land Use Implementation Group (FLAIG) report has also included a number of research recommendations.

Market diversification, product innovation and logistics, will largely be addressed by industry with vital encouragement and support from Enterprise Ireland and DAFM, supported by longer-term market focussed research.

Macro issues such as structural inefficiencies, climate change issues – mitigation and adaptation, stand dynamics and biotic/abiotic risk management require rigorous science and knowledge resources developed within appropriate permanent structures.

Historical background

There was a long tradition of forest research in Ireland. Traditionally forest research was carried out at state level within the Forest Service (a division of whichever Government Department was responsible for forest policy) much akin to the UK Forestry Commission. In 1989 the state forestry was transferred to Coillte CGA who took over the management of forests and continued to play a key role in forest research, maintaining a research mandate after the state forest assets were vested in it. Coillte had, and has, a statutory commercial remit and it gradually moved away from forest research and now has no permanent research staff. As Coillte developed its statutory commercial remit it was precluded from receiving research funding from the Department, subsequently resulting in the non-replacement of researchers. Forest research was already in a lean phase, due to retirements from Coillte and RPOs, as the country entered a recession. This exacerbated the problem resulting in today's current situation. The research role, initially of the state and then Coillte, has not been maintained and the aim of this COFORD Council report is to address this and bring forward recommendations. Coillte remains a significant contributor to forest research through benefit in kind contributions to research projects as well as within its panels business.

Previous research - rich data resource

Many previous research experiments were designed to last the full rotation of the crop; others with a shorter planned lifespan remain *in situ* and are robust in terms of layout and design for further studies. Previously established long-term experiments proved to be a valuable resource for addressing unanticipated questions, unrelated to the original reason. For example, trials comparing genetic variation within and between species are particularly important for planning silviculture under future climate change scenarios. By way of another example, much of the data gathered on carbon sequestration within forests was constructed from forest experimental sites set down in the 1960s, 70s and 80s. These sites provided invaluable data in forming conversion factors for carbon reporting. Most of these sites where created with an alternative use in mind - for instance thinning, spacing. In some instances, climate change was not recognised as an issue at the time of trial establishment; however, gathered and stored data can be reinterpreted. The forest sector needs, above all commercial sectors, a long-term approach. Continuity of scientific rigour allowed Ireland to quantify carbon sequestration and silvicultural best practice and its potential in an Irish forest setting. It is strategically vital that we re-establish this to ensure strong standing when facing future challenges and opportunities – including those currently unknown. The maintenance of essential data sites for potential research use is vital. The National Forest Inventory permanent plots already provide rich data and research could utilise these plots and findings in innovative ways to contribute further scientific knowledge.

Finding

For the sector to fully exploit the potential returns to society and to strengthen its position as a major land use contributing to carbon neutrality in the land sector, complementing Ireland's food bioeconomy and delivering other societal needs there is a need for ongoing rigorous research within a permanent structure to inform policy.

Longer-term research aligned to market and societal needs is necessary - and urgently so - to complement the competitive research programmes by providing continuity, building on previous research, and custodianship, through maintaining an accessible database of forest research.

Forest sector research capacity will need to maintain and further develop its alliance with EU strategic research goals of open innovation, open science and open to the world (international cooperation). Much research funding after 2020 is likely to be mission driven at EU and national level as policy shifts from project/instrument driven supply policy to challenge driven mission/demand policy approach. This will require multidisciplinary scientific expertise to drive research policy and delivery.

By way of comparison, the Forestry Commission UK has similar conditions and challenges to those in Ireland; however, the Commission maintains direct ownership of the state forests and has a research mandate with significant resources for research, currently about £15 M p.a.

Section 3: Longer term research streams

There are five main streams for longer-term, strategic, forest research:

- Silviculture, including tree improvement
- Forest ecosystems and stand dynamics
- Forest products
- Climate change – impact, adaptation and mitigation
- Resource utilisation – crops, fibre – planning at national, regional level, longer-term modelling.

Silviculture - forest soils and site productivity; tree selection and improvement; establishment and reforestation; growth and yield modelling for pure and mixed stands; forest harvesting and aspects of wood transport systems, including the uses of IT in the business of forestry; forest economics, planning and policy research. This Centre would require a range of disciplines including forest science, engineering and IT.

Forest ecosystems and stand dynamics - the physical and biological forces that shape and change a forest ecosystem including forest disturbances such as natural disasters, disease, pests and other pathogens as well as well as nutrient issues and anthropogenic impact including fires. Forest ecosystems would require measurement of various parameters such as carbon, water, nutrient flows. Stand dynamics would assess growth parameters such as volume, basal area, taper. Forest protection and disease risk appraisal would come within the scope of such a Centre. Climate change is potentially so significant that it may require a related or separate Centre.

Forest products - a significant requirement is the characterisation of the Irish wood resource and its utilisation, with the ability to partner industry in the development of wood products, processing technologies, wood engineering and construction, input to the development of national, CEN and ISO wood product standards and systems, the archiving and retention of nationally important datasets on wood properties, and marketing research where required. This Centre would require engineering and scientific expertise related to wood property assessment and analysis, structural engineering expertise and experience in the development and use of wood product standards. The Wood Technology Centre at NUIG is already a Centre of Excellence in the making.

Climate change – this could be housed with the Silviculture or Forest Dynamics Centre and would provide expertise to inform the structure of trials, interpretation of results and would guide on adaptive policy and practice and reach beyond forestry to national land use and agricultural policy.

Resource utilisation - to ensure efficiencies at the national level, optimal use of state funding and best return on investment within national policy requirements there is scope for collaborating on national land use planning, crop yield projections, crop fibre utilisation issues.

Bioeconomy – straddling various aspects of forest research and science needs is the bioeconomy. The COFORD paper on Growing the Irish Forest Bioeconomy (COFORD, 2017) made the case for a well resourced bioeconomy Centre of Excellence. Strong linkage with the SFI funded Beacon Centre is recommended. There is a case for considering collaboration and co-location of a CoE with the Irish Bioeconomy Foundation at the National Bioeconomy Campus at Lisheen, Co. Tipperary; the potential for a field station in that vicinity should be considered.

Section 4: Hosting options and implementation

Several options were considered in addressing the structure and placement of long-term research needs, including:

- Research Division in DAFM
- Forest Institute
- Hybrid
- Existing Agency or RPO

Each has merit and brief comments are made in relation to each option.

DAFM

There is a fine track record of forest research in DAFM.

DAFM is now primarily the regulatory agency for licensing of forestry activities, plant health and related enforcement, for grant aid through programmes, and for forest sector development.

Strategic issues that need to be addressed by a Forest Research Hub need strong linkages to agriculture, to environment, to climate action, to public expenditure and relevant state agencies. While there is a case for ***the Hub*** being within DAFM it is more in line to reserve policy functions and primary governance within the Department and to have scientific capacity in an independent structure. Changed times, needs and circumstance, rule out the case for returning to a situation where longer-term research functions would be carried out directly by the Department. Future governance, use of technology, flexibility and accountability require structures that can rapidly respond and adapt to new challenges and ensure efficiency in resource utilisation and cost.

Research Institute

An example is the Marine Institute. It has an annual state allocation of over €40 M and the staff of over 200. It is an important sector, estimated to be worth approximately €1.2 bn to the Irish economy, with, a wide reach along the coastal towns and villages of Ireland. The model appears to have many attributes, such as a statutory basis, and sectoral board with responsibility and accountability.

We believe that longer-term forest research should not require that scale of annual funding or staffing. A Forest Institute could be a longer-term consideration where research, development, innovation science and technology functions could be housed based on proven need, and proven benefit.

Hybrid

A hybrid model with a small expert Forest Research Unit within DAFM, with the capacity to contract in specialist expertise on a service agreement basis, could provide a solution. A Strategic Forest Research Unit Director would need to be at a very senior level with direct access to the appropriate Minister and senior DAFM management. The Director, under the governance of an appropriate Board or Council for Forest Research, would be responsible for devising an overall forest research policy, for management of specific longer-term projects, for annual and multi-annual plans for research, for responding to demands and requests for scientific knowledge or assessments and for accountability for budgets, best practice and governance. However, there is a strong view that this approach would not solve the capacity issue in that "best in their field" might not be attracted to contract/service-agreement based careers. Nevertheless, a competitive approach where longer-term funding is related to performance, progress and results would be a requirement of any model.

Research Performing Organisation (RPO)

This could be Teagasc, a university or other third level institute. This would have the capacity to bring significant benefits in synergies with other research activities of the entity and benefits of existing structure and funding expertise. Teagasc, the Agriculture and Food Development Authority of Ireland, was established under the Agriculture (Research, Training and Advice) Act, 1988. The Act defines "agricultural research" as including research in relation to all aspects of agriculture, forestry, plant breeding and veterinary research. Teagasc has advisory and valuable, albeit, limited forest research capacity, and arguably it has yet to embrace forestry as a mainstream agricultural activity. Teagasc has considerable strengths in agricultural research which could provide significant synergies with forest research as well as having structures in place for assuring high standard research. It would be for Teagasc and other suitable RPOs to demonstrate capacity and willingness **at the corporate level** to embrace the full range of forest sectoral research needs outlined here.

Implementation - proposed next steps

Implementation requires a state commitment to creating a Forest Research and Open Innovation and Science Hub, with a mandate to meet longer-term forest research needs directly, and through Centres of Excellence. The Hub, together with Centres of Excellence, and DAFM, can – indeed must - build leadership competency within the sector by providing robust scientific guidance and leadership. DAFM, together with DBEI, EI and others, should collaborate to finalise the description of needs of the Hub and ensure a comprehensive approach in addressing forest industry and policy long-term research needs. It may be ambitious to have this be done by end 2018 but given the critical state of forest research capacity and the challenges – and opportunities – for the sector, it is vital to press on quickly and have proposals for hosting of the Hub ideally in the first half of 2019.

A more detailed specification for the Hub could require that it:

- Address, as a priority, the degradation of forest research capacity which is at a critical point;
- Contribute to a long-term research strategy, appropriate to the long cycle of forestry, in line with state policy with the aim of ensuring the full economic potential of the sector;
- Input to relevant mission driven strategic research needs, such as carbon sequestration and identify and formulate longer-term research challenges, such as resilience, in the forest sector;
- Contribute to the development of existing and further Centres of Excellence to service strategic research needs through service agreements or other appropriate relationships with collaboration as a key resource driver;
- Ensure custodianship, and continuity, where relevant, over physical and digital data sets, including trial sites – Longer-Term Experiments - to be available to Centres of Excellence and future researchers;
- Improve risk management of biotic and abiotic threats;
- Provide scientific guidance to the Minister, and to the forest sector;
- Ensure timely knowledge transfer of progress and results to enable and ensure sure early market pickup and encourage early deployment and responsible innovation.
- Report to Governance on Key Performance Indicators for addressing its progress and performance and that of related Centres of Excellence;
- Ensure core research values including excellence, openness, collaboration and integrity.

Proposed structure

The Hub will require a Director and Chief Scientific Officer (CSO)/Principal Investigator (PI).

The Hub, through the Director and CSO, will take its mandate from a board consisting primarily of industry and policy stakeholders. The Director would liaise between RPOs, Science Centres e.g. Beacon, Insight and others as well as policy advisors and industry. The CSO would be responsible for, and coordinate research needs, research programmes, results, access and dissemination.

The Hub would over a period of three years be funded for, and ensure recruitment of a small team of permanent, preferably experienced, researchers for specified fields e.g. climatic research, genetics, plant health, biosecurity, stand dynamics. This would amount to approximately five researchers in total, with appropriate support required from approximately three to four support staff, including technologists/technicians and technology/data support.

An initial provision would be of the order of €2 M; this is separate from, and in addition to, existing competitive research funding, with further funding required to build capacity in designated Centres of Excellence (such as the Wood Technology centre in NUIG). Research programmes would be funded in line with requirements. Specific provision would need to be made for accessing, reviewing, cataloguing, securing and retaining data plots.

The challenge for ***the Hub*** will be to show real impact, such as visible benefits for citizens, support of economic growth and maintenance and creation of employment, with a culture of innovation, all with respect to other policy goals.

It is recommended that its operations, knowledge exchange, and impact be externally reviewed in line with best practice after three to four years relative to key performance indicators. The review could inform decisions about the scale of further multi-annual funding.

Centres of Excellence

The range of the forest sector is so broad that there is considerable merit, indeed need, in looking at Centres of Excellence (CoE) for forest research and innovation excellence to support the work of ***the Hub***. Any such centres should also be able to secure additional national, EU and industry funding and should probably be parented within state resourced structures.

