Delivering Synergies between Renewable Energy and Nature Conservation

Messages for Policy Making up to 2030 and Beyond

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Authors:
Catherine Bowyer
Graham Tucker
Martin Nesbit
David Baldock
Andrea Illes
Kamila Paquel

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Executive Summary

The last decade has seen a transformation of electricity supply in Europe and rapid growth in the role played by renewable energy sources. These shifts owe much to EU climate and energy policy; the Renewable Energy Directive (RED) sets a binding target requiring each Member State to deliver a proportion of energy from renewables by 2020. This has proved a powerful lever to change patterns of supply.

The future policy framework to determine energy demand and supply in Europe is currently being designed in detail. Targets and governance structures that will determine the nature and ambition of climate and energy action for 2020 to 2030 are under development, with formal proposals anticipated in 2016. Now is, therefore, the right time to develop a more robust and finely tuned framework for delivering environmentally positive renewable energy in Europe. This must provide greater confidence in energy decarbonisation and offer improved protection of the wider environment at the same time.

The Climate Challenge

Human-induced climate change is not only a major challenge for current and future generations, but it has also been identified as the single most significant threat to global biodiversity. The effective development and deployment of renewable energy has a strong environmental rationale but the scale of expansion needed, and the associated grid infrastructure, will have a range of impacts over a considerable area of Europe. Safeguards are needed to ensure that these impacts are managed, that renewable energy is sited appropriately, that supporting infrastructure is well conceived and that decision-making reflects long-term pathways to decarbonisation.

Sustained and large-scale investment in renewable energy is essential to ensure wider transformation of the energy system. Critically, this shift in supply needs to be coupled to ambitious action to secure better demand side management and significantly improved energy efficiency. This will curtail the need to further increase energy supply and its associated environmental impacts.

As renewable energy installations and networks are established on a larger and rapidly expanding scale their impact on the environment can only grow. Measures to contain negative impacts need to be established alongside incentives for investors to roll out new capacity. Lessons from the past decade allow us to identify the nature of these impacts more precisely and to develop more effective measures to contain them. The protection of biodiversity is a particular concern given the expanding spatial distribution and density of renewable installations. This report reviews experience under the Renewable Energy Directive to date, outlines some of the lessons that can be identified, and sets out proposals for how the EU policy framework for the decade to 2030 could be strengthened.

Impacts on Biodiversity

The challenges to biodiversity protection (and other environmental media) associated with different renewable energy technologies are reasonably well understood. Many are easier to address than the impacts of conventional energy sources. The impacts of renewable energy development on biodiversity are highly dependent on scale and context in nearly every case; however, scale-impact relationships may not be linear. A certain level of habitat change or exploitation of a resource may have acceptable or manageable consequences, but as the intensity of exploitation increases impacts may change more or less proportionally (for example, if the impacts affect an increasingly significant proportion of a vulnerable habitat).

Five dimensions of biodiversity interactions with renewable energy have been identified in this report. These are intended to help policy makers take into account and mitigate negative impacts, and maximise any gains more effectively.

Five Dimensions of Renewable Energy Interaction with Biodiversity

Dimensions	Nature of the Interaction
Systemic environmental concerns	Renewable energy systems need to ensure the delivery of significant real world reductions in GHG emissions, taking account of the full supply chain. The impact of the energy sources including biomass feedstocks on natural resources, such as water and soil, should be taken into account in energy policy. Impacts will not be purely local.
Scale and capacity concerns	Taking account of the cumulative effects of expanding production pathways and transmission infrastructure as well as individual facilities is essential. The environmental capacity to take up both specific technologies and extended complexes of related facilities should be examined and respected.
Siting concerns	The particular impacts of a technology or installation, and the habitats and species that are sensitive to such impacts, need to be understood and the sensitivities reflected in appropriate siting.
Project design concerns	Beyond site specific considerations are design attributes including efficiency, performance, reliability, removability etc. Design decisions will help to determine the overall balance of biodiversity benefits during the lifetime of an installation, and whether interventions are reversible.
Ongoing management concerns	For static renewable sources the ongoing management of a site can be critical for minimising pressure on biodiversity and securing any positive outcomes. For biomass used as energy it is the source of feedstocks, and the many second order implications of deploying them for energy, that determine nearly all the environmental footprint.

Safeguarding Biodiversity

Policy measures are required to manage these impacts on biodiversity effectively alongside incentives to secure the investment in energy from renewables. A number of such measures are already established within EU environmental legislation including: the Environmental Impact Assessment (EIA) Directive and the Strategic Environmental Assessment (SEA) Directive; and legislation focused on the protection of biodiversity ie the Habitats and Birds Directives. These address some of the concerns set out above. However, these Directives need to be applied effectively by national and local authorities if they are to fulfill their potential role in managing the impacts of new energy infrastructure. There are opportunities to utilise some measures, such as the EIA and SEA Directives, more fully with regard to renewables.

At present the effectiveness of environmental protection legislation is limited by a lack of strategic and spatially explicit planning for energy transformation in much of Europe. In the absence of such clarity impacts of installations, interconnections and wider infrastructure are difficult to determine and efforts to establish more responsible, predictable and secure energy for Europe are compromised. A more explicit spatial dimension to renewables policies is, therefore, becoming increasingly urgent. This is needed both to steer a successful strategy of renewables deployment (by facilitating consideration of shared grid and interconnection requirements and providing investors with greater predictability) and to ensure that biodiversity and other environmental concerns are addressed.

Bioenergy, accounts for a large proportion of current renewable energy supplied in the EU. The use of biomass for energy raises environmental concerns and challenges that are different in terms of type, impacts and scale from other renewable technologies. Despite this biomass' use for energy is not subject to statutory or consistent EU wide safeguards. It is unclear whether the European Commission is planning to put forward proposals to establish such safeguards as part of the policy package now being developed for launch in 2016, but there are strong arguments for doing so. Appropriate action would rebalance and align environmental and energy goals; it would also provide investors with greater confidence by improving clarity as to the supply systems that will be judged acceptable into the future.

Driving Forward Renewable Energy in Europe

Keeping the required growth in renewable energy on track to 2030, in ways that are consistent with full energy system decarbonisation by 2050, demands a new vision for sustainable renewables with a clear European dimension. The framework the EU adopts must be designed to:

- Respect biodiversity and wider environmental protection goals;
- Recognise the spatially explicit nature of environmental impacts; and
- Secure genuine, lasting, climate mitigation.

EU policy for renewable energy, therefore, needs a clear, predictable and preferably binding framework for Member State action to address:

- The scale of the challenge involved in Europe's long-term decarbonisation;
- The level of private sector investment necessary; and
- The extent to which the energy market and physical environment gives rise to issues that cross national borders.

The current proposals for an EU level target, rather than nationally binding targets, post 2020 create a number of risks. In particular:

- A lack of clarity on the legal consequences of failing to deliver the target (or, worse, clarity that there will be no consequences), leading to less ambitious and less consistent approaches to renewable energy deployment across Member States;
- A lack of certainty for investors;
- Potential "free rider" behaviour by some governments relying on more ambition and investment elsewhere in Europe.

Despite political reservations from national governments, there is a role for enshrining a new system of governance for renewables in EU legislation post 2020 that is more proactive than currently envisaged. To deliver both renewable energy deployment and environmental protection we recommend that such a framework should include:

- Target setting for Member States, agreed at a European level based on objective criteria, rather than differing levels of Member State enthusiasm: this is needed to ensure adequate delivery, provide the greater confidence that investors need, avoid the risks posed by free rider Member States in the system, and support those Member States which have ambitions to go further;
- A more coherent single EU governance framework for delivering energy targets that recognises the important contribution that energy efficiency and associated demand management can make to EU decarbonisation objectives and in terms of limiting supply-side infrastructural needs;
- A requirement for Member States to plan for renewable energy deployment in, efficient ways that address not only decarbonisation but also: cumulative impacts on biodiversity and other aspects of sustainability; land use and resource constraints associated with certain technologies and the supporting energy infrastructure; and the need for effective monitoring of the cumulative impacts of renewable energy deployment;
- A strategy to make more effective use of existing environmental legislative instruments, particularly the SEA and EIA Directives (and supporting tools such as biodiversity mapping and spatial planning), in order to ensure that risks to biodiversity in the wider environment are identified early and avoided;
- The introduction of EU level sustainability criteria and associated requirements that apply to all biomass feedstocks used for energy. These should be designed to reflect both the relevant attributes of each feedstock and the scale of biomass use for energy that is environmentally responsible. These criteria should enable the differentiation of the most sustainable bioenergy pathways and provide a framework for appropriate patterns of future supply. There are several issues that do not arise so prominently, if at all, with other forms of renewable energy technologies. These differences should be reflected in other EU instruments that support renewable energy adoption including the EU ETS.

Contents

1. RENEWABLE ENERGY AND BIODIVERSITY PROTECTION – SYNERGIES BETWEEN ENVIRONMENTAL GOALS 7

2. RENEWABLE ENERGY AND BIODIVERSITY 10

2.1. What Does it Take to Deliver Environmentally Responsible Renewable Energy? 10

2.2. Renewable Energy and Biodiversity Interactions – Defining Five Dimensions 12

3. ASSESSING THE 2020 CLIMATE AND ENERGY PACKAGE POLICY – KEY LEARNING POINTS FOR 2030 14

3.1. Environmental Protection and the 2020 Climate and Energy Package – A Need to Further Integrate Climate and Environment Goals 15

3.2. Target Setting – The Impacts of Binding Commitments 15

3.3. Streamlining Permitting Requirements – Potential to Limit Environmental Risk and Increase Investor Certainty Remains Untapped 17

3.4. Monitoring and Reporting – A Basis for Assessing Delivery and Providing Oversight 18

3.5. Support Schemes – A Missed Opportunity to Deliver Added Value and Support Long Term Transition of the Energy System 19

3.6. Biofuels, Bioliquids and Bioenergy – Governance and GHG Accounting 21

4. THE ROLE OF EU ENVIRONMENTAL LEGISLATION 24

4.1. Strengths – Key Added Value for Responsible Deployment of Renewable Energy 25

4.2. Weaknesses – Limiting Effective Environmental Protection During Development 26

4.3. Opportunities for Improving Oversight - Ensuring Environmentally Responsible Development 27

5. A VISION FOR RESPONSIBLE, RENEWABLE ENERGY DELIVERY TO 2030 29

5.1. The 2030 framework – Renewable Energy and Energy Efficiency 30

5.2. The 2030 framework – GHG Emission Reduction, the EU ETS and Beyond 32

6. CONCLUSIONS AND RECOMMENDATIONS 34

6.1. Key Messages 34

6.2. Elements of the EU Climate and Energy 2020 Package to be Retained and Improved 36

6.3. Elements of the EU Climate and Energy 2020 Package to be Amended or Removed 38

6.4. New instruments needed at EU level for the 2030 Period and Beyond 39

6.5. The role of Member States Post 2020 41

APPENDIX 1 – EXAMINING BIODIVERSITY IMPACTS OF KEY RENEWABLE TECHNOLOGIES

APPENDIX 2 – SUMMARY OF KEY EU ENVIRONMENTAL LEGISLATION IMPORTANT IN ENABLING ENVIRONMENTALLY POSITIVE RENEWABLE ENERGY

1. Renewable Energy and Biodiversity Protection – Synergies between Environmental Goals

'The ultimate aim of this Convention [UN Framework Convention on Climate Change] is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner' Article 2 of the UNFCCC – defines dangerous climate change in the context of protecting global ecosystems[1]

The **aim of this study** is to provide positive input into the debate around the future rollout of renewable energy in Europe. **In order to fight climate change and the major threat this poses to biodiversity, to phase out the use of fossil fuels and to improve energy security, renewable energy solutions are essential.** The scale of deployment required for renewable energy sources, however, poses its own challenges. Without a clear, planned and robust policy framework the predictability of renewable energy uptake and associated carbon emission benefits are potentially undermined. Moreover, the individual and cumulative impacts of deployment on biodiversity and the wider environment would be addressed in a suboptimal way. These challenges can be met. The concern is that current approaches to the delivery of climate and energy targets, and those currently proposed for the period to 2030, do not put in place the mechanisms necessary to achieve this.

In future, **the risk of conflict between renewable energy deployment and environmental goals will increase as renewable energy use continues to expand, and the decarbonisation of energy supplies is pursued more decisively**. Impacts will be exacerbated by the likelihood that easy sites for renewables development will be in shorter supply, as a consequence of historic expansion. Now is the time, therefore, to develop a better, more robust framework for delivering environmentally positive renewable energy. Such a framework could deliver:

- ***Benefits for climate policy***, by providing a system that better guarantees the integrity of emission reductions, hence greater confidence in energy system decarbonisation;
- ***Enhanced environmental protection*** through a more coherent and effective consideration of environmental impacts associated with, in particular, the cumulative impacts of deploying renewable energy technologies and providing supporting energy infrastructure;
- A ***more transparent approach and secure basis for investment***, reducing uncertainty for investors; and
- ***Lower long-term costs of deployment***, compared to a less planned approaches to decarbonisation, reflected in lower energy bills.

[1] Text of the United Nations Framework Convention on Climate Change - http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf

At present, the **EU Renewable Energy Directive (RED)** sets targets, differentiated for and binding on each Member State, to deliver an EU total of 20 per cent of energy from renewable sources by 2020 and for 10 per cent of energy used for transport to be from renewable sources by 2020 in each Member State. The required contribution of each Member State towards the 20 per cent renewable energy target is determined taking into account national circumstances, including historic deployment levels and GDP per capita. The RED also incorporates rules on the streamlining of renewable energy deployment, monitoring and reporting requirements and criteria for the sustainable use of biofuels and bioliquids.

The promotion of renewable energy is intended to contribute towards the overall Greenhouse Gas (GHG) emission reduction target of 20 per cent (based on 1990 levels) by 2020. The RED is one part of a 'package' of EU measures adopted to push forward climate policy in the EU towards 2020 that includes overall goals for emission reduction (delivered via the EU emissions trading system (EU ETS) and the 'Effort Sharing Decision', which sets national level goals for non EU ETS sectors), rules around Member State use of state aids and legislation on the EU internal market for electricity[2].

Up to 2020 it is widely accepted that the **binding targets placed upon the Member States within EU law are driving renewable energy deployment**. In response, renewable energy use is expanding significantly in Europe[3]. However, reporting by Member States suggests that the deployment designed to drive forward and meet the 2020 renewable energy target has been slower than anticipated, at least in aggregate[4]. This is despite the relatively strict, nationally binding requirements up to 2020 and considerable oversight provisions aimed at ensuring delivery.

For **2030,** the European Council[5] has committed to deliver 27 per cent of energy in Europe from renewable sources, as part of a wider goal to reduce GHG emissions by at least 40 per cent, from domestic sources, by 2030 (based on 1990 levels). The European Council has also committed to an energy efficiency target aimed at delivering a reduction in energy use of 27 per cent below projected levels for 2030. The European Council has, however, stated that **neither the renewables nor the energy efficiency target should be broken down to individual targets that would be binding on each Member State** - as was the case under the RED to 2020. As yet, however, the detail of the governance system that will support the delivery of these targets has yet to be agreed[6].

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[2] This package, its requirements and impacts are assessed in detail in section 3.

[3] The primary production of renewable energy within the EU-28 in 2012 was 177.3 million tonnes of oil equivalent (toe) — a 22.3 % share of total primary energy production from all sources. The quantity of renewable energy produced within the EU-28 increased overall by 81.3 % between 2002 and 2012, equivalent to an average increase of 6.1 % per year.

[4] This is based on analysis by the European Commission on Member State progress reports (submitted in 2013) against the EU targets when compared to original submissions set out in National Renewable Energy Action Plans in 2009/2010 – https://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports

[5] European Council Conclusions, 23/24 October 2014 - http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145397.pdf

[6] On the 18 November 2015 the Commission did publish guidance to Member States on National Energy and Climate Plans as part of the Energy Union Governance (COM(2015)572) in support of the State of the Energy Union Communication (COM(2015)572). However, this is only a first step to attempt to integrate energy and climate

Renewable energy solutions can be delivered in a way that minimises environmental and social and economic costs to society if properly planned, sited and managed. **This study seeks to highlight how EU policy up to 2030, and any supporting system of governance, can promote renewable energy deployment that maximises benefits from adoption for biodiversity and climate mitigation while minimising negatives.** It therefore examines:

- The nature of interactions between renewable energy and biodiversity;
- The lessons from the 2020 targets, and from the associated rules and commitments;
- The role of wider EU environmental legislation in enabling environmentally positive renewable energy deployment; and
- How policy might be developed for the 2020 to 2030 period to provide a basis for expansion of renewable energy, and to deliver this in an environmentally responsible way.

planning and reporting with further legislative action and formal templates anticipated in 2016. Member States are anticipated to need to start their developing their national plans for 2020 to 2030 in 2016 to ensure their finalisation well before 2020.

2. Renewable Energy and Biodiversity

'Climate change adds to the global challenge of biodiversity conservation. There is ample scientific evidence that climate change affects biodiversity. It is threatening individual species as well as entire ecosystems, with negative consequences for human well-being. However, the links between biodiversity and climate change flow both ways. Biodiversity, through the ecosystem services it supports, makes an important contribution to both climate change mitigation and adaptation'. Ahmed Djoghlaf Executive Secretary Convention on Biological Diversity [7]

2.1. What Does it Take to Deliver Environmentally Responsible Renewable Energy?

Any energy supply system has environmental impacts[8]. Renewables, like other systems, need to be developed in ways that take full account of biodiversity concerns, as well as wider emission reduction goals. It is helpful first to consider the range of risks and issues posed by the different technologies and scales of deployment.

Before assessing consequences, it should be noted that the quality and scope of existing evidence is mixed (see Annex 1 for detailed information on impacts). This is in part due to the scientific challenges involved (especially in the marine environment), but also because there has been insufficient time or opportunities to monitor and understand the full impacts over time of the newest technologies. Consequently, some studies that relate to pilot sites or initial deployment may not be representative of potential future, large-scale commercial implementation. As such these are of limited value in assessing the impacts of deployment on a wider scale. Many studies relate to observations of biophysical effects on habitats and species (such as the probability of fatal bird or bat collisions with power lines or wind turbines), but it is very difficult to assess whether these risks will result in population level impacts for the affected species. Lastly, there is little evidence on the indirect effects of energy technologies on biodiversity, such as the wider intensification of grassland management that might result from agriculturally productive land being used for renewable energy (either in the form of biomass feedstock, or through the siting of renewable energy installations).

Despite these limitations, it is possible to draw some conclusions on the usual impacts of most renewable energy technologies. To deliver environmentally responsible renewable energy the following issues will be key:

1. ***Scale/impact relationships*** - Overall impacts are likely to be highly dependent on the scale of deployment, but scale-impact relationships may not be linear: for example, a certain level of habitat change or exploitation of a resource may have manageable consequences, but as intensity increases impacts may not change proportionally ie. a doubling of intensity might cause a 10-fold increase in impacts.
2. ***Spatial understanding*** - Renewable energy projects are often limited by spatial constraints to certain locations based on the renewable resource they use. Moreover,

[7] Review of the Literature on the Links between biodiversity and climate change, CBD Technical Series No. 42, (2009) http://www.cbd.int/doc/publications/cbd-ts-42-en.pdf

[8] It should of course be noted that fossil fuel production and use clearly creates significant biodiversity risks and impacts, not least linked to their contribution to climate forcing; but these are not the focus here.

they rely on additional energy and grid infrastructure to deliver their power or heat to end-users. Available sites for grid expansion and infrastructure are also spatially determined, as are the biodiversity and many other environmental factors. As policy on EU renewable energy matures, the impacts of deployment at scale will become more apparent; and the importance of careful policy consideration to assess, minimise, and manage those impacts will become more acute. **A more explicit spatial dimension to renewables policies at Member State level is becoming increasingly urgent, both to ensure its success (by facilitating consideration of shared grid and interconnection requirements, for example; and to provide investors with greater predictability), but also to maximise its contribution by addressing potential impacts on biodiversity and other environmental concerns**. Spatial planning, and associated assessment methods[9], are key to ensuring effective and environmentally responsible renewable energy deployment.

3. ***Case by case assessment*** - Environmental suitability should normally be carefully considered on a case by case basis, while taking into account possible cumulative effects. In this respect, for most renewable solutions, a key consideration is an affected site's existing habitat and associated species composition; thus, for example, the impacts of a solar farm will largely depend whether it is installed on a brown field site, intensive farmland or a semi-natural habitat of high biodiversity value.
4. ***Applying precaution*** – Given the limited time series and size of assessment of impact associated with some technologies, the precautionary principle should be applied. For example, it should be assumed that where there is good evidence of substantial impacts on individuals, these are likely to lead to population impacts, unless reliable evidence indicates otherwise.
5. ***Bioenergy, a question of feedstocks*** - In contrast to other forms of renewable energy, for bioenergy the type of feedstock used, the location and nature of feedstock production will dominate the associated environmental impacts and can vary both spatially and temporally over the lifetime of an energy facility or installation.
6. ***Grid expansion, the reality*** - The variability of some renewable electricity generation options – particularly wind and solar PV generation – creates challenges both for facilitating investment, and for managing the environmental impacts of that investment. As the Commission's Energy Union communication notes, integration of significant levels of renewable capacity means that "electricity grids must … evolve significantly"; and the development of more flexible demand side management will become increasingly important. The need for expanded grid development, potentially into remote areas, to support additional renewable energy use and transfer creates its own, equally geographically specific challenges. Just as the impacts of renewable installations themselves need to be assessed, bearing in mind wider sustainability objectives and the impact on the natural environment, so too will the grid investment necessary to make them possible[10].

[9] see section 4 for details of EIA and SEA and other related measures

[10] The Renewable Grid Initiative was set up to attempt to address questions around the integration of renewable energy into the grid and over-coming concerns regarding associated expansion in grid infrastructure and bringing actors together with an emphasis on strategic and participatory planning to realise new grid infrastructure - http://renewables-grid.eu

2.2. Renewable Energy and Biodiversity Interactions – Defining Five Dimensions

The **environmental footprint of renewables has a number of aspects**, some of which are different from those of fossil fuels and some of which apply more critically to certain renewable energy sources than others. It is too simplistic to treat all current (and indeed future) renewables in the same way – some tailoring of policy is required. There is also an opportunity to calibrate support more finely to the performance of technologies, encouraging best practice and innovation.

There are essentially **five dimensions of renewable energy/biodiversity interaction** that can be identified, offering a starting point for tailoring of policy requirements, developing better governance and providing certainty for industry actors up to 2030. The nature and significance of some of these issues – and the challenges of tackling them through public policy while accelerating the deployment of renewables – has become much more apparent in the last decade. **In some cases the issues are central to the shape and viability of the industry**. Failing to adequately recognise and address any of these aspects can lead not only to avoidable impacts on the natural environment, but also to uncertainty, delay in deployment and an undermining of public confidence that limits Europe's ability to transition away from a fossil-based energy sector.

EU rules can provide clarity and a level playing field for investment and operation across the internal market. Moreover EU wide rules will be key to an energy supply future where more connectivity is expected. They can also provide the structure around which performance in terms of renewable energy delivery and the quality of that renewable energy can be monitored. Clearly, however, there are issues, such as decisions on preferred energy solutions or on the appropriate use of land, that are the responsibility of national and local decision makers; a rigid set of EU rules on the specific location of projects would not be acceptable and is not envisaged. We propose the following five dimensions of renewable energy and biodiversity that should be considered at both EU and Member State levels, and addressed to deliver environmentally responsible renewable energy.

Five Dimensions of Renewable Energy and Biodiversity Interaction

Dimension	Nature of the Interaction	Example of challenges
Systemic environmental concerns	Development of renewable energy sources should always deliver real world GHG emission reductions that contribute to preventing dangerous climate change. The impact of the energy sources on natural resources, such as water and soil, should be taken into account in energy policy.	Limitations to accounting standards and sustainability frameworks have led to biomass being used for energy and transport fuels in a way that delivers limited GHG benefits
Scale and capacity concerns (ecological capacity)	Critically, the scaling up of renewable energy deployment (and particular technologies) entails cumulative impacts of the suite of technologies selected. When considering cumulative consequences it is important to assess both systemic risks associated with a technology and the siting risks posed to particularly vulnerable or high risk habitats. For renewable energy deployment it is important to not only assess the risks associated with the energy production site but also the consequences of supporting infrastructure to link this to end users eg the electricity grid, gas network etc	Concerns regarding the cumulative consequences of a small scale hydro plant within one river catchment or alternatively the cumulative impacts on a particular habitat at risk of conversion or intensification of use, such as semi-natural grasslands. For certain technologies there will be a limit in the scale of deployment possible ie appropriate sites for hydro, tidal lagoons, the scale to which biomass dedicated for energy can be supported
Siting concerns	The location of many renewable technologies, and the supporting infrastructure required, is central to determining their environmental risks and impacts. These vary in character, range and nature depending on the technology in question and the decisions concerning potential locations.	Certain technologies can be entirely appropriate in some sites but not at all in others (eg offshore wind farms, solar). Some technologies are almost invariably in sites of environmental sensitivity and will likely eliminate or degrade associated habitats (such as large hydro, tidal barrages and tidal lagoons). These will therefore inevitably have impacts, the scale of which will depend on the fit between an installation and the characteristics of the site
Project design concerns	The specific characteristics of a site will determine the most appropriate design and scale, to mitigate potential impacts on local biodiversity.	Design decisions (ie the set up of a solar array or wind turbine selection) will determine the overall balance of biodiversity impacts during the lifetime of an installation, and whether interventions are reversible. At this stage it is possible not only to mitigate negative impact but also take positive steps to promote biodiversity benefits.
Ongoing management concerns	For some renewable sources the ongoing management of a site and the provision of positive measures for biodiversity can make an important difference to its long term biodiversity impacts. For facilities using biomass to produce power or transport fuels the raw material must be grown, harvested, sourced and consumed on an ongoing basis. As a consequence, ongoing efforts to understand, monitor and control feedstock production and usage patterns are essential to determining desired environmental outcomes.	For static renewable sources the ongoing management of a site is usually critical for biodiversity and securing positive outcomes, for example, management of vegetation on solar farms or intelligent management systems to halt wind turbines at times of high risk to birds. For biomass used as energy the precise type and origins of biomass feedstocks, and the second order implications of deploying them in the energy sector, are the primary factors determining the environmental footprint of biomass used for energy and outcomes in relation to systemic, scale, capacity and siting concerns.

3. Assessing the 2020 Climate and Energy Package Policy – Key Learning Points for 2030

The pattern of renewable energy deployment, and the nature of impacts on the environment, is determined by the interplay between:

- EU rules (see box 1);
- national implementing measures and support schemes;
- infrastructure availability; and
- investment in, and the evolution of, the EU energy market.

These factors combine to determine the economic signals and investment decision-making.

This section **examines the nature of support for renewable energy in EU law up to 2020**, considers how this might influence the environment, and identifies **positive elements of the existing policies and lessons to be learnt in terms of promoting responsible renewable energy**. Complementary legislation and policies on demand side management and energy efficiency are not included in the scope of this assessment. Action in these fields would, however, offer important benefits in terms reducing GHG emissions and limiting the infrastructure needed to deliver energy alternatives, resulting in economic and environmental benefits.

Box 1 - The 2020 Climate and Energy Package: Delivering Emission Reductions and Renewable Energy in Europe up to 2020

The Renewable Energy Directive (RED) is one part of a package of EU measures adopted to push forward climate policy in the EU towards 2020 that includes:

- amendments to the EU Emissions Trading Scheme (Directive 2009/29/EC – EU ETS Directive);
- the Effort Sharing Decision (No 405/2009/EC) that sets out GHG emission reductions to be delivered from non EU ETS sectors;
- amendments to the Fuel Quality Directive (2009/30/EC – FQD) incorporating mechanisms to monitor and reduce GHG emissions from transport by at least 6 per cent (up to 10 per cent, based on 2010 levels) by 2020.

This package of measures, along with supporting and complementary requirements set out in State Aid Guidelines (for environmental protection and energy 2014-2020) and the Directive on common rules for the internal market in electricity (2009/72/EC – IEM Directive), in essence set out the framework for support for renewable energy in EU law up to 2020.

3.1. Environmental Protection and the 2020 Climate and Energy Package – A Need to Further Integrate Climate and Environment Goals

The 2020 climate and energy package (see Box 1) is structured to deliver an environmental goal, ie the reduction in GHG emissions in Europe. The measures within the package, however, have limited or ambiguous references to wider environmental protection and the pursuit of wider environmental goals, alongside the promotion of GHG reductions and energy system transition.

- The Renewable Energy Directive (RED) does not state a desire to deliver renewable energy in a way that is environmentally sustainable in a broad sense[11].
- Delivering an 'environmentally sustainable market for electricity' is mentioned in the IEM Directive; however, this it not defined and references to environmental impacts in the wider text refer only to energy efficiency and combatting climate change.
- Energy efficiency and demand side management are highlighted as priorities or priority actions in the IEM Directive, EU ETS Directive and Effort Sharing Decision and emphasised in the formulation of the targets under the RED. Despite the acknowledged positive environmental impact of such action[12], implementation of the package has been criticised for its lack of emphasis on efficiency[13], which leads to increased demand for energy investment.

Future action on renewable energy should both be closely aligned with delivering energy and climate goals, and place greater emphasis on the importance of interactions with **energy efficiency and demand management**. Moreover, action to promote renewable energy should be very **clearly embedded within a wider set of goals aimed at protecting Europe's environment**, such as those on biodiversity protection, which represent outcomes that are valued by Europe's citizens, and protected by EU and national laws.

3.2. Target Setting – The Impacts of Binding Commitments

The RED currently sets a binding target for each Member State to deliver a proportion of energy from renewables by 2020. The proportion of renewable energy to be delivered by each Member State was determined based on: historic performance in delivering renewable energy; GDP per capita; and the need to deliver 20 per cent of all gross final energy consumption from renewable sources in the EU as a whole[14]. The target setting process was important in that **each Member State was allocated a binding target intended to be relevant to their own national conditions**.

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[11] There is one explicit reference to environmental sustainability in the specific case of biofuels and bioliquids and the establishment of sustainability criteria

[12] The Internal Electricity Market Directive explicitly highlights the positive environmental impact of energy efficiency and demand side management

[13] Client Earth letter on effort sharing - http://www.clientearth.org/reports/131014-climate-and-energy-open_letter_to_hedegaards_cabinet_effort_sharing_reform_and_essential_conditions_to_the_ghg_target.pdf . This highlights the importance of a strong effort sharing decision both to deliver emission reductions and reduce pressure on energy demand/energy transformation

[14] The RED also sets a second target that requires that all Member States deliver 10 per cent of energy used in transport from renewable sources by 2020. This then contributes towards their achievement of the wider target for energy deployment from renewable sources.

Allocating specific binding requirements to each Member State **avoids 'free riding'** ie. situations where a national government less motivated to take climate action simply relies on over-delivery by countries with more ambitious energy and climate policies. Free riding would potentially impact the EU as a whole in terms of the cost of renewable energy delivery, and the EU's collective ability to make progress towards energy system decarbonisation. Importantly the formulation of the **RED national targets does not inhibit flexibility or cooperation** between Member States, as cooperation measures are specifically outlined to enable statistical transfer of renewable energy, joint projects or joint support schemes[15].

The targets under the RED have driven significant expansion in the use of renewable energy in Europe since their adoption in 2009. One challenge, however, is that the **nature of the targets has tended to incentivise governments to increase the supply of renewable energy rather than to focus on the most environmentally sustainable options.** In a number of cases they have driven those technologies which were closest to market profitability, without sufficient consideration of wider environmental consequences or the need to maximise long term decarbonisation opportunities. This has led to concerns, in particular, around the rapid expansion in the use of biofuels for transport and large scale use of biomass for heat and power. The current quantity based targets may fail to provide enough policy support for technologies that are at present more expensive, but which are likely to be needed as part of a long-term cost-effective and sustainable decarbonisation strategy; or where significant upfront investment in grid or other infrastructure is necessary.

Progress towards the targets has been slower than originally hoped (when compared, for example, to submissions made as part of the National Renewable Energy Action Plan (NREAP) process). The 2015 Progress Report from the Commission shows that 19 Member States are considered on track to meet their targets, but some are considered to need to take significant additional policy action[16].

Oversight and potential enforcement action to oblige Member States to rectify an insufficiently ambitious trajectory are possible due to the binding nature of reporting requirements and the national targets. This has been shown to be an important means of trying to secure sufficient progress. The value of enforcement action is highlighted within Case Example 1. This illustrates the pressure the Commission was able to bring to bear on Poland to secure full transposition of the RED.

[15] It should, however, be noted that little use has been made of cooperation mechanisms to date based on assessments of the national progress reports submitted to the European Commission

[16] Based on the 2015 Progress Reports for Member States 19 Member States, may deliver or potentially exceed their 2020 renewable energy targets with implemented and planned renewable energy policies. The Progress Report states that some Member States, including France, Luxembourg, Malta, the Netherlands and the United Kingdom, and to a lesser extent Belgium and Spain need to assess whether their policies and tools are sufficient and effective in meeting their renewable energy objectives. Achievement of the 2020 renewable energy targets is also not certain in the case of Hungary and Poland: it is only under optimistic assumptions related to the future development of energy demand and country-specific financing conditions that the 2020 renewable energy targets appear achievable – Renewable Energy Progress Report, COM(2015)293, 15.6.2015 - http://eur-lex.europa.eu/resource.html?uri=cellar:4f8722ce-1347-11e5-8817-01aa75ed71a1.0001.02/DOC_1&format=PDF

Box 2 - Case Example - Transposition of EU law on renewables in Poland

The Polish energy generation mix is dominated by fossil fuels; energy from coal represented more than 52% of Polish gross inland energy consumption in 2013. In 2013, the share of renewables in gross final energy consumption amounted to 11.3% increasing from 6.9% in 2004 when Poland entered the EU. The national target set by RED is 15% by 2020. The share of renewable energy in transport fuels reached 6% in 2013, down slightly from the 2010-2012 levels.

For many years Poland promoted electricity from RES through a quota, tax, subsidy and loan schemes. Heat generated from RES was supported through subsidies and a loan. Renewable energy in transport is promoted through a biofuels quota obligation. Non-discriminatory access and priority in transmission of electricity from renewable energy sources to the grid is guaranteed by national legislation.

