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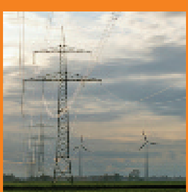


MEETING EUROPE'S RENEWABLE ENERGY TARGETS IN HARMONY WITH NATURE

SUMMARY REPORT

BOX 2

Failing to take the environment into account: the example of Spanish regional government planning for wind power

In December 2006, the Extremadura regional government in Spain announced that 116 requests had been received to install wind farms in the region. Sixteen had at least part of their area within an SPA, and 11 within a SAC. Furthermore, 82 projects were sited within 10 km of Natura 2000 sites declared for birds or bats, and thus potentially could adversely affect the value of these sites and the integrity and coherence of the Natura 2000 network. However, not one of these projects was evaluated in terms of its impact on Natura 2000 sites, and alternatives with no impact on the network were not considered. Projects were proposed in sites as important as the Sierra de San Pedro SPA, with the highest density of Iberian imperial eagle in the world.

The EU strategic environmental assessment Directive (2001/42/EC) requires authorities developing plans in a range of sectors, including energy, to take environmental considerations into account through a process of assessment and consultation. In Spain only two wind energy plans have been subjected to this type of evaluation. The failure to carry out Strategic Environmental Assessment (SEA) of wind energy plans elsewhere has in many cases meant that they have been prepared simply in terms of the distribution of the wind resource, without taking into account any environmental concerns. This is the case, for example, in the autonomous community of Valencia.

Far from accelerating wind farm development, failure to carry out SEA can result in lengthy delay, as has been the case in Catalonia, where the Supreme Court of Justice has halted the planning of wind farms in priority zones for wind energy development because of the lack of environmental evaluation. A similar situation exists in Cantabria, where complaints have been registered in the courts because the wind energy plan was approved without being subject to SEA.

These risks are by no means inevitable, however. Europe's climate, renewable energy and biodiversity targets must all be met, and much can be done to make them compatible and mutually reinforcing. *Meeting Europe's Renewable Energy Targets in Harmony with Nature* explains how policy makers can contribute.

Aerial view of wind turbines in parched Spanish fields.

BIRDLIFE EUROPE'S SUPPORT FOR RENEWABLE ENERGY

BirdLife Europe supports achieving and going beyond Europe's 2020 renewables target, in line with four key principles:

1 **Renewables must be low carbon** – Renewable energy supply must make a significant difference in reducing greenhouse gas emissions compared to fossil fuels, accounting for emissions from the full life-cycle.

2 **A strategic approach to deployment is needed** – Positive planning frameworks are needed so that the most appropriate energy sources are exploited in the most appropriate places.

3 **Harm to birds and biodiversity must be avoided** – Precautionary avoidance of harm to biodiversity and ecosystems is essential when locating and designing renewable energy facilities.

4 **Europe's most important sites for wildlife must be protected** – Where significant impacts on a Natura 2000 site (those protected under the Birds and Habitats Directives) are likely, development may only proceed under strict conditions, which must be robustly applied.

RENEWABLE ENERGY TECHNOLOGIES AND ECOLOGICAL SUSTAINABILITY

After a preliminary review of the risks posed by all forms of renewable energy, technologies were classified based on the risks they pose to wildlife. Figures on the contributions the various technologies will make are colour coded in the full report as follows:

- Low conservation risk technologies (eg, solar thermal and heat pumps) – shades of green
- Medium conservation risk technologies (eg, wind and wave power) – shades of purple/blue
- High conservation risk technologies (eg, liquid biofuels) – shades of red

Technologies that are small-scale, involve little or no additional new infrastructure, and/or do not result in any land use charge, are very unlikely to present significant risks to biodiversity. This "low risk" category includes roof-mounted solar panels, heat pumps and electric vehicles. Energy saving measures, while not renewables technologies, are relevant here since they make achievement of renewables targets easier. Conversely, technologies that result in complete changes in land use will inevitably present significant risks for the wildlife present, for example where valuable habitats are lost to intensive land use for energy crops or through the construction of dams for hydro or tidal power. The "high risk" category refers to technologies that present unacceptable risks in most instances with currently available technologies, such as new large hydropower dams and liquid biofuels. With adequate safeguards and/or technical innovation some use of these technologies may become possible without significant ecological risks, but BirdLife sees current potential as extremely limited.

Most technologies fall in to the second, "medium risk" category, and require sensitive deployment. This category provides much of the focus for *Meeting Europe's Renewable Energy Targets in Harmony with Nature.* It contains a detailed review of current scientific evidence regarding potential ecological risks associated with wind, solar, wave and tidal stream power, and biomass for heat and electricity. It also reviews the scientific evidence on the most effective ways to avoid those risks, and even to achieve benefits for wildlife. The power lines needed to distribute and transmit renewable electricity are also considered. Table 1 summarises the technologies and impact/enhancement areas covered in this review.

Wave or tidal power devices that are visible from the air may be lower risk for diving birds.

TABLE 1

Summary of technologies covered in the review of scientific evidence and examples of impacts and mitigation/enhancement measures covered

TECHNOLOGY	MAIN CONSERVATION RISKS CONSIDERED	AVOIDING AND MITIGATING RISKS	ACHIEVING BENEFITS FOR WILDLIFE
Solar PV arrays	• Habitat loss • Direct impacts on birds, mammals and insects • Habitat fragmentation and/or modification.	• Avoid protected areas • Retain trees and hedges • Time construction and maintenance to avoid disturbance of birds and bats during breeding seasons.	• Manage vegetation around/beneath panels for wildlife • Use some revenues to support on-site conservation.
Onshore wind power	• Disturbance/ displacement • Barrier effects • Collision mortality • Habitat loss.	• Spatial planning (sensitivity mapping and location guidance) and site selection • Modelling collision risks and estimating displacement impacts • Improved tools and methodologies to assist pre- and post-construction monitoring and research • On- or off-site ecological enhancements.	• Positive land management changes • Create wildlife areas on- or off-site as part of community-benefit packages.
Offshore wind power	• Disturbance/ displacement • Collision risk • Habitat loss • Pollution.	• Spatial planning and site selection. • Baseline surveys and targeted pre-construction studies • Remote sensing techniques.	• Reef effects • No-take zones • Contributions to marine ecological data.
Tidal stream and wave power	• Collision risk • Entrapment • Disturbance/ displacement • Indirect effects.	• *None recommended due to early stage of development of wave and tidal technologies.*	• *None recommended due to early stage of development of wave and tidal technologies.*
Biomass for heat and power	• Pressure on existing habitats in forests and on farm land • Direct and indirect land-use change.	• Location guidance • Good practice guidelines • Sustainability standards and certification • Avoid using biomass from sources where sustainability cannot be guaranteed.	• Manage neglected forests for biodiversity gains and sustainable biomass production • Grow patches of wildlife-friendly energy crops, planned to improve habitat connectivity.
Power lines	• Electrocution • Collision risk • Habitat loss.	• Avoid sensitive locations • Retrofitting "killer poles" • Underground cables.	• Manage land beneath pylons as biodiversity "stepping stones" • Provide ecological enhancements to affected communities.

THE ECOLOGICAL SUSTAINABILITY OF EUROPE'S 2020 RENEWABLES PLANS

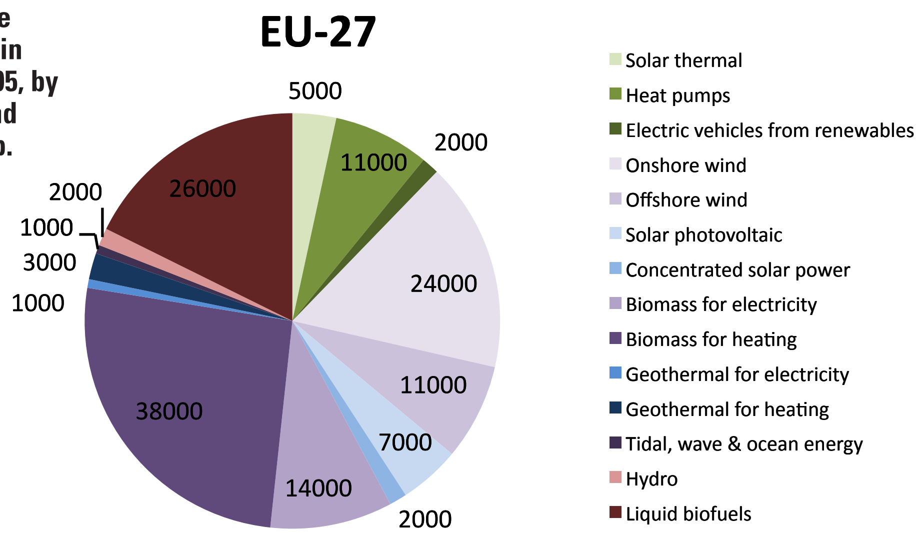
We analysed the EU Member States' NREAPs to generate a clear picture of ambition across Europe for different renewable energy technologies. The NREAPs present Member State plans for each technology in terms of the role they will play in 2020 (additional to 2005). Over two thirds of the additional renewable energy consumed in 2020 will be provided by "medium conservation risk technologies", represented in shades of blue/purple in Figure 1. These include wind, biomass, tidal and wave power. This heavy dependence on such technologies clearly demonstrates the need for proactive policy intervention to ensure ecological impacts are minimised.

Twelve per cent of the increase in renewable energy will be provided by "low conservation risk technologies", including solar thermal and heat pumps, as well as renewable electricity consumed in electric vehicles. These technologies, represented in shades of green in Figure 1, are win-wins for the environment and the climate. In addition, the NREAPs identify additional energy savings measures that reduce total energy consumption in 2020 by 10% relative to "business as usual" scenarios. Energy savings are a very low risk means to make the renewables targets easier to achieve.

Significant differences in ambition to save energy and use low-risk technologies were found between Member States, some of which can only be explained by political will, rather than suitability of individual technologies. For example, Poland and Belgium intend to make significant use of solar thermal energy for space heating, while other

FIGURE 1

Additional renewable energy consumption in 2020 compared to 2005, by technology [ktoe][v] and ecological risk group.



northern European countries with similar weather do not consider it in their NREAPs. Similarly, heat pumps are seen to have great potential in the UK, France and Italy and 13 other EU Member States, while others have not stated an intention to make significantly greater use of this technology. BirdLife believes that Member States should review the potential for these technologies and maximise their deployment.

Nineteen per cent of the increase in renewable energy will be provided by "high-risk technologies", represented in shades of red in Figure 1. Additional hydropower provides a little over 1%, partly accounted for by "repowering" existing facilities. The remaining 18% of the increase in consumption is attributed to liquid biofuels. While repowering hydro facilities and wind farms can be achieved with low ecological risks, and can even benefit the environment, new hydro and liquid biofuels are identified here as technologies that carry high ecological risks. BirdLife recommends that further expansion of use of these technologies should be reviewed and any shortfall in meeting the 2020 renewables target should be made up using less risky technology and/or more ambitious energy savings.

Onshore wind power is expected to contribute 24,000 ktoe more energy to Europe's mix in 2020 than in 2005. This is the largest additional contribution to renewable electricity consumption in 2020. Offshore wind also makes a significant additional contribution in 2020, of 11,000 ktoe. To illustrate what this could mean "on the ground", this would require installation of approximately 59,000 2-MW onshore wind turbines and 6,600 8-MW offshore wind turbines. These would occupy surface areas of approximately 11,800 km^2 onshore and 5,300 km^2 offshore[vi]. These areas are relevant to ecological influences such as avoidance by birds and fishing exclusion zones, but the actual footprints of the turbines would, of course, be far smaller.

Biomass for heat is the biggest contributing technology to meeting the 2020 target overall. Again, simply to illustrate the scale of this ambition, if this were all to be met using wood fuel[vii] an additional annual consumption of approximately 88 million oven dry tonnes (odt) would be required. In addition, meeting the biomass for electricity target using wood fuel would require an additional 194 million odt of wood in 2020. For reference, total wood biomass production across the EU each year for all purposes is approximately 500 million odt.
To meet the target for solar PV to provide an additional 7,000 ktoe in 2020 using domestic rooftops the EU would require an additional 19.4 million 4-kW photovoltaic home systems. Again for illustration, the target for "concentrated solar power" (CSP, using mirrors) would require approximately 170 50-MW plants, while the wave and tidal targets would require an additional 5,300 1-MW tidal/wave turbines[viii].

Germany accounts for just under half of all Europe's additional solar PV energy to 2020. Other southern European nations make up most of the remainder, but the UK, Belgium and Netherlands also see that PV has potential in northern Europe. CSP is important in Spain's NREAP, and features in the plans of five other countries in southern Europe.

Germany and Spain appear set to consolidate their positions as leaders in further deployment of onshore wind. In other countries such as Romania and Bulgaria the onshore wind industry is just getting started. Offshore wind ambitions are concentrated in the North Sea, but France and Spain also plan to exploit wind energy in the Atlantic, and a small contribution is expected in the Mediterranean.

The UK is by far the most ambitious nation in terms of developing tidal, wave and ocean energy according to the NREAPs, though five other countries see potential for these technologies to deliver significant quantities of electricity by 2020. BirdLife considers that with directed innovation funding and sensitive deployment, wave and tidal stream technologies are potentially significant and ecologically acceptable technologies. However, large tidal power "barrages" are likely to present very significant ecological risks through loss of intertidal habitats.

Hydropower makes only a small additional contribution in 2020 according to the NREAPs. While much of this will involve repowering existing facilities or small installations, there is a risk that large dams will be built on some of Europe's last remaining ecologically rich rivers. Liquid biofuels feature in every NREAP, reflecting the mandatory requirement to meet 10% of transport fuel needs using biofuels, hydrogen or renewable electricity. This is expected to be delivered largely through liquid biofuels.

HOW TO ACHIEVE A RENEWABLES REVOLUTION IN HARMONY WITH NATURE

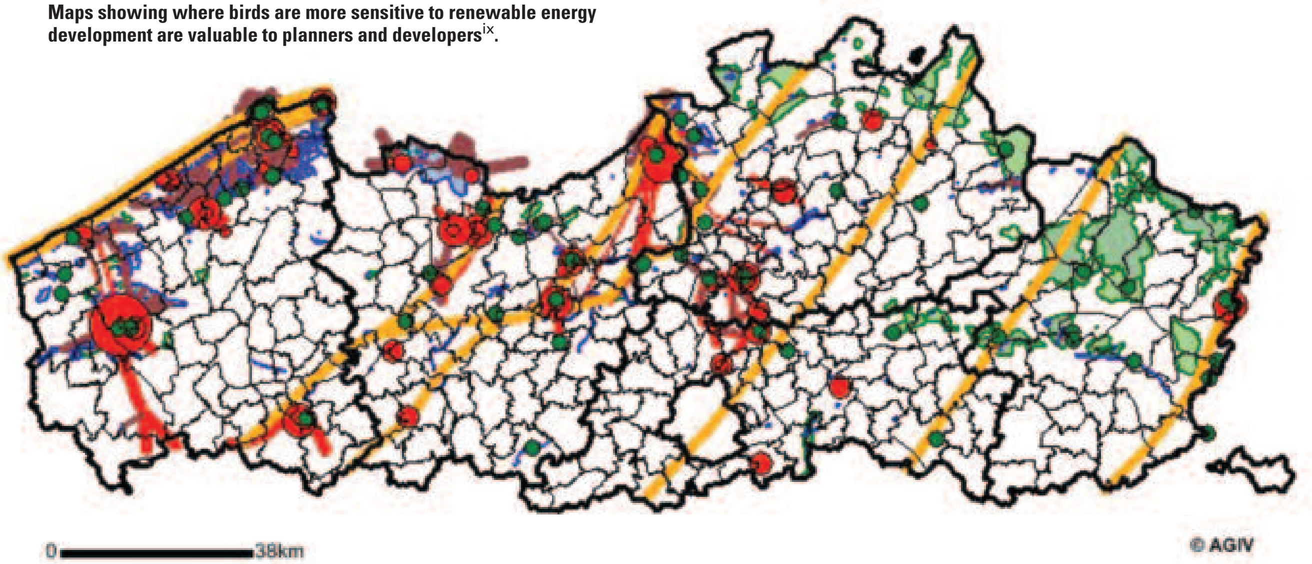
The report identifies eight areas where policy makers must help to enable a renewables revolution in harmony with nature. Action in these areas would support investment, minimise ecological impacts and also improve the public acceptability of investment plans and specific projects.

1 COMMIT POLITICALLY AND FINANCIALLY.

The major obstacle to renewables investment in the coming decade is likely to be difficulty accessing adequate finance at a reasonable cost. Investor confidence falls, and the cost of venture capital rises, where incentives and policy frameworks are unstable. Certainty needs to be offered both in terms of commitment to renewable energy at a political and a practical level. This means that:

i) Europe should urgently set binding targets for renewables as a share of energy consumption in 2030.
ii) Member States should ensure suitable locations are identified for the major renewables technologies.
iii) Stable incentive frameworks are needed, to give investors and all stakeholders more confidence that sufficient renewables will be delivered.
iv) R&D budgets for lower cost and biodiversity-friendly renewables need to be increased by an order of magnitude.

Maps showing where birds are more sensitive to renewable energy development are valuable to planners and developers[ix].



When poorly sited, large solar arrays can cause habitat loss for various species.

Collision with wind turbine blades is a risk for certain bird species.

2 MINIMISE OVERALL INFRASTRUCTURE NEEDS.

High level strategic planning and energy-system optimisation will reduce the overall amount of new resources, capacity and infrastructures required. This reduces impacts and keeps costs to consumers and industry down.

3 INTRODUCE STRATEGIC SPATIAL PLANNING FOR RENEWABLES.

Renewable energy investments are often controversial, with supporters and opponents both having legitimate opinions. Planning is the process through which these concerns are reconciled in the public interest, both within and between EU Member States (eg, in offshore areas). Good planning, based on transparency and public participation, ensures suitable locations are identified for various land uses, and improves the public acceptability of investments. Maps indicating where the most sensitive habitats and species are located are a valuable planning tool for identifying broad zones where renewables development is most appropriate. SEA provides an ideal structured framework for environmentally sensitive planning.

4 ENSURE ALL STAKEHOLDERS ARE ENGAGED AND WORKING TOGETHER.

At every stage in developing and implementing policies and plans for renewables, policy makers, public institutions, developers, conservation organisations and other stakeholders can benefit from working together to find mutually beneficial solutions and to avoid unnecessary conflicts.

5 ENSURE PROJECT IMPACTS ARE MINIMISED.

Renewables developers routinely take steps to avoid and minimise the impacts of their projects, through use of tools such as Environmental Impact Assessment (EIA). Policy makers can help by ensuring the legislative and institutional frameworks in every Member State are adequate to ensure environmental assessments are carried out to a high and scientifically rigorous standard, and that agreed mitigation measures are always implemented and monitored for effectiveness. And of course, unacceptably damaging proposals should be rejected in the planning system.

6 DELIVER ECOLOGICAL ENHANCEMENTS.

Ecological "enhancements" are improvements that go beyond measures required to mitigate or compensate for damage. Developers often provide incentives to communities to make their proposals more readily acceptable, such as paying for community facilities. Providing attractive and wildlife-rich habitats is another way to provide community benefits, and to contribute to local and national biodiversity strategies and targets.

7 GUIDANCE AND CAPACITY BUILDING.

Legislation, regulation and good practice for biodiversity-friendly renewables development are not always well-understood by all parties concerned. Moreover, institutions often lack the necessary capacity to ensure they are properly applied, particularly in the newer and less wealthy EU Member States. Big gains can be made for quite small investments here, and BirdLife Partners are keen to help.

8 PROTECT BIODIVERSITY.

Renewables will help limit climate change, but healthy ecosystems and protected habitats will be essential to enable society and nature to survive the warming that we are already experiencing and cannot avoid. In particular, the Natura 2000 network of internationally important sites for biodiversity needs robust protection, while also accommodating economic activities that present no significant conservation risks or that contribute to conservation goals.

RECOMMENDATIONS FOR NATIONAL AND EU POLICY MAKERS

In developing *Meeting Europe's Renewable Energy Targets in Harmony with Nature*, the project Partners evaluated how well the policy framework in their country achieved the following:

- stimulating investment in a range of renewable energy technologies
- protecting biodiversity and enabling it to adapt to climate change
- minimising overall infrastructure needs and impacts
- spatial planning for renewables, and
- minimising project impacts.

In general the most positive aspects of the policy frameworks are: stimulating investment in renewables; designation and protection of areas of European, national and local importance for biodiversity; and the use of planning control to refuse consent to the most damaging proposals. Areas where policy frameworks are performing less well are: protection of biodiversity outside designated areas; national energy system planning; national-level spatial planning for renewables; use of bird sensitivity maps and SEA; and enforcement of mitigation and monitoring measures agreed at the project consent stage of planning.

The project Partners then suggested policy recommendations for their country and/or the European Commission. Given the principle of subsidiarity, many of the policy changes required to better enable a renewables deployment in harmony with nature can only be made at the level of Member States, for example, changes to spatial planning frameworks and policies shaping national energy mixes. National-level policy recommendations are given in the main report.

In summary, the recommendations for the European Commission are:

1 COMMIT TO LONG-TERM SUPPORT FOR RENEWABLE ENERGY.

- Push for ambitious binding targets and effective mechanisms to save energy across Europe.
- Adopt binding targets for renewable energy as a share of total energy consumption across Europe for 2030, backed by a level of commitment and vision that will sustain investment and public/ NGO support.
- Build post-2020 plans for renewables on an analysis of the level of investment in various technologies that is both necessary and respects ecological limits.

2 PUT BIODIVERSITY CONSERVATION AT THE HEART OF ENERGY POLICY.

- Ensure biodiversity protection is a high priority in European energy infrastructure plans through a co-ordinated approach that minimises total infrastructure requirements and makes new and existing power lines safe for birds and other wildlife.
- Develop clear guidelines to achieve these aims, for application in Member States and where EU finance is provided.

3 ESTABLISH A POSITIVE PLANNING FRAMEWORK.

- Promote transparent, effective and inclusive planning procedures, wherever possible using bird sensitivity maps, to ensure ecologically sensitive planning takes place and all stakeholders are effectively informed and involved from the outset.

- Develop up-to-date guidance on "appropriate assessment" (under Article 6 in the Habitats Directive) for all renewables sectors, and in particular for the appropriate assessment of plans. Increase commitment to enforcement action on infringements of the rules on development in Natura 2000 areas.
- Improve Member States' understanding of EU laws on development in Natura 2000 areas. Ensure developments are not automatically refused consent if they cause no harm (and are also permitted in national legislation), or contribute to the conservation objectives of the designated area, such as sustainable agriculture and forestry practices and sustainable biomass schemes.
- Require environmental impact assessments for all sectors, including renewables, to set out a clear and specific plan for implementing mitigation and monitoring measures, and for reporting on measurable outcomes that can be verified by competent authorities.
- Where required, build capacity in Member State authorities to scrutinise environmental assessments and ensure that agreed mitigation, compensation and monitoring provisions are implemented.
- Ensure environmental assessment reports are scientifically robust, for example, by requiring independent selection of consultants to carry out studies from a pool of approved professionals.
- Clarify how alternatives should be defined in SEA eg, following the "mitigation hierarchy" (ie, alternatives should look first to avoid impacts, then to minimise and mitigate, and lastly to compensate).