The proposal for a Forest Research and Open Innovation and Science Hub with associated CoE is additional to and would complement – not replace – the annual COFORD competitive research programme. There are areas of research that are not capable of being fully addressed within the competitive research programme, mainly due to the long cycle from seed to timber and other benefits from mature forest.

Organisation of Centres of Excellence

Collaboration is at the heart of future success in forest research and innovation. CoE would be mandated to input to policy and practice developments primarily at the national level, and with capacity for international collaboration; and would be expected to liaise closely with the forest sector, and to have a planned and structured annual research outputs dissemination programme.

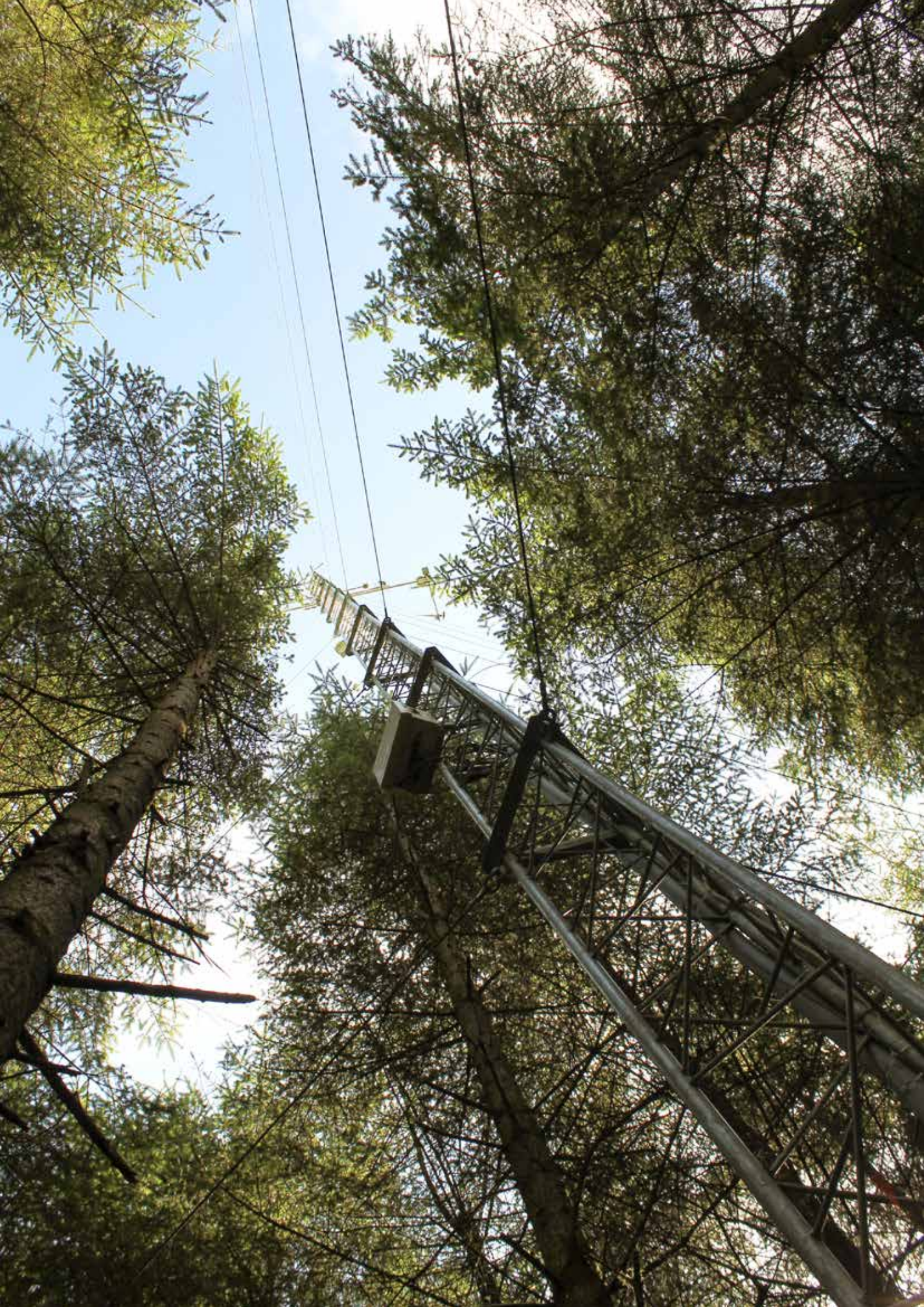
Staffing should generally be on a permanent full-time basis. A staff complement of senior and entry level persons per research topic area would be envisaged over the medium term to develop expertise, and for passing on knowledge and expertise as part of succession planning. Each centre would have a manager (perhaps shared) responsible for external dissemination goals, research programmes and projects, budgets (including securing external funding), liaison with ***the Hub*** and DAFM, other government departments and agencies, and industry.

