

Nordex SE • Langenhorner Chaussee 600 • 22419 Hamburg /Germany

To whom it may concern

Person to contact	Phone	Fax	email	Date
M. Marburger	-1208	-1311	mmarburger@nordex-online.com	March, 3 2023

Black wind turbine blades – status of research and development

Dear Madam,
Dear Sir,

Herewith, we would like to give an overview of the status of research and development of "black blades" for wind turbines related to Nordex wind turbines.

Based on a study carried out in a Norwegian wind farm (see <https://onlinelibrary.wiley.com/doi/10.1002/ece3.6592>), it is supposed that painting one blade of a wind turbine rotor black could reduce the number of bird victims hit by a blade. The study concludes that on the specific site the annual fatality rate could be "*significantly reduced for a range of birds*", however also recommends "*to either replicate this study, preferably with more treated turbines, or to implement the measure at new sites and monitor collision fatalities to verify whether similar results are obtained elsewhere, to determine to which extent the effect is generalizable.*"

Currently, at least one more research project is ongoing in the Netherlands (see <https://www.rwe.com/en/press/rwe-renewables/2022-09-29-research-black-rotor-blades-for-bird-protection/>) to evaluate and – if possible – to confirm not only the positive impact on bird victims of such black blades, but also to consider further aspects like impact on flight safety, visual impact by humans, technical effect of black paint on wind turbine blades.

In particular, the last one is supposed to negatively impact the structural integrity and safety of the wind turbine blades:

Nordex SE
Langenhorner Chaussee 600
22419 Hamburg
Deutschland

Phone: +49-40-30030-1000
Fax: +49-40-30030-1101

info@nordex-online.com
www.nordex-online.com

Registered office: Rostock
Trade Register HRB 11500
Branch: Hamburg

VAT-ID: DE813076467
27/193/00424

Board of Directors:
José Luis Blanco
Dr. Ilya Hartmann
Patxi Landa

Supervisory Board:
Professor Dr. Wolfgang Ziebart
(Chairman)

UniCredit Bank AG

EUR
BIC: HYVEDEMM300
IBAN: DE31200300000000311613

USD
BIC: HYVEDEMMXXX
IBAN: DE96700202700910030006

- At a thermal level, the behaviour of black paint has a negative effect on the temperature of the internal elements of the blades, being able to cause excessive heating on sunny days and it may destroy or weaken some construction materials of the blade.
- The conductive properties of black paint differ from those of greyish or white paint, which can negatively influence the lightning protection system of the wind turbine and therefore these blades might be more prone to lightning damages.
- Black paint tends to have weaker mechanical properties which are expected to lead to additional wear and premature damages.
- Black paint is increasing the difficulty to detect cracks or other critical defects by conventional or drone inspection in early state.

Due to the research work ongoing and the technical risks, we currently don't offer such a solution.

Yours sincerely,

Nordex SE

Global Product Management / Global Sales Engineering



M. Marburger
Director Global Sales ENG



M. Groth
Head of Global Product Management