Nevertheless, Poland struggled to implement both directives: 2001/77/EC and the RED. To address "complete absence of transposition" of the latter, the Commission sent a Letter of Formal Notice to Poland in January 2011 and a Reasoned Opinion in March 2012. One year later, the European Commission referred Poland to the Court of Justice, with a proposed penalty for non-transposition of over €130 000 per day. To avoid the fine, the Polish government voted a number of amendments to the existing laws, providing the Commission with the grounds to reduce the proposed penalty to around €61 000 per day. However, Poland failed to establish sufficient requirements related to transport fuels and the sustainable use of biofuels and bioliquids. The missing provisions were introduced on 15 January 2015, and notified to the Commission on 29 January 2015. The Commission has now withdrawn the RES-related case against Poland from the Court.

The Act on Renewable Energy Sources was adopted on 20 February 2015, but it is not, according to the Polish Ministry of Economy, related to the infringement procedure before the Court. The new scheme of support to renewables will apply as of the 1st January 2016. The new act remains highly controversial; it remains uncertain as to whether the new law will be effective in promoting the most sustainable renewable energy and supporting smaller players by creating the conditions for them to share the market with the biggest utilities. For example, according to the Ministry of Economy which is in charge of the act's implementation, a current 20-23% share of biomass co-firing in the Polish renewable energy mix is expected to be maintained in the longer term due to the prolonged support to this practice in dedicated infrastructure owned by incumbent generators.

3.3. Streamlining Permitting Requirements – Potential to Limit Environmental Risk and Increase Investor Certainty Remains Untapped

Protracted approval processes for renewable energy projects are often cited as causing delays and inhibiting renewable energy deployment. Moreover, poor coordination or lack of effective consideration of environmental aspects (and other social factors) can lead to local opposition and inappropriate siting of development undermining confidence in renewable technologies. To combat these challenges the RED set out provisions to streamline and improve the permitting process. In the Commission progress reports, action to address permitting is one of the key areas cited where there has been limited progress by Member States.

Better, more coordinated planning that properly takes account of environmental risk can increase certainty and reduce upfront administration costs for investors and developers.

Market actors regularly cite the importance of clear rules, planning and permitting procedures as critical to facilitating development[17].

Restriction can become facilitation if you are informed and can plan effectively up front with clarity and certainty to determine the appropriate locations for renewable energy infrastructure. There is clearly a need to continue to promote better coordination, planning and approval processes for renewable energy in Europe. It should, however, be noted that while there is a clear appetite from renewable industry players for more coordinated and explicit planning and permitting regimes for renewables, experience in the energy sector (linked to the TEN-E streamlining exercise[18]) suggests that Member State appetite for this is more limited.

3.4. Monitoring and Reporting – A Basis for Assessing Delivery and Providing Oversight

Under the RED, the N**ational Renewable Energy Action Plans (NREAPs) submitted by the Member States form a strong basis for an ongoing system of monitoring and assessment of national progress**[19]. Within the NREAPs Member States are required to set out a variety of information around support for renewable energy, policies under development and in place, and their anticipated use of different technologies to put themselves on a trajectory to meet their nationally binding renewable energy target under the RED. Subsequent progress reports[20] then reflect on Member State delivery against the NREAP.

NREAP reporting is perceived to have **improved understanding considerably as to Member State use and policy support for renewables**. This enables learning across Member States and improved analysis of the appropriate response to the targets set. It also provides an increased level of confidence within the EU, and among third countries, that action will come to fruition.

At present while the overall renewable energy volumes and technologies to be used are set out in the NREAP, **there is little emphasis on where and how renewable energy will be delivered**. Nor is there much reference to **how associated grid investments will be dealt with**. Member States have also been criticised for approaching the NREAP process too much in isolation with learning opportunities and sharing of information failing to be maximised.

Within the NREAPs guidelines for development the only mention of environmental sustainability is in relation to biomass requirements. This approach is similar to that used in other reporting on energy infrastructure development. The exception is the Internal Electricity Market Directive, which includes the need to report on the environmental consequences of opening up the electricity markets within requirements on annual reporting. As for the NREAPs, however, there

[17] Based on experiences under initiatives such as BESTGRID http://www.bestgrid.eu and discussions with stakeholders around the future of EU and national targets for renewables energy and renewable transport fuels including comments made under the auspices of the Transport Energy Task Force in the UK.

[18] The TEN-E is the support for Trans-European Energy Infrastructure and details of the efforts to streamline permitting procedures can be found at http://ec.europa.eu/environment/eia/pdf/PCI_guidance.pdf

[19] Details of all NREAPs are publically available at https://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans

[20] Member States are obliged to submit these every 2 years, with the Commission then assessing on this basis the effectiveness of national action and the likelihood of achieving the national target in 2020. To date reports were submitted in 2011, 2013 and 2015 and can be found at http://ec.europa.eu/energy/node/70

is no spatial information associated with the reporting making impacts difficult to unpick. Moreover, the progress reports, reviewed as part of this analysis, contained no reference to biodiversity as an issue for consideration when delivering the internal energy market for electricity. Moreover, references to environmental protection related only to introducing the Directive rather than reflecting on potential consequences and impacts[21]. Therefore, while **opportunities exist to report on environmental issues, these are not currently prioritised or implemented in a form where it is possible to develop a clear understanding** of the associated consequences.

There are significant opportunities to build up from the information base that is already available to make the information reported in the NREAPs, and linked reporting on energy transitions, easier to interpret. Importantly, **it is difficult to understand the appropriateness of EU wide policies unless the locations and spatial characteristics of anticipated and established development are set out**. **Renewable energy, and the development of energy infrastructure more generally, are spatially explicit** and, as highlighted in Section 2, consequences are site and location specific.

There are potential tools already in place that could be enhanced to provide spatial information. For example, Guarantee of Origin[22] information is already required under Article 15 of RED alongside the planning/management systems in place. In future **more oversight regarding the location of capacity and how renewable energy sources fit within a long term vision for land use, interconnections and the wider energy system, would facilitate cooperation between Member States. It would also support industry in terms of upfront planning and facilitate environmental protection**. This will become increasingly important as the scale of deployment increases.

3.5. Support Schemes – A Missed Opportunity to Deliver Added Value and Support Long Term Transition of the Energy System

The RED currently obliges Member States to 'introduce measures effectively designed to ensure the share of energy from renewable sources equals or exceeds their target and trajectory specified in the Directive'. One of the two options stated for such measures is to put in place support schemes for renewable energy. The Directive, therefore, not only specifies the target but obliges Member States to take identifiable action to deliver it. Within related Articles of the RED Member States are asked to report on support schemes that take account of more than just capacity of renewable sources but 'additional benefits in relation to other comparable technologies' (the example given was lignocellulosic biofuels from waste/residues being promoted over other biofuel alternatives). This offers the potential to identify and additionally support renewable energy technologies that deliver added value either in terms of minimising environmental impact or maximising the contribution to long-term decarbonisation needs.

[21] Single market progress report - https://ec.europa.eu/energy/en/topics/markets-and-consumers/single-market-progress-report

[22] Efforts have already been made to better standardise and make use of the Guarantee of Origin information including by Eko energy, who provide an ecolabel for electricity - http://www.ekoenergy.org/ecolabel/aspects/tracking/

There is, perhaps, an **opportunity for more targeting of support in future** to take account of additional co-benefits. There is increasing pressure on subsidies and national support schemes, which has been marked by a pull back from support partly on the grounds of costs to consumers. **To justify future public support and funding there will be an increasing need to demonstrate value for money**. One approach to this could be that **support for renewable energy should deliver not just quantity of renewable deployment but also quality deployment** that supports a long term transition in line with the concerns of citizens (ie taking account of broader environmental concerns and the need to maintain and restore ecosystem services).

The Commission has published guidance on **support schemes** highlighting that public intervention is needed as 'the market does not provide optimal level of renewables in the absence' of such measures[23]. This is considered to be due to market and regulatory failures associated with: low levels of competition and unfair competition with other fuels, in particular subsidies for fossil fuels and nuclear energy; the incomplete internalisation of external costs (air pollution and energy security); and a rigid electricity system design that inhibits the growth of renewable energy. To counter and correct such situations public authorities intervene. Examples given in the guidance include state aid to certain sectors or companies in the form of grants or exemptions from taxes and charges.

The guidance on support schemes is complemented by specific **State Aid Guidelines**. The State Aid Guidelines set out conditions under which aid for energy and environment may be compatible with the internal market and are considered to contribute to objectives of common interest. The support for renewable energy within the existing state aid guidelines is more nuanced than some related measures; there is an explicit presumption in favour of long term decarbonisation objectives. Measures considered, under certain conditions, to be compatible with the internal market and objectives of common interest include: aid for energy from renewable sources; aid for energy efficiency measures, including cogeneration and district heating and district cooling; aid in the form of reductions in or exemptions from environmental taxes; aid in the form of reductions in funding support for electricity from renewable sources; and aid for energy infrastructure.

State Aid Guidelines set the high level direction for acceptable support from Member States. However, it is difficult to target these towards achieving a broad goal, such as ensuring renewable energy deployment respects broader environmental needs or biodiversity. This is because the associated systems for approval are not dynamic. They are, however, of more potential use in limiting financial support to a specific damaging pathway ie stating what should not be supported (as has been the case with the withdrawal of support from food-based biofuels[24]).

[23] COMMISSION STAFF WORKING DOCUMENT, European Commission guidance for the design of renewables support schemes, 5.11.2013 SWD(2013) 439, https://ec.europa.eu/energy/sites/ener/files/com_2013_public_intervention_swd04_en.pdf

[24] Paragraph 112 of the guidelines states that the 'Commission will consider investment aid in new and existing capacity for food-based biofuel not to be justified. However, investment aid to convert food-based biofuel plants into advanced biofuel plants is allowed to cover the costs of such conversion. Other than in this particular case, investment aid to biofuels can only be granted in favour of advanced biofuels'.

3.6. Biofuels, Bioliquids and Bioenergy – Governance and GHG Accounting

Biofuels for transport and bioliquids used for other energy solutions, stand out in the RED. They represent the **only renewable energy technologies for which specific environmental parameters**, in the form of sustainability criteria, are set out as conditions of their being counted toward the delivery of the RED's targets. These criteria cover: the delivery of a certain level of GHG savings; avoidance of direct land use change in areas of high biodiversity value and of high carbon stock; and the avoidance of peatland.

The sustainability criteria adopted for biofuels and bioliquids represented a positive step to attempt to control the potential adverse impacts of biomass-based fuels. They were intended to address known environmental concerns and to enable responsible deployment. **The success of the criteria has, however, been muted** by two key limiting factors: their **incomplete coverage of the range of biomass used for energy purposes**; and their f**ailure to account fully for GHG emissions** associated with biomass use for energy.

These limitations, and the associated controversy, have led to a questioning of the ability of biomass based energy technologies to deliver GHG emission savings. As a result public and political support for the technologies has been undermined leading to a lack of clarity and high risk for the industry and potential investors. Controversy around the use of biomass for energy has been compounded by the high levels of bioenergy adopted, or to be utilised, by many Member States to deliver their targets under the RED[25].