Temporary postgraduate staff and students could be recruited for specific projects with some or all of budgets, for same being provided, where appropriate, by external funding.

Three-year programmes of work, including on longer-term projects, informed by strategic policy, the FORI Strategic Agenda for Forest Research and its successors, and emerging issues would be formally approved by the Board of ***the Hub***, with the COFORD Council providing stakeholder input. At the end of each three-year period, a programme review would be carried out by ***the Hub*** in consultation with COFORD and DAFM, dealing with levels of impact, dissemination, and competencies covered.

Archiving of data from project research and maintenance of trial sites would be according to a pre-agreed standard and would be the primary responsibility of ***the Hub*** Director supported by the managers of CoE through service agreements.

Other critical areas of research including ecosystem services such as biodiversity and water would continue to be funded under the COFORD competitive programme with the capacity to transfer emerging longer-term research requirements to ***the Hub***.



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Appendix A

Members of the COFORD Council spin-off working group

As the process or reviewing longer-term forest research developed a Spin-Off Working Group of the COFORD Council was formed to address the structure and detail of recommendations.

Members:

- Nuala Ní Fhlatharta – Teagasc
- Gerard Murphy – Coillte CGA
- John Joe O'Boyle – Northern Ireland Forest Service
- Neil Kerrigan – Enterprise Ireland
- Fergus Moore – Forest Sector Development, DAFM
- Tony Quinn – Research and Codex, DAFM
- John Phelan – Woodland Managers Limited (Chairperson).

This group visited the Teagasc Campus at Ashtown and met with Meat Technology Ireland and exchanged comments and drafts in meetings, via e-mail and dialogue.

Appendix B

Long Term Forest Research – key stakeholder needs workshop

A well-attended workshop was held on 25th September 2017 at Backweston Campus (DAFM) with the objectives of:

- Reviewing Long Term Forest Research requirements, issues and consequent commitments;
- Consideration of experiences elsewhere – forest and other sectors;
- Having an Open Forum with Researchers and other stakeholders.

Participants included researchers and various forest sector stakeholders. Presentations were arranged in three modules:

1: Long Term Forest Research – National and Sectoral perspectives

(a.) Overview of National Research Strategy Environment - Richard Howell, Senior Inspector, Head of Research & Codex Division, DAFM

(b.) Forest Research in Ireland - historical perspective, current position. Dr Eugene Hendrick, Senior Inspector, Forest Sector Development, DAFM

(c.) Forest Policy needs. Seamus Dunne, Senior Inspector, Inspectorate Division, Forest Service (DAFM)

(d.) Forest practice needs. Gerard Murphy, MD Forestry, Coillte

(e.) Market needs. Richard Latimer – Glennon Brothers Sawmill

2: The UK experience and can Forestry learn from the Dairy Sector.

(a.) UK experience, current approach . Dr James Pendlebury, Chief Executive - Forest Research, Forestry Commission UK.

(b.) The Dairy Research Experience. John Moloney, Chairman of Coillte; former Group MD – Glanbia, plc

3: Research Focus, Funding and Capabilities

Focus and Funding support structures - National/European. Tony Quinn, Research Division, DAFM

Current research capability issues. Dr Áine Ní Dhubhain, Associate Professor Forestry, School of Agriculture & Food Science, UCD

Following open forum dialogue the attendees broke into working groups to discuss policy and sectoral needs, current issues, the possible benefits of an LTFR framework and to consider recommendations and reconvened to present findings to the participants. The workshop provided a unique forum for an open meeting of sectoral researchers and research users with much valuable dialogue which contributed to the final COFORD Council report. Detailed notes of the workshop outputs were recorded by DAFM.

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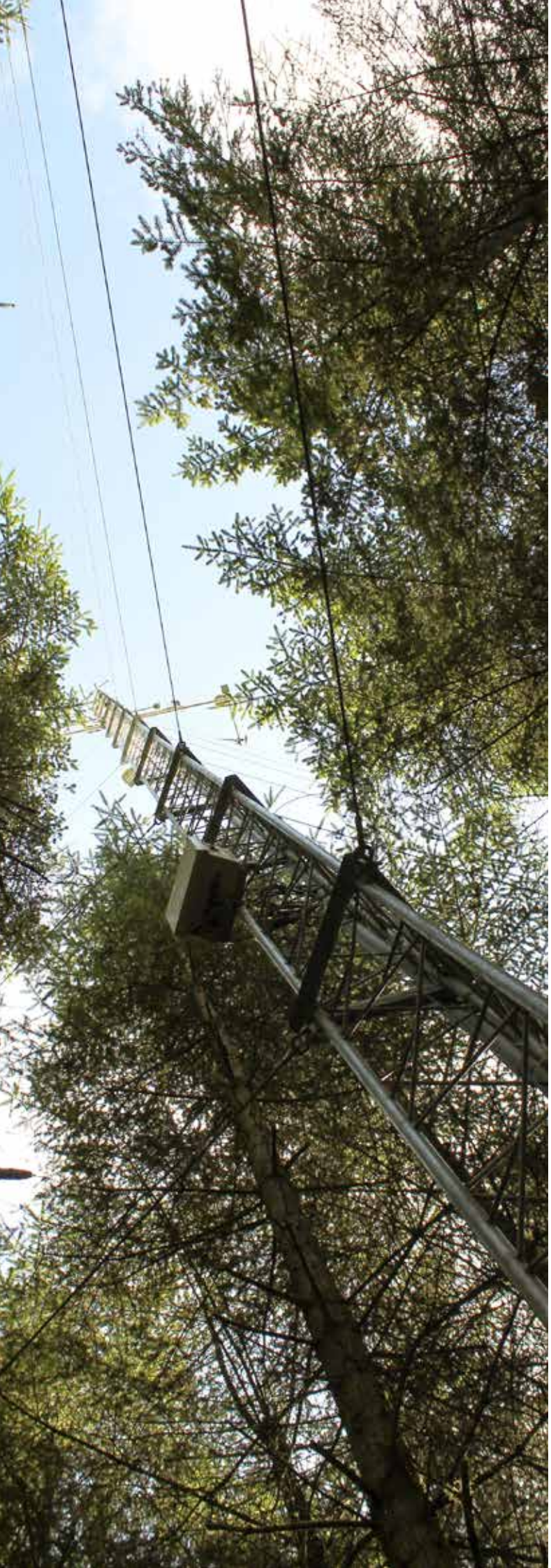

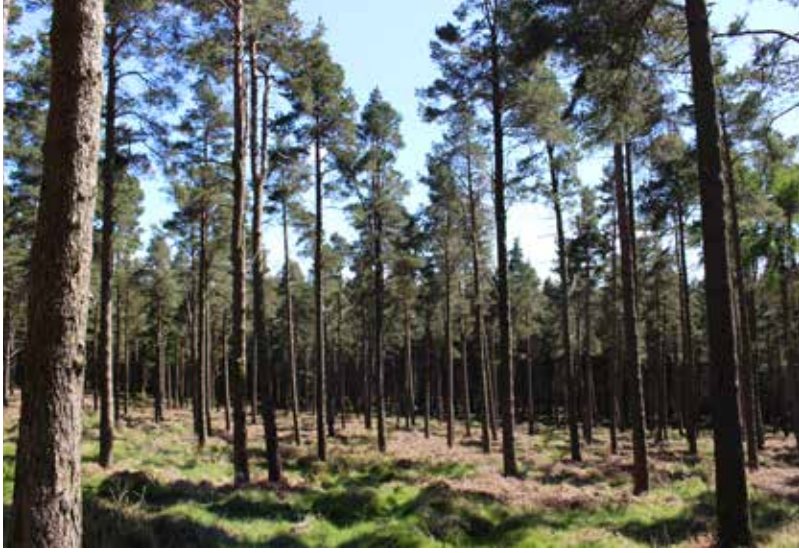

Longer Term Forest Research

Proposed structures for meeting the needs and opportunities of Ireland's forest sector through longer term research and innovation

Authored by
The COFORD Long Term Forest Research Working Group

COFORD
NATIONAL COUNCIL FOR FOREST RESEARCH & DEVELOPMENT