

Draft Bioenergy Plan

October 2014



Roinn Cumarsáide, Fuinnimh agus Acmhainní Nádurtha
Department of Communications, Energy and Natural Resources

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Contents:

Foreward by the Minister for Communications, Energy and Natural Resources, Alex White T.D.	5
Introduction, Vision and Goals	7
Section 1 - Opportunity and Policy Context	9
Opportunity	10
Policy Context	11
- Renewable Energy	11
- Agriculture and Forestry	14
- Environment and Sustainability	17
- Job Creation and Innovation	21
Section 2 - Next Steps	23
Bioenergy Principles	24
Policy Actions and Enablers	24
- Demand Measures	25
- Supply Measures	27
- Research, Development and Demonstration	29
- Further Market Support and Sustainability Measures	31
- Governance	32
Glossary	33

List of Figures:

Figure 1.	Potential Bioenergy Pathways	10
Figure 2.	On-Farm Anaerobic Digester Model (Source: FNR, German Biogas Association)	12
Figure 3.	Harvested Timber (Source: Teagasc)	14
Figure 4.	Miscanthus Plantation (Source: Teagasc)	15
Figure 5.	Anaerobic Digestion Plant supported by REFIT 3, Shanagolden, Co. Limerick (Source: McDonnell Farms Biogas Ltd)	17
Figure 6.	Waste Hierarchy (Source: EPA)	18
Figure 7.	Bioenergy Supply Curve for Ireland 2020 (Source: SEAI)	20
Figure 8.	Miscanthus Harvesting (Source: SEAI)	21
Figure 9.	Willow Planting (Source: Teagasc)	22
Figure 10.	Categories of Bioenergy Actions and Enablers	25
Figure 11.	Logo for Better Energy Homes Scheme (Source: SEAI)	26
Figure 12.	Forest Harvesting (Source: IEA)	28
Figure 13.	Biotechnology, Crops Research Centre, Oak Park, Carlow (Source: Teagasc)	30

Foreword by the Minister for Communications, Energy and Natural Resources, Alex White T.D.



The long term development of Ireland's abundant, diverse and indigenous renewable energy resources is a defining element of this Government's energy policy. Not alone is renewable energy of key environmental importance, it also provides real and sustainable economic opportunities for Ireland, both in terms of providing a secure, indigenous source of energy, and as an engine for job creation. Therefore, the development of an energy policy designed to meet the challenges of moving to a decarbonised energy system and to provide support for the bioenergy sector makes both economic and environmental sense underpinning the social recovery prioritised by Government. This Draft Bioenergy Plan sets out a vision for the sector that delineates its contribution to economic development and sustainable growth.

Meeting our 2020 renewable energy targets is not without its challenges particularly in the areas of heat and transport. The potential of the bioenergy sector to make a significant contribution in this regard is well recognised, both here in Ireland and by the EU. However, realisation of this potential requires coordinated cross Government support, in particular in relation to agriculture, forestry, waste recovery, job creation, and innovation policies. This is why I am establishing a Bioenergy Steering Group which will be responsible for the finalisation and implementation of the Bioenergy Plan across its various sectoral work streams. By bringing forward measures to stimulate demand and supply, as well as research, development and demonstration, the Bioenergy Plan when finalised will underpin the future development of the sector.

Of course, the citizen must be at the heart of the transition to renewable energy and there will be opportunity for members of the public to make their views heard before the Bioenergy Plan is finalised. The Draft Bioenergy Plan is to be subject to Strategic Environmental and Appropriate Assessments, including public consultation, which will inform the shape of the finalised Plan. These assessment processes will commence shortly and will include consideration of alternative approaches. In this way, the finalised Bioenergy Plan will provide a clear framework for the sustainable development of Ireland's bioenergy resources and the delivery of real economic benefits to Ireland.

I look forward to the completion of these assessments and the finalisation of this important plan during 2015.

Introduction, Vision and Goals

The overarching objective of the Government's energy policy is to ensure secure and sustainable supplies of competitively priced energy to all consumers. The development of Ireland's renewable energy resources is critical for the achievement of each element of this objective. The recently published *Green Paper on Energy Policy in Ireland* recognises the important role energy security, sustainability and competitiveness play in driving economic activity. Cost-effective harnessing of sustainable, indigenous, renewable energy resources is crucial to reducing our dependence on expensive fossil fuel imports, improving our national competitiveness over time, reducing harmful emissions and delivering growth and jobs in the green economy. These objectives are fully aligned with those of EU energy policy, reflecting the common challenges faced by Ireland, and our partners in Europe, in decarbonising our energy systems.

In the last two decades there has been significant growth in Ireland's renewable energy output. The contribution of renewable energy to overall energy demand rose from 2.3% to 7.1% between 1990 and 2012. Under the *Renewable Energy Directive*, Ireland is obliged to reach a target of 16% of all energy consumed in the State coming from renewable sources by 2020. This obligation is to be met by 40% from electricity, 12% from heat and 10% from transport. The share of **electricity** generated from renewable energy sources has increased fourfold between 1990 and 2012, from 4.9% to 19.6%. In terms of the other two energy sectors, renewable **heat** accounted for 5.2% of all thermal energy in 2012, while renewable **transport** energy (biofuels) accounted for 3.8% of road and rail transport. In 2012, displacement of fossil fuels by renewable energy for electricity generation resulted in an avoidance of between €250 million and €280 million in fossil fuel imports, and carbon dioxide (CO₂) avoided through renewable energy use in **all** sectors totalled 3.2 million tonnes (Mts), with wind energy accounting for 61% of this saving.

However, there is no room for complacency. Achieving the anticipated renewable energy usage in the three energy sectors will be challenging, with renewable heat being particularly so. Estimates by the Sustainable Energy Authority of Ireland (SEAI) show that

current policies will not deliver 12% renewable energy in the heat sector by 2020. The estimated shortfall will be in the region of 2 to 4 percentage points of the 12%. This represents about 1 to 2 percentage points in terms of the overall national target of 16% mandated to Ireland under the 2009 Renewable Energy Directive.

While it is clear that bioenergy has a significant role to play in the period to 2020, energy policy is defined by the need to be forward looking and to ensure that our energy system is fit for purpose in the decades to come. As we look towards 2030, and even out to 2050, the goal of decarbonising our energy system will require the expansion of our renewable energy portfolio to include additional forms of renewable energy, with bioenergy playing an increasingly significant role. It should be noted that Ireland has a suitable climate advantage for bioenergy crops which results in the potential for higher growth rates. The Bioenergy Plan will underpin the development of the sector in the period to 2020 and lay the foundations for its longer term growth. The Plan seeks to form a link between critical policy areas for Ireland, namely, renewable energy; agriculture; forestry; the environment; sustainability; and the growth potential of the green economy; while taking account of international development policy considerations. In this way, it is intended that

the Bioenergy Plan will provide a mechanism to inform and coordinate policy and implementation across these policy areas, thus supporting the sustainable exploitation of Ireland's bioenergy resources.

This Draft Bioenergy Plan sets out a **vision**:

VISION

Bioenergy resources contributing to economic development and sustainable growth, generating jobs for citizens, supported by coherent policy, planning and regulation, and managed in an integrated manner

Three high level **goals**, of equal importance, based on the concept of sustainable development have been identified:

- *To harness the market opportunities presented by bioenergy in order to achieve economic development, growth and jobs*
- *To increase awareness of the value, opportunities and societal benefits of developing bioenergy*
- *To ensure that bioenergy developments do not adversely impact the environment and its living and non-living resources*

The Department of Communications, Energy and Natural Resources will put in place a robust governance structure to oversee the implementation of the Bioenergy Plan, with on-going updates to the Minister.

The Draft Bioenergy Plan consists of two sections:

Section 1 sets out the broader context for the development of Ireland's bioenergy sector, and the current state of play with regard to the range of policy areas that must be coordinated in order to create the conditions necessary to support the development of this sector. There are a wide range of Government departments, agencies and State bodies that are critical enablers for bioenergy development by virtue of their responsibility for areas such as forestry, agriculture, waste recovery, research funding and business development. This Draft Bioenergy Plan identifies ways to ensure the optimal coordination of all of these players.

Section 2 of the Draft plan goes on to identify the next steps that must be taken to support the sustainable realisation of the economic potential of Ireland's bioenergy resources.

Section 1

Opportunity and Policy Context



Opportunity

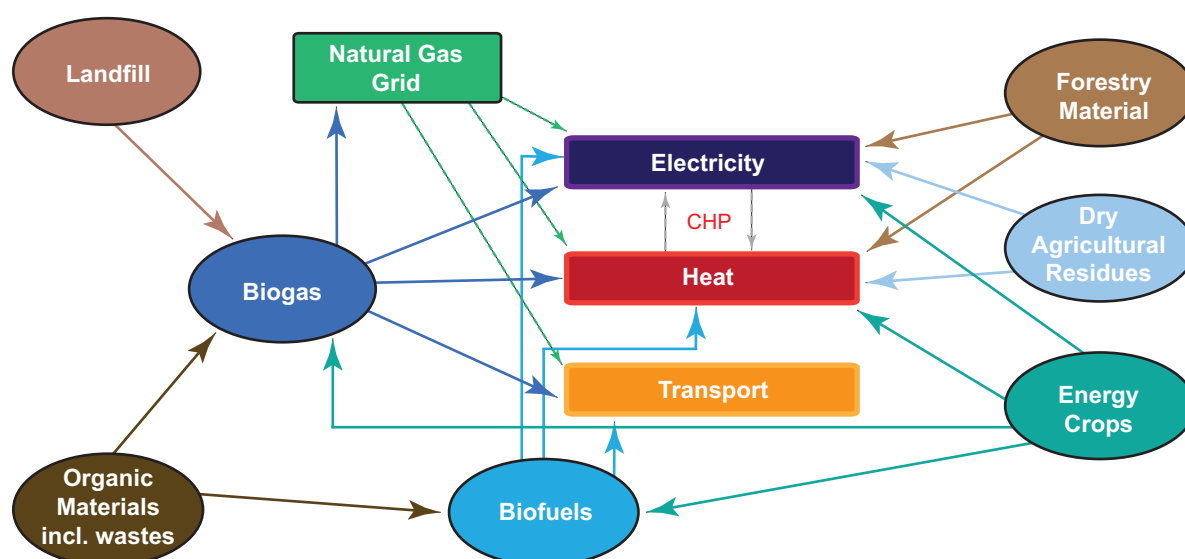
Bioenergy will be an essential element in contributing to Ireland's future energy needs, and has the potential to provide significant economic and environmental benefits. Our available resource – derived from forests, wood processing by-products, purpose grown energy crops, animal by-products, and waste – can rapidly increase through supportive policies and actions across energy; forestry; agriculture; waste recovery; and research, development and deployment.

SEAI's *Bioenergy Roadmap* presents one plausible scenario of over 3,500 kilotonnes of oil equivalent (ktoe) of indigenous resources being available for the bioenergy supply chain by 2050, delivering abatement of over 11 Mts of CO₂ annually. The development of this bioenergy resource is central to overall energy policy in Ireland. It can assist Ireland in meeting its renewable energy targets to 2020 and beyond, making a contribution across the three sectors of electricity, heat and transport, and enhance security of supply through the displacement of imported fossil fuels. Greenhouse gas emissions will be reduced, while growth and jobs are delivered to the economy.

Developing the bioenergy sector can also help in achieving wider policy objectives in areas such as waste recovery. While the process of change involved represents a huge opportunity for Ireland, it is not without its challenges, risks and uncertainties. These include ensuring that bioenergy genuinely contributes to carbon reductions; the availability and price of sufficient sustainably-sourced biomass; the relationship between bioenergy and other land uses such as food production; other uses for biomass such as in construction; the environmental impacts of bioenergy on biodiversity, water resources and air quality; the delivery of network reliant bioenergy services in the context of Ireland's dispersed population; and the cost of supporting bioenergy on the Exchequer, investors, energy consumers and wider societal stakeholders.

In this context, the Draft Bioenergy Plan is key to the development of bioenergy in Ireland and sets out the necessary principles, policy actions and enablers for delivery of Ireland's significant potential in this area. More specific detail on potential benefits and challenges for Ireland in developing our bioenergy resources is set out in the following sections.

Figure 1. Potential Bioenergy Pathways



Policy Context

Development of this bioenergy potential requires coordination across a range of policy areas encompassing not just energy itself, but also forestry; agriculture; the environment; research, development and demonstration; and job creation and economic growth. Relevant policy developments across these areas are outlined below.

Renewable Energy

Developments in national and EU renewable energy policy point to the further significant deployment of bioenergy out to 2020, 2030, 2050 and beyond.

2007 White Paper and the Emergence of Targets

The 2007 Government White Paper *Delivering a Sustainable Energy Future for Ireland* articulated for the first time Ireland's ambition for renewable energy, setting targets for 2020 of 33% of electricity from renewable sources with onshore wind providing the main contribution; 12% renewable heat market penetration derived principally from bioenergy; and at least 10% biofuels penetration in transport. An additional target was also set of 30% co-firing with biomass at the three State-owned peat power generation stations, to be achieved by 2015. Also in 2007, the EU set an ambitious renewable energy target as part of its overall climate change and energy policies, with the objective of achieving 20% of all energy in the EU from renewable sources by 2020. This was followed in 2008 by Ireland settling on a revised ambition of 40% of electricity from renewable sources by 2020.

Strategy for Renewable Energy: 2012 – 2020

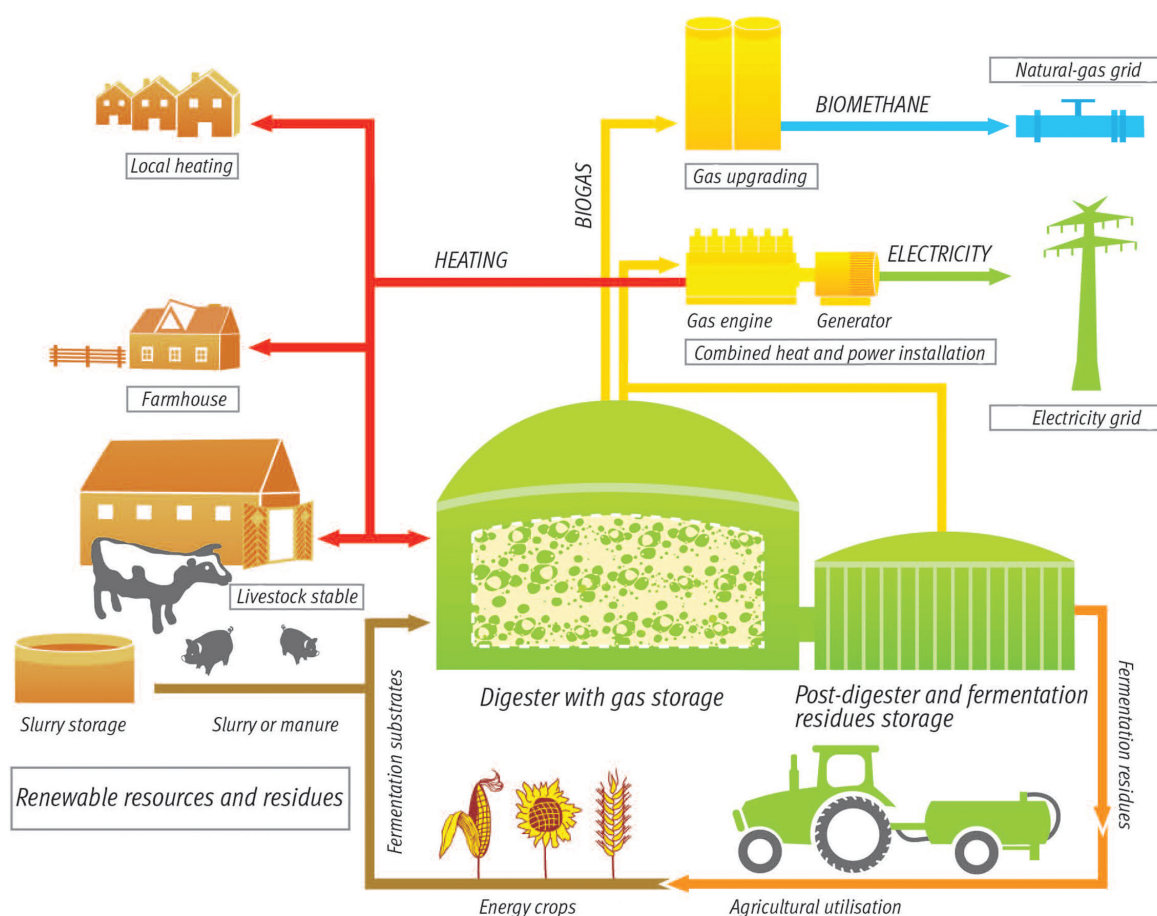
In 2012, the Department of Communications, Energy and Natural Resources published the *Strategy for Renewable Energy: 2012 – 2020*. This strategy reiterates the Government's firm view that "the development of Ireland's abundant indigenous renewable energy resources, both onshore and offshore, clearly stands on its own

merits in terms of contribution to the economy, to the jobs and growth agenda, to environmental sustainability and to diversity of energy supply." It is this position that informs Ireland's commitment to delivering on its binding EU obligations under the Renewable Energy Directive, which assigned 2020 targets to each Member State in 2009. Under the Directive, Ireland is obliged to reach a target of 16% of all energy consumed in the State coming from renewable sources by 2020. This obligation is to be met, as previously stated, by 40% from electricity, 12% from heat and 10% from transport.

The Strategy for Renewable Energy articulates the Government's high level policy goals, and the key actions to be undertaken to support the development of each of the renewable energy sectors in the short to medium term. In this way it provides the overarching strategic framework for the *National Renewable Energy Action Plan* (NREAP). The NREAP was first produced in 2010, as required by the Renewable Energy Directive. It sets out in great detail the individual actions and measures underway across all relevant Government departments, agencies and State bodies to reach the legally binding targets for energy consumed from renewable sources as specified in the Renewables Directive.

The Strategy for Renewable Energy includes specific consideration of bioenergy in the context of energy policy to 2020, setting the strategic goal of establishing a sustainable bioenergy sector supporting renewable heat and power generation. It recognises the need for a cohesive approach to developing our national bioenergy resources which addresses both demand and supply side issues. The Renewable Energy Feed-in Tariff scheme for biomass technologies (REFIT 3), which was approved by Government in 2011, underpins the provision of a stable demand for biomass. It is designed to support a range of technologies including Combined Heat and Power (CHP), Anaerobic Digestion (AD) and the co-firing of biomass in peat power stations. REFIT can also be claimed by a generator using

Figure 2. On-Farm Anaerobic Digester Model (Source: FNR, German Biogas Association)



biogas derived from AD, where both sites are physically separated, if that biogas is injected into the gas grid.

The Strategy for Renewable Energy also includes a strategic goal of achieving a more sustainable transport sector, principally through biofuels. The national *Biofuel Obligation Scheme*, which currently requires 6% of biofuels in the road transport fuel mix, is the key mechanism for delivering on the 10% renewable transport target. The *Biofuel Obligation Scheme* is designed to conform fully with the EU Biofuel Sustainability Criteria, ensuring that all future biofuels included in the scheme will meet stringent, and legally binding, EU recognised sustainability criteria.

EU 2020 Renewable Energy Targets: Challenges, Risks and Uncertainties

Although achieving the anticipated renewable energy usage in the three energy sectors will be challenging, the 12% for renewable heat is particularly so. It is also the least regulated and homogeneous of the sectors. Estimates by SEAI show that current policies, such as CHP supports under REFIT 3; fully achieving energy efficiency goals; Part L of the Building Regulations; and taking into account natural migration to renewable heat technologies, will not deliver 12% renewable energy in the heat sector by 2020. This clearly indicates that additional action is required. SEAI estimates that the shortfall will be in the region of 2 to 4 percentage points of the 12%, equating to approximately 200 ktoe or

2,300 gigawatt hours (GWh). This represents about 1 to 2 percentage points in terms of the overall national target of 16% mandated to Ireland under the 2009 Renewable Energy Directive.

In transport, though the increased use of electric vehicles will contribute a small amount of renewable energy to our targets, the uptake has not been as expected here or indeed elsewhere for a number of reasons. Therefore, biofuels will contribute most to the 10% target (up to 9%) by 2020 for renewable energy in transport. The *Biofuel Obligation Scheme* is the mechanism which will be used to progressively increase the use of biofuel to meet the renewable energy target in transport. As with fossil fuels, Ireland will remain a net importer of biofuels. The outcome of the proposal by the European Commission to address the potential impact of Indirect Land Use Change (ILUC), caused by certain categories of biofuel, will make the achievement of the renewable transport target more challenging, given the early stage of development of advanced or second generation biofuels.

Though it is not known as yet what the cost will be to Member States of not meeting their targets, the Directive anticipates that there will be a market where Member States can trade renewable energy. The cost of acquiring renewable energy/statistical transfers will be dependent on a number of factors including the extent to which the EU as a whole meets the Renewable Energy Directive's overall EU target of 20%; the identity of the Member States that over-achieve on their targets; the cost of supports used by Member States to do so; the financial status of the Member States who have to purchase compliance; and the level of penalties imposed on Member States.

SEAI has estimated that the cost to Ireland may be in the range of €100 million to €150 million for each percentage point Ireland falls short of the 16% target. In arriving at these figures, SEAI used the Irish onshore wind tariff support

cost (lower bound) and the UK offshore wind tariff support cost (upper bound) as the cost per megawatt hour (MWh) of purchasing renewable energy credits to meet 2020 targets. Further work commissioned by SEAI suggests the cost to Ireland may be in the range of €70 million to €140 million per percentage point shortfall (equivalent to €50 to €100 per MWh). These estimates are based on the projected marginal cost of the renewable energy being brought to market by the selling Member State, with the cost per MWh based solely on the premium component of the tariff support and the type of technology used, ranging, as with SEAI estimates, from onshore wind (lower bound) to offshore wind (upper bound). There are also likely to be penalties imposed on Member States who do not comply with their targets although these have yet to be defined.

EU Policy to 2030 and 2050

While the EU has a clear framework underpinning its energy and climate policies up to 2020, the debate has now begun on how this framework must evolve to achieve EU objectives for the period to 2030. This debate is taking place in the context of the commitment made by Member States at the October 2009 European Council to reduce EU greenhouse gas emissions by 80 to 95% below 1990 levels by 2050.

At the request of the European Council, the European Commission published the *Energy Roadmap 2050* in December 2011. Based on the premise that achieving this reduction in greenhouse gas emissions will require EU energy production to become almost carbon free, the roadmap explores the challenges of delivering on this decarbonisation objective for the energy sector, while at the same time ensuring security of supply and competitiveness. The roadmap analyses a number of scenarios through which the consequences of decarbonising the EU energy system are assessed and policy needs identified. In the light of analysis showing that the continuation of 2020 energy policies will deliver less than half

the greenhouse gas reduction sought by 2050, the roadmap calls for urgent action to formulate the EU energy agenda up to 2030 so that it establishes the pathway to achieving the 2050 objective.

To this end, the European Commission published the Green Paper, *A 2030 Framework for Climate and Energy Policies*, in March 2013. The Green Paper highlights the importance of reaching agreement on a 2030 framework in order to provide investor certainty; reduce regulatory risk; promote demand for efficient, low carbon technologies; spur research, development and innovation; support economic growth and job creation; and provide a basis for the EU to engage in future climate change negotiations. Following a period of consultation, the Commission published *A Policy Framework for Climate and Energy in the Period from 2020 to 2030*, in January 2014. It proposes a new reduction target for domestic greenhouse gas emissions of 40% compared to 1990, to be shared between the Emissions Trading System (ETS) and non-ETS sectors, as the centre piece of the EU's energy and climate policy for 2030. The non-ETS target is to be allocated amongst Member States. It is to be accompanied by a coherent headline target at European level for renewable energy of at least 27% with flexibility for Member States to set national objectives.

Ireland, along with our partners in Europe, has embarked on the detailed analysis and negotiations required to identify the optimal policy instruments for the period to 2030, while also providing the foundations for achieving the EU's 2050 objective in a way that is cost effective, takes full account of the specific circumstances of individual Member States, and maintains the security and competitiveness of Ireland's and Europe's energy supplies.

Given the key finding in the SEAI *Bioenergy Roadmap* that 3,500 ktoe of indigenous Irish resources could be available for the bioenergy supply chain by 2050 (delivering annual

abatement of over 11 Mt of CO₂) EU energy and climate policy developments represent both an important opportunity and a challenge to develop Ireland's significant bioenergy potential.

Agriculture and Forestry

Our national bioenergy resources (including forestry, energy crops and biofuels) need to be developed and supported through a cohesive approach which addresses supply side as well as demand side issues. The REFIT 3 scheme for biomass technologies marks an important step in providing certainty for the sector. It will underpin the development of a robust and sustainable biomass supply in Ireland as it will provide a stable demand for biomass. The sustainable growth of biomass/biofuel use in the heat sector as well as in power generation and transport will be underpinned by the Bioenergy Plan. It should be noted that electricity generation from bioenergy resources offers the additional advantage of being dispatchable i.e. it is available on demand and not variable.

Figure 3. Harvested Timber (Source: Teagasc)



Forest Policy Framework and Forestry Programme

The Department of Agriculture, Food and the Marine issued a forest policy framework: *Forests, products and people: Ireland's forest policy - a renewed vision*, in 2014. It sets out its overarching strategic goal as being the development of an internationally competitive and sustainable forestry sector that provides a full range of economic, environmental and social benefits to Ireland. One of the recommended policy actions in the new forest policy framework is to increase the forest area in accordance with sustainable forestry management principles, in order to support a long term sustainable roundwood supply of 7 to 8 million cubic metres per annum, of which 1.45 million cubic metres and 1.75 million cubic metres is forecast to be available for energy purposes in 2020 and 2028 respectively. One of the main focuses of the new forest policy framework is to increase the level of annual afforestation over time, in order to reach a forest cover of 18% of the land area of the country by 2050. For the period 2010 to 2013, the average annual afforestation rate was 7,000 hectares. The planned increased level of afforestation will underpin a sustainable level of future wood supply for the forest-based biomass energy sector. However, forests planted between now and 2020 will bring very little additional biomass to market in the period to 2020, and will only begin to come on stream from 2025 at the earliest. Species choice will need to take account not only of the implications of climate change, but will also need to be aligned with future market requirements and carbon sequestration capacity. The more recent forestry programme, drafted in the context of the forest policy framework and national funding envelopes, proposes a gradual increase in afforestation rates from current levels to 9,000 hectares per annum by 2020.

Schemes to Incentivise the Supply of Biomass

The Department of Agriculture, Food and the Marine also runs a number of schemes

to incentivise the supply of biomass. The *Afforestation Grant and Premium Scheme* provides a package to encourage planting of forests by compensating forest owners for some of the costs of forestry establishment and for the income foregone during the maturation of the timber crop. The objectives of the scheme include providing a sustainable source of wood biomass for energy purposes. The *Forest Road Scheme* provides opportunities to forest owners to improve access to forests. The objectives of the scheme include the provision of funding for the construction of harvesting roads, which are essential in ensuring the supply of biomass can be brought to market. The *Bioenergy Scheme* provides establishment grants to farmers to grow miscanthus and willow for the production of biomass suitable for use as a renewable source of energy. The scheme aims to increase the production of miscanthus and willow in Ireland and to encourage alternative land use options.

Figure 4. Miscanthus Plantation
(Source: Teagasc)



BioEnergy Ireland

In order to accelerate the development of Ireland's forestry and bioenergy resources, the *Programme for Government* committed to merging Bord na Móna and Coillte to create a new State company called BioEnergy Ireland. This company would become a global leader in the commercialisation of next generation bioenergy technologies, including a significant annual afforestation programme. Subsequent

analysis by NewERA has indicated that while an immediate full merger could achieve net financial benefits, there would be significant implementation risks and costs, and a phased approach to full merger would be preferable. The initial establishment of joint ventures focusing on identified areas of synergy (biomass, wind, shared services, and recreation and tourism) would deliver lower but more immediate financial benefits. This approach would also facilitate a full merger in the future, and would allow for the mitigation of risk and the minimisation of cost. Therefore, the Government has decided that BioEnergy Ireland will be established as a biomass joint venture between Bord na Móna and Coillte to procure biomass at market rates from all sources including Coillte Forest, private forests and elsewhere. This product will be offered to the entire market, including Bord na Móna and Coillte subsidiaries, based on market pricing in a manner that optimises the supply chain. The joint venture will be structured to economically incentivise Coillte to engage with private sector suppliers. A Steering Group, which includes representatives of the Department of Public Expenditure and Reform, the Department of Communications, Energy and Natural Resources, the Department of Agriculture, Food and the Marine, and NewERA, will oversee the establishment of BioEnergy Ireland.

EU Timber Regulation

Forest resources must be managed in accordance with best practice to ensure their capacity to provide the full range of timber and other benefits. Illegal logging is the harvesting of wood in a way that breaches the laws or regulations of the country of harvest. It has severe economic, environmental and social impacts for some of the world's most valuable remaining forests and the billions of people that rely on them. In 2011, 35% (€37.8 billion) of the global trade of primary timber products was by and within the EU. While it is difficult to estimate the percentage of this trade that was in illegally harvested timber, the EU is an important export market for those countries where levels

of illegality and poor governance in the forest sector are most serious. Allowing wood and wood products that are potentially derived from illegal sources onto the EU market jeopardises the efforts of timber-producing countries to fight against illegal logging and essentially sustains the practice. The *EU Timber Regulation* is to help eliminate illegal logging worldwide. It entered into force in March 2013. As the designated competent authority, the Department of Agriculture, Food and the Marine is implementing the regulation in Ireland, ensuring that fuel wood brought to market in Ireland is derived from legal sources.

Animal By-products

The use and disposal of animal by-products is regulated by the Department of Agriculture, Food and the Marine under *Regulation (EC) Number 1069/2009* (which sets out the health rules regarding animal by-products and derived products not intended for human consumption), and its implementing *Regulation (EU) Number 142/2011*. The use of animal by-products as a fuel typically to generate heat or electricity has the benefit that the business which is doing so may not have to meet additional onerous and costly requirements arising under waste regulation. The Department of Agriculture, Food and the Marine, in collaboration with the Department of the Environment, Community and Local Government and the Environmental Protection Agency (EPA), has sought to encourage the use of animal by-products as "valuable by-products not waste." For instance, tallow can be used as a substitute for imported heavy fuel oil, and poultry litter can be used as a biomass energy source. The sustainable use of animal by-products can also result in wider environmental and economic benefits. For example, as an end product of bioenergy processing, the organic residue agri-fertiliser has the potential to replace other fertiliser sources and, used in accordance with a nutrient management plan, can assist in meeting the objectives of the *EU (Good Agricultural Practice for Protection of Waters) Regulations, 2014*.

These regulations give effect to Ireland's Nitrates Action Programme for the protection of waters against pollution caused by agricultural sources, and contribute to the achievement of good status in all Irish waters by 2015 under the *EU Water Framework Directive*.

Environment and Sustainability

The REFIT 3 scheme also recognises the importance of more sustainable management of waste, including municipal waste, through a range of treatments including AD and Waste to Energy and the inherent potential this source has to contribute to meeting Ireland's renewable energy targets.

Waste Policy

The Department of the Environment, Community and Local Government's waste policy, *A Resource Opportunity: Waste Management Policy in Ireland*, provides a roadmap on how Ireland will move away from an overdependence on landfill, by putting in place the most appropriate technologies and approaches to reduce waste, while at the same time maximising the resources that can be recovered from waste. The policy recognises the importance of waste as an energy resource opportunity in terms of recovery, and the need to develop efficient ways to harness that resource. The introduction of household food waste regulations in driving the rollout of the "brown bin" will, for example, assist in the diversion of food waste towards more productive uses, such as composting and the generation of electricity through AD.

Figure 5. Anaerobic Digestion Plant supported by REFIT 3, Shanagolden, Co. Limerick (Source: McDonnell Farms Biogas Ltd)



Central to waste policy is Ireland's commitment to implement the waste hierarchy, set out in the Waste Framework Directive, by aiming for more **prevention, reuse and recycling** so that we reduce the impact of waste on the environment. Next in the waste priority order is **recovery**, which relates to the use of certain waste materials in order to replace fossil fuel use in the generation of energy, such as the production of electricity by waste to energy and AD plants. At the bottom of the hierarchy is **disposal**, which in Ireland generally involves waste being sent to landfill. Landfilling involves resources being buried and wasted without the possibility of recovery. This results in risks such as emissions from methane, leachate, and groundwater contamination, having to be closely monitored and managed. An important objective of Ireland's waste policy is to move from an over-reliance on unsustainable disposal to the virtual elimination of landfill as a waste management option, in favour of more sustainable waste management approaches.

Figure 6. Waste Hierarchy (Source: EPA)

However, the diverting of biodegradable material from landfill to more productive and useful purposes such as producing energy remains a challenge. Key policy measures and actions being brought forward to address this include the landfill operating guidelines, the landfill levy, and the food waste regulations. A key principle underpinning the making available of waste for energy is to ensure that material which could be reused or recycled is not drawn down the waste hierarchy and that waste generation is not encouraged in order to feed energy recovery processes. The implementation of the policy will require the proactive engagement of all of the key stakeholders, from individuals and households through to business and industry, and also regulatory agencies, to ensure its success.

Clean Air Policy

While bioenergy can contribute to reduced greenhouse gas emissions and enhance carbon sequestration, there are certain combustion emissions that require management. In addition, it must be noted that some bioenergy technologies such as AD can contribute to methane reduction targets as proposed in the Clean Air Policy Package and so offer wider environmental benefits. Biomass combustion

generates a range of air pollutants, with the scale of emissions depending to varying degrees on the quality of the fuel input, the conversion technology used, and how the technology has been installed, maintained and managed. These include fine particulate matter (PM_{2.5}), persistent organic pollutants (POPs) and nitrogen oxides (NO_x).

In order to protect our health, vegetation and ecosystems, EU Directives set down minimum air quality standards in Ireland and the other Member States for a wide variety of pollutants. These rules include how we should monitor, assess and manage ambient air quality as well as legally binding standards. The *Ambient Air Quality and Cleaner Air for Europe Directive* sets legally binding standards for a range of air pollutants including PM_{2.5}. The Directive also requires that where existing pollutant levels are below prescribed limit values, existing air quality standards must be maintained, and that a Member State could be deemed to be in breach of the Directive in the event of deterioration in air quality standards, even though pollutant levels continue to remain below set limit values.

Furthermore, the Directive requires that Member States take all necessary measures, not entailing disproportionate costs, to reduce exposure to PM_{2.5}. Although Ireland's PM_{2.5} concentrations are in general lower than the EU average, they must be further reduced by 10% by 2020. The EPA, as the national competent authority for the implementation of the Directive, has established a National Emissions Reduction Target stakeholder workshop group to assist in developing a coordinated strategy for achieving the 2020 target. The group is comprised of representatives from relevant Government departments, State agencies and local authorities.

The *National Emission Ceilings Directive* sets overall national ceilings for a range of air pollutants to be achieved from 2010. The ceiling for NO_x, which has proved challenging

for Ireland, has been exceeded each year since 2010 and has triggered a review of potential additional measures to achieve compliance. The *Industrial Emissions Directive* aims to achieve significant benefits to the environment and human health by reducing, inter alia, harmful air pollution emissions across the EU, in particular through application of “best available techniques” to industrial sources. The EU’s *Seventh Environment Action Programme* commits to achieving EU ambient air quality in line with World Health Organisation standards by 2020, which will require air pollution emissions reductions below current levels in Ireland.

The EU recently launched the Clean Air Policy Package to revise current policy. The new policy proposals include a revision of the *National Emission Ceilings Directive* to establish challenging new ceilings for 2020, 2025 and 2030, including for PM_{2.5} and NO_x; and to regulate medium-scale combustion installations (1 - 50 MW) to complement the existing regulation of large-scale combustion installations (50 MW plus) under the *Industrial Emissions Directive*. These developments highlight the imperative to encourage the use of low-emission biomass combustion technologies.

International Development and Land Use

In terms of broader environmental and societal acceptance, challenges arise with respect to the potential of biomass to compete for land use with food in Ireland, the EU and third countries. This competition is likely to become increasingly important, given that it is estimated that global food production must increase by 50% by 2030 in order to feed a projected world population of 8 billion.

One World, One Future: Ireland’s Policy for International Development sets out a vision for a sustainable and just world, where people are empowered to overcome poverty and hunger and fully realise their rights and potential. It aims to enhance the coherence of Government policies in the area of international development, and achieve a more focussed approach across all Government departments that harnesses the particular contributions, expertise and knowledge that each can offer. Two 2008 reports, *Biofuels and Developing Countries: with a focus on sub-Saharan Africa* commissioned by the Advisory Board for Irish Aid and the *Hunger Task Force Report to the Government of Ireland* (Irish Aid), highlight the importance of policy coherence in order to ensure that biofuel use in Ireland does not impede the achievement of the United Nations’ *Millennium Development Goals* and lead to adverse impacts on the developing world in terms of food security. The European Commission’s *Energy Roadmap 2050* signals that bioenergy which does not compete for land use with food production should be promoted.

It is clear that the sustainability of biomass will continue to be a critical consideration in the development of bioenergy policy. Liquid biofuels must already comply with strict sustainability criteria for land-use and greenhouse gas emissions. The outcome of the proposal by the European Commission to address the potential impact of ILUC, caused by certain categories of biofuel, will make the achievement of the renewable transport target more challenging, given the still early stage of development of advanced or second generation biofuels. The proposal has the potential to limit the availability of biofuels for Member States. The European Commission has also signalled its intention to introduce sustainability criteria that will apply to solid and gaseous biomass used in the heating and electricity sectors. A legislative proposal in this area will also potentially affect resource availability and cost, particularly for biomass sourced from non-EU countries.

Energy Conversion Efficiency

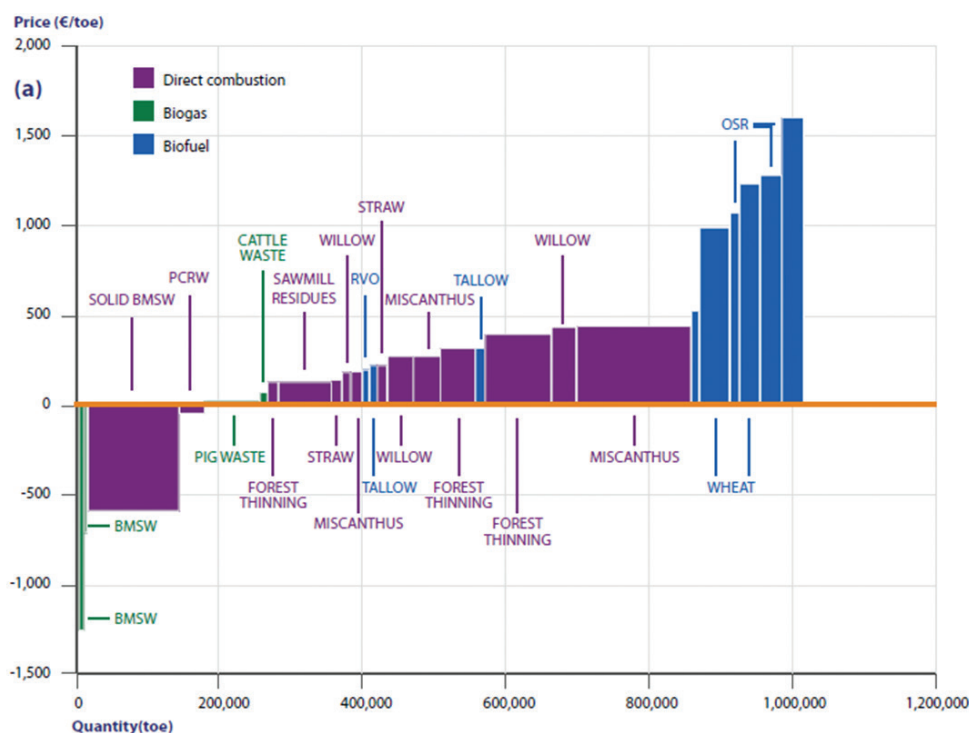
Given the potentially constrained supply of sustainable biomass into the future, the efficiency of energy transformation is an important consideration. To achieve Ireland's 2020 renewable energy targets, approximately 1,000 ktoe of bioenergy may be required as part of gross final consumption. Taking energy conversion efficiency into account, this equates to over 1,200 ktoe of primary bioenergy resource. Conversion efficiency varies across the electricity, heat and transport sectors, and across technologies. The largest difference between primary and final energy consumption occurs in the electricity sector, where conversion efficiencies are significantly lower. Innovation is key to ensuring the efficient use of biomass, and it is important to put in place policies and measures that incentivise the use of biomass installations with high energy conversion efficiencies. It is also important to inform consumer choice in favour of energy efficient biomass installations.

Biomass: An Internationally Traded Commodity

Biomass, unlike other sources of renewable energy, is reliant on fuel supply chains for a scarce resource and consequently can have a relatively high fuel commodity cost. While there are considerable bioenergy resources in Ireland, and the climate and soil conditions are well suited to certain categories of biomass, production challenges remain. In particular, large scale biofuel importation is likely to be required in the short to medium term if demand is to be facilitated ahead of indigenous supply.

As stated above, approximately 1,000 ktoe of bioenergy will be required to meet Ireland's 2020 renewable energy targets. Of this, heating will require 475 ktoe, transport 370 ktoe, with the remaining 155 ktoe required for electricity. The extent to which there will be development of domestic resources to meet demand will be dependent on the price of biomass. Analysis shows current market prices range up to about

Figure 7. Bioenergy Supply Curve for Ireland 2020 (Source: SEAI)



€250/toe depending on the resource and that a price of €420/toe could bring 850 ktoe of domestically sourced bioenergy to market by 2020, which would be mainly suitable for use in the electricity and heat sectors. The analysis goes on to further suggest that, depending on the price of biomass, there could be up to 3,000 ktoe of domestically sourced biomass available by 2030 if barriers to its mobilisation can be addressed.

International markets for bioenergy resources are likely to strongly influence the bioenergy market in Ireland. The market price for internationally-traded biomass products is determined by a variety of factors, including the support tariffs in place in other jurisdictions. This means that Ireland, in effect, will remain a price taker for certain categories of biomass and that domestic support schemes will be competing with support schemes in other jurisdictions for certain categories of biomass. Depending on international prices, biomass produced here could ultimately be exported to locations where the support tariffs for technologies, for which the biomass is suitable, are higher than in Ireland, and biomass users in Ireland could be importing lower cost alternatives.

Job Creation and Innovation

The *Strategy for Renewable Energy: 2012 – 2020* recognises that the development of biomass energy will encourage the establishment of new rural enterprises and support job creation in the regions, using our existing and potential indigenous resources. Forest harvesting residues and thinnings, as well as dedicated energy crops such as miscanthus and willow, and farm wastes, all provide additional opportunities, while wastes such as used cooking oil, and meat and bone meal, which previously incurred disposal costs, can now be converted into biofuels for transport or used to generate renewable electricity and heat.

Job Creation

A report, *The Economic Benefits from the Development of BioEnergy in Ireland to meet 2020 Targets*, commissioned by SEAI and the Irish BioEnergy Association, was published in 2012. This report confirmed that there are significant economic benefits that could be delivered as a result of the development of the bioenergy sector in Ireland. In total, it is estimated that almost €1.5 billion in direct investment in biomass processing infrastructure

Figure 8. Miscanthus Harvesting (Source: SEAI)



and equipment will be required over the period to 2020 to deliver the output needed to meet our renewable energy targets. Of this, approximately 55% would be spent in the Irish economy (the balance being imported plant and equipment). In addition, once fully operational, almost €430 million would be spent annually on operating these facilities. In terms of employment, almost 8,300 work years would be generated throughout the domestic economy during the construction and installation of the various facilities required to deliver on the targets. Permanent on-going employment generated by the sector would grow to over 3,600 full-time equivalents by 2020. This includes employment in the facilities themselves, in supply industries and in the wider economy. These figures record the net or incremental employment impacts across the different sectors only. In some instances, for example, the net impacts may be relatively modest as they are to a large degree securing the employment associated with existing activities.

Figure 9. Willow Planting (Source: Teagasc)



In terms of impact on the rural economy, the report found that a very significant proportion of the employment generated in both the construction and operation of the bioenergy facilities and infrastructure will be in rural Ireland. Most of the facilities themselves will be based in rural areas, and most of the feedstock will be

grown or produced there. The bioenergy sector can, therefore, offer farmers and other rural-based businesses new opportunities and provide alternatives to traditional farming activities. Revenue generated from the production of bioenergy feedstocks or from the sale of energy produced from bioenergy resources can help to sustain farm incomes and, because the majority of this income will be spent locally, will help to maintain income and employment within the wider rural community. This will, in turn, contribute to sustaining rural communities and help deliver more balanced regional economic development.

Innovation

Given the sustainability challenges that bioenergy faces in terms of air quality issues, land-use and energy conversion efficiency, innovation is key to the future development of the sector. It is important that research, development and demonstration activities focus on areas such as the potential of biogas and biomethane to play an important role in contributing to Ireland's renewable energy targets, reducing reliance on land-based feedstocks and mitigating ILUC impacts, and the development of advanced or second generation biofuels. In this regard, Ireland has world-class biomass research facilities and a history of conducting significant research into biomass production, conversion and end-use. It remains a key priority of energy policy that appropriate bioenergy research is carried out in Ireland along the entire innovation chain from basic research to pre-commercial demonstration.

Section 2

Next Steps



Next Steps

It is evident from the breadth of policy context set out in Section 1, that the development of the bioenergy industry in Ireland cuts across a wide range of sectors, bodies and stakeholders, from energy policy to agricultural land-use, to waste recovery, to environmental sustainability. Alongside a range of State bodies and activities which must interact with regard to bioenergy, stands the critical factors of legitimate public interest in, and EU and international obligations regarding, the protection of our environment in tandem with the commercial exploitation of our bioenergy resources, to the ultimate benefit of Ireland as a whole. Safeguarding the public interest, while realising the benefits of the commercial development of our bioenergy resource, is the overarching priority for the Government, and therefore, it informs every aspect of this Draft Bioenergy Plan.

Bioenergy Principles

To this end, and in the light of the diversity of interests and stakeholders involved, the following core principles are set out as being necessary to underpin the work that is required to implement the Bioenergy Plan and advance the sustainable development of Ireland's bioenergy resources:

- Policies that support bioenergy should deliver genuine carbon reductions and help Ireland to meet its carbon emissions and renewable energy objectives to 2020 and beyond.
- Policies must be economically and financially feasible, and cost effective. All policies, including taking no action, will attract a cost either now or post 2020. Taking no action now may result in higher costs in terms of achieving objectives for the post-2020 period. This plan is framed by the limited scope for direct Exchequer support and an imperative that policies are as cost-effective as possible.

- The use of scarce resources should be optimised and policies should take account of the availability of biomass domestically and internationally, including the potential impact that the demand for biomass can have on land-use change in Ireland and abroad.
- Bioenergy policies should contribute to wider environmental policy objectives. Bioenergy supports should be designed in a manner that assists in managing the particulate, POPs and NO_x emissions that are associated with the combustion of biomass. Bioenergy supports should also maximise the wider environmental co-benefits such as reduction and control of methane.
- Bioenergy supports should afford a degree of certainty for investment in the sector. Central to achieving policy objectives will be the extent to which policy actions directly and indirectly offer certainty and predictability for the principal actors and engender investor confidence.
- Bioenergy supports should seek to optimise enterprise and employment opportunities.
- The governance of the Bioenergy Plan must be in line with best practice, with robust and transparent reporting mechanisms.

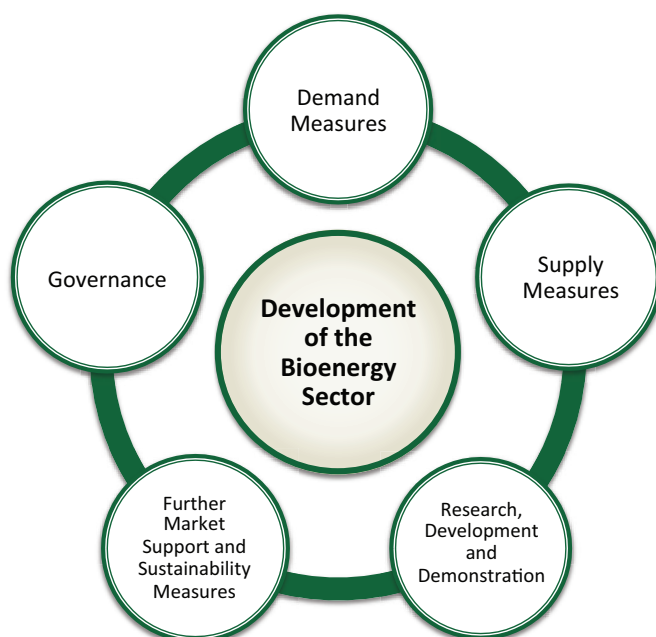
Policy Actions and Enablers

Taking full account of the energy, agricultural, environmental and economic development issues identified, the following policy and enabling actions, along with responsible bodies and completion timeframes, have been identified as key to the development of the bioenergy sector.

The bioenergy actions and enablers to be pursued fall into five broad high-level categories:

- demand-side measures that contribute directly to delivering renewable energy;
- supply-side measures that address the supply-chain challenges faced by domestic producers of biomass and enable the supply of the resources necessary to meet demand over the medium and long term;
- research, development and demonstration;
- further market support and sustainability measures; and
- governance.

Figure 10. Categories of Bioenergy Actions and Enablers



Demand Measures

1. Introduce a Renewable Heat Incentive (RHI):

Section 1 outlined that estimates by SEAI show that current policies will not deliver 12% renewable energy in the heat sector by 2020, indicating that additional action is required. The estimated shortfall will be in the region of 2 to 4 percentage points of the 12%, equating to approximately 200 ktoe or 2,300 GWh. This represents about 1 to 2 percentage points in terms of the overall national target of 16% mandated to Ireland under the 2009 Renewable Energy Directive. Analysis of various options, including increased carbon taxes, indicated that the option with the least modelled cost is an appropriately focussed RHI. This would provide stability and long term security for investors, ensure better value for money for consumers, and have a significant positive impact on non-ETS sector emissions. It is proposed, subject to State Aid clearance from the European Commission and further Government approval once the scheme is designed, that the Minister for Communications, Energy and Natural Resources introduce from 2016 an Exchequer-funded incentive scheme for larger non-ETS industrial and commercial renewable heating installations. The scheme will be designed to reward users for each unit of renewable heat used from sustainable biomass, and to deliver the additional heat required in the context of meeting 12% of heat demand from renewable sources by 2020. The scheme will be kept under review to assess its effectiveness.

Responsibility: DCENR

Timeline: 2016

2. Continue to Implement REFIT 3:

The successful implementation of REFIT 3 will remain a central goal of bioenergy policy. The REFIT 3 scheme was introduced in 2012 in order to stimulate the installation of 310MW biomass electricity technologies including AD, CHP, and co-firing of biomass with peat. The tariff levels and structures were designed to encourage the efficient use of biomass, and have higher tariffs rewarding high efficiency cogeneration. The market certainty afforded by the scheme allows generators to enter into long-term supply contracts for biomass, stimulating demand for a range of energy crops, further afforestation, forestry material, post-waste recovered wood and other dry wastes. REFIT 3 will be kept under review to ensure it is contributing to meeting 40% of electricity demand and 12% of heat demand from renewable sources by 2020, and to assess the most cost-effective way to support co-firing of biomass with peat and possibly other fossil fuels in electricity generation out to 2030.

Responsibility: DCENR

Timeline: Ongoing

3. Explore Green Procurement Opportunities:

The publication of the Government's Action Plan on Green Public Procurement, *Green Tenders* in 2012, put in place a national green public procurement policy. It identifies eight priority areas, including energy, transport and construction. Green public procurement can be a major driver for innovation, providing industry with real incentives for developing green products and services, particularly in sectors where public purchasers represent a large share of the market such as construction, health services or public transport. The Bioenergy Steering Group (BSG) will engage with relevant stakeholders to prepare a report on economically feasible green procurement

opportunities, including, for example, public sector buildings converting to bioenergy heat supply contracts.

Responsibility: BSG

Timeline: 2015

4. Inform Consumer Choice in Favour of Energy Efficiency:

SEAI will continue to maintain and promote the Home-heating Appliance Register of Performance and Energy Efficient Exemplar databases which contain, inter alia, listings of biomass appliances for both the domestic and non-domestic sectors respectively. These registers empower prospective buyers with details on appliance performance. SEAI also advise consumers of the applicable standards as they relate to wood fuel. Work is ongoing between the Department of Communications, Energy and Natural Resources, SEAI and NewERA to implement a Better Energy Finance scheme to encourage energy efficiency in domestic dwellings, including the use of clean and efficient biomass technologies.

Responsibility: DCENR, SEAI, EPA and NewERA

Timeline: Ongoing

Figure 11. Logo for Better Energy Homes Scheme (Source: SEAI)



5. Continue to Implement the Biofuel Obligation Scheme:

The *Biofuel Obligation Scheme* will remain the central means by which Ireland's 2020 10% renewable transport target will be met. The scheme, which was introduced in 2010, is designed to establish a stable and secure regulatory regime for biofuel use, and to provide the framework to deliver progressively higher penetrations of sustainable biofuel out to 2020. The obligation was increased to 6% by volume in January 2013. Pending the outcome of the proposal by the European Commission to address the potential impact of ILUC caused by certain categories of biofuel, a consultation will be undertaken with all relevant stakeholders to agree on a sustainable and achievable trajectory of biofuel obligation increases, to meet the 10% renewable transport target by 2020. The availability of sustainable and cost-effective biofuels with a low risk of ILUC effects will be a critical consideration in this regard.

Responsibility: DCENR

Timeline: 2015

6. Continue to Examine the Potential Energy Efficiency Measures in the Transport Sector:

In the context of the restrictions on the availability of sustainable biofuels, potential energy efficiency measures in the transport sector will continue to be examined in order to reduce the quantity of biofuels required to achieve the 2020 10% renewable transport target.

Responsibility: DTTS

Timeline: Ongoing

Supply Measures

7. Continue to Support the Afforestation Programme, including Improved Access to and Mobilisation of Forest Materials:

The Department of Agriculture, Food and the Marine will continue to support the Afforestation Programme including considering how best to bring forward the recommendation in *Forests, products and people*, to increase the forest area in accordance with sustainable management principles. This will underpin a long term sustainable roundwood supply of 7 to 8 million cubic metres per annum, of which 1.45 million cubic metres is forecast to be available for energy purposes in 2020. An increase to 1.75 million cubic metres is envisaged by 2028. The main focus will be to increase the level of annual afforestation. This will ensure a sustainable level of future wood supply for the forest-based biomass energy sector. However, forests planted between now and 2020 will bring very little additional biomass to market in the period to 2020. Additional biomass will begin to come on stream from 2025 at the earliest.

Responsibility: DAFM

Timeline: Ongoing

8. Establish BioEnergy Ireland as a Biomass Joint Venture:

BioEnergy Ireland will be established as a biomass joint venture between Bord na Móna (BnaM) and Coillte to procure biomass at market rates from all sources including Coillte Forest, private forests and elsewhere. This product will be offered to the entire market, including BnaM and Coillte subsidiaries, based on market pricing in a manner that optimises the supply chain. The joint venture will be structured to economically incentivise Coillte to engage with private sector suppliers.

Responsibility: DPER, NewERA, DCENR, DAFM, BnaM and Coillte

Timeline: 2014

Figure 12. Forest Harvesting (Source: IEA)



9. Explore Opportunities for Additional Bioenergy Funding:

Additional funding will be required in the period to 2020 to fund the establishment of the bioenergy sector. The Department of Agriculture, Food and the Marine will continue to support funding for the *Bioenergy Scheme* under the *Rural Development Programme 2014 – 2020*. The Department of the Environment,

Community and Local Government (DECLG) and NewERA will respectively explore opportunities for potential funding support under the LEADER Programme and other market based funding solutions for developing the supply chain in order to help mobilise biomass. This includes support for proposals for AD; district heating projects; bioenergy co-operatives; and processing and trade centres for biomass resources. In addition, the EU's funding instrument for the environment and climate action (LIFE Programme), offers opportunities for co-financing innovative projects that contribute to high quality biomass burning applications and their proper use, as well as to projects demonstrating new and sustainable approaches for the production and consumption of biomass. DECLG, in its role as LIFE national contact point, aims to promote the programme as widely as possible, to engage all stakeholders and facilitate potential applicants from concept through to application stage.

Responsibility: DAFM, DECLG and NewERA
Timeline: Ongoing

10. Continue to Encourage the Innovative Use of Animal By-products for Bioenergy:

The Department of Agriculture, Food and the Marine will continue to encourage and facilitate the innovative use of animal by-products for energy production in accordance with EU regulations, including through combustion and as biogas. Relevant Government departments and agencies will continue to work together in the Cross Agency Animal By-products Group, and in cooperation with industry, through appropriate structures, including through the Consultative Forum on the Use of Animal By-products. DAFM will engage with the agri-food sector, particularly with regard to new agri-food enterprises in terms

of using their waste product for energy production. Any such process of licensing the innovative use of animal by-products for energy production will need to be streamlined to minimise cost.

Responsibility: DAFM

Timeline: Ongoing

11. Continue to Optimise the Availability of Waste for Energy:

The Department of the Environment, Community and Local Government, with the proactive engagement of all the key stakeholders from individuals and households through to business and industry and the regulatory agencies, will endeavour to ensure the full implementation of the actions set out in *A Resource Opportunity: Waste Management Policy in Ireland*. The policy recognises the importance of waste as an energy resource opportunity in terms of recovery, and the need to develop efficient ways to harness that resource, such as through the generation of electricity by waste to energy and AD plants. The diverting of biodegradable material from landfill to more productive and useful purposes such as producing energy remains a challenge. Key policy measures and actions being brought forward to address this include the landfill operating guidelines, the landfill levy, and the food waste regulations. A key principle underpinning the making available of waste for energy is to ensure that material which could be reused or recycled is not drawn down the waste hierarchy, and that waste generation is not encouraged in order to feed energy recovery processes.

Responsibility: DECLG

Timeline: Ongoing

Research, Development and Demonstration

12. Continue to Support Research in Bioenergy:

Ireland has world-class biomass research facilities and a history of conducting significant research into biomass production, conversion, and end-use. It remains a key priority of energy policy that appropriate bioenergy research continues to be carried out in Ireland along the entire innovation chain from basic research to pre-commercial demonstration. To facilitate this:

- The **Department of Communications, Energy and Natural Resources** will guide the various funding departments and agencies on bioenergy research policy priorities. The Department will also give guidance to bioenergy researchers intending to access support under *Horizon 2020: The EU Framework Programme for Research and Innovation*.

Responsibility: DCENR

Timeline: Ongoing

- The **Sustainable Energy Authority of Ireland** will continue to support the development of bioenergy through its *Renewable Energy Research, Development and Demonstration Programme*.

Responsibility: SEAI

Timeline: Ongoing

- The **Department of Agriculture, Food and the Marine** will explore opportunities for research, development, and demonstration projects in the bioenergy sector (including establishing linkages with other EU Member States), accessing funding available from sources such as the *Research Stimulus Fund*, the *Council for Forest Research and Development (COFORD) Research Programme*, and the *European Innovation Partnership on Agricultural Sustainability and Productivity*. In cooperation with DAFM, **Teagasc** and other relevant third level institutions will continue engaging in bioenergy research, development, demonstration, training and advice provision, including in relation to the forest-based biomass supply chain. In particular, Teagasc will continue to engage with the farming community through bioenergy research programmes and knowledge transfer to help develop the required biomass supply chains. COFORD has also established a Wood Mobilisation Group which will report on the potential to improve the mobilisation of projected increases in Ireland's roundwood resource.

Responsibility: DAFM, Teagasc and Third Level Institutions

Timeline: Ongoing

Figure 13. Biotechnology, Crops Research Centre, Oak Park, Carlow (Source: Teagasc)



13. Conduct an Economic Assessment of the Costs and Benefits of Biogas and Biomethane:

Biogas and biomethane have a potentially important role to play in contributing to Ireland's renewable energy targets, reducing reliance on land-based feedstocks and mitigating ILUC impacts. They could also have a potential role for controlling methane emissions under the proposed EU Clean Air Policy Package and contributing to agricultural non-CO₂ emissions reductions under the proposed climate and energy framework. However, initial analysis indicates that it may be in a post-2020 context that they become cost-effective in contributing significantly to renewable energy targets. For example, while a biomethane injection into the national gas grid is technically feasible, it would currently be very costly to support. Therefore, a detailed economic assessment of biogas and biomethane will be undertaken to identify the energy sectors where they can be cost-effectively deployed, the appropriate time horizon for such deployment, and the least-cost supports that would be required. The assessment will also address barriers to deployment, including the type and availability of feedstocks, and the means of distributing the gas and its potential end-use markets. Based on the analysis, appropriate policy options will be developed in consultation with relevant stakeholders, including the possible introduction of a tariff to support the injection of biomethane into the national gas grid, and potential demonstration projects for the use of biomethane with compressed natural gas in public transport and the freight sector.

Responsibility: BSG

Timeline: 2015

Further Market Support and Sustainability Measures

14. Continue to Support Bioenergy through Taxation Policy:

Taxation policy is currently used to directly and indirectly support a range of renewable energy technologies, including bioenergy. Examples include the Carbon Tax, Vehicle Registration Tax and Accelerated Capital Allowances. The BSG will, in consultation with the Department of Finance and other relevant stakeholders, consider and report on further cost-effective opportunities to support bioenergy development through taxation policy. For example, this could be done by supporting clean and efficient bioenergy technologies through Accelerated Capital Allowances, or partial relief from the carbon tax for clean (smokeless) biomass blends of solid fuels, to support a move away from dirtier, more carbon intensive home heating fuels.

Responsibility: BSG

Timeline: 2015

15. Ensure Use of Sustainable Forest Material:

The *EU Timber Regulation* came into force in March 2013 with the objective of minimising the risk of placing timber and timber products from illegal sources on the EU market. As the designated competent authority, the Department of Agriculture, Food and the Marine will implement the regulation in Ireland. The regulation prohibits the placing of illegally harvested timber and products derived from such timber on the EU market. The regulation defines “operators” as those who place timber or timber products on the EU market **for the first time**, and requires them to put in place a risk management system which contains three key elements relating to information, risk assessment and risk mitigation. The

regulation also defines “traders” as those who sell or buy timber or timber products **already placed on the EU market**. They are required to keep information about their suppliers and customers so that the timber products can be traced if necessary. Both operators and traders may be subject to inspection by the competent authority to ensure that they fulfil their obligations under the regulation. The regulation applies to both domestic and imported timber and timber products in the EU, and covers a wide range of such products including fuel wood. Its implementation will ensure that fuel wood brought to market in Ireland is derived from legal sources.

Responsibility: DAFM

Timeline: Ongoing

16. Continue to Endorse the Industry Developed Wood Fuel Quality Assurance Scheme:

The Department of Agriculture, Food and the Marine will support the industry-led development of standards related to wood fuels covering harvesting, use, and quality across the entire production process for bioenergy feedstocks. These standards will provide consumer assurance as to wood fuel quality.

Responsibility: DAFM and Industry

Timeline: Ongoing

17. Address the Possible Air Quality Risks Associated with Biomass Combustion:

This is a technically complex area requiring further research and cross-sectoral coordination. The BSG, working with all relevant stakeholders, will ensure at the design stage of the proposed RHI scheme that appropriate quality standards for fuel and conversion technologies are incorporated in the scheme to mitigate the possible particulate matter (PM_{2.5}), POPs and NO_x emissions that are associated with the combustion of biomass.

Responsibility: BSG

Timeline: 2016

18. Continue to Support Measures to Reduce the Risk of Indirect Land-use Change (ILUC) from Biofuel Use:

The Department of Communications, Energy and Natural Resources will continue to seek to minimise the risks of ILUC from the use of food-based biofuels, and support measures that incentivise the use of advanced biofuels. The Department will transpose the Directive when agreed, following consultation with stakeholders, in a manner that takes into account the need to meet Ireland's legally binding renewable energy target in the transport sector in a cost-efficient and sustainable manner.

Responsibility: DCENR

Timeline: Ongoing

Governance

19. Put in place a robust Governance Structure for the Bioenergy Plan:

A robust governance structure is critical to achieving the level of cross-Government cooperation necessary for the delivery of the Bioenergy Plan. A BSG will be established and chaired by the Department of Communications, Energy and Natural Resources to oversee the actions that fall within the remit of the Department and such other cross-Government actions as agreed in consultation at the steering group. The group will report to the Minister for Communications, Energy and Natural Resources and will ensure efficient mechanisms are put in place for the coordination of the implementation of the Bioenergy Plan. The Steering Group will include representation from the Department of Communications, Energy and Natural Resources, the Department of Agriculture, Food and the Marine, the Department of the Environment, Community and Local Government, the Department of Transport, Tourism and Sport, SEAI, NewERA, the EPA, the National Parks and Wildlife Service and industry representation. Other stakeholders will be consulted as appropriate. The Steering Group will be responsible for drawing up a work programme, and reporting on progress periodically to the Minister for Communications, Energy and Natural Resources. The Steering Group will oversee an interim review of the Bioenergy Plan in 2017, with a full review to be carried out in 2020.

Responsibility: DCENR

Timeline: 2014

Glossary

Advanced Biofuels/Second Generation Biofuels: Biofuels typically produced from non-food feedstocks such as wastes and residues (i.e. wheat straw, and municipal waste), non-food crops (i.e. grasses, such as miscanthus) and algae. Most technologies are at pilot scale or in development.

Anaerobic Digestion (AD): The breakdown of organic waste by bacteria in an oxygen-free environment. The waste/feedstock is placed in an airtight container (digester) along with bacteria. Depending on the waste and system design, biogas typically contains 55 – 75% pure methane. This biogas can be upgraded to fossil (“natural”) gas standard, which typically contains 70 – 96% methane. The liquid fraction of the remaining digested feedstock can be returned to the land as a fertiliser and solid fibre used as a soil conditioner.

Animal By-product: The entire bodies or parts of animals, products of animal origin or other products obtained from animals, which are not intended for human consumption.

Bioenergy: Energy derived from the conversion of biomass where biomass may be used directly as fuel, or processed into liquids and gases.

Biofuel: Liquid or gaseous fuel for transport produced from biomass.

Biomass: Biodegradable fraction of products, waste and residues of biological origin from agriculture, forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste. Biomass can be used in all three energy sectors: electricity, heat, and transport.

Co-firing: The combined burning of bioenergy feedstocks with conventional fossil fuels such as peat or coal.

Combined Heat and Power (CHP): The simultaneous generation in one process of thermal energy and electrical or mechanical energy.

Combustion: This is the simplest way to produce heat energy from biomass. The heat, often in the form of steam, can be converted to electricity and/or it can be used for heating houses and buildings.

District Heating (DH): A local heating network usually facilitated through underground pipes and a centralised heat source.

Emissions Trading System (ETS): The EU ETS was established in 2003 by Directive 2003/87/EC and it is the largest emissions trading system in the world. The main form of emissions trading is known as “cap and trade”: a cap on emissions is set and then permits are created up to the level of this cap. The companies or other entities covered by the scheme need to hold one permit for every tonne of pollution (CO₂) they emit. Trade in these permits puts a price on pollution – the cost of emitting one tonne of carbon dioxide is the cost of the permit – and creates flexibility as to how and where pollution is reduced. In the Irish context, the system covers over 100 large point source installations, responsible for approximately 28% of carbon dioxide emissions. It is the main policy tool in respect of emissions from power generation and industry. The EU ETS is central to the EU policy to address climate change in that it delivers abatement where it is most cost effective. Approximately 72% of Irish EU ETS emissions in Phase II are related to power generation, a further 13% to cement and other building material manufacture, and the remainder arise across a variety of sectors. Since 2012 the aviation sector is also reporting its emissions under the scheme.

Energy Crops: Biomass, such as miscanthus and willow, grown specifically for energy purposes. The Department of Agriculture, Food and the Marine has administered a *Bioenergy Scheme* since 2007 to provide grant-aid to support the establishment of the energy crops miscanthus and willow. This scheme operated as an Exchequer funded pilot scheme from 2007 to 2009 and has been an EU co-funded measure under the Rural Development Programme since 2010. As of the end of 2013, the scheme has grant-aided the establishment of over 2,400 hectares of miscanthus and over 900 hectares of willow.

Energy from Renewable Sources: Energy from renewable non-fossil sources, namely wind; solar; aerothermal; geothermal; hydrothermal and ocean energy; hydropower; biomass; landfill gas; sewage treatment plant gas; and biogases.

Greenhouse Gas (GHG): Gases (such as water vapour, CO₂ and methane) that contribute to the greenhouse effect by absorbing infrared radiation (heat).

Gross Final Consumption (GFC): The Renewable Energy Directive defines gross final consumption of energy as the energy commodities delivered for energy purposes to manufacturing industry, transport, households, services, agriculture, forestry and fisheries, including the consumption of electricity and heat for electricity and heat production and losses of electricity and heat in distribution.

Ktoe: Kilo tonnes of oil equivalent (i.e. a thousand tonnes of oil equivalent).

Non-ETS: The non-ETS sectors cover those sectors that are outside the EU Emissions Trading System and include the agriculture, transport, residential and waste sectors.

RES: Energy from renewable sources in Gross Final Consumption. Ireland must ensure that this is 16% by 2020.

RES-E: Energy from renewable sources in the electricity sector. Ireland is required to achieve 40% by 2020.

RES-H: Energy from renewable sources in the heating/thermal sector. Ireland aims to achieve 12% by 2020.

RES-T: Energy from renewable sources consumed in the transport sector. All EU Member States must ensure that this is 10% of final consumption by 2020.

Roundwood: Wood in its natural state as felled, with or without bark. It may be round, split, roughly squared or in other forms.

Teagasc: The Irish Agriculture and Food Development Authority.

Thinning: The removal of a proportion of immature trees from a forest in order to improve the growth and form of the remainder.

Total Final Consumption (TFC): The total energy used by the final consuming sectors of industry, transport, residential, agriculture and services (excluding that used in the energy sector itself such as in electricity or oil refining).

Units of Energy


Joule (J): Joule is the international unit of energy. A **kilojoule (kJ)** is equal to 1,000 joules. A **gigajoule (GJ)** is equal to one billion (10^9) joules (or one million kilojoules).

Kilowatt Hour (kWh): The conventional unit of energy that electricity is measured by and charged for commercially. A **megawatt hour (MWh)** is equal to 1,000 kWh.

Tonne of Oil Equivalent (toe): This is a conventional standardised unit of energy and is defined on the basis of a tonne of oil having a net calorific value of 41,868 kJ.

Energy Conversion Factors

		toe	MWh	GJ
1 toe	=	1	11.63	41.868
1 MWh	=	0.086	1	3.6
1 GJ	=	0.02388	0.2778	1



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