



Driemaandelijks overzicht van relevante literatuur over windenergie en gezondheid Q1-2023

Periode: januari t/m maart 2023

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 literatuuurdatabanken. Daarna volgt een (niet-uitputtende) opsomming van overige relevante bronnen, zoals (Nederlandse) onderzoeksrapporten en conferentieverlagen, ook wel grijze literatuur genoemd.

Disclaimer

Deze selectie is tot stand gekomen met behulp van een zoekprofiel (zie bijlage Methode Zoekstrategie) 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	Jan-Mrt 2023
Aantal artikelen gevonden met zoekstrategieën voordat selectie heeft plaatsgevonden	134
Aanvullende referenties gevonden via andere bronnen (dit betreft niet de grijze literatuur)	0
Aantal referenties na verwijdering van duplicaten	116
Verwijderde referenties omdat ze niet relevant zijn (voldoen niet aan inclusie en exclusie criteria)	95
Aantal relevante artikelen geselecteerd door reviewers	9
Aantal artikelen waarover reviewer 1 en reviewer 2 hebben afgestemd (grensgevallen)	12
Totaal aantal relevante artikelen (na afstemmen)	13

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Overzicht van de relevante studies

1. Titel: Health effects of wind turbines: a review of the literature between 2010-2020

Samenvatting (gekopieerd uit artikel): Although wind power is more acceptable in terms of its environmental impact, possible risks to human health are still being discussed. The aim of this study is to systematically evaluate the methodology and the outcomes of the articles that investigate the health effects of wind turbines on humans. Combinations of keywords were entered into the PubMed database. The search resulted in a total of 141 hits, 22 were included. It had been noticed that the most common problems in those living around the wind turbines are noise annoyance(n=18), risk perception and attitude towards wind turbines(n=11), general health symptoms and quality of life(n=11), sleep disturbance(n=10), annoyance(n=7) and shadow flicker effect(n=4). General annoyance is adversely affected by the noise level and sensitivity to noise. We can conclude that the knowledge of and attitude towards wind turbines can turn into annoyance and symptoms if the audio-visual effects of turbines limit daily life activities.

Referentie: Ata, T. & Hassoy, H. (2023). Health effects of wind turbines: a review of the literature between 2010-2020. *International Journal of Environmental Health Research*, 33(2), 143-157.

Link naar bron: <https://doi.org/10.1080/09603123.2021.2010671>

2. Titel: Does intermittency management improve public acceptance of wind energy? A discrete choice experiment in Ireland

Samenvatting (gekopieerd uit artikel): Due to Ireland's abundant wind resources, the Irish government are focussing primarily on wind energy to meet renewable electricity targets. However, due to intermittent wind speeds, the energy generated cannot be scheduled as consistently as conventional fuel sources, impacting power system security and stability. Developing wind energy that internalises intermittency could provide positive public impacts in the form of reduced emissions, increased renewable energy capacity and energy security but can also have negative impacts in the form of increased costs, visual disamenities, environmental impacts and reduced autarky, amongst others. Few studies elicit public preferences for the development of wind energy that takes account of intermittency. Using focus groups and a discrete choice experiment involving four latent classes as part of a national survey of 1107 members of the public in Ireland, we evaluate public preferences for wind energy development that mitigates wind energy variability through electricity trade, battery storage, and demand side management. We observe substantial heterogeneity with respect to preferences for wind energy development with intermittency solutions. Approximately 62 % of the sample derive positive utility from all solutions, appear unconcerned about the potential negative impacts of renewable energy infrastructure and display pro-wind energy sentiment. However, 38 % do not derive utility from most or all of the solutions. The vast majority of our respondents; approximately 94 %; support measures to compensate affected individuals for near neighbour externalities associated with wind power generation using local benefit funds even at a personal cost to themselves. © 2022 Elsevier Ltd

Referentie: Brennan, N. & van Rensburg, T. M. (2023). Does intermittency management improve public acceptance of wind energy? A discrete choice experiment in Ireland. *Energy Research and Social Science*, 95.

Link naar bron: <https://doi.org/10.1016/j.erss.2022.102917>

3. Titel: Wind turbine infrasound: Phenomenology and effect on people

Samenvatting (gekopieerd uit artikel): Dit artikel heeft geen samenvatting.

Referentie: Flemmer, C. & Flemmer, R. (2023). Wind turbine infrasound: Phenomenology and effect on people. *Sustainable Cities and Society*, 89.

Link naar bron: <https://doi.org/10.1016/j.scs.2022.104308>

4. Titel: Broadening the social acceptance of wind energy – An Integrated Acceptance Model

Samenvatting (gekopieerd uit artikel): To foster the green energy transition, local acceptance of wind energy is highly relevant. Since simple solutions like setback distances do not reflect the issue complexity, we incorporated acceptance factors from social science and interdisciplinary research in an Integrated Acceptance Model (IAM). To capture impact differences of the acceptance factors, in Study 1, residents of three operating wind farms in Germany (N = 158) were surveyed. Five most relevant acceptance factors were derived by a regression analysis: economic effects, impacts on residents and nature, attitudes towards the energy transition, trust in local actors and the planning process as well as social norms substantially explained local acceptance ($R^2 = 0.76$). Next, in Study 2 the IAM was validated in an early stage, informal planning process in a Bavarian region (N = 92). In accord with Study 1, the IAM explained the variance in local acceptance comprehensively ($R^2 = 0.78$). Moreover, a consistent impact of economic effects, attitudes towards the energy transition, expected effects on residents and nature as well as social norms was observed. While social norms played a pronounced role in Study 2, trust only related to the acceptance in Study 1. The IAM seems to capture the overall relevant acceptance categories, which can be used as guidance to create a sustainable green energy transition. © 2022 Elsevier Ltd

Referentie: Hübner, G., Leschinger, V., Müller, F. J. Y. & Pohl, J. (2023). Broadening the social acceptance of wind energy – An Integrated Acceptance Model. *Energy Policy*, 173.

