



Driemaandelijks overzicht van relevante literatuur over windenergie en gezondheid Q2-2026

Periode: April t/m Juni 2026

Het Expertisepunt Windenergie en Gezondheid houdt voor haar kennisbasis de wetenschappelijke literatuur bij over windenergie en gezondheid. Elke drie maanden wordt een overzicht gemaakt van de nieuwgevonden wetenschappelijke en grijze literatuur.

In dit document vindt u het overzicht van de literatuur gevonden in de hierboven aangegeven periode.

Literatuuropbrengst

Hieronder wordt eerst een overzicht gegeven van de wetenschappelijke artikelen gevonden in diverse literatuurdatabanken. Daarna volgt een (niet-uitputtende) opsomming van overige relevante bronnen, zoals (Nederlandse) onderzoeksrapporten en conferentieverslagen, ook wel grijze literatuur genoemd.

Disclaimer

Deze selectie is tot stand gekomen met behulp van een zoekprofiel (zie bijlage Methode Zoekstrategie 2026) en toepassing van inclusie en exclusiecriteria. Op deze documenten is geen dataextractie toegepast noch is er een algemeen kwaliteitsoordeel aan gegeven.

Literatuur gepubliceerd in wetenschappelijke tijdschriften

Tabel 1 Overzicht van het aantal gevonden studies

Fase	April – Juni 2026
Aantal artikelen gevonden met zoekstrategieën voordat selectie heeft plaatsgevonden	70
Aanvullende referenties gevonden via andere bronnen (dit betreft niet de grijze literatuur)	0
Aantal referenties na verwijdering van duplicaten	56
Verwijderde referenties omdat ze niet relevant zijn (voldoen niet aan inclusie en exclusie criteria)	48
Aantal relevante artikelen geselecteerd door reviewers	6
Aantal artikelen waarover reviewer 1 en reviewer 2 hebben afgestemd (grensgevallen)	2
Totaal aantal relevante artikelen (na afstemmen)	6

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Overzicht van de relevante studies

1. Titel: Noise annoyance mapping for wind turbines: a psychoacoustic approach incorporating noise sensitivity

Samenvatting (gekopieerd uit artikel): Wind energy is a clean and renewable resource; however, wind turbine noise (WTN) poses challenges for communities residing near wind farms, with annoyance emerging as a significant concern. This study investigates WTN-induced annoyance through a psychoacoustic approach, with a particular focus on Loudness and individual noise sensitivity. Noise data were collected from 14 locations in proximity to wind farms in County Wexford, Ireland. These audio samples were subsequently used in a controlled laboratory listening experiment involving 46 participants to assess annoyance responses and calculate annoyance probabilities. A generalised linear mixed-effects model was developed incorporating key psychoacoustic indicators, including Loudness, Fluctuation Strength, and Roughness, alongside noise sensitivity scores. A validated relationship between LAeq,24h and Loudness enabled spatial prediction of perceptual responses. ArcGIS was employed to generate spatial maps of Loudness and predicted annoyance probabilities using Kriging interpolation. The results demonstrate that Loudness is the strongest predictor of annoyance, with responses varying significantly according to individual noise sensitivity. Low-sensitivity individuals exhibited minimal annoyance beyond 500 m, whereas highly sensitive individuals exhibited annoyance probabilities of approximately 0.7 near the 500-metre setback distance. By integrating psychoacoustic modelling with sensitivity-based mapping, this study offers a more inclusive and evidence-based framework for environmental noise management, contributing to the sustainable development of wind energy. © 2026 The Author(s)

Referentie: Manohare, M., Guerrero, S. G., O'Hora, D. & King, E. (2026). Noise annoyance mapping for wind turbines: a psychoacoustic approach incorporating noise sensitivity. *Applied Acoustics*, 248. doi:10.1016/j.apacoust.2026.111280

Link naar bron: <https://doi.org/10.1016/j.apacoust.2026.111280>

2. Titel: Community preferences and expectations for end-of-life management strategies of wind farms: A prospective study

Samenvatting (gekopieerd uit artikel): In this study, we examined resident preferences for prospective end-of-life management of a coastal wind farm in Japan through a case study of an 11-turbine, 22 MW installation, based on a questionnaire survey of 218 households within a 4 km radius. Respondents were presented with four disposition options: repowering with unchanged capacity (56.9%), repowering with increased capacity (18.8%), decommissioning (15.1%), and lifespan extension (9.2%). Preferences were examined through perceptual, attitudinal, and demographic lenses, though inferential support remained limited across several predictors. Descriptively, negative impressions were concentrated among decommissioning proponents, yet inferential testing showed no significant predictive effect for visual or acoustic evaluations. Principal component analysis consolidated perceptual dimensions, and binary logistic regression indicated that disaster-risk cognition alone significantly predicted support for active reconstruction, whereas mitigation measures and noise annoyance were statistically non-significant. Analysis of variance followed by Tukey's honestly significant difference post-hoc tests revealed significant yet modest differences in expectations for post-operational attributes—such as landscape harmony, tourism attraction, information transparency, proper explanations, and blade length—across preference groups, though effect sizes remained limited. No demographic or geographic variables were significantly associated with end-of-life preferences, indicating limited explanatory power of conventional socio-spatial characteristics. These findings highlight the limited role of demographic determinants and the importance of disaster-risk

cognition and procedural fairness in shaping wind farm end-of-life strategies. They also underscore the need to incorporate local perspectives into policy frameworks through transparent communication, locally adaptive mitigation, and sustained stakeholder engagement.

Referentie: Zhang, W., Nishikizawa, S., Murayama, T., Suwanteeep, K., Yokoyama, S., Liu, K., Yu, Q. & Takejima, K. (2026). Community preferences and expectations for end-of-life management strategies of wind farms: A prospective study. *Journal of Environmental Management*, 410. doi:10.1016/j.jenvman.2026.130126

Link naar bron: <https://doi.org/10.1016/j.jenvman.2026.130126>

3. Titel: Predicting the community acceptance of airborne wind energy with the integrated acceptance model: Insights from two test sites

Samenvatting (gekopieerd uit artikel): Airborne wind energy (AWE) harnesses higher-altitude winds using kites to generate renewable electricity. As AWE technologies move closer to potential commercialization, understanding how local communities interact with and are affected by these technologies is crucial for socially responsible deployment. Identifying key predictors of community acceptance can help develop targeted measures to address potential impacts while the technology is still adaptable. This study tested the Integrated Acceptance Model (IAM) on survey data from two European AWE test sites. A linear regression analysis revealed that two of the five explanatory variables significantly predicted acceptance: perceived site impacts (e.g., sound emissions, landscape changes, and aviation lights), as well as developer transparency and fairness in site operations. In contrast, attitudes toward the energy transition, perceived economic impacts, and social norms did not predict acceptance. These findings suggest that while AWE developers prioritize technical challenges, attention must also be given to social factors, such as minimizing impacts and ensuring transparent and fair implementation. The results also have important policy implications, highlighting the need for AWE-specific regulations and socially responsible planning practices. Further research is required to investigate additional acceptance predictors, especially if AWE technologies continue to develop toward commercial applications. © 2026 The Authors

Referentie: Schmidt, H., Müller, F. J. Y., Leschinger, V., de Vries, G., Schmehl, R., Renes, R. J. & Hübner, G. (2026). Predicting the community acceptance of airborne wind energy with the integrated acceptance model: Insights from two test sites. *Journal of Environmental Psychology*, 111. doi:10.1016/j.jenvp.2026.103021

Link naar bron: <https://doi.org/10.1016/j.jenvp.2026.103021>

4. Titel: Social Licence to Operate: The Contextual Role of Culture and the Dominance of Attitudinal and Regulatory Factors in New Wind Energy Installation

Samenvatting (gekopieerd uit artikel): This study investigated the factors influencing the social licence to operate (SLO) for new wind-farm installations, focusing on the roles of community attitudes, regulatory environment and local cultural values and beliefs. Using survey data collected from 226 community members across Australia, multiple linear regression analysis was conducted to examine how these factors influence community acceptance of wind energy development. The findings reveal that positive community attitudes towards wind energy and trust in the regulatory environment significantly enhance the SLO. In contrast, local cultural values and beliefs were not significant predictors. The findings suggest that acceptance of wind energy projects is driven more by perceptions of regulatory fairness and individual attitudes than by cultural norms. Interestingly, community members appear to base their support primarily on perceived economic and social benefits, underpinned by strong trust in the regulatory

environment rather than cultural values and beliefs. Theoretically, the study refines SLO frameworks by empirically demonstrating the context-specific nature of cultural influences and the dominant role of attitudinal and regulatory factors. Practically, the study highlights the need for transparent governance and proactive community engagement strategies to strengthen public confidence and foster renewable energy transitions. © 2026 The Author(s). This article is distributed under the terms of the Creative Commons Attribution 4.0 License (<https://creativecommons.org/licenses/by/4.0/>) which permits any use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access page (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

Referentie: D'Souza, C., Marjoribanks, T. & Yiridoe, E. K. (2026). Social Licence to Operate: The Contextual Role of Culture and the Dominance of Attitudinal and Regulatory Factors in New Wind Energy Installation. *Management and Labour Studies*, 51(2), 157–172. doi:10.1177/0258042X261432780

Link naar bron: <https://doi.org/10.1177/0258042X261432780>

5. Titel: Wind turbine proximity and health: Longitudinal evidence from US households

Samenvatting (gekopieerd uit artikel): Rapid growth of wind energy plays a key role in global efforts to reduce carbon emissions, yet public concerns persist about its potential health effects, particularly through noise exposure. While some studies and media reports suggest that wind turbines may contribute to sleep disturbances, anxiety, and even suicide, existing evidence remains limited and inconclusive. This study combines geolocated data on turbines from the US Wind Turbine Database with longitudinal survey data on over 120,000 households (2011–2023) and consumer purchasing records to assess whether proximity to wind turbines affects mental and physical health. We examine a wide range of outcomes, including depression, anxiety, sleep disorders, headaches, and use of sleep aids and painkillers. Comparing households before and after nearby turbine installations, we find no detectable adverse health effects from turbine exposure at typical exposure distances. While we cannot rule out small effects, our CIs exclude moderate-to-large impacts, suggesting that fears about substantial health impacts are not borne out in population-level data. Other disamenities such as noise, shadow flicker, and visual intrusion may still affect quality of life even absent measurable health impacts.

Referentie: Rott, N., Almond, D. & Giuntella, O. (2026). Wind turbine proximity and health: Longitudinal evidence from US households. *Proceedings of the National Academy of Sciences of the United States of America*, 123(21). doi:10.1073/pnas.2525715123

Link naar bron: <https://doi.org/10.1073/pnas.2525715123>

6. Titel: Wind turbine proximity and health-related quality of life in Germany 2002 to 2022

Samenvatting (gekopieerd uit artikel): The expansion of wind energy has intensified debate about potential impacts on the health and wellbeing of nearby residents, yet empirical evidence remains mixed. Using data from the German Socio-Economic Panel (SOEP) linked to administrative records on onshore wind turbines, we analyse changes in health-related quality of life (HRQoL) associated with turbine construction in Germany between 2002 and 2022. We implement a quasi-experimental matched difference-in-differences design among residential non-movers, focusing on turbines with hub height ≥ 50 m and proximity bands from 1.5 km to 6 km. We find no evidence of adverse average HRQoL changes associated with turbine presence within 6 km in this setting for matched residential non-movers over the observed pre-post interval. Secondary analyses indicate

heterogeneity by turbine characteristics and cumulative exposure, including patterns consistent with lower mental HRQoL where turbine density is higher. These results are interpreted cautiously, given multiple related specifications and limitations in assessing pre-trends with biennial HRQoL measurement. Overall, the findings highlight the importance of cumulative exposure and turbine characteristics for assessing the local health implications of wind energy deployment.

Referentie: Knies, G. & Jetzkowitz, J. (2026). Wind turbine proximity and health-related quality of life in Germany 2002 to 2022. *Scientific reports*, 16(1). doi:10.1038/s41598-026-56835-5

Link naar bron: <https://doi.org/10.1038/s41598-026-56835-5>

Tabel 2 Indeling van de wetenschappelijke literatuur naar type en onderwerp.

Soort onderzoek	Hinder	Slaap	Gezondheid divers	Anders (bijv. co-determinanten)
Tekstmining (bijv. sentiment analyse van (sociale) media artikelen)				
Case study				
Observationeel (bijv. Cross-sectionele, cohort, of case control studies)			Knies (2026,), Rott (2026)	D'Souza (2026), Schmidt (2026), Zhang (2026)
Experimenteel	Manohare (2026)			
Review				
Anders (bijv. theoretisch model, opinie,...)				

Relevante Nederlandse onderzoeksrapporten en overige relevante grijze literatuur

Overzicht van relevante grijze literatuur

1. Titel: *Methodology Note: Social Media Analysis of Europe's Anti-Wind Ecosystem*

Beschrijving (gekopieerd): This document sets out the methodology underpinning the social media analysis published in Wind Energy Dis- and Misinformation Undermining Europe's Security and Competitiveness, produced by WindEurope in collaboration with CASM Technology. It is intended to support transparency by documenting the data collection, account annotation, classification, and analytical framing decisions that shaped the study. The analysis draws on 42,947 wind energy-relevant social media posts from 573 accounts, collected across Facebook, Instagram, X, YouTube, TikTok and LinkedIn between 1 May 2024 and 28 February 2026.

The dataset reflects the activity of known or suspected anti-wind actors, rather than a fully representative sample of all online discourse about wind energy. Patterns in actor composition by country or platform therefore reflect the scope and structure of the monitored sample, not necessarily the true distribution of European focused anti-wind activity online. Cross-country differences in posting volume and engagement are shaped not only by how many actors were identified in a given market, but also by the mix of

actor types and platforms represented. Direct cross-market comparisons are less reliable, while specific country and platform contexts offer better comparability. While it is not possible to know the full scale of all social media activity online, based on the breadth of countries covered and the consistency of observed patterns, this network likely captures the core nodes of the publicly visible online anti-wind ecosystem across Europe.

Referentie: Technology, W. C. (2026). *Methodology Note: Social Media Analysis of Europe's Anti-Wind Ecosystem*. WindEurope.

Datum van publicatie: 21 April 2026

Link naar bron: <https://windeurope.org/data/products/wind-energy-dis-and-misinformation-undermining-europes-security-and-competitiveness>

2. Titel: Effects of noise on sleep: a summary of the current state of research from 2023 to 2026

Samenvatting (gekopieerd): This review summarizes recent research on the impact of environmental noise on sleep. A PubMed search applying the search terms "noise" and "sleep" for titles and abstracts identified 611 publications between April 2023 and February 2026. A stepwise selection process including only original research on humans and publications in English, followed by title and abstract screening, resulted in 118 eligible studies.

The included studies addressed a broad spectrum of noise sources, including neighbourhood, (daytime) occupational, wind turbine, transportation, white, and hospital noise. Hospital-related research clearly predominated, with 48 studies focusing on sleep in hospitalized patients. Many of these investigated the effect of interventions to reduce ward or intensive care unit noise levels, alongside complementary approaches such as earmuffs, music therapy or white noise application.

Sleep outcomes were predominantly assessed using self-reports and less often using wrist actigraphy. The application of other comprehensive physiological assessments, such as polysomnography, was rare. Research maintained a strong focus on vulnerable populations, including neonates, infants and (pre-)adolescents, older adults, individuals with medical conditions, and those exposed to irregular work-sleep schedules.

Co-exposure to additional environmental stressors in the bedroom such as artificial light, particulate matter, humidity, and temperature has partly been considered. Several studies further examined the direct and indirect associations between nocturnal noise exposure, impaired sleep, and adverse mental and cardiovascular outcomes. However, the mediating role of sleep disturbance in the pathway between environmental noise and health effects as proposed by the WHO Environmental Noise Guideline was not consistently supported across studies.

Referentie: Bartels, S. (2026). *Effects of noise on sleep: a summary of the current state of research from 2023 to 2026* [Paper presentation]. ICBEN, Copenhagen, Denmark.

Datum van publicatie: Juni 2026

Paginanummer: 197-216

Link naar bron: <https://medialib.cmcdn.dk/medialibrary/9A0273DD-90E3-46A4-AADB-DC91C1DD09E8/C342C015-B296-468A-B864-B6F63A4E3BB3.pdf>

3. Titel: Team 6 review of community response research published from 2023 to 2025

Samenvatting (gekopieerd): The central questions in community noise research are: how does noise exposure affect people, what noise characteristics are harmful, and what effects of noise respond to intervention? Within the International Commission on Biological Effects of Noise (ICBEN), Team 6 addresses human responses to environmental noise at the individual and community levels, using noise annoyance as the primary assessment metric. This review synthesizes community response research published from

2023 to 2025, restricted to the Team 6 scope to minimize overlap with other teams. Publications were identified through searches of PubMed, ScienceDirect, and Scopus, and supplemented by publications suggested by members of Team 6. After screening and eligibility assessment, 72 peer-reviewed studies were included and organized by noise source: road traffic, railway, aircraft, wind turbines, occupational settings, and mixed environments. Across noise sources, annoyance is multidimensional and only partly explained by sound level. Non-acoustic factors often match or exceed acoustic variables in explanatory power, especially noise sensitivity, attitudes, perceived fairness and transparency of planning, trust, coping behaviors, and environmental context. Short-term annoyance, which includes reactions from immediate to next-day, is increasingly linked to abrupt changes in noise. Long-term annoyance, or chronic annoyance resulting from noise exposure over weeks, months, or years, appears more strongly shaped by expectations and psychosocial factors. The results point to several research priorities, such as greater understanding of long-term and short-term annoyance processes and the relationships among them, and improved assessment measures.

Referentie: Nguyen, T. & Rathsam, J. (2026). *Team 6 review of community response research published from 2023 to 2025* [Paper presentation]. ICBEN, Copenhagen, Denmark.

Datum van publicatie: Juni 2026

Paginanummer: 241-265

Link naar bron: <https://medialib.cmcdn.dk/medialibrary/9A0273DD-90E3-46A4-AADB-DC91C1DD09E8/C342C015-B296-468A-B864-B6F63A4E3BB3.pdf>

4. Titel: Monitor Wind op Land 2025

Beschrijving (gekopieerd): De monitor Wind op Land is een jaarlijks product van de Rijksdienst voor Ondernemend Nederland (RVO).

Deze monitor geeft inzicht in de realisatie van wind op land en status van windprojecten in Nederland met als peildatum 31-12-2025. De monitor presenteert landelijk en regionaal inzicht in gerealiseerde vermogens, verwachte jaarproducties, geplande projecten (de pijplijn) en geeft duiding aan de cijfers door te reflecteren op de verschillende factoren die invloed hebben op de ontwikkeling van wind op land.

Windenergie op land draagt bij aan de verduurzaming van de elektriciteitsvoorziening in Nederland. In 2030 wil Nederland de CO₂-uitstoot t.o.v. 1990 verlagen met 55%. Om mede invulling te geven aan deze doelstelling is in het Klimaatakkoord afgesproken dat 30 RES (Regionale Energiestrategie) regio's gezamenlijk ten minste 35 Terawattuur (TWh) moeten opwekken door grootschalige opwek van wind- en zonne-energie op land in 2030. De 30 RES-regio's hebben in hun gezamenlijke bod hun ambitie voor een energieopwekking van 55TWh getoond. In de langetermijnvisie op ons energiesysteem, vastgelegd in 2023 in het Nationaal Plan Energiesysteem (NPE), speelt wind op land ook een belangrijke rol. Voor een klimaatneutraal Nederland in 2050 wordt hierin voor wind op land een indicatieve toename tot 17 GW in 2050 voorzien. De monitor is geschreven voor onder andere decentrale overheden,

Referentie: RVO (2026). *Monitor Wind op Land 2025*. Rijksdienst voor Ondernemend Nederland (RVO).

Datum van publicatie: Mei 2026

Link naar bron: <https://www.rvo.nl/sites/default/files/2026-05/Monitor-Wind-op-Land-2025.pdf>