

MAKING WIND POWER MORE BIODIVERSITY- FRIENDLY: RECENT LESSONS FROM WORLD BANK EXPERIENCE

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**(The views expressed here are those of the author and should not be attributed to
the World Bank Group.)**

Bird Collisions with Wind Power Equipment



- Mostly with wind turbine rotors; some with turbine towers or masts with guy wires.
- Rotor tip speed is very high (even if low RPM); birds get hit by surprise.
- Some bird species are especially collision-prone, e.g. large soaring birds.
- As an example, watch brief video of Eurasian Griffon Vulture struck by wind turbine in Crete, Greece:
http://youtu.be/9srPoOU6_Z4

Impacts of Wind Power on Bats



- Collision problem probably **worse for bats** than for birds, because many bats appear **attracted** to moving rotor blades (for unknown reasons).
- Bat fatalities often higher than bird fatalities at well-monitored wind farms.
- Bats have naturally **low reproductive rates**, so scaled-up wind power in sensitive sites could threaten some species.

Impacts of Wind Power on Natural Habitats

- **Land Clearing** (~1-2 ha/MW) for turbine platforms, access roads, construction staging areas, etc.

- **Habitat Fragmentation** from rows of turbines and connecting roads.

- **Special Cases:**

- Land degradation from careless **off-road driving.**

- Specialized, endemic **ridge-top vegetation** may be disproportionately affected (especially in tropics).

- **Downwind sand dunes** might be altered.



Biodiversity Impacts of Ancillary Facilities: Transmission Lines

- **Bird Collisions** (large-bodied, fast-flying species)
 - Serious threat to some species, e.g. Ludwig's Bustard (Karoo plains of South Africa, Namibia)
 - Wetland sites (bird concentrations)
 - Mitigated through careful alignment; use of BFDs
- **Bird Electrocutions** (especially raptors)
 - Bird-friendly power pole and wire configurations
 - U.S. Avian Power Line Interaction Committee (APLIC) useful source <www.aplic.org>
- **Bird Perching and Nesting** (mostly benign)
- **Forest Fragmentation**

Applicable World Bank Safeguard Policies

- Environmental Assessment OP 4.01: All projects.
- Natural Habitats OP 4.04: Natural land and water areas (including biologically active airspace).
- Forests OP 4.36: Natural and Plantation Forests
- Involuntary Resettlement OP 4.12: Compulsory land acquisition.
- Indigenous Peoples OP 4.10: Vulnerable ethnic minorities (traditional rural populations).
- Physical Cultural Resources OP 4.11: Archaeological, historical, sacred sites or objects.

Applicable IFC Performance Standards

- **PS 1:** Social and Environmental Assessment and Management System
- **PS 2:** Labor
- **PS 4:** Community Health and Safety
- **PS 5:** Land Acquisition and Involuntary Resettlement
- **PS 6:** Biodiversity Conservation and Sustainable Natural Resource Management
- **PS 7:** Indigenous Peoples
- **PS 8:** Cultural Heritage

WBG Official Guidelines:

Environmental, Health, and Safety (EHS) Guidelines for Wind Energy (World Bank Group, 2007)

- Overview of most environmental impacts (also occupational health and safety)
- Limited discussion of bird and bat issues
- Downloadable from:

<http://www1.ifc.org/wps/wcm/connect/3af2a20048855acf8724d76a6515bb18/Final%2B-%2BWind%2BEnergy.pdf?MOD=AJPERES&id=1323162509197>

Technical Guidance (WB Study):

Greening the Wind: Environmental and Social Considerations for Wind Power Development (Ledec, Rapp and Aiello, 2011)

World Bank book (ISBN 978-0-8213-8926-3): Available from WB InfoShop or on-line <www.amazon.com>

- **Full Conference Report** (content same as WB book): <www.tinyurl.com/GreeningTheWind>
- **Synthesis Report** (concise summary): <www.tinyurl.com/GreeningTheWind2>
- In-depth coverage of biodiversity issues (birds, bats, and natural habitats)
- All volumes include handy **Table of Environmental and Social Impacts and Corresponding Mitigation or Enhancement Options**

MEXICO La Venta II Wind Power Project (85 MW, 98 turbines)

- Demonstrated technical and financial feasibility of **short-term shutdowns**, on-demand & in real time
- World-class migratory bird corridor, yet more fatalities among **resident birds**
- More **bats** killed than birds
- Surprising number of low-flying birds collide with **turbine towers** (not rotors)
- Entire wind resource area has **biologically unique** thorn forest habitat (largely overlooked, no legal protection)



URUGUAY Wind Farm Project (10MW, 5 turbines)

- Project area (Sierra de Caracoles) assessed to be low risk for birds, uncertain **risk for bats**.
- Since bats fly mainly during low winds, **higher turbine cut-in speeds** can greatly reduce bat mortality, often with little loss in power generation.
- Under agreed **Bird and Bat Monitoring Plan (BBMP)**:
 - **Year 1**: Operate turbines at normal 4 m/s (day & night).
 - **Year 2**: If monitoring find >5 dead bats/MW, operate at 6 m/s (night).
 - **Year 3**: If monitoring shows significant drop in bat fatalities, continue operating at 6 m/s (night).
- Emissions Reduction Purchase Agreement makes BBMP--with this operating condition--**legally binding**.

Key Tools to make Wind Power more Biodiversity-Friendly

Planning:

- **Site selection** (ideally, low bird & bat numbers; no species/ecosystems of conservation concern)
- More bird-friendly **equipment**: Turbines, lighting, masts, transmission lines, power poles
- **Strategic EAs**: Overlay maps & zoning maps
- **Project-specific EIAs**, including wind farm EMPs
- **Bidding documents & contracts** with environmental requirements for construction/operation
- **Conservation offsets**: Off-site species/habitat enhancements

Construction:

- **Environmental rules for contractors**
- **Diligent field supervision**

Operation:

- **Post-construction monitoring** of bird/bat fatalities
- **Operational curtailment**:
 - **Increased cut-in speed** (bats)
 - **Short-term shutdowns** (migratory birds)