



QUICK TIPS

WORKING WITH NATURE IN THE RENEWABLE ENERGY SECTOR

 This document is part of the “[Working with Nature](#)” Quick Tips series, comprising 7 sectoral Quick Tips on [Agriculture and Livestock](#), [Cities](#), [Disaster Risk Reduction](#), [Forestry](#), [Transport](#), and [Water](#).



Renewable energy and nature are not necessarily allies

The transition to renewable energy is an important step in the fight against climate change, climate change being one of the main global threats to biodiversity. Yet, renewable energy is not automatically green and clean energy. Before highlighting the opportunities for biodiversity-positive action in the energy sector, we first summarise the main biodiversity-related issues with renewable energy generation technologies.

- ▶ **Wind power**, onshore and offshore. Most serious biodiversity impact is the interference of turbines with flyways of birds and bats, both on land and at sea. The pile driving during construction for offshore turbines creates noise known to kill marine mammals. Onshore wind farms and their access roads take land. Offshore wind farms may create more biodiverse habitat and safe space for fish as fishing and shipping is not allowed near turbines.
- ▶ **Solar energy** siting is obviously fundamentally important as may interfere with land use. Apart from site clearing, solar parks cause soil modifications (shade, moisture), need water for cleaning, may change local hydrology and cause erosion. The effects of floating solar panels on water quality and aquatic ecology are still largely unknown¹.
- ▶ **Hydropower** interferes with water and sediment flows and can have far-away up- and downstream impacts. Well-known detrimental biodiversity impacts by dams, reservoirs and river diversions are the blocking of animal migration; destruction of riverine and terrestrial habitat; stratification of deep reservoirs (no oxygen) leading to fish kills and methane production; proliferation of aquatic weeds; changes in the hydrological cycle and sediment balance of rivers and coastal areas leading to erosion and loss of biodiversity and aquatic productivity. Multiple HP facilities in the same river basin create complex cumulative impacts.
- ▶ **Biomass**² is a biodiversity-based and carbon neutral source of energy, heavily criticised for being competitive with the production of food and fibres on a planet with limited availability of arable land. Traditional use of fuelwood can lead to overexploitation and land degradation. The 2021 revision of the EU Renewable Energy Directive promotes a shift away from conventional biofuels to advanced biofuels (produced from non-recyclable residues) and carbon-neutral synthetic fuels; use of whole trees and food crops for energy production should be avoided³.

¹ See: [Floating solar energy](#)

² The use of biomass in the EU is governed by the [Renewable Energy Directive](#) and its underlying [Regulation on Land Use, Land Use Change and Forestry](#)

³ See: [EU rules on sustainable biomass](#)

- ▶ **Transmission lines** are inseparable from electricity production. The main biodiversity impacts are, like all linear infrastructure, the interference with animal migration corridors (collision risks, particularly of low flying large birds). Furthermore, clearing of the right-of-way of the transmission line leads to habitat loss; access roads provide access into potentially undisturbed areas; birds and small mammals are at risk of electrocution in the vicinity of energized conductors.



Contributing to and benefiting from nature in renewable energy

Target 11 of the 2022 [Global Biodiversity Framework](#) requires us to restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature. Many excellent and detailed guidelines exist on the **minimisation and compensation** of biodiversity impacts by energy production and transmission projects⁴. However, for a green transition **more is needed to ensure net biodiversity benefits**. The renewable energy sector has the potential to both contribute to and benefit from nature in many ways. Some of these include:

- ▶ **First of all: support renewable energy development.** Climate change is one of the most significant threats to biodiversity; renewable energy reduces the risk by reducing CO₂ emissions.
- ▶ **Think holistically.** Energy production can be an underlying factor of biodiversity loss in certain areas. For example, through unsustainable wood exploitation for charcoal production or land-consumptive biomass solutions. New energy projects can be positive for nature if they enable the replacement of more destructive energy systems, thus addressing root causes of biodiversity loss.
- ▶ **Good site selection can include opportunities for biodiversity enhancement.** Gravel pits, landfills, old mines and abandoned agricultural land provide good opportunities, for example for solar parks, in **combination with nature restoration and landscape diversification**. Green belts, ponds and streams may serve as stepping stones or corridors. Linear infrastructure such as powerlines provide opportunities for biodiversity enhancement within the right of way; early planning is required.
- ▶ **At river basin level** dams should be located in river branches where least harm is done, with a guarantee (for example in the context of a river basin management plan) of leaving biodiverse river branches free flowing. This guarantees the maintenance of a biodiverse, functional and resilient river basin. Other options include the partial damming of the river (for example in braided rivers) or creating a deviation towards a turbine for part of the water while leaving the natural course free flowing.
- ▶ **Plan for the use of ecosystem services and nature-based solutions.** Protecting and restoring nature in upper river catchments makes economic sense for dam operators as it can enhance upstream water storage and control erosion, avoid landslides (disaster risk reduction), reduce sediment inflow (extending the lifetime of the reservoir), and increase the resilience of the watershed against climate change (climate adaptation). Similarly a reservoir and river flow can be managed for multiple ecosystem benefits, including fisheries, nature conservation, recreation, water supply. These measures may come at minimal costs, generate co-benefits and may even save on construction cost, if biodiversity is pro-actively considered from the early design.
- ▶ **See unavoidable negative impacts as a driver for action** (or lose a court case). Wind projects and powerlines are notorious for their negative wildlife impacts. Careful site selection and proper mitigation measures⁵ may minimise collision risk. Net positive biodiversity contribution, however, can only come from additional conservation activities, for example focussed at high risk species. Measures can be taken pro-actively or may be ordered by court (as shown by the India case).
- ▶ **Consider excess compensation** after the mitigation hierarchy has been fully applied (avoid >minimize> compensate). Once the main impacts have been avoided (e.g. site location) or minimized (e.g. considering river branches/deviations), there may still be unavoidable residual impacts that will need compensation measures. It is recommended to compensate more than the amount of natural areas lost, and consider the multiple natural values that were lost (surface of ecosystems, species – but also ecosystem services and social values). Energy investments may be the largest investments in some countries and provide the only serious opportunity to allocate budget to biodiversity conservation. Compensation should not legitimize the loss of critical habitats, that are hard to restore, and for which emphasis should be put on the first steps of the mitigation hierarchy.

⁴ Avoidance, mitigation and compensation: too many relevant documents to list – please contact the Greening Facility for further assistance.

⁵ Wind turbines located on a known flyway can be temporarily shut down when a large flock of approaching birds is observed by radar. In the case of the Indian bustard (see case box) the only effective measure was avoidance of collision by (expensive) underground cables. Various types of deflectors attached to power lines are effective for various species. It's a specialist job.



The Case of the Great Indian Bustard

The critically endangered Great Indian Bustard is restricted to only two isolated regions in India with the largest population of 150 birds in Thar landscape of Rajasthan. Power lines pose the biggest threat to bustards due to their low flying nature and poor frontal vision. Collision with high voltage power lines leads to annual death of 15% of the population, posing a serious threat of extinction. A conservation breeding program has been initiated in Rajasthan to breed Great Indian Bustard in captivity and rewild them. A supreme court ruling ordered to immediately take the most threatening powerlines underground, stressing that irrespective of the cost factor the priority shall be to save the near-extinct birds.

Source: A. Rajvanshi, India Wildlife Institute, personal communication and ppt



Priorities for action

Graduate from a “do no harm” approach to a “do more good” approach at project level. Energy sector investments usually involve huge budgets. Environmental Impact Assessment (EIA) studies for such projects identify alternative options to avoid impacts, suggest mitigations measures and recommend compensation actions for the residual loss of biodiversity and loss of livelihoods. **Excess compensation** provides opportunities to invest in biodiversity conservation and sustainable use beyond the minimally required, for the benefit of long term biodiversity conservation, the sustainable exploitation of ecosystem services by local communities, and in some cases for the benefit of the energy project itself. Additional costs can be minimised when **pro-actively planning** for such measures. **Holistic thinking** for local energy systems transition can identify options to reduce root causes of biodiversity loss, by replacing harmful approaches, and therefore contribute to a positive action. Awareness is fundamental!

Ideally, energy development projects (and all other developments for that matter) are embedded in a larger strategic planning framework. Priorities for action include:

- ▶ **Energy sector planning** focussing on the optimal energy mix for a specific region, including off-grid and mini-grid solutions (avoiding transmission lines), informed by SEA.
- ▶ **Spatial planning** indicating development opportunities (suitability for wind, solar, hydro- and other sources of renewable power) and no-go areas for certain activities (e.g. leaving areas untouched to maintain fundamental ecological processes; avoiding animal migration corridors), informed by SEA.
- ▶ **River basin management planning** taking into account all human interventions and water uses, and the flow dynamics needed for a functional river system (i.e. ecological flow requirements), including the identification of river branches suitable for hydropower development and those which should be left free flowing (see case), informed by SEA.
- ▶ **Use of strategic environmental assessment (SEA)**, carried out during the planning processes, to inform such process at an early stage on, amongst many other things, opportunities for biodiversity enhancement (for example by comparing siting/location alternatives).

- ▶ **Create an enabling environment for biodiversity-positive action** through:
 - Building capacity in the energy industry and government
 - Strengthening legislation and policy; conduct a gap analysis for biodiversity management by the renewable sub-sectors and identify opportunities to incorporate biodiversity into the energy policy.
 - Building better understanding around the value of nature by communication mechanisms, involvement of relevant actors in society, and encouraging the integration of the value of nature into corporate practices.



Good practice examples of nature-friendly energy infrastructure

The Case of Solar Parks in Germany

By planning the solar plant in **Salmdorf** near Munich on a former gravel pit and the **Fürth-Atzenhof** solar plant on a former landfill the two projects significantly contributed to local biodiversity. In the first example a species-rich meadow was developed, bordered by hedges and trees, while ponds served as stepping-stone for a threatened green toad. In the second example a flock of grazing sheep avoiding regrowth of shrubs and trees, incompatible with solar panels, but also resulted in a large variety of plant species. After 6 years an astonishing total of 254 types of ferns and flowering plants were counted and 30 types of moss, including 23 red-listed species. Surrounding agricultural land benefits from the enhanced biodiversity, for example by enriching species for pollination and pest control. Further lessons were (i) to connect with local people to seek for opportunities to also enhance biodiversity in the wider area and (ii) to integrate nature conservation and enhancement measures with solar park maintenance measures into the design.

Source: [Solar parks – profits for biodiversity](#)

The Case of SEA for a Hydropower Plan

The SEA of the Quang Nam Province Hydropower Plan incorporated close to 40 hydropower projects, including 8 large projects (60 - 225 MW). By the time the SEA was completed the number of planned projects had increased to over 60, with proposals continuing to come in. The SEA resulted in four critical strategic concerns in the basin: integrity of ecosystems and biodiversity, water supply, impacts on ethnic minority groups, and economic development. The SEA concluded that the pace and scale of the proposed hydropower developments was unsustainable. National benefits from the hydropower plan (energy and income) would not be captured locally, unless measures such as a river basin management fund were established.

The SEA made a number of recommendations relating to the integrated management of the basin, including a proposal to develop an “intact rivers” policy to secure the maintenance of one or two complete river sequences (from headwaters to sea) free of barriers to ensure a full sequence of habitats and fish migratory routes. The SEA resulted in a freeze on hydropower development in nature reserve and a trial for a benefit-sharing mechanisms. Adding social and economic assessments to the SEA increased its acceptability within government. Even though time-consuming, the involvement of government stakeholders and consultations with communities clearly contributed to the success by increasing stakeholder ownership.



LIFE Elia-RTE – Layman's report

Source: OECD (2012) [Strategic Environmental Assessment in Development Practice: A Review of Recent Experience](#)

The Case of Green Corridors for Biodiversity under High-voltage Lines

The aim of the project was to create green corridors under overhead electrical lines in wooded areas in Belgium and France. The idea was to replace conventional vegetation management (“U” shaped corridor) by an alternative method (“V” shaped corridor). The project showed that with proper management, the land under powerlines can enable and support greater biodiversity. The actions included restoration of forest edges, planting fruit trees of wild and local species, restoration of protected habitats, digging of ponds, establishment of a pasture or mowing, combating invasive plant species, and harvesting seeds, sowing and mowing of flower meadows.

Source: [LIFE Elia](#)



Further information and support

- ▶ **Avoidance, mitigation and compensation:** too many relevant documents to list - please contact the Greening Facility for further assistance.
- ▶ QuickTips guide to [integrate environment and climate change into the energy sector](#)
- ▶ QuickTips on [Integrating the Environment and Climate Change in Water Resources Management](#)
- ▶ [QuickTips on Working with Nature](#)

All documents are available on capacity4dev (public group: [Environment, Climate Change and Green Economy](#)).

Contact INTPA and NEAR Environment & Climate Change Mainstreaming Facility:
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