4 TARGET R&D AT FACILITATING SUSTAINABLE ENERGY.

- Increase R&D funding for key technologies with potential for high-carbon savings and low-biodiversity impacts, including micro-renewables, floating offshore wind turbines, wave power and tidal stream power.
- Provide R&D funding for EU-wide biodiversity sensitivity mapping for a range of major renewables technologies, following an agreed common methodology.

Expansion of renewable energy will require new power lines to be built: these can be a hazard for birds.

ENDNOTES

[i] Intergovernmental Panel on Climate Change (2007) *Climate Change 2007: The Physical Science Basis. Summary for Policymakers.* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf [accessed 20-10-11]

[ii] Huntley, B., Green, R.E., Collingham, Y.C. & Willis, S.G. (2008) *A Climatic Atlas of European Breeding Birds*. Lynx Editions, Barcelona, Spain.

[iii] Thomas, C.D., Cameron, A., Green, R.E., Bakkenes, M., Beaumont, L.J., Collingham, Y.C., Erasmus, B.F.N., Siqueira, M.F.D., Grainger, A. & Hannah, L. (2004). *Extinction risk from climate change, Nature* 427 (6970): 145–8

[iv] Millenium Ecosystem Assessment (2005) *Ecosystems and human well-being: Synthesis*. Island Press, Washington, USA. http://www.maweb.org/documents/document.356.aspx.pdf [accessed 20-10-11]

[v] Thousand tonnes of oil equivalent (ktoe). Calculations based on data in Beurskens, L.W.M. & Hekkenberg, M. (2011) *Renewable Energy Projections as Published in the National Renewable Energy Action Plans of the European Member States*, Energy Research Centre of the Netherlands (ECN), Petten, The Netherlands. For gross final consumption values the "total before aviation reduction" was taken. BirdLife makes no guarantee for completeness or correctness of data: mistakes might have occurred due to copying of wrong numbers, typing mistakes, misinterpretation or mistakes of our sources.

[vi] Using a conversion factor of 11,630 GWh/Mtoe, facility run times of 8,760 hours per year, load factors of 27.1% for onshore wind turbines and 27.6% for offshore wind turbines (Digest of UK Energy Statistics, Department of Energy and Climate Change, London) and surface areas based on EEA (2009) *Europe's onshore and offshore wind energy potential. An assessment of environmental and economic constraints*, European Environment Agency, Copenhagen, Denmark, (p.10).

[vii] To calculate demand for biomass in oven dried tonnes (odt), a conversion factor of 6,000 odt/MW was used for electricity, and 18 GJ/odt (at 41.9 GJ/toe) to calculate the demand for biomass for heat.

[viii] Using a conversion factor of 11,630 GWh/Mtoe, facility run times of 8,760 hours per year, capacity factors of 12% for photovoltaic 31% for solar power, 57.6% for biomass electricity, 27% for tidal/ wave turbines and 34.8% for hydropower.

[ix] Map for Flanders Region of Belgium. Details and searchable interactive map available at http://geo-vlaanderen.agiv.be/geo-vlaanderen/vogelatlas

IMAGES: wind turbine with planted hardwood trees by Niall Benvie; Spanish wind turbines and solar panels on farmland by Roger Tidman; Polarmis tied at quayside by Laurie Campbell; common or Eurasian crane and electricity cables by Nick Upton.

GRAPH: Sandra Pape

MAP: bird sensitivity in Belgium by © Agentschap voor Geografische Informatie Vlaanderen – Geovlaanderen – Vogelatlas.