- Despite evidence at the time, and associated concerns[26], **sustainability criteria were only applied to biofuels and bioliquids, not to solid and gaseous bio-based fuels**. This has created a mismatch in terms of standards and a lack of clarity; particularly as the feedstocks for solid and liquid fuels are becoming more closely linked over time as ligno-cellulosic biofuels become market ready[27].
- The sustainability criteria addressed the question of direct land use change, however, they **failed to take into account indirect GHG emissions associated with land use change (ILUC)** as a consequence of the displacement of agricultural activity.
- There was **no provision made to take into account the lag between growth, consumption of biomass and regrowth** ie the gap between GHG emissions to the atmosphere associated with use of biomass for energy and the reabsorption of those emissions through photosynthesis. While for annual food crops the latter point is of more limited importance, this is an important consideration for the use of wood based fuels and residues.
- **Biomass based renewable energy is considered within the same framing as other renewable technologies** such as wind, solar, hydro, tidal despite the system constraints, costs and nature of the technologies being fundamentally different. Unlike other renewable

[25] Between 2000 and 2012, the use of biomass for energy effectively doubled reaching 102 Mtoe in 2012: 75 Mtoe in bioheat; 12 Mtoe in bioelectricity; and 15 Mtoe in biofuels for transport (Aebiom, 2014). Based on Member States' planned commitments within the NREAPs by 2020 139 Mtoe of bioenergy is anticipated (Beurskens and Hekkenberg, 2011).

[26] This can be demonstrated by attempts by the European Parliament during the first reading of the RED to broaden the sustainability categories to all biomass for energy.

[27] These can use a similar profile of wood based biomass, residues and wastes as for solid biomass plant.

energy technologies, bioenergy, like fossil fuels, relies on a raw material that is 'used' within the energy process; while biomass is potentially renewable, as biomass can be regrown, the potential for this is finite, and dependent on the use of land, water and nutrients for ongoing production. The key challenge for bioenergy, indeed for all biomass production, is that the **environmental impacts are sensitive to the volume of supply** at both the local and global level[28]. The order of magnitude change in biomass use for energy has implications associated with land use change and also importantly for the increased intensity of land use, within the EU and globally.

Despite the absence of a coordinated EU approach, in response to environmental concerns some Member States and industry actors have sought to extend sustainability criteria to solid biomass independently. However, most schemes do not fully address the errors in carbon accounting set out above. There is increasingly an emphasis within some Member States on developing approaches to:

- **limit biomass use in certain installation types** - Netherlands – Energy Agreement for Sustainable Growth, 2013 set a limit on cofiring of biomass of 25Petajoules [29];
- to **focus biomass use on more efficient conversion technologies** ie preferential support for combined heat and power solutions - UK - In 2012 amendments were adopted to the Renewable Obligation (RO) that imposed a cap of 400MW on new build dedicated biomass plant for electricity generation. Plant that can demonstrate that they deliver high quality combined heat and power (CHP) in line with the UK government's certification scheme are exempt from the cap. There is separately an additional uplift in the credits gained under the RO for CHP plant. Moreover the UK requires, as of October 2013 that new biomass plant over 1 megawatt meet sustainability criteria for solid biomass set by the UK government in order to receive support under the RO; and
- to **control the feedstocks entering plant** ie requiring a minimum proportion of biomass from waste in biogas installations - Denmark - in 2014 adopted standards to require biogas plants to use a minimum of 25% waste material – focus on added value and biomass that delivers greatest GHG saving potential.

The EU coordination of sustainability criteria for biomass and the **treatment of bioenergy is also of importance in the context of the EU ETS**. At present, biomass used to deliver energy under the EU ETS is considered to be zero carbon, while fossil fuels are required to account for their emissions. This means that **one of the key routes for installations to reduce their emissions under the EU ETS is the use of biomass**. For bioliquids, used for thermal or electric energy generation (transport is not covered at present by the EU ETS) under the scheme, to continue to receive this zero carbon rating they must comply with the RED sustainability criteria[30]. **For other**

[28] Estimates of land use for bioenergy are that 44.5 Mha of land and forest area were in use in 2010 to deliver bioenergy within the EU. This would rise to an estimated 57 Mha by 2020 were anticipated use patterns to be delivered based on NREAPs. This would encompass approximately 14 Mha of cropland (equivalent to approximately 12 per cent of the total EU area) and 43 Mha of forest land (Schutter & Giljum, 2014)

[29] http://www.ser.nl/nl/actueel/persberichten/2010-2019/2013/~/media/Files/Internet/persberichten/2013/Samenvatting-Energieakkoord-voor-duurzame%20groei.ashx

[30] COMMISSION REGULATION (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council – amends to take

biomass, in the absence of sustainability criteria, these are considered to all be zero carbon by default[31]. This creates an imbalance in the consideration of biomass-based products in the EU ETS. It is also now understood that approaches intended to account for emissions elsewhere are not effectively implemented nor are signals effectively communicated to installations through the price signals of the EU ETS. T**here is, therefore, a need to shift the baseline to ensure that use of biomass to deliver savings under the EU ETS, and associated price signals for its support, reflect the reality that biomass use is not a zero carbon endeavour**.

Biomass for energy has a potential role in future in delivering renewable energy in Europe. **To fulfill this role in a way that delivers climate mitigation and broader environmental goals, requires more effective regulation of all biomass used for energy**. This is critical for building confidence in renewable energy use beyond 2020, providing clarity in terms of delivery of alternative renewable energy sources and ensuring that renewable energy delivery is coordinated with environmental protection. There are a number of issues that a future framework must address:

- The **variability and, in some cases, limitations to GHG savings** associated with biomass use for energy;
- That there is a **limit to the scale of sustainable and renewable use of biomass for energy** and that scale is critically linked to ability to deliver both GHG savings and broader environmental protection;
- That renewable biomass for energy is a limited commodity which therefore **needs to be utilised in an energy and resource efficient way so that GHG savings are maximised**; and
- That the **nature of the biomass feedstocks and associated production methods are fundamentally linked to environmental impact** and GHG savings.

account of sustainability criteria for biofuels/bioliquids, translates definitions from the RED to EU ETS - http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02012R0601-20140730&from=EN

[31] Guidance Document, Biomass issues in the EU ETS, MRR Guidance document No. 3, Final Version of 17 October 2012 - http://ec.europa.eu/clima/policies/ets/monitoring/docs/gd3_biomass_issues_en.pdf

4. The Role of EU Environmental Legislation

The climate and energy acquis determines the level of ambition and overall governance of renewable energy solutions. Climate and energy policy does not, however, act in isolation. **Environmental legislation has a critical role to play in directing development providing a framework that should deliver greater clarity and certainty around appropriate uses and sites for energy infrastructure**. Box 2 sets out the key EU environmental Directives of particular relevance to renewable energy development, these are presented in more detail in Annex 2.

The environmental acquis is intended to help support sustainable development in Europe and ensure environmental issues are taken into account during all development. It is an important complement to renewable energy support providing many of the tools and methods needed to facilitate planning for renewable energy solutions and provide clarity regarding appropriate location, design and management conditions. To offer clarity and robust environmental protection, however, many of these measures rely on specificity in terms of the type and location of impact, and an understanding of the cumulative impacts. The **implementation of these laws and their effectiveness in delivering responsible renewable energy, therefore, depends on a coherent and explicit framework for the planning and establishment of energy infrastructure**. **These environmental measures would, therefore, be complemented and strengthened by a strong approach to climate and energy governance post 2020.**

Biodiversity and environmental protection are critically important when considering public support for renewable energy deployment. In addition, many of the environmental mechanisms in place set out explicit requirements for public engagement. Rapid but responsible deployment is key to delivering renewable energy solutions that meet the EU's targets and delivers appropriate transition of Europe's energy into the longer term. Rules are needed to provide clarity to facilitate this process – industry actors and national policy makers have highlighted the importance of clear rules and shared understanding repeatedly. **Coherent, comprehensive, and geographically specific plans for renewables deployment, including the linked connectivity investment, can contribute both to a thorough understanding of wider environmental impacts, but also to improved viability and confidence among potential investors**.

Box 3 – Environmental Legislation - Complementing Climate and Energy Policy

The following measures have been reviewed within this report and are considered highly relevant to the effective delivery of environmentally responsible renewable energy. All of these measures are intended to protect the environment from inappropriate development and degradation.

- Environmental Impacts Assessment (EIA) Directive, 2011/92/EU
- Strategic Environmental Assessment (SEA) Directive, 2001/42/EC
- Birds Directive, 2009/147/EC
- Habitats Directive, 92/43/EEC
- Water Framework Directive (WFD), 2000/60/EC

For further details of each measure, its coverage and relevance see Annex 2

4.1. Strengths – Key Added Value for Responsible Deployment of Renewable Energy

In principle, the **main benefits of the SEA and EIA processes are that environmental considerations should be taken into account in decision-making in a transparent way whilst identifying potential impact avoidance and mitigation options**. This enables competent authorities to reject projects where likely impacts are considered unacceptable, or to require implementation of mitigation or compensation measures through consent conditions. Furthermore, as a result of a review of the EIA Directive, a number of weaknesses have been addressed in a revised EIA Directive - 2014/52/EU. This is expected to improve the level of biodiversity protection through a new explicit requirement to consider biodiversity, provisions for joint procedures where Appropriate Assessments[32] and an SEA are simultaneously required, measures to improve the quality of EIAs, requirements for Member States to ensure that developers implement the envisaged mitigation and offsetting measures for significant adverse effects on the environment, and compulsory monitoring of adverse impacts on the environment.

A key strength of SEA is that it has the potential to overcome many of the limitations of project-based EIA by providing opportunities for conservation and sustainable use of biodiversity to be considered as a fundamental part of **strategic decision-making**. For example, SEA can support and enhance EIA processes by:

- Building biodiv**ersity objectives into land-use, urban or sectoral policies, plans and programmes**, at any point between international and local levels;
- Identifying and **managing cumulative impacts**, which would be considered insignificant if assessed in isolation, but which may pose severe threats to biodiversity if assessed in combination with other similar impacts;
- Identifying **biodiversity-friendly alternatives and mitigation strategies** that would be compatible with sustained delivery of ecosystem services;
- Ensuring **effective monitoring programmes** are in place to provide information about biodiversity to inform baseline assessments carried out for EIA; and
- Allowing **biodiversity specialists and decision-makers and/or planners to engage and to develop a shared understanding** of biodiversity requirements.

Although the Birds and Habitats Directives have some weaknesses and implementation problems the Directives are widely considered to provide a strong science-based protection and management framework[33]. Most importantly, despite slow and incomplete implementation of the Directives to date, there is evidence that the Birds Directive has had significant measurable benefits for birds that are the focus of its protection measures (ie listed in Annex I)[34] and some birds and mammals are responding well to conservation actions under both Directives[35]. At the same time, the Birds and Habitats Directives are considered to be flexible and proportionate, and if appropriately implemented do not appear to have been a significant constraint on necessary

[32] Required under the Habitats Directive for projects/plans that may have significant impacts on a Natura 2000 site

[33] IEEP (2011) Manual of European Environmental Policy. Taylor & Francis, London.

[34] Donald, P F, Sanderson, F J, Burfield, I J, S.M., B, Gregory, R D and Waliczky, Z (2007) International conservation policy delivers benefits for birds in Europe. Science No 317 (5839), pp810-813

[35] Deinet, S, Ieronymidou, C, McRae, L, Burfield, I J, Foppen, R P, Collen, B and Böhm, M (2013) Wildlife comeback in Europe: The recovery of selected mammal and bird species. Final report to Rewilding Europe. ZSL, BirdLife International and the European Bird Census Council, London, UK

developments and economic growth, for example as revealed by a governmental study in the UK[36] and an EU study of Appropriate Assessment cases[37].

4.2. Weaknesses – Limiting Effective Environmental Protection During Development

Despite the recent revision of the EIA Directive the most **fundamental limitation is that EIA, and SEA, are processes that aim to ensure that environmental issues are considered and described: they do not create a legal requirement to actually avoid or reduce impacts nor compensate for residual impacts**.

Another significant weakness of both **EIA and Appropriate Assessments is their limited ability to take into account cumulative impacts** arising from other projects and plans. Therefore, as described above, **SEA has an important role to play in addressing this**. Indeed, the requirement for an Appropriate Assessment of a plan also triggers a requirement for an SEA of the plan in question. However, there is **scope for improving the way that SEAs assess cumulative impacts** on the Natura 2000 network[38].

To be most effective SEA should be used in the development of spatially explicit delivery plans or multi-sector strategies that aim to balance and achieve environmental, economic and social objectives. Such plans can be an extremely effective way of avoiding the most damaging activities and promoting win-win opportunities, such as options to locate renewable energies on land of low biodiversity and economic value (eg contaminated land). In accordance with good practice, spatial plans should follow six fundamental principles namely: 1) the democratic principle; 2) the subsidiarity principle; 3) the participation principle; 4) the integration principle; 5) the proportionality principle; and 6) the precautionary principle[39]. However, **many Member States have not developed (or in the case of the UK, have scrapped) such large-scale spatial plans**. Therefore, the **location of renewable energy and related impact assessments are often conducted in the absence of high-level spatial policy and related guidance. This makes it difficult to strategically address some of the core concerns** set out in this report regarding the appropriate scale and location of renewable energy.

Although some of the weaknesses with respect to EIA relate to the legislation and process, there are also significant problems with implementation. For example, this has been noted with respect to the limited use of effective impact assessments in Spain where there is a general presumption in favour of development, which has resulted in some severe impacts on birds as a result of poor siting of wind farms[40].

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[36] DEFRA (2012) Report of the Habitats and Wild Birds Directives Implementation Review. Department for Environment, Food and Rural Affairs, London.

[37] Sundseth, K and Roth, P (2013) Study on Evaluating and Improving the Article 6.3 Permit Procedure for Natura 2000 Sites. Main report and case study compilation. Ecosystems Ltd, Brussels

[38] Arcadis and IEEP (2010) Dealing with conflicts in the Implementation and Management of the Natura 2000 Network - Strategic Planning (lot 2). Guidance Document. Report to the European Commission: Contract Number N° 070310/2008/515135/SER/B2. Arcadis, Antwerp, Belgium

[39] UNECE (2008) SPATIAL PLANNING, Key Instrument for Development and Effective Governance

[40] Bowyer, C, Baldock, D, Tucker, G, Valsecchi, C, Lewis, M, Hjerp, P (2009) Positive Planning For Onshore Wind Expanding Onshore Wind Energy Capacity While Conserving Nature, IEEP, London

There are **particular problems regarding impact assessments of agricultural improvements and developments**, which is relevant to the regulation of direct and indirect impacts of biofuels and biomass crops. Rural Development Programmes (RDPS) can include measures that support bioenergy production (eg anaerobic digesters). Whilst the RDPs must be subject to an SEA, it is difficult to assess the impacts of many renewable energy related measures because they are not precisely defined in the RDPs. Nevertheless, the SEA provides an important opportunity to identify environmental safeguards that should be taken up in the plan. The EIA legislation requires Member States to act to minimise environmental damage from agricultural developments and other 'projects' in rural areas including the restructuring of agricultural land and conversion of uncultivated or semi-natural habitats to intensive agricultural management. However, analysis has found that the frameworks and criteria for screening are poorly implemented and use high thresholds that result in many agricultural improvements falling outside the scope of the legislation, so that their potential impacts are often not assessed[41].

There is also **evidence that some provisions of the Habitats Directive are not adhered to by some Member States** in certain situations. For example, despite their strict protection, some proposed developments threaten Natura 2000 sites. Some of these threats lead to interventions by the European Commission and, if necessary referral of some cases to the EU Court of Justice, as for instance concerning the potential impacts of wind turbines and other projects on Kaliakra SPA in Bulgaria[42]. However, it seems inevitable that other damaging impacts will remain unnoticed or unreported and will not be taken up by the Commission. Given the evidence of limited application of EIA requirements to agricultural developments, it seems that the possible impacts of biofuel crops and biomass production on Natura 2000 sites are especially likely to be overlooked.

4.3. Opportunities for Improving Oversight - Ensuring Environmentally Responsible Development

The recent **revisions to the EIA Directive are expected to improve the efficiency and effectiveness of impact assessments** when they are carried out. Improved and more transparent screening procedures may also help to address the problem that some projects, especially relating to agriculture and forestry, are not subject to EIAs when they should be. However, this may be partly the result of a lack of awareness amongst project proponents (especially landowners) of the need for EIAs. There is, therefore, an opportunity to address this by increasing awareness of the EIA Directive and the projects that require EIAs.

The Commission is now starting to prepare the **2nd implementation report for 2016, which will evaluate the application and effectiveness of the SEA Directive** across the EU and assess the potential for simplification. According to the Commission's work programme, this may lead to a REFIT evaluation. This may provide an opportunity to improve the Directive and its implementation, by implementing recommendations made under the previous review if they remain relevant. These included, the possible coverage of policies and legislation (such as the RED) in the application of the SEA Directive, steps to develop the capacity of Member States

[41] COWI (2009) Study concerning the report on the application and effectiveness of the EIA Directive. Report for European Commission DG ENV. COWI A/S, Denmark.

[42] http://europa.eu/rapid/press-release_IP-12-654_en.htm?locale=en

effectively carry out SEAs and development of guidance on best practice approaches to SEA. For example, guidance for Member States on how to identify sites suitable for renewable energy deployment and ensure that this is recognised in SEA, as well as land already protected for biodiversity, would be valuable.

As part of its 'REFIT – Fitness for growth' initiative, the European Commission is carrying out a fitness check of EU nature legislation, focusing on the Birds and Habitats Directives. According to the published mandate for the Fitness Check[43], the aim is to establish whether the legislation is fit for its purpose, taking into account its effectiveness, efficiency, relevance, coherence and EU-added value. The ultimate objective is to promote better/smart legislation that is more responsive to existing and future challenges, and to help to improve its implementation. The Fitness Check aims to identify any excessive administrative burdens, overlaps, gaps, inconsistencies and/or obsolete measures taking into account the cumulative impact of EU legislation. The results of the Fitness Check (and supporting evaluation study) are due to be published in early 2016. Any Commission proposals that arise from the exercise may have an impact on the treatment of renewables projects within the nature legislation applied by Member States.

[43] http://ec.europa.eu/environment/nature/legislation/fitness_check/docs/Mandate%20for%20Nature%20Legislation.pdf

5. A Vision for Responsible, Renewable Energy Delivery to 2030

The **current EU climate and energy targets** and their supporting legislative acquis are focused on delivering change up to 2020; and as we have noted above, **they suffer from a weakness of failing to place renewables deployment in a long-term perspective beyond 2020**. Discussion on targets and legislation for the period from 2020 to 2030 has been under way since the Commission's publication of its communication "A policy framework for climate and energy in the period from 2020 to 2030"[44] in January 2014. The European Council adopted a set of conclusions in October 2014 responding to the Commission communication, and providing guidelines for future policy development. The targets outlined, and which have formed the basis for the EU's Intended Nationally Determined Contribution as submitted to the UNFCCC secretariat in advance of the Paris Conference of the Parties in December 2015, include a **27 per cent share for renewable energy by 2030; an energy efficiency target of a level of final energy use 27 per cent below that projected for 2030; and an overall domestic greenhouse gas emissions reduction target of at least 40 per cent by 2030**.

Potentially as significant as the targets themselves are the **European Council's suggestions on the flexibility allowed to Member States** on their implementation. These are likely to have considerable influence on the Commission's drafting of its legislative proposals; however, it is far from certain that the European Parliament will follow the policy direction suggested by the European Council, particularly as its weaknesses in terms of ensuring delivery and providing investor certainty become better understood. The **European Council's decision making process**, which is predominantly based on consensus, places significant power in the hands of a small minority of reluctant Member States, who can refuse to agree conclusions until their concerns are met. Consequently if the European Council takes on a quasi-legislative role by specifying its preferences in terms of the detailed design of legislation, it potentially disrupts the balance of power between the different legislative bodies within the EU foreseen by the Treaty[45].

The current expectation is that detailed legislative proposals for the implementation of the 2030 climate and energy targets will be put forward in the first half of 2016, in the light of further evaluation work, and of the results of the Paris Conference of Parties to the UNFCCC. The European Council's conclusions of October 2014 suggest that the **legislative framework could look very different to that currently in place to deliver the 2020 targets**, particularly in terms of the approach to the promotion of renewable energy. The key elements of climate legislation (the Emissions Trading System (ETS); and the Effort Sharing Decision, which allocates between Member States the responsibility for non-ETS emissions sector reductions) will remain broadly similar, although with a more rapidly declining cap in the Emissions Trading Systems, and unspecified additional flexibility for Member States in the Effort Sharing Decision.

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[44] COM 2014 (15) final "A policy framework for climate and energy in the period from 2020 to 2030", Brussels 22/1/2014

[45] See "Meyer-Ohlendorf, Nils 2015: Can the European Council impose consensus on EU climate policies? Discussion Paper. Berlin: Ecologic Institute" for a detailed discussion of this issue. There is, however, no strong reason why the European Parliament should consider itself bound by European Council views on the detailed design of legislation, as demonstrated by their insistence in negotiations on the 2014-2020 multi-annual financial framework on provisions which altered the approach which the European Council believed it had agreed on.

5.1. The 2030 framework – Renewable Energy and Energy Efficiency

The **legislative framework for both renewable energy investment and the delivery of energy efficiency targets will**, if the Commission and the co-legislators follow the policy direction proposed by the European Council, **contain significant structural weaknesses** due to the uncertain enforceability of the targets they provide. The October conclusions of the Council and the February Energy Union Package Communication put forward by the Commission include the following targets, set out in table 3.

Targets Relating to Energy Supply and Management Proposed for 2030

	Targets	Actions set in the Roadmap for Energy Union and scheduled times for delivery
Renewables	At least 27% of energy consumed in the EU to be from renewable sources in 2030 • "Binding at EU level" • No "nationally binding targets" to be set	Renewable Energy Package: including a new Renewable Energy Directive for 2030; best practices in renewable self-consumption and support schemes; bioenergy sustainability policy (a new policy for sustainable biomass and biofuels); legislation to ensure that the 2030 EU target is met cost-effectively (2015-2017) Communication on Waste to Energy (2016)
Energy efficiency	At least 27% improvement in energy efficiency by 2030 compared to previous projections • An indicative target at EU level, to be reviewed in 2020 with a view to a 30% target • No "nationally binding targets" to be set	Review of: - the Energy Efficiency Directive (2016) - Directive of Energy Performance of Buildings including Smart Finance and Smart Buildings Initiative (2016) - Energy efficiency framework for products (Energy Labelling Directive and Ecodesign Directives) (2015) Strengthening the targeted use of financial instruments to support investment in energy efficiency (2015)

There are also limitations. The European Council's conclusions from October 2014 contain rather **ambigous messages on the inclusion of Member State targets for renewables**. On the one hand, they state that 'targets will not be translated into nationally binding targets'; but they also make it clear that 'Individual Member States are free to set their own higher national targets.' Member States would, therefore, be responsible for proposing their own plans for renewable energy deployment up to 2030, with the Commission monitoring progress against these. Without clear

targets set down in legislation to guide Member State performance and the Commission's assessment of performance, it is difficult to see how the 'higher national targets' mentioned would be understood – higher in reference to what share of the EU target?

The **Council's overall approach has a number of weaknesses in terms of its delivery of renewable energy, compared to either the existing framework, or a revised framework based on Member State targets**. In particular:

1. The lack of national targets for energy efficiency, or clarity on what further support would be available for energy efficiency through EU level policy instruments (including product standards and vehicle emissions standards), and uncertainty over even the indicative EU target, potentially creates significant uncertainty over likely total future energy demand and infrastructure requirements. This brings with it risks of (a) a failure to bring forward investment in the deep decarbonisation necessary for longer-term emissions reductions beyond 2030, and (b) increased investment in currently cheaper, but more carbon intensive, energy sources, including gas, leading to infrastructure that is either stranded by more demanding targets in future, or which leads to incumbent lobbying against ambitious targets and a failure to deliver long-term EU decarbonisation goals. More energy generation and transmission assets of all kinds imply a greater cumulative impact on biodiversity.
2. The absence of nationally binding targets for renewable energy would be likely to lead to less ambitious, and less consistently pursued, approaches at Member State level (as we set out in this report, enforceable targets have had a clear impact of the development of Member State policy, and the delivery of new renewables investment);
3. A lack of certainty for investors, who would face greater policy risk in relation to Member State support mechanisms, than if those support mechanisms were backed by legally enforceable national targets;
4. The potential for those Member States less politically committed to decarbonisation objectives to free ride on more aggressive policies in other Member States, with the potential for reduced collective support for a decarbonisation agenda, and higher overall long-term costs of decarbonisation;
5. The absence of either a binding or indicative trajectory for targets risks delaying necessary investment further;

The **lack of clarity for investment introduced by the significantly looser framework** proposed by the European Council thus poses substantial risks both for longer term decarbonisation goals (and thus, of significant damage from climate change in both human and wider environmental terms), and in the short- to medium- term for land use, biodiversity, and other environmental impacts from misdirected energy infrastructure investment. While it is expected that the governance structure developed for the delivery of energy targets will replicate much of the detail of National Renewable Energy Action Plans under the current Renewable Energy Directive, the lack of a clear requirement for delivery by Member States risks robbing the NREAPs of their value.

On the other hand, **there are some welcome elements of the expected package**, although their potential is heavily dependent on the ambition with which they are brought forward, and would in any case be significantly reduced if the weaknesses identified above are a feature of the legislation finally adopted. In particular, drawing together different strands of Member State energy policymaking, monitoring and reporting into a single framework should help Member States – and civil society groups in Member States – present and discuss a clearer picture of the

total impact of energy decarbonisation goals, and of the choices related to alternative routes to their delivery. Trade-offs and opportunities for win/wins between energy efficiency and the land use, biodiversity, and wider costs of energy infrastructure should become clearer. The importance of grid infrastructure issues, and the potential changes required in terms of demand management and storage (together with the associated infrastructure needs and costs) in order to accommodate a significantly greater share of variable renewable energy will also be highlighted. There is, therefore, an opportunity to ensure that the new reporting and planning framework explicitly requires integration of land use and biodiversity impacts, both of additional generating capacity, and of the grid and storage investments associated with it.

Making energy markets and grid infrastructure 'fit for renewables' is a cross-border challenge and will require adequate action at regional and EU level. Isolated policy and national investments delivered without coordination between neighbouring countries may fail to address the particular challenges of adding RES into the energy system and, as proposed by the Commission, 'integrate renewable production progressively and efficiently into a market that promotes competitive renewables and drives innovation'. A rising share of intermittent sources (i.e. PV and wind) in the EU energy generation mix has impacts on electricity markets as well as on transmission and distribution system operations. If these impacts are not reflected in the regional market design(s), end-consumers could incur significant extra costs, renewable energy deployment would slow down, and its positive environmental impact would be limited. Moreover, the resulting disruption of market conditions (e.g. greater spot price volatility) could also create additional uncertainty for investors.

5.2. The 2030 framework – GHG Emission Reduction, the EU ETS and Beyond

While our expectation is that the price signal delivered by the **Emissions Trading Scheme** will be strengthened, including through implementation of the Market Stability Reserve, it seems clear that it will remain insufficient to provide adequate signals to encourage ambitious public policies or private investment to deliver decarbonisation. It will, however, continue to provide incentives for changes in how the current, largely fossil-fuel based, energy infrastructure is used; and it will therefore be important to ensure that those incentives are aligned with long-term decarbonisation objectives. In particular, the current anomalous treatment of biomass will need to be addressed in order to improve the integrity of emissions reductions under the ETS, and in order to avoid perverse subsidies to fossil fuel generating capacity (see discussion in section 3).

The European Council's October 2014 conclusions also set out two possible approaches to the treatment of targets, which create concerns on the integrity and effectiveness of the EU's policy framework. On the one hand, it calls on the Commission to examine how **the Land Use, Land Use Change and Forestry (LULUCF)** net emissions can be brought within the target framework. While positive incentives for mitigation in the LULUCF sector would be welcome, there is a significant risk that simply including the sector into delivery of an overall 40 per cent emissions reduction target would (by virtue of the LULUCF sector's current net sink status) have the effect of weakening that target's contribution to energy system decarbonisation. Secondly, the possibility of a **flexibility for Member States to transfer effort from the non-traded sector to the ETS sector**, by means of an up-front reduction in ETS allowances, risks weakening policy signals for decarbonisation in the transport, agriculture and heat sectors. If any such flexibility is to be included in the final legislation, it will be important to ensure that it is accompanied by mechanisms ensuring that Member States making use of it are nevertheless required to

demonstrate ambitious long-term plans for the non-ETS sectors; and to ensure that the resulting reduction in allowances in the ETS sector is guaranteed to lead to an equivalent reduction in emissions (the automaticity of which will be weakened by the operation of the Market Stability Reserve).

Finally, the European Council's **emphasis on delivery of targets in "a cost-effective manner",** while it is fundamentally right (in principle, efficiency is consistent with sustainability; and high-cost approaches to delivery risk reducing societal and political support and ambition in the longer term), **is expressed too narrowly**. In particular, it is **focused on delivery of targets in 2030; and not on establishing long-term least-cost pathways to the energy system decarbonisation needed beyond 2030**. It therefore creates risks of investment now in fossil fuel infrastructure (both generation and transmission) which will be stranded in the future; and thus of a wasted investment in that infrastructure, including the associated environmental impacts.

6. Conclusions and Recommendations

6.1. Key Messages

This report suggests that the building of an efficient; expanding and environmentally sustainable renewable energy sector in Europe could best be advanced by a more developed EU policy framework than that currently advocated by the European Council. There are two principal reasons for this.

i. **A more elaborated and specific framework for the development of renewable energy would help to create the confidence necessary for investment on the required scale up to 2030 and beyond**. It would help send clearer signals for investors on the need for both currently competitive renewable technologies, and for innovation in other technologies. This implies acceptance either of some form of explicit national targets or an equivalent measure. These should not be dismissed as an unwarranted interference in national flexibility; they are the best way to reduce the policy risk that investors otherwise face. Greater clarity on the technological and geographical spread that governments foresee is critical for securing jobs and growth benefits from renewables, for enabling effective planning and coherence of technology and grid choices, and for managing wider environmental impacts.

ii. **The environmental rationale for the development of renewable energy, risks being undermined by approaches which effectively encourage a rush towards short-term delivery of the lowest-cost technologies**, regardless of their long-term impacts. Improved policy frames, technology choices and coherent spatial planning, as well as enhanced implementation of existing EU legislation on environmental impacts, will help to deal with these risks.

Delivering a robust, renewable energy network is not a technologically and spatially neutral endeavour. Both its environmental impacts, and its contribution to Europe's economic success, clearly depend on what is built, where and on the scale of deployment. A future EU legislative framework must reflect this. An effective frame of EU policies that deliver deployment of renewable energy solutions at scale and simultaneously protect and promote the environment and biodiversity requires action at both the EU and Member State level. The following recommendations focus on the action we think is needed at EU level.

The need for greater coordination and cooperation justifies a proportionate set of requirements being placed upon Member States to deliver change up to 2030; complementing those already in place, such as state aid rules. An approach based purely on voluntary cooperation (ie building up a European commitment from differing levels of national ambition in the hope of achieving an overall EU 2030 target) cannot be relied on to deliver. Furthermore it seems unlikely to deliver deployment that is consistent with sustainable environmental and economic pathways to deliver the further decarbonisation required by 2050.

EU policy needs a clear, predictable, framework for Member State action due to:

- the sheer scale of the challenge involved in Europe's long-term decarbonisation;
- the level of private sector investment necessary; and
- the extent to which the energy market and physical environment cross national borders.

To deliver both renewable energy deployment and environmental protection in the decade after 2020 we recommend that an EU framework should include the following elements.

- More **explicit and transparent target setting for renewable energy delivery by each Member State or an equivalent mechanism**. Targets should be determined at a European level based on objective criteria, rather than differing levels of Member State enthusiasm. This is needed to ensure delivery, to provide the greater confidence that investors need, to avoid the risks and costs imposed by free rider Member States, and to support other Member States in their ambitions to go further (as called for by the October 2014 European Council conclusions);
- A **more coherent single EU governance framework for developing and delivering energy targets that recognises the important contribution that energy efficiency and associated demand management approaches** (including distributed generation and improved management of the heat sector) **can make to EU decarbonisation objectives**, while also significantly reducing impacts on the wider environment;
- A **requirement for Member States to plan for renewable energy delivery in ways that address cumulative impacts on biodiversity and other aspects of sustainability**, that address land use concerns and constraints associated with certain technologies and supporting grid infrastructure, and that **provide a basis for effective monitoring of the spatial impacts of renewable energy deployment**. This should include the effective use of existing legislative instruments covering plans and projects, particularly the Strategic Environment Assessment and Environmental Impact Assessment Directives, in order to ensure that risks to biodiversity are identified early, and avoided.
- **Sustainability criteria and requirements that apply to all biomass feedstocks used for energy**. These should take into account:
    - the attributes of each feedstock and the relevant environmental issues that result;
    - the scale of biomass use for energy that is judged environmentally responsible and any consequent limitations;
    - appropriate accounting regimes and monitoring arrangements;
    - differentiate bioenergy use from wider renewable energy technologies, this differentiation should be reflected in other EU instruments that support renewable energy adoption, including the EU ETS.

This report does not aim to assess the actions that Member State and sub-national authorities need to take, although we have referred to some potentially helpful approaches in different chapters and a few proposals are included in the recommendations. **Clearly the policy framework for renewables need to be elaborated in most detail at the Member State rather than EU level, with many decisions taken at the regional or local level.**

6.2. Elements of the EU Climate and Energy 2020 Package to be Retained and Improved

There are a number of key elements of the existing framework for delivery of the EU 2020 targets whose retention, or improvement, appears to be crucial for 2030 and potentially beyond.

- **Renewable Energy Targets or equivalent at Member State level –** Targets at EU level that set some form of normative expectation for Member State performance – ideally binding, and ideally set on the basis of an objective process, rather than volunteering – are essential both to guide investment decisions and ensure delivery. This also facilitates those Member States which wish to adopt a more ambitious stance to do so, without simply creating greater scope for other Member States to free ride on their efforts. There will also be consequential benefits for emission reductions and an enhanced capacity to manage environmental impact.

  Moreover, clarity on the need for individual Member States to meet a specific share of renewable energy by 2030 will help to drive an improved level of spatial planning in national delivery. Without a clear indication of the required share of renewables for each Member State, which will give a good sense of the cumulative capacity needed, it will be too easy for policymakers to rely on incremental price and policy signals, rather than promoting a clear vision of the overall investment required. Setting out a clear vision would help both to create greater investor certainty, and to push Member States to acknowledge and address the cumulative environmental impacts of the investment required. We set out below some suggestions for how new approaches can help to ensure that these incentives for Member States can be translated into improved planning.

  We recognise that this approach differs from the approach set out by the European Council. We also understand that there is likely to be significant resistance by a sizeable minority of Member States, and that this resistance may dissuade the Commission from bringing forward proposals along the lines we suggest. In our view, the damage the European Council's approach would create both for investor certainty, for delivery of the EU's decarbonisation approach, and for the freedom for more ambitious Member States to make real progress, are serious and dissuasive. However, if the co-legislators, including the European Parliament, maintain their reservation, there may be scope for agreeing targets that are subject to mid-term review and adjustment. This could involve redistributing effort between Member States where there is a clear and agreed rational, as a result the overall level of EU effort and investor confidence maintained. Were legislators to agree on a sub-optimal system without any binding national renewables targets, the need for many of the other elements in our proposed package of actions becomes stronger.

- **Sustainability criteria for biofuels and bioliquids -** Stronger criteria are required post 2020 for biomass based renewables, either in a revised RED or elsewhere in EU legislation. Experience with certain biofuels and other forms of biomass energy have made clear the significant risks in terms of impacts on land use, in the EU and beyond. There is a risk of both negating climate change mitigation and significantly exacerbating biodiversity and broader sustainability impacts, where the wrong choices are made. In the case of transport fuels, the proposed non-renewal of the current EU volume based consumption target for 2020 (which in practice primarily promotes biofuels), would remove some of the perverse incentives created by the current EU legislation. Appropriate forms of bioenergy on a sustainable scale

can make an important contribution to the spectrum of renewables deployed in Europe. However, it will be necessary to ensure that both the biofuels and the other biomass based renewables contributing to attainment of the overall EU and any corresponding Member State targets genuinely have a significant impact on reducing GHG concentrations in the atmosphere, and avoid significant harmful impacts on biodiversity.

The existing RED sustainability criteria therefore need to be significantly improved and partly reconceived, taking into account a wider range of both potential feedstocks and energy end uses. For many feedstocks sustainability is partly a question of scale e.g. the area of European agricultural land that is acceptable to devoted to energy (including maize for AD plants) or the proportion of forest residues that can be extracted and utilised for energy – reducing availability for other uses. Mechanism to address appropriate scale within different geographic parameters will need to be developed as part of a new sustainability regime. This is challenging and the potential complexity can be a concern. It is, however, unavoidable due to the different nature of bioenergy compared to other renewable energy sources. This difference has to be recognised in policy, especially support regimes across the energy field including within the EU ETS and state aid rules.

- **Monitoring and planning provisions in the RED -** The requirement for Member States to develop a National Renewable Energy Action Plan has been beneficial in assisting more planned and transparent decision-making at national level, and in providing the Commission with some of the information necessary for it to gauge whether progress is being made. Similar requirements should be maintained and strengthened (particularly if there are no binding national targets). The European Council's preference for bringing together diverse elements of energy policy planning into a single governance framework would create the right structure and could contribute to a better planned and more transparent transition.

- **EU environmental legislation -** While the prime role in planning for investment in renewables, selecting locations and addressing environmental impacts lies with the Member States, it is helpful to have a European framework with consistent core processes that guides good practice and provides predictability for developers. Here, the long established SEA and EIA Directives are of particular value and relevance to renewable energy technologies. Experience to date indicates that they often do help to avoid and minimise detrimental impacts (eg through the consideration of alternatives and the identification of mitigation measures) and can lead to worthwhile compensation for unavoidable residual impacts; although implementation varies considerably between Member States. Effective implementation of the Directives remains a priority, following good practices for example set out in the European Commission' existing guidance on wind power.

6.3. Elements of the EU Climate and Energy 2020 Package to be Amended or Removed

There are a number of elements within the existing renewable energy policy framework that have caused problems and, therefore, are priorities either for amendment or complete removal.

- **EU Renewable transport fuel targets and support for biofuels -** The Commission has proposed in its 2014 communication on a policy framework for the 2020 to 2030 period that it "does not think it appropriate to establish new targets for renewable energy or the greenhouse gas intensity of fuels used in the transport sector or any other sub-sector after 2020." One important reason for this retreat from targets is the level of incentives that they generated for a range of first generation crop based biofuels, which then had to be modified by the recent agreement on ILUC.

  Consequently there are good reasons for ending undiscriminating targets. However, there are strong arguments for this approach to be accompanied by the introduction of specific EU mechanisms, including, potentially, targets at Member State level, to encourage investment in advanced biofuels, provided the feedstocks meet stringent sustainability criteria (as part of a wider support scheme as outlined above). These could be accompanied by the roll out of electric transport solutions based on renewable energy. Without provision for such incentives at EU level, the necessary investment and technological development will be delayed.

- **Correcting the zero rating for biomass in the Emissions Trading Scheme and lack of sustainability considerations for solid and gaseous biomass –** Currently EU legislation fails to take sufficient account of the difference in the nature of biomass for energy compared with other renewable energy solutions. Post 2020 there is a need for the environmental consequences of all biomass used for energy to be properly considered, not least in recognising the limits in terms of sustainable potential for a range of biomass feedstocks. One policy mechanism for this is the introduction of 'sustainability criteria', as outlined above, in other policy mechanisms used to support low carbon energy, including the EU ETS.

  Under the EU ETS, the current approach applies a zero-rating of GHG emissions from biomass combustion that fails to reflect the full, real world emissions. While zero-rating logically should be removed as part of a review of biomass policy, defining a better approach is, however, more complex. Detailed case-by-case assessment of sustainability and GHG impacts of biomass fuels would be prohibitively complex. Other solutions merit investigation. One would be a simple, tiered categorisation of biomass fuels, with all those fuels within a certain sustainability category being credited with an appropriate percentage reduction from the full requirement to retire ETS allowances. (Thus, if a fuel meets the stipulated criteria for a category suggesting that its net carbon impact is no more than, say, 40% of its direct carbon emissions, the requirement to retire ETS allowances would be limited to 40% of the associated emissions). Such a system of categories would be based mainly on lifecycle GHG emissions but also would be linked to an expanded set of sustainability criteria for bioenergy.

6.4. New instruments needed at EU level for the 2030 Period and Beyond

Leaving aside the issue of targets the proposed streamlined approach to Member State action planning and reporting of progress in the delivery of climate and energy targets, as endorsed by the European Council, is welcome. A requirement to publish evidence-based, transparent national programmes covering all aspects of energy policy (including renewables and other approaches to decarbonisation) has a number of potential benefits These include enhanced transparency, certainty and understanding for potential investors; and a clearer overview of cumulative land use, biodiversity, and other sustainability impacts of energy investment. It will, however, be important to ensure that the action planned is credible, and that Member States are effectively held to account for the delivery of their share of the wider European target. The consequence of governments failing to meet their share of obligations needs to be spelled out clearly.

The following aspects of the governance structure require particular attention:

- **Planning for further mitigation post 2030:** One weakness in both Commission and European Council policy statements on the 2030 targets package is that they focus heavily on delivery of specific targets in the year 2030. The trajectory of renewables investment and associated emissions over the decade needs attention through a tracking and potential correction system. Secondly, Member States need to be strongly encouraged to plan investment and system development in the light of emission reduction targets for 2050. A number of the pathways which may be necessary for cost-effective mitigation beyond 2030 – in terms of renewables capacity, and the potential for electrification of sectors such as heat and transport, for example – may require preparatory investment now, but without suitable planning may be subject to price and policy signals which are inadequate.

- **Incorporating land use implications, biodiversity impacts and wider sustainability impacts into national energy planning -** As this report demonstrates, there are a wide range of spatial planning, land use and biodiversity impacts of renewables technologies as well as other energy investments required in the coming decades. A clearer spatial planning aspect to Member State energy plans would help to ensure that these impacts are addressed. Such plans would not only help to show how environmental considerations were being built into complex and geographically dispersed investment programmes but would help to demonstrate compliance with the SEA Directive. Both at the strategic and the more specific project level, plans need to take into account at least the five different dimensions of biodiversity/RES interactions set out in this report: systemic environmental concerns; siting concerns; ecological capacity concerns; project design concerns; and ongoing management concerns. Ideally, Member State plans should include scenarios on the desirable 2050 end state for deployment of specific renewables and storage technologies; and should also indicate the preferred approach to their geographical distribution in order to help: (i) manage wider environmental and sustainability impacts and (ii) optimise connections between generation and use of energy.

- **Improved regional cooperation among Member States –** the Commission's Energy Union communication emphasises the importance of improved regional cooperation among Member States, particularly in view of the need for better interconnection planning. We share the Commission's belief in the importance of regional cooperation; in addition, improved regional cooperation could help to address many of the information challenges associated with the greater focus on land use implications of renewable energy capacity outlined above.

- **Providing for investor confidence, and reducing policy risk associated with renewables investment -** While the key mechanism for creating improved investor certainty in renewables is, in our view, explicit and (ideally) binding renewables targets for Member States, other requirements could be included; and, indeed, would become more important in the absence of binding targets. Examples could include requiring Member States to set out how they will provide investors with improved certainty; and to set out clear commitments on the mechanisms they will adopt to ensure that investors in renewables capacities have some level of insurance or guarantee against policy risk (for example, future changes in support regimes). This is an element of policy where requirements would need to be more stringent in the absence of binding Member State targets; given the greater public policy risks to investors that such an approach would entail.

- **Greater clarity on how energy market policy will help to promote the integration of renewables –** Policy on renewables will be an important component of the Energy Union initiatives as well as the 2030 climate and energy package. Indeed, renewable energy is a critical part of secure and sustainable future energy supply. In general terms this implies a more interconnected internal energy market, flexible demand management and appropriate back-up generation capacity. As part of the Energy Union package measures are needed to:
    - make sure that the EU Member States fully implement the energy market legislation to improve the functioning of the internal energy market and resolve structural problems,
    - carefully adjust the energy market design to ensure that market participants are incentivised to address system scarcities (such as capacity and flexibility issues) while preserving a stable environment for RES investors,
    - create a stable, efficient, open and fair regulatory framework for demand side management activities.

6.5. The role of Member States Post 2020

In all the measures set out in this chapter the role of Member States is crucial, but this report is not intended to map the action required at this level in any detail. **Critically, the approach we have set out would require all Member States to take the sort of strategic approach to energy and renewables planning currently only attempted in a few**. We recognise that not all Member States are equally committed to decarbonisation and renewables targets; and that in many cases this in turn reflects the different, democratically expressed, priorities of their populations. However, the European Council's preferred approach effectively would allow more reluctant Member States to free-ride on the progress achieved by the more enthusiastic; we believe this holds serious risks of a failure to deliver the targets agreed unanimously by Member States, and risks preventing the more climate progressive Member States from making the contribution their populations want them to make to tackling climate change. A lop-sided distribution of effort on renewables might also result in unavoidable environmental pressures in some areas with concentrated investment in capacity while suitable resources elsewhere are not exploited at all.

Our approach avoids this by taking a **more equitable approach to the allocation of effort**, based on objective criteria. The enhanced process we have suggested for planning the delivery of that effort does create risks that more reluctant Member States will make use of a greater focus on long-term spatial planning constraints and the wider impacts of renewables deployment in order to emphasise the difficulties of achieving the 2030 targets and the deeper emissions reductions necessary thereafter. There are also risks that in other Member States the process of setting out a long-term vision may shine a clearer light on the challenges and constraints, and provoke some disagreement with high levels of ambition. In both cases, the contribution that a more strategic approach could make to promoting early, transparent, and well-informed debate would be welcome nevertheless; and the resulting increased focus on the benefits of energy conservation measures could help to trigger a more committed Member State approach to policymaking in that area.

Other areas outside the main focus of this report where Member State action can contribute to delivery of renewables and wider environmental sustainability objectives include:

- Improved research into the environmental impacts of renewables and interconnector development, including improved sharing of results among Member States;
- Incorporating the enhanced focus on land use implications of renewable energy capacity in their wider national land use planning systems, in order to avoid as far as possible the pre-empting of valuable sites for renewable energy investment by other, non-compatible, development.