Link naar bron: <https://doi.org/10.1016/j.enpol.2022.113360>

5. Titel: Crowdsourcing social acceptance: Why, when and how project developers offer citizens to co-invest in wind power

Samenvatting (gekopieerd uit artikel): Citizen co-investment in wind energy projects has recently received a lot of attention among scholars and policymakers as a way to finance renewable energy projects and increase community acceptance of these projects. Citizen co-investment refers to the process by which members of the local community can financially participate in renewable energy projects prior to or shortly after construction. While previous research has often been cross-sectional and focused on the preferences of citizen-investors, this paper focuses on the perspective of project developers and asks why, when and how they offer citizens the opportunity to co-invest in wind farms. The work is based on the analysis of fourteen in-depth interviews with a sample of experienced German wind energy developers. The analysis shows that the decision to offer co-investment is driven by citizen demand and local stakeholder preferences, rather than financial needs. We shed light on how experienced developers deal with key trade-offs in terms of the timing of their offering and the choice of capital structure. As a result, we offer a number of testable propositions for further research on the nuanced relationship between citizen co-investment and social acceptance and derive recommendations for policymakers. © 2022 The Author(s)

Referentie: Knauf, J. & Wüstenhagen, R. (2023). Crowdsourcing social acceptance: Why, when and how project developers offer citizens to co-invest in wind power. *Energy Policy*, 173.

Link naar bron: <https://doi.org/10.1016/j.enpol.2022.113340>

6. Titel: Empowering onshore wind energy: A national choice experiment on financial benefits and citizen participation

Samenvatting (gekopieerd uit artikel): This paper examines a representative choice experiment for Ireland (n = 1014) to understand the trade-offs citizens are willing to make between the distribution of financial benefits from a nearby wind farm and procedural measures for citizen participation in decision-making. Both participatory processes and outcomes which recognise local impacts are necessary for the acceptance of onshore wind farms. This paper distinguishes between shared community benefit funds, near-neighbour compensation, and citizen investment relative to issues of ownership, modes of engagement and the management of financial benefits during siting, construction, and operation of a wind farm respectively. Citizens willing to accept place greater importance on factors associated with distributive and procedural justice, while proximity and related visual impacts have comparatively more importance for citizens unwilling to accept. Willingness to accept is associated with early, in-person, engagement with a community liaison officer during siting and citizen participation in the governance and distribution of financial benefits during operation. However, citizens who show conditional support for wind farm developments prefer compensation of near-neighbour households, semi-state developers, and town hall engagement meetings. Strong supporters are more influenced by financial benefits for the wider community and local (co-)ownership of wind farms, particularly joint ventures between the developer and community. © 2022 Elsevier Ltd

Referentie: le Maitre, J., Ryan, G., Power, B. & O'Connor, E. (2023). Empowering onshore wind energy: A national choice experiment on financial benefits and citizen participation. *Energy Policy*, 173.

Link naar bron: <https://doi.org/10.1016/j.enpol.2022.113362>

7. Titel: Does Stochastic and Modulated Wind Turbine Infrasound Affect Human Mental Performance Compared to Steady Signals without Modulation? Results of a Pilot Study

Samenvatting (gekopieerd uit artikel): Wind turbines (WT) are a specific type of noise source, with unique characteristics, such as amplitude modulation (AM) and tonality, infrasonic and low frequency (LF) components. The present study investigates the influence of wind turbine infrasound and low frequency noise (LFN) on human well-being. In the between-subjects study design, 129 students performed a cognitive test evaluating attention and filled out questionnaires in three various exposure conditions, including background noise, synthesized LFN (reference noise) and registered WT infrasound (stimulus). No significant differences in test results or in the number of reported post-exposure feelings and ailments in various exposure conditions were found when analyzing them in males and females, separately. However, a significant association between pre-exposure well-being and reported post-exposure complaints was noted and explained by in-depth statistical analysis.

Referentie: Małecki, P., Pawlaczyk-Łuszczynska, M., Wszolek, T., Preis, A., Kłaczyński, M., Dudarewicz, A., Pawlik, P., Stępień, B. & Mleczo, D. (2023). Does Stochastic and Modulated Wind Turbine Infrasound Affect Human Mental Performance Compared to Steady Signals without Modulation? Results of a Pilot Study. *International Journal of Environmental Research and Public Health*, 20(3).

Link naar bron: <https://doi.org/10.3390/ijerph20032223>

8. Titel: The Health Effects of 72 Hours of Simulated Wind Turbine Infrasonid: A Double-Blind Randomized Crossover Study in Noise-Sensitive, Healthy Adults

Samenvatting (gekopieerd uit artikel): BACKGROUND: Large electricity-generating wind turbines emit both audible sound and inaudible infrasound at very low frequencies that are outside of the normal human range of hearing. Sufferers of wind turbine syