



Birds and Solar Energy within the Rift Valley/Red Sea Flyway

Solar technologies such as photovoltaics and passive heating have been around for some time. But new technologies and industrial-scale solar farms are being developed and deployed around the world, and solar energy development in the Rift Valley/Red Sea region is expected to increase particularly rapidly. While the known environmental effects are, in the majority of cases, benign, impacts are site-, scale- and location-specific.

Potential impacts on migratory soaring birds may include collisions with associated infrastructure, and possibly with panels; habitat loss, disturbance and fragmentation; and water use. The cumulative impacts of successive developments are potentially significant.

Governments can minimise many potential adverse impacts by:

- Reviewing, and where appropriate revising, legal and regulatory mechanisms to ensure birds and biodiversity are safeguarded;
- Carrying out strategic planning for solar energy developments, utilising the **Strategic Environmental Assessment (SEA)** approach
- Ensuring appropriate site selection for developments, adhering to the precautionary principle
- Developing and strengthening legislation regarding the use of SEA and **Environmental Impact Assessment (EIA)**, ensuring appropriate EIA is carried out for each development
- Ensuring that appropriate ornithological assessment as part of an EIA, and also post-construction monitoring, are part of project legal agreements. This is required so that potential impacts can be quantified
- Engaging with a wide range of stakeholders, guaranteeing stakeholder consultation in SEA and EIA throughout the processes
- Committing to the publication of environmental and ecological data generated as part of EIA and SEA, so that it is freely available for review and consultation, and storing it in a centralised and accessible information system
- Committing to post-construction monitoring
- Recognising that solar energy is a new and developing technology, and that further research is needed to assess impacts on birds and biodiversity in the region
- Regional sharing of good practice examples and information, to reduce impacts and improve the knowledge-base of appropriate mitigation actions
- Working with BirdLife Partners and other stakeholder groups who can identify important areas, and provide guidance on mechanisms to reduce the adverse impacts on birds and biodiversity.

BirdLife International supports the transition to more renewable sources of energy. Renewable energy will deliver a number of long-term benefits, which can help in reducing greenhouse gas emissions and in delivering lasting economic and social benefits to countries and communities, by reducing reliance on fossil fuels and contributing to energy self-sufficiency. This transition must avoid harm to ecosystems and biodiversity.

The high solar potential of the region has been noted, with extensive developments being planned in a number of countries. Solar development globally is growing at a rate of 40% per year, but still only contributes about 0.6% of electricity generation. Solar however has the greatest potential for global energy generation of all renewable energy resources. For instance, Concentrated Solar Power technology has the capacity to provide for about 7% of the total electricity needs projected for the world by 2030 and 25% by 2050¹. The expansion in solar energy has the potential to occupy large tracts of land: for example the Shams 1 project in the United Arab Emirates, consisting of 768 parabolic troughs, occupies an area of 2.5 square kilometres.

Solar is believed to be one of the most environmentally benign of all the renewable energy technologies. As with any infrastructural development, there are potential adverse impacts, but with appropriate planning, impacts can be minimised. Where consideration is not given to the cumulative risks associated with successive developments, the risks to birds and biodiversity could be significant. An impact in one area of the flyway has the potential to cause significant adverse impacts along the flyway route.

The technologies used in solar energy developments can be broken down into four categories:

1. **Photovoltaic/Concentrated Photovoltaic:** which converts the Sun's energy directly into electricity to be exported to the grid;
2. **Concentrated Solar Power (CSP):** which uses mirrors to concentrate the Sun's rays, and a fluid-based system to drive steam generators which deliver electricity to the grid;
3. **Solar thermal heating** panels use the direct heat of the sun to raise the temperature of water. Panels are usually mounted on the roofs of buildings, with a simple arrangement of dark-coloured water pipes beneath glass. This is used to heat water for buildings, swimming pools, and for various industries;
4. **Passive solar:** which generally refers to the use of glazing, building design and building orientation to contribute to space heating.

BirdLife recognises that a balanced approach to renewable energy development is needed, which recognises national, regional and international priorities, and in which competing interests and priorities are compared. Defining this approach is an intricate process, requiring the inputs of a range of stakeholders to ensure that balanced decisions and the most sustainable solutions are achieved.

Governments have the right to develop in the way they believe is most appropriate, but long-term and strategic planning which integrates bird and biodiversity concerns will ensure lasting sustainable development. BirdLife International is committed to working with governments to ensure that development takes place in a way which integrates bird and biodiversity concerns, and that decisions are taken which minimise environmental impacts and deliver maximum benefits to the citizens of each country.

The Rift Valley/Red Sea flyway is the second most important flyway in the world for migratory soaring birds. More than 1.5 million migratory soaring birds of 37 species use the flyway, including raptors, storks, pelicans and cranes, of which five species are globally threatened. Each country within the flyway and across the region has a unique contribution to make to ensure the continued resilience of the bird species present within their borders, and to conservation at the flyway scale as birds move through and use habitats within their countries.

The potential for renewable energy generation within the region is very high, with significant developments across the flyway. Many countries have made commitments to the generation of renewables as part of their energy mix. For example, Egypt has a domestic energy target of 20% from renewables by 2020, and Jordan has a target of 10% by 2020.

Government commitment to renewable energy is a positive element in setting out a strategic development plan, and will provide guidance to many stakeholders, including potential investors. By providing policy predictability, governments can stimulate investment by reducing risks to investors.

This document will concentrate on Photovoltaic (PV) and Concentrated Solar Power (CSP) technologies. Solar thermal and passive solar heating are not believed to pose any direct threat to birds and biodiversity, and are in the majority of cases confined to urban environments. The same is true for roof mounted solar PV in the urban environment or single houses. Governments should set out a strategy for the use of solar energy as part of their renewable energy plans. BirdLife Partners and ornithological experts can provide valuable knowledge in relation to sites which may be inappropriate for development due to risks and vulnerability, and any likely impacts.

New solar energy developments will also mean the construction of power lines, the cumulative length of which could reach thousands of kilometres. Such power infrastructure may pose a high risk to birds and bird populations, potentially leading to the deaths of thousands of birds across the region annually.

Governments must ensure that the electricity generated by solar operations is transmitted to end users in a way which minimises the impacts on birds and biodiversity. Locating new sites close to the existing grid will limit the amount of new lines required. BirdLife International has developed guidance material in relation to power lines for the region, which can be found on the Migratory Soaring Birds website.

Potential Impacts

Industrial-scale solar technologies are relatively new, with a limited number of significant developments worldwide, and as yet little is known about their impact on bird populations and biodiversity in general. Studies that have taken place have shown that environmental effects are relatively benign, but no studies have been completed in the Rift Valley/Red Sea region. Therefore one of the most urgent requirements is for further research on the impacts of solar technology on birds, and biodiversity in general, within the Rift Valley/Red Sea flyway.

The effects of solar developments on birds and biodiversity could include:

- **Water use:** the volume of water used for cleaning purposes can be significant². For Concentrated Solar Panel technologies, water may be used in the cooling process, or to generate steam to drive a turbine. The potential extraction rate can be very high³ and may have a significant impact on local and regional hydrology and associated avifauna, especially in water-constrained areas;

¹ Estrela, Greenpeace International, Solar PACES (2009) The Global CSP Outlook 2009 www.greenpeace.org/international/Global/international/planet-2/report/2009/5/concentrating-solar-power-2009.pdf 2)

² Guardian (2012) www.guardian.co.uk/environment/2011/dec/11/sahara-solar-panels-green-electricity

³ Damerou K, Williges K, Patt A, Gauche P (2011) Costs of reducing water use of concentrating solar power to sustainable levels: Scenarios for North Africa Energy Policy, 39(7):4391-4398

- **Habitat loss/fragmentation:** potentially this is the largest impact, as large areas of habitat may be removed, replaced or degraded. The actual ecological significance of the impact will be site and scale specific; many developments are likely to have limited impacts. An assessment of the ecological value of the development's footprint will show the significance of the impact. The assessment of cumulative impacts is vital;
- **Risk of collision:** with associated infrastructure, including fencing and towers, but particularly with associated power lines. Some species of birds may collide with panels because they are attracted to shaded areas, particularly if panels are located in previously undisturbed areas;
- **Pollution:** activities during construction and ongoing maintenance, and the use of chemicals in CSP processes, could lead to the release of pollutants into the environment. Contaminated liquids in hyper-arid regions could be detrimental to large numbers of migrants.

A number of other scenarios have been put forward as potentially having an adverse impact, but there is limited data on these, and they require further study;

- **Disturbance:** Disruption of a bird's natural patterns of behaviour may lead to disorientation and increased energy use. Large arrays of panels may resemble water bodies, attracting some bird species. One study indicated that insects were attracted to laying eggs on panels, as they confused them with water⁴. The shade cast by panels can also attract birds. Disturbance during construction and maintenance may also be an issue. Other possible issues resulting from increased human access to otherwise inaccessible areas should also be assessed;
- **Change of habitat function:** the increase in shade and the changing water regime within a solar power plant change the micro-climate, and may change vegetation patterns. This means potential indirect impact on breeding and resting birds by changing food sources (e.g. seeds, insects, plants and animals) and also nesting structures;
- **Barrier effect:** Links within the flyway could be disrupted if very large areas are used without assessment of the cumulative impacts on migratory soaring bird populations, or if solar arrays occupy habitat at known resting sites, forcing the birds to abandon the area;
- **Potential heat damage:** a theoretical risk from heliostat technology, which concentrates solar energy on a central collector, generating temperatures in excess of 1000°C, is that birds flying within its beam may be injured or killed. One study at the now decommissioned Solar One facility in California indicated that while some birds were affected, the overall outcome was not significant⁵.

The potential impacts are likely to vary depending on the site location, and also the particular species migrating through or resident in an area. Grassland, steppe and desert bird species sensitive to disturbance, such as bustards, may be vulnerable to habitat loss and fragmentation of the landscape. Particularly high impacts are likely to occur where these developments coincide with migratory resting, staging or stopping-off spots, or areas of undisturbed habitat.

Another potential effect which requires further investigation is the ability of large industrial-scale projects to affect the thermal updraft of an area, which could impact positively or negatively on soaring birds. This requires further solar development-related research to identify the extent and range of impacts, if any.

A precautionary avoidance approach should be used in the selection and development of sites, but this need not deter

developments in all cases, as mitigation actions and habitat manipulation may be possible when informed by appropriate assessment. Solar has a valuable contribution to make as part of a diverse renewable energy mix within the region.

Strategic planning and assessment

The potential adverse impacts associated with renewable energy developments will be significantly reduced by the use of a positive planning framework and a strategic approach to development. Strategic planning should be used in conjunction with other mechanisms which reduce overall energy demand and improve energy efficiency at the consumer level. Such mechanisms will reduce the need to develop additional energy generation facilities and associated infrastructure.

At the pre-planning stage a **Strategic Environmental Assessment (SEA)** should be carried out to identify areas where impacts may occur. Where there is a high probability of a significant impact to vulnerable species or sensitive ecosystems, this area should be excluded from future development. Protected areas and other sites important for biodiversity, such as Important Bird Areas, will require in-depth investigation and precautionary avoidance. Sensitive ecosystems could potentially be more vulnerable to impacts of solar developments. Consideration must be given to the appropriate technology to use, given the characteristics of the site. Some areas may be unsuitable for CSP technologies because of water resource constraints, and sites next to water bodies may require mitigation measures to prevent collisions by birds.

This SEA is a vital component of any infrastructural development processes, and should take into account existing as well as planned developments from other sectors across a region. This helps to ensure that the cumulative impacts from solar, combined with other sectors, do not produce unexpected landscape barriers or hazards. Governments and national authorities should ensure that the SEA is included in the strategic planning framework.

A range of stakeholders should be engaged at an early stage, including local communities, indigenous peoples, planners, researchers, and specific interest groups including conservation groups. Stakeholder consultation enables expert and local knowledge to be incorporated at an early stage, and should continue throughout the SEA process. Governments must ensure that the consultation is as open and transparent as possible.

The use of an SEA enables governments and developers to identify long-term strategic areas for future development at a number of scales, and also cut down on potential impact costs in the future. The assessment methods for the ornithological appraisal require expert review prior to commencement, to ensure that the appraisal is to a high standard and generates accurate results. This will greatly aid the ability to identify the cumulative effect that renewables infrastructure could potentially have across a landscape.

