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Renewable energy and biodiversity

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IUCN

THE BIODIVERSITY CONSULTANCY

Mitigating biodiversity impacts associated with solar and wind energy development

Guidelines for project developers

IUCN GLOBAL BUSINESS AND BIODIVERSITY PROGRAMME

BirdLife INTERNATIONAL Partnership for nature and people | FAUNA & FLORA INTERNATIONAL | The Nature Conservancy | WCS

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Μετριασμός Επιπτώσεων στη Βιοποικιλότητα κατά την Ανάπτυξη Ηλιακών και Αιολικών Πηγών Ενέργειας

Οδηγίες για κατασκευαστές έργων

ΠΑΓΚΟΣΜΙΟ ΠΡΟΓΡΑΜΜΑ ΓΙΑ ΕΠΙΧΕΙΡΗΜΑΤΙΚΟΤΗΤΑ ΚΑΙ ΒΙΟΠΟΙΚΙΛΟΤΗΤΑ ΤΗΣ ΔΙΕΘΝΟΥΣ ΕΝΩΣΗΣ ΓΙΑ ΤΗΝ ΔΙΑΤΗΡΗΣΗ ΤΗΣ ΦΥΣΗΣ (IUCN)

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WORLD HUMAN FORUM

ΠΡΑΣΙΝΟ ΤΑΜΕΙΟ

NATIONAL BANK OF GREECE

ΔΕΗ Ανανεώσιμες

Dr Bruno Oberle, IUCN Director General:

Large-scale expansion of solar and wind energy is vital for a sustainable, low-carbon future.

However, developers must take care to ensure that these technologies do not unwillingly pose risks to nature and livelihoods.

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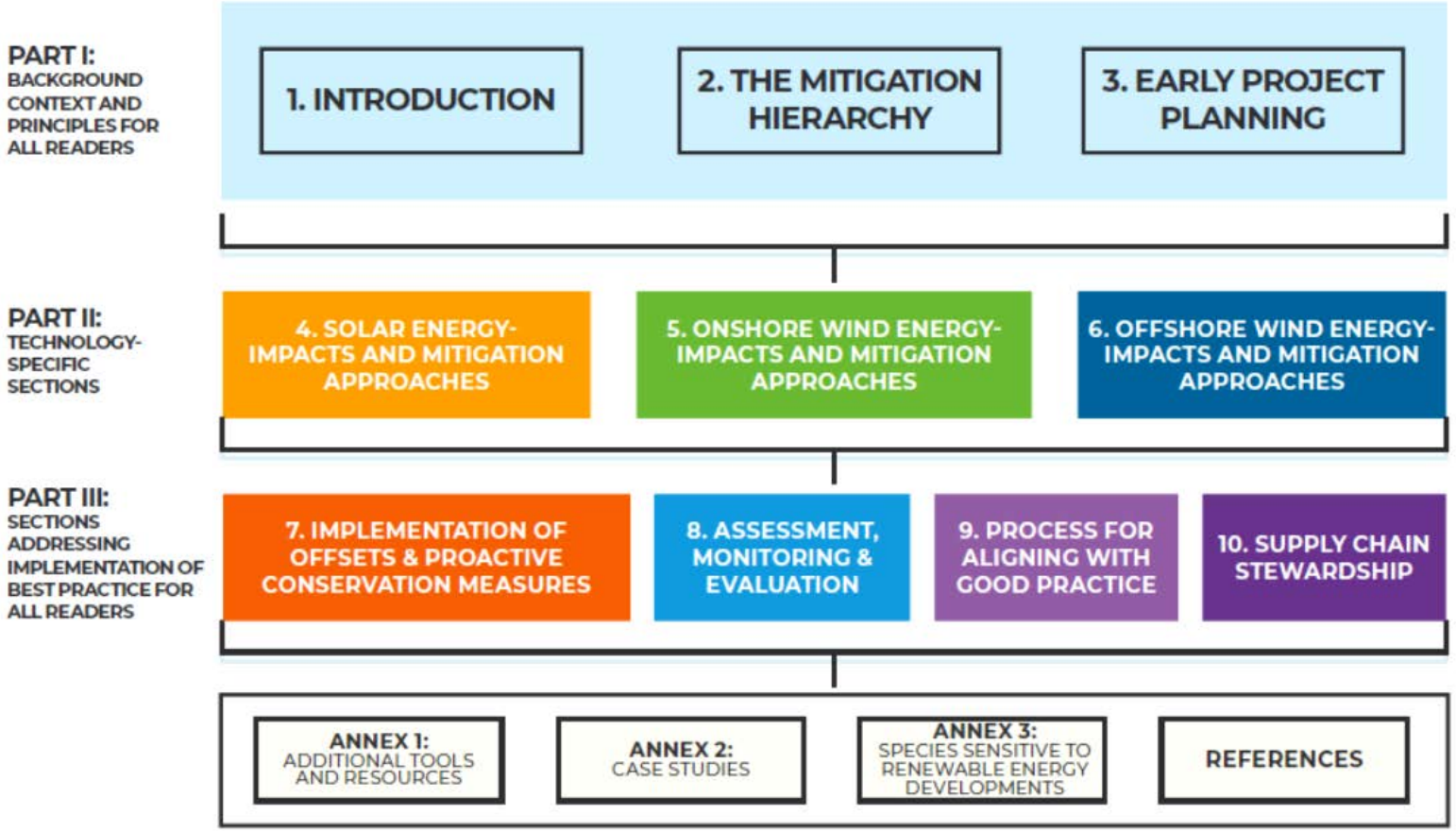
Structure of the guidelines



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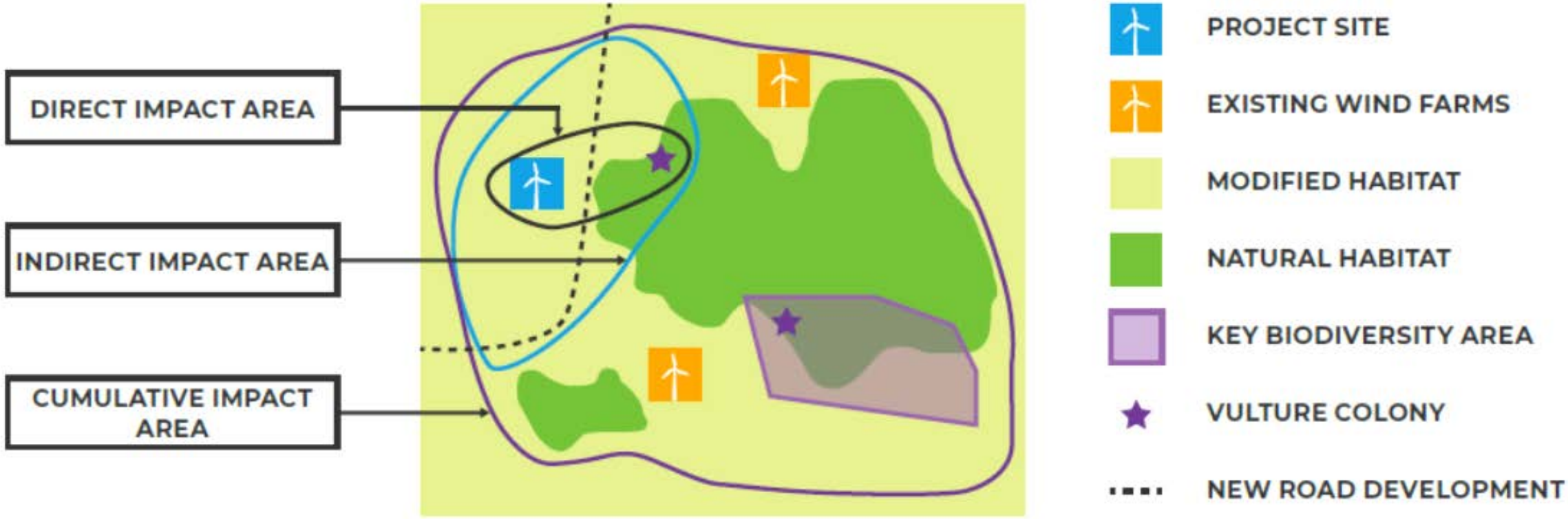
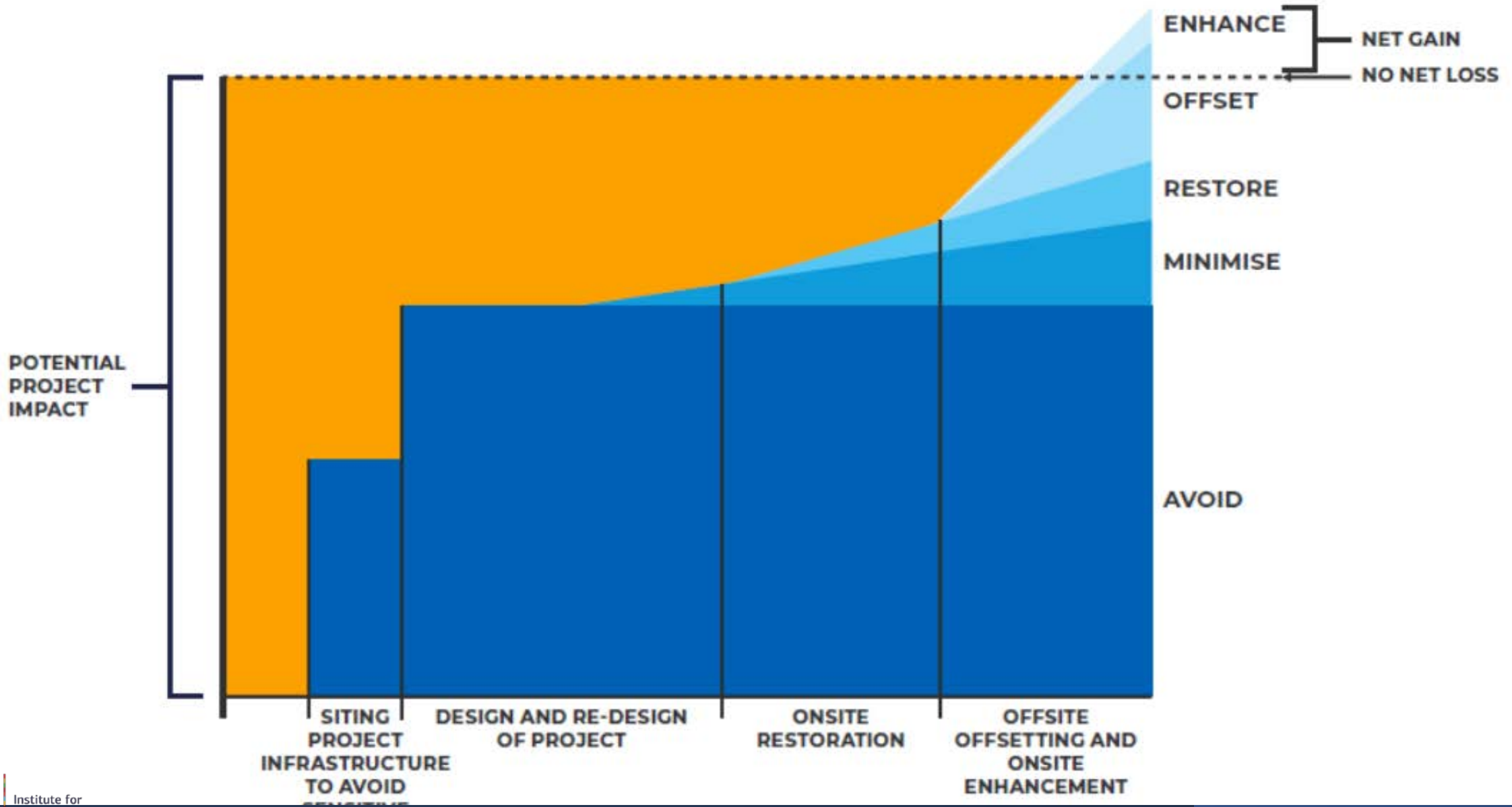
The mitigation hierarchy.

Figure 2.1 Relationship between direct, indirect and cumulative biodiversity impacts – Illustrative example of an onshore wind development within an area important for vultures



opportunities to undertake off-site habitat enhancement



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Mitigation components relevant at each stage

THE MOST IMPORTANT STAGE FOR OPTIMISING AVOIDANCE

PROJECT STAGE	EARLY PLANNING	PROJECT DESIGN	CONSTRUCTION	OPERATIONS	DECOMMISSIONING	REPOWERING
MITIGATION FOCUS	AVOIDANCE	AVOIDANCE	AVOIDANCE		AVOIDANCE	AVOIDANCE
	AVOIDANCE BY SITE SELECTION - CONSIDERATION OF SPATIAL PLANS AND AND/OR SENSITIVITY MAPPING INFORMATION - RISK SCREENING	- PROJECT DESIGN	- SCHEDULING		- SCHEDULING	- PROJECT DESIGN
	MINIMISATION	MINIMISATION	MINIMISATION	MINIMISATION	MINIMISATION	
		- PROJECT DESIGN	- OPERATIONAL CONTROL - ABATEMENT CONTROL	- PHYSICAL CONTROL - OPERATIONAL CONTROL - ABATEMENT CONTROL	- PHYSICAL CONTROL - OPERATIONAL CONTROL - ABATEMENT CONTROL	
			RESTORATION		RESTORATION	
		OFFSETS				
PROACTIVE CONSERVATION ACTIONS		ADDITIONAL CONSERVATION ACTIONS AND ON-SITE HABITAT ENHANCEMENT				
SURVEY TYPE*	RISK SURVEYS	IMPACT & MITIGATION SURVEYS	MONITORING SURVEYS & ADAPTIVE MANAGEMENT			

*The type of surveys needed to assess and monitor biodiversity risk, impacts and mitigation.

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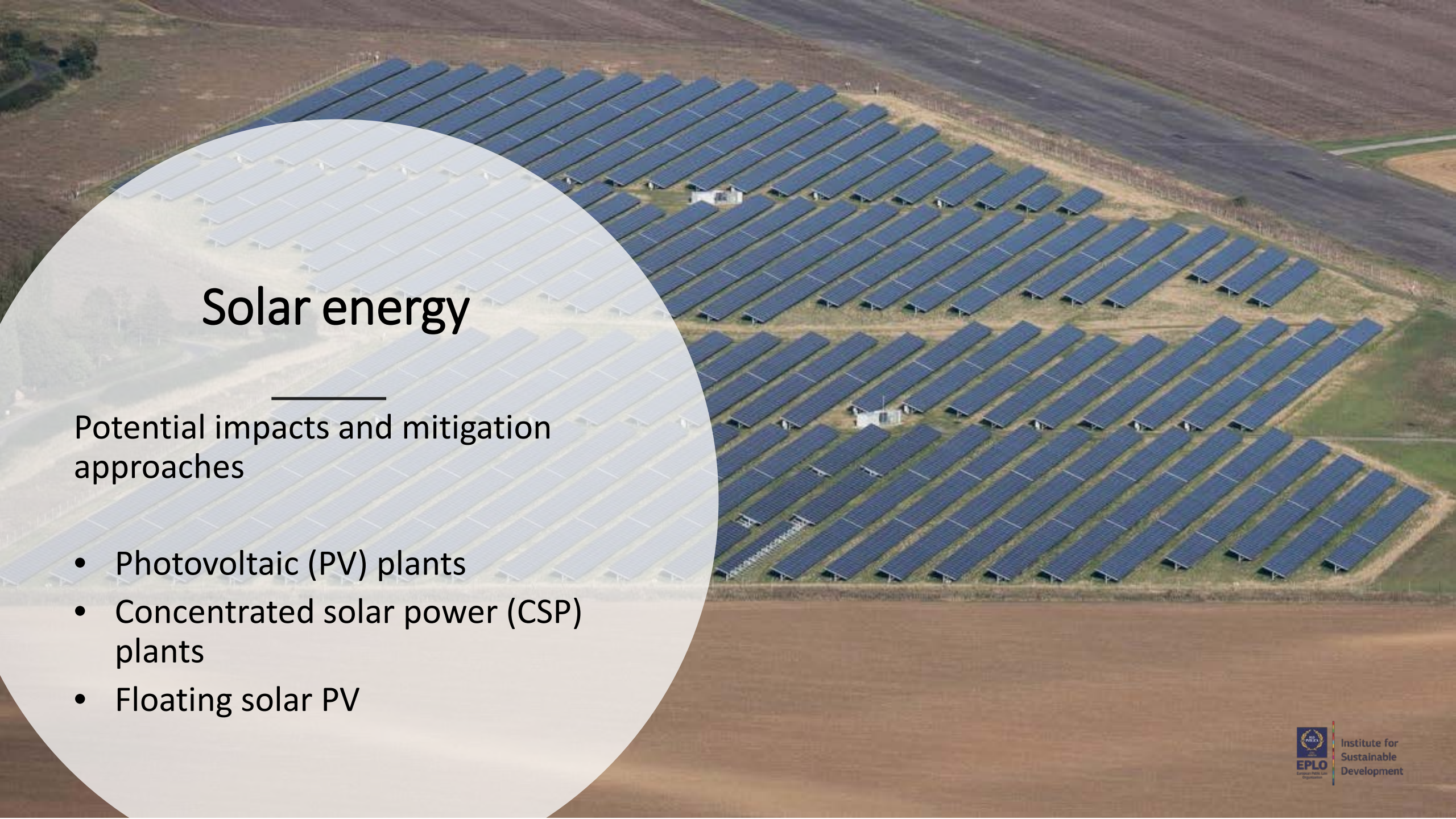

Solar energy

Potential impacts and mitigation approaches

- Photovoltaic (PV) plants
- Concentrated solar power (CSP) plants
- Floating solar PV

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Types of impact: Solar

Habitat loss through clearance or displacement
Bird collisions with solar panels and/or transmission lines
Bird and bat mortality through electrocution on distribution lines
Displacement due to attraction to reflective surface of solar panels
Wildlife mortality due to attraction to evaporation ponds
Barrier effects
Habitat degradation due to changes in hydrology and water availability and quality
Pollution (dust, light, noise and vibration, solid/liquid waste)

Solution example

Solar panels – *General*			
Minimise habitat loss/degradation by reducing foundation footprint	Natural habitat and associated species	Solar panels can be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity.	This measure has been recommended as good practice for mitigating impacts across solar developments.[130]
Modify security fencing to minimise barrier effects	Small- and medium-sized animals	Modifications to fencing can involve maintaining a gap between the base of the fence and the ground. This could occur across the full extent of, or at regular intervals, along the fence line.[131] This can also involve creating passageways by modifying the fence weave to facilitate animal movement.	This measure has been recommended as good practice for mitigating impacts across solar developments and other infrastructure development.[132]

Land-based Wind Energy

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Types of impact: Wind

Bird and bat collisions with turbines blades and/or transmission lines
Habitat loss through clearance or displacement
Bird and bat mortality through electrocution on distribution lines
Barrier effects
Trophic Cascades
Pollution (dust, light, noise and vibration, solid/liquid waste)
Indirect Impacts
Associated ecosystem service impacts
Introduction of invasive alien species

Solution example

Overhead power lines			
Installation of bird flight diverters	Bird	Attaching devices (typically flappers, balls or spirals) to transmission lines to increase their visibility. Evidence for the effectiveness of this measure is fairly robust. Table 5-3 summarises the different design options and examples of effective application.	An analysis of 35 studies on the effectiveness of wire-marking in reducing bird collisions with power lines revealed that average collision mortalities was reduced by 50%, with the type of device having no influence on this effect.[222]
Wildlife-safe design or retrofitting power-line wires and poles	Bird	Designing low- or medium-voltage power lines, or adding insulation to existing poles and wires, to reduce the risk of electrocution of birds or other wildlife from contact. Evidence proving the effectiveness of this measure is robust, although ongoing maintenance may be required if components have a limited life.	In Mongolia, retrofitting of insulation on low-voltage power pylons resulted in an estimated 85% reduction in mortalities.[223]
Altering transmission line configurations	Bird and bat	Measures to change the design of transmission lines to reduce bird collisions aim to reduce the vertical spread of lines, increase the visibility of lines, and/or decrease the span length. Specific measures could include: (i) reducing the number of vertical wire levels by adjusting the conductor heights to reduce the number of potential collision points; (ii) stringing wires as low as possible; (iii) keeping wire span lengths as short as possible to minimise line height as birds usually respond to seeing lines by increasing height; and (iii) using wires with a thicker diameter or bundling wires to increase visibility.	While these measures are generally agreed upon and recommended, further scientific evidence is needed to clearly demonstrate their effectiveness.[224] Electrocution risk to fruit bats was found to be almost zero for powerlines with wires oriented horizontally. Vertically-oriented powerlines killed close to one individual per km of powerline.[225]

Offshore Wind Energy

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Implementation of biodiversity offsets and proactive conservation actions

Biodiversity offsets must be measures taken as a last resort to compensate for any residual significant, adverse impacts that cannot be avoided, minimized and/or restored.

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Assessment, monitoring and evaluation indicators

Effective mitigation of project impacts requires a comprehensive understanding of biodiversity features present in the area and their likely direct and indirect interactions with project operations.

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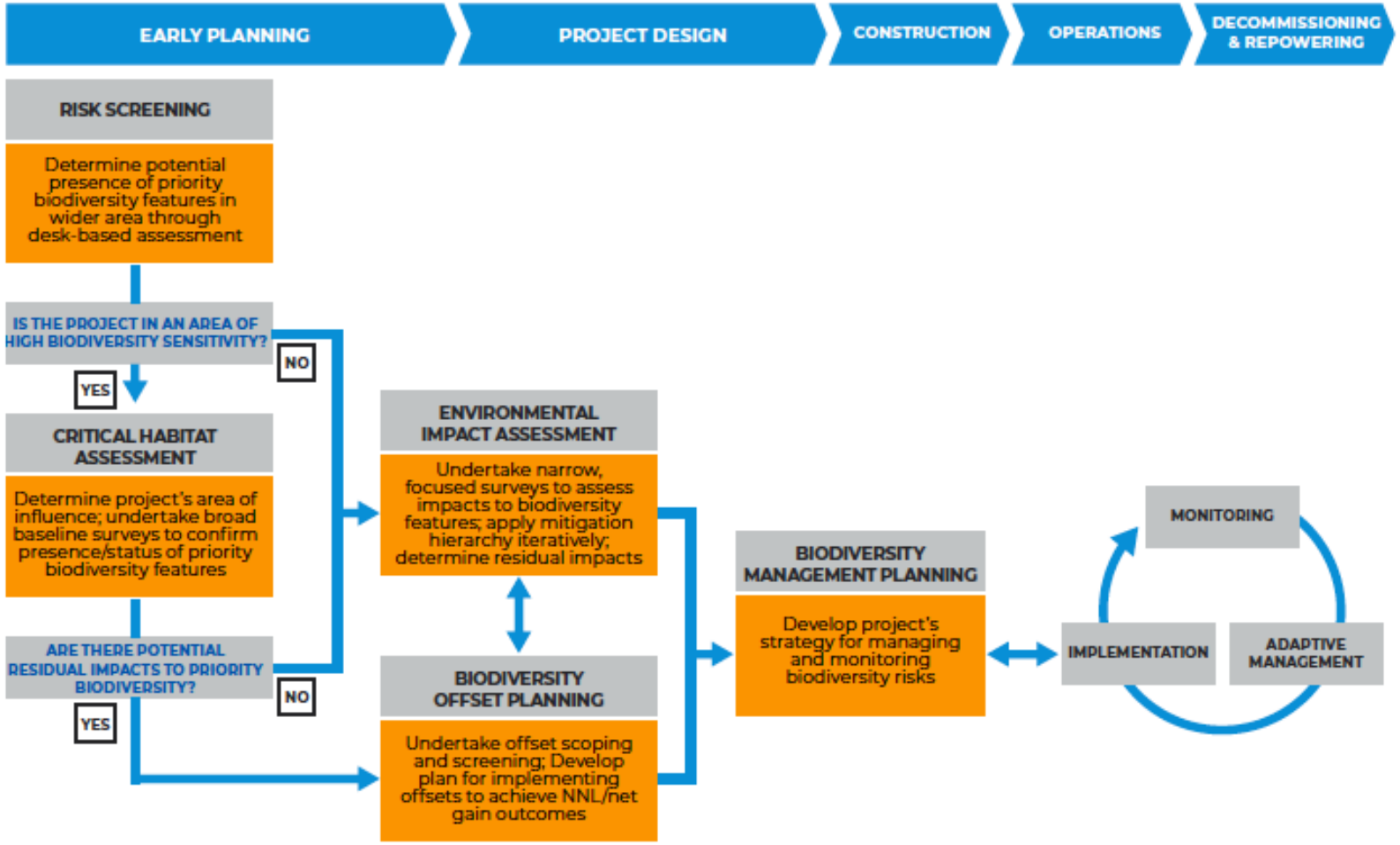
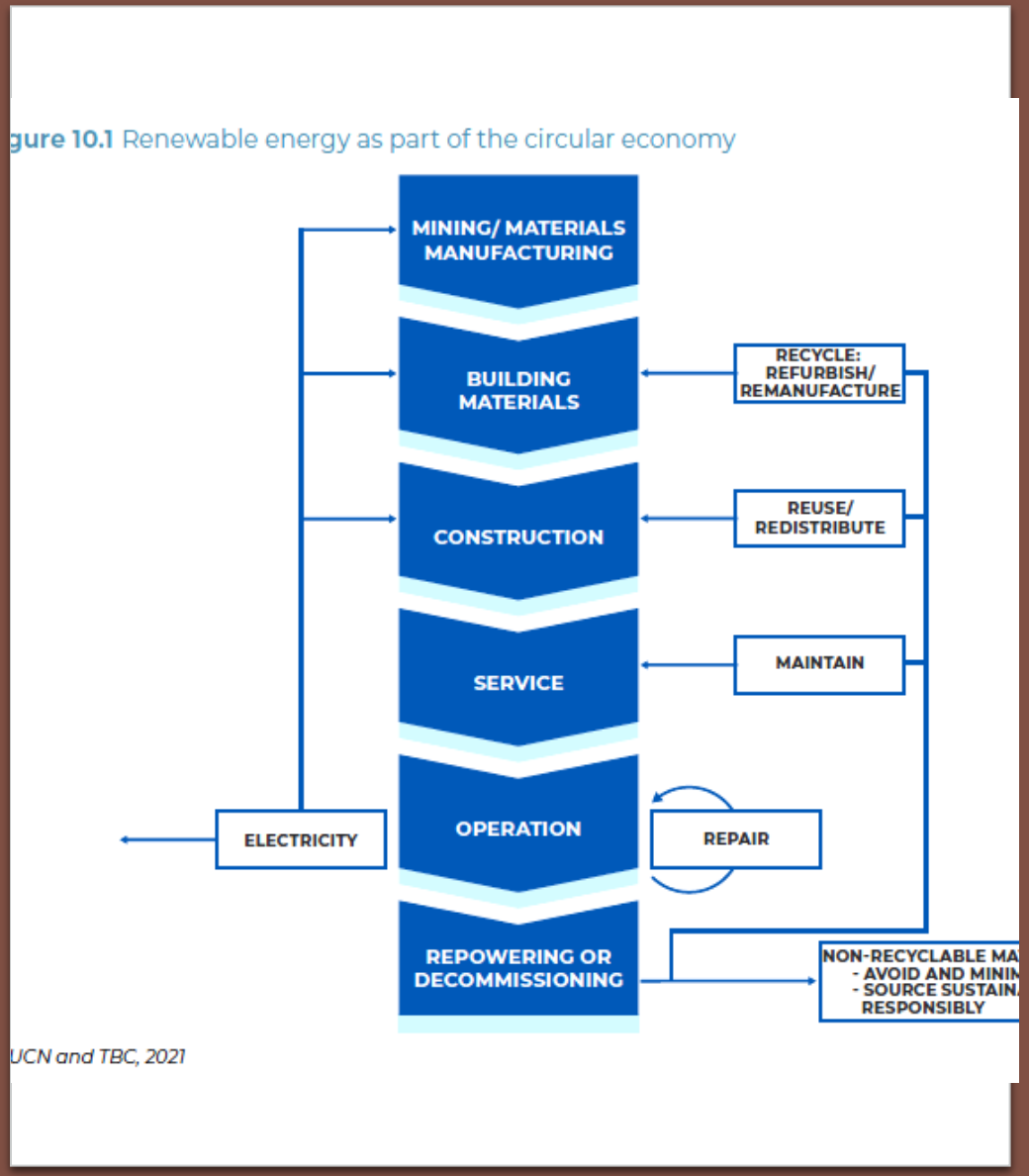
Process for aligning with Good Practice