The SEA will be reinforced and enhanced when it is conducted in partnership with **sensitivity mapping**, which presents a strategic view of the sensitivities of bird species to infrastructural developments. BirdLife International has developed and is continuing to refine a sensitivity mapping tool for the Rift Valley/ Red Sea Area relating to wind farm developments. Although the sensitivity layer is specifically for wind farms, it shows congregations of migratory soaring birds and important areas for migratory soaring birds which can inform site selection. The sensitivity map, and the information it contains, offer a valuable resource to national governments and national

⁴ Horváth, G., Blahó, M., Egri, A. *et al.* (2010) Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects. *Conservation Biology*. 24(6):1644-1653

⁵ McCary M.D., McKernan R.L., Schreiber R.W., Wagner W.D. & Sciarrotta (1986) Avian mortality at a solar energy plant *Journal of Field Ornithology* 57 (2) 135-141

authorities involved in planning energy developments, but will be enhanced through the availability of additional data. Other decision support tools such as [IBAT](#) should be consulted to review the likely risk associated with any developments, and can aid the screening and categorisation processes.

Once sites have been identified, it is essential that the developer be required to undertake a site-specific **Environmental Impact Assessment (EIA)**. Governments must ensure that an EIA is carried out, through appropriate legislation or regulation. The EIA must appropriately assess the ornithological value and the biodiversity of the site, such as the flora, reptiles and mammals, including nocturnal species like bats. For solar projects, a detailed hydrological impact study may be necessary, depending on the technology used. Project contracts and legal agreements must specify the requirement to carry out an appropriate assessment, and permits for development should not be issued if significant negative impacts may occur. BirdLife International is in the process of developing guidance material in relation to EIA. This guidance can be used to inform legislative and regulatory standards, and will be available in the coming months.

It is essential that any survey identifying the ecological value of the development's footprint includes the additional area required for construction, and a buffer zone, to allow for any changes in the proposed development and assessment of possible edge effects. The techniques and methods used in undertaking these surveys should be capable of replication as part of a post-construction monitoring programme. Stakeholder consultation is a vital component of any EIA, and can help ensure the inclusion of expert and local knowledge, and reduce the risks. EIA should be carried out by qualified independent practitioners, and be reviewed by qualified independent reviewers.

Projects should not be given consent if the risks are too high. If the risk levels posed by a project are deemed acceptable, then the mitigation hierarchy should be adhered to.

The mitigation hierarchy is defined as **avoidance, minimisation (mitigation) rehabilitation/restoration, offset**⁶:

- a. Avoidance: measures taken from the outset, such as careful spatial or temporal placement of elements of infrastructure, in order to completely avoid impacts on certain components of biodiversity.
- b. Minimisation: measures taken to reduce the duration, intensity and/or extent of impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as is practically feasible.
- c. Rehabilitation/restoration: measures taken to rehabilitate degraded ecosystems, or restore cleared ecosystems, following exposure to impacts that cannot be completely avoided and/or minimised.
- d. Offset: measures taken to compensate for any residual significant, adverse impacts that cannot be avoided, minimised and/or rehabilitated or restored, in order to achieve no net loss, or a net gain, of biodiversity. Offsets can take the form of positive management interventions, such as restoration of degraded habitat, arrested degradation or averted risk, and protecting areas where there is imminent or projected loss of biodiversity.

The EIA should also consider the ecological needs of the species occurring within the site, and provide recommendations regarding possible mitigation measures, such as leaving or creating habitat corridors, creating complementary habitat, or ecosystem restoration. One option that could be considered is contiguous/compensatory habitat development to compensate for loss of habitat due to the solar development. This should only be considered once the other avenues within the mitigation

hierarchy have been considered. Any compensatory land requires an appropriate management plan to maximise its biodiversity potential.

The ecological data generated by the EIA should be stored in a publicly accessible, centralised information system, enabling strategic analysis and also the generation of greater knowledge. It is essential that the Environmental Management Plan is open to stakeholder consultation, and that a non-technical summary report is also produced in the local language.

The EIA will aid in identifying the impacts upon birds and other taxa at the site/project level. It enables specific risks to be addressed, and outlines specific avoidance and mitigation actions, which will reduce the impact on birds and biodiversity.