Figure 9.1 Key project activities and outputs for a good biodiversity practice



Note: Specific requirements depend on the biodiversity risks and potential for significant residual impacts. This diagram does not account for specific legislative requirements which will vary between countries.



Supply chain stewardship

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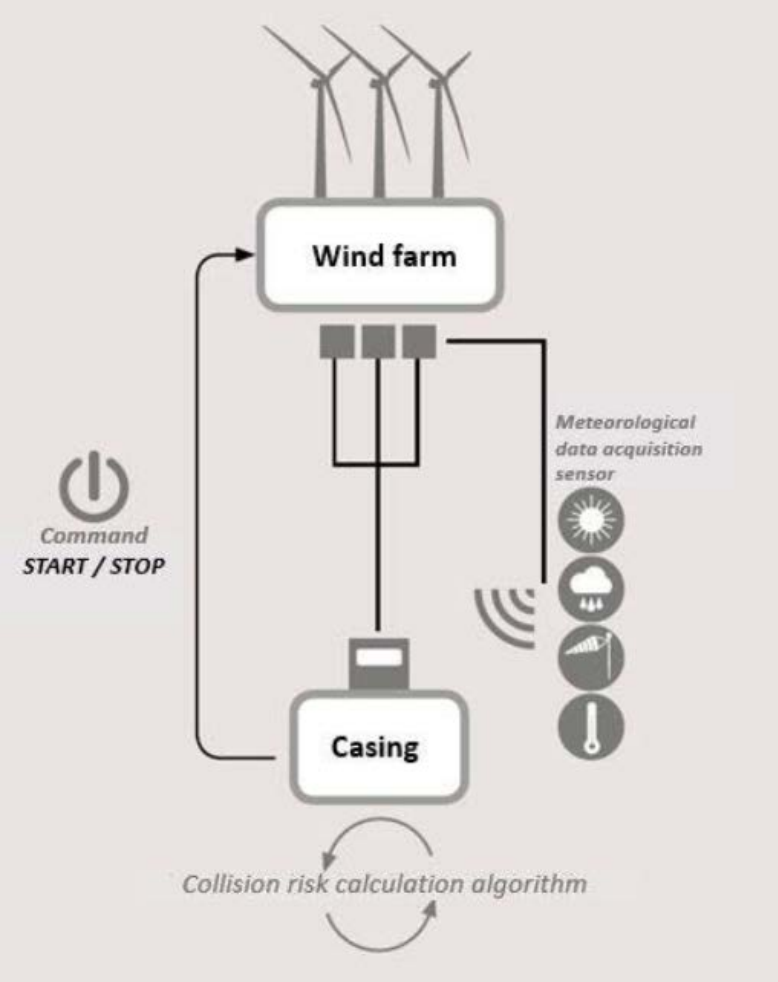
Case studies

Case study 3

Chirotech®, an automated curtailment system for wind power plants



First tested in Boin and Mas-de-Leuze (France) has since been used by dozens of wind power projects across Europe and in Canada.

Peaks of bat activity at low wind speeds, mostly at dawn and dusk, are generally not when wind turbines are most productive. The system is based on bat behaviour modelled in response to temperature, wind, rainfall etc. Using real-time environmental data, it determines if a collision risk threshold is exceeded, and then automatically stops the turbines.

Case study 14

Working in partnership to protect cinerous vultures *(Aegypius monachus)*

Using GPS tracker on tagged vultures, the GPS identified that the vulture was frequently flying within 100 m of the turbines at the Olivento Wind Farm in north-west Spain.

Through international collaboration by the Vulture Conservation Foundation, the Department of the Environment of the Xunta de Galicia, and environmental organizations, a temporary shutdown on demand (SDOD) was quickly implemented to prevent a collision with the vulture. This partnership continues to monitor birds through GPS tracking and observation at the wind farm site to implement further SDODs as necessary.

Case study 20

Marine mammal protection during offshore wind power plant construction

A comprehensive environmental impact assessment (EIA) was conducted during the development of the offshore wind power project, and the findings were integrated into the project design and construction process.

A specialist team was deployed on site to conduct monitoring and ensure that the area in the vicinity of the piling activities was clear of marine mammals before work started each day.

- Prior to each piling exercise, a dedicated vessel was used to circle the piling site at a distance of 250 m, to ensure that there were no marine mammals near the piling operations;

- Visual watchkeeping of the sea for marine mammals was carried out; and

- A hydrophone was dropped into the water to listen for vocalisations made by whales and dolphins.

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You can find the study here in Greek:

https://portals.iucn.org/library/node/49699

And in English:

https://portals.iucn.org/library/node/49283

Download is free of charge

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Thank you!