A robust pre-construction baseline survey is an essential component of this EIA assessment. This pre-construction **baseline survey** should take place for a minimum of one year; three years could be necessary if an area is known to be important for migratory species. It should be completed by a trained professional, and generate robust scientifically accurate results.

The pre-construction baseline surveys should include:

1. Breeding bird surveys, to assess potential footprint and buffer zone impact of a development on resident species;
2. Vulnerable and protected species-specific surveys, for species that may need individual assessment, e.g. nationally and internationally important bird, reptile and mammal species, or colonial bird species;
3. Migratory bird surveys may be required if the site is along a migratory route. If required this should include vantage point surveys undertaken during migration periods, particularly at or near bottlenecks, and should cover the seasonal variation during a year-long period;
4. Hydrological Assessments may be required, depending on the technologies used.

Power lines and associated infrastructure

The power line infrastructure which carries the power generated by solar farms to the end user can potentially have a significant impact on birds and bird populations. This impact could be reduced by using appropriate mitigation measures. These measures include the appropriate routing of the lines, use of bird deflectors, and pole design which minimises electrocution risks. Further details can be found in the BirdLife guidance factsheets produced for the region in relation to power lines. Any impact assessment for a solar development must take into account the infrastructure needed to connect the development to the national grid. Routing and mitigation actions should be informed by an SEA and EIA.

Governments must ensure that the routes, and pole and power line designs, minimise the risks to birds and biodiversity. Within a development, power lines should be placed underground. As it is costly to retrofit existing lines with bird flight diverters, a precautionary approach should be adopted, and bird flight diverters should be fitted on all new lines where collisions risk is high. Sites should be located close to existing grids to minimise the creation of additional lengths of line.

Construction activities

The construction of the renewable infrastructure has the potential to have a significant impact on biodiversity, in particular resident bird species with territories close to the construction site. These impacts can be reduced by utilising environmentally-sensitive construction practices and techniques, including habitat restoration at the site level.

⁶ Business and Biodiversity Offsets Programme (BBOP) (2012) Standard on Biodiversity Offsets. www.forest-trends.org/documents/files/doc_3078.pdf

Governments must ensure that project legal agreements and contracts specify the need to engage in environmentally-friendly construction techniques, and to limit the use of chemicals on site, and include the appropriate disposal of waste and chemicals post-construction. Enforcement mechanisms must be designed to ensure compliance.

Good construction techniques include (1) minimising any clearing of natural vegetation; (2) implementing adequate measures to control soil erosion and runoff; (3) ensuring proper disposal of all solid and liquid wastes, especially when using hazardous chemicals; (4) ensuring construction materials come from local and environmentally sustainable sources; (5) restoring cleared areas where feasible; and (6) putting in place mechanisms to minimise the risk of the introduction of invasive species. Construction should be timed to avoid times of peak sensitivity, such as during the breeding season or periods of peak migration. Governments or designated national authorities must ensure that project legal agreement or regulations ensure that environmentally-friendly construction practices are followed.

Mitigation actions

The best way to avoid any potential negative impacts of a solar development on birds and biodiversity is to select an appropriate site. Governments must ensure that areas where there is a high risk of developments affecting vulnerable species or sensitive ecosystems are excluded from developments.

Mitigation actions for solar developments include:

- Placing of white strips along the edges of the panels to reduce the similarity of panels to water, to deter birds and insects⁷;
- Some CSP technologies can use 'dry' cooling technologies. Although more expensive, these can reduce the amount of water extracted from the local environment;
- For CSP technology, reflective surfaces which are parabolic (curved) in shape reduce the likelihood of skyward reflection, whereas flat heliostats have an increased associated risk of being reflective, and therefore potentially attractive to birds;
- Trough receivers should use evacuated glass tubes or similar technology to reduce heat loss, which results in low receiver temperatures which will not burn birds;
- Use fencing and wire grids to ensure evaporation ponds are not accessible to birds and other fauna. This is to reduce the possibility of a) attraction b) drowning c) poisoning;
- Use of translocation to protect terrestrial species (e.g. reptiles, amphibians) present at a development site during construction and operation. This requires a suitable site with suitable habitat and viable population levels;
- Fencing should not hinder species movements at the site level, and fencing should utilise bird diverters;
- Minimum clearing of native shrub and plant communities;
- Nocturnal lighting should be kept to a minimum to avoid attracting birds;
- Appropriate management of the space between and beneath solar panels. Good maintenance practices (such as confining vehicular access to defined tracks) can also minimise environmental impacts;
- When developments are sited in degraded land areas biodiversity can be improved, but in pristine ecosystems, developments will almost certainly be detrimental.

Recent developments within CSP technologies, where sunlight is focused on a receiver which is very close to the mirror, should

be investigated. This design makes it less likely that a bird will fly between the receiver and mirror, reducing the likelihood of heat damage.

Post-construction monitoring

In the light of our limited understanding of the impact of large scale solar developments on birds, post construction monitoring should be a standard recommendation for any new solar plants that are approved, especially in regions of significance for birds. Once a solar development has been constructed, the ongoing effects on bird populations and biodiversity should be monitored, so that potential long term impacts can be identified and addressed.

A range of surveys are required to assess the potential impact on birds. These surveys should include:

1. Assessment of residents, breeding and seasonal species compared with baseline surveys
2. Vantage point surveys to assess any impacts on soaring birds during intense migration periods, or winter movements
3. A minimum of one year's post-construction monitoring, and a review process which provides the ability to react to results of surveys and identified impacts
4. Mortality surveys and carcass searches should also be carried out at intervals appropriate to scavenger removal rates, and taking searcher bias into account.

Continuous monitoring generates information establishing the range and extent of any operational impacts, and will inform the need to adapt mitigation actions and operational procedures within the development. This monitoring should be carried out in a standardised way by recognised qualified individuals. It is critical for a new and developing industry that it undertakes monitoring to identify any potential impacts that may arise. The Before After Control Impact (BACI)⁸ approach should ideally be used, to allow comparison with the pre-construction data and control site, so that impacts can be readily assessed.

These studies should be scientifically accurate, be freely available, and be used to inform future developments within the sector. This should be a requirement for the development of all large-scale solar projects. Governments should ensure that budgets have been set aside for the post-construction monitoring phase, and that if the impacts are found to be significant on vulnerable or at-risk species, mitigation actions are implemented. Any ecological data generated should be stored in a publicly accessible information system, and governments should provide mechanisms to make this possible.

Strengthening national and international legislation

National legislation

BirdLife International, its Partners and its staff are committed to ensuring a lasting sustainable future for all. We welcome government commitments to renewable energy, and the use of new technologies to deliver low carbon energy. Within the region there is a high potential for solar energy, and while this energy is believed to be one of the most environmentally friendly, a precautionary approach should be used until the long-term impacts of these new technologies are known. This is especially true for technologies which require the use of water.

Every country needs a national planning framework for infrastructure projects, including the strategic development of renewable technologies, which integrates biodiversity

⁷ Horvath G, Blaho M, Egri A, Kriska G, Seres I, Robertson B (2010) Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects *Conservation biology* 24 (6) 1644-1653

⁸ McDonald, T.L., Erickson, W.P. & McDonald, L.L. (2000) Analysis of Count Data From Before-After Control-Impact Studies. *Journal of Agricultural, Biological and Environmental Statistics*. 5: 262-279

considerations. Its development will be enhanced by the engagement of a wide range of stakeholders, including civil society and private industry. Roles and responsibilities of specific entities and national authorities need to be clearly defined, and supported by specific laws and regulations which reduce duplication and overlapping responsibilities.

Governments should ensure that SEAs and EIAs are used prior to any development been given consent. If no legislative framework is in place that calls for the use of SEA and EIA for development of infrastructure projects, governments should work with all relevant stakeholders to ensure such mechanisms are enshrined in legislation, and that the methods used, reflect the need to integrate bird and biodiversity concerns. In order to be effective, the EIA processes should be fully incorporated into existing legal planning processes, and should not be seen as an 'add on'. The use of an SEA can help ensure planned and strategic development, and that bird and biodiversity concerns are mainstreamed across government departments.

National governments should ensure that bird and biodiversity concerns are mainstreamed across all government departments and sectors. The definition of 'environment' in national legislation and procedures should fully incorporate the concept of biological diversity, as defined by the Convention on Biological Diversity and related conventions. The outcome of any SEA process must be communicated across all relevant departments, including planning, environment, and the designated national authority in charge of solar energy development.

There is precedent for the development of national legislation and standards for the use of solar energy. The German Renewable Act specifies that a local development plan and EIA are required before a solar plant is approved.

The data generated as part of an SEA and EIA should be made freely available and accessible. This allows for the continued study of birds and biodiversity within a national framework, and for the impact of solar to be investigated to inform future developments within the sector. This can lead to appropriate siting of developments and reduce risks. EIA assessments should be reviewed by external and independent experts to ensure their appropriateness. No decision on granting permission for a development should be given until the EIA process has been completed and there are no detrimental impacts.

Clear legislation and resulting regulations are needed to ensure protection of birds and compliance by developers. Project legal agreements need to reflect agreed solar farm operating standards, which specify post-construction monitoring and data-sharing, use and disposal of chemicals, and equipment and landscape maintenance. Mitigation measures are more likely to be implemented if they have been explicitly described and budgeted-for in project agreements, bidding documents, and contracts. Redress and compliance mechanisms need to be developed to ensure that operators and developers are adhering to rules.

Other national legislation, such as that related to protected areas and species, should be enhanced, including the strengthening of existing environmental legislation, especially in relation to the disposal of toxic materials, and environmentally-friendly construction practices. BirdLife Partners should be consulted in relation to strengthening this legislation.

International Agreements

BirdLife International supports renewable energy generation and believes that a positive planning framework can reduce the negative impacts on birds and biodiversity. We call on all stakeholders to adhere to the precautionary principle. The [Strategic Plan for Biodiversity 2011-2020](#), adopted at [Convention on Biological Diversity](#) (CBD) COP 10 in 2010, provides a comprehensive global framework for achieving the vision of '[Living in Harmony with Nature](#)', including the 20 headline Aichi Targets for 2015 or 2020. These targets called for the mainstreaming of biodiversity across government, so that biodiversity values are integrated across sectoral plans and policies, and adverse effects can be minimised. [Article 14 of the CBD](#) identifies impact assessment as a key instrument for achieving the conservation and other objectives of the convention. The CBD has also endorsed formal texts on [voluntary guidelines](#) for incorporating biodiversity into impact assessments.

As industrial-scale solar is a relatively new and rapidly developing technology, there are as yet very few international agreements or resolutions in relation to solar energy and birds or biodiversity. However, various international conventions do refer to renewables and energy infrastructure. The recent COP11 meeting of the [Ramsar Convention](#), held in July 2012, contains a specific resolution in relation to Energy. Resolution XI.10 on '[Wetlands and Energy Issues](#)' provided guidance on addressing the implications of policies, plans and activities in the energy sector for wetlands, stressing the need for integrated planning.

There are resolutions related to migratory birds and energy infrastructure (power lines) in the [Convention on Migratory Species](#) (CMS). Resolution 7.4 '[Electrocution of Migratory Birds](#)' from the 7th Conference of the Parties (COP) in 2002 calls on the parties to the convention to curb increasing electrocution risk from medium-voltage transmission lines. Resolution 10.11 '[Power lines and Migratory Birds](#)', adopted at COP 10, developed specific guidelines on mechanisms to reduce power line impacts on birds, and urged countries to implement these guidelines, including 'development of specific impact criteria to be applied in selection of energy generation sites'.

The [Agreement on the Conservation of African-Eurasian Migratory Waterbirds](#) (AEWA) also addresses power lines and renewables. Specific resolutions include 5.11 on '[Power lines and Waterbirds](#)' agreed at the 5th Meeting of the Parties (MOP) in 2012, and Resolution 5.16 '[Renewable Energy and Migratory Water birds](#)' calling for the development and strengthening of national renewable energy planning, and for the developments to include monitoring in order to avoid and minimise the adverse effects of renewable energy installations.

BirdLife International recognises that there has been limited investigation into the impact of solar energy generation on birds and biodiversity, and believes that, given the proposed expansion within the sector, more research and in-depth analysis is needed to inform the sector and future developments.

More details on the Migratory Soaring Bird Project can be found on the link below. Specific guidance in relation to wind energy, power lines and solar energy is to be published, and a sensitivity mapping tool is being developed and will be available over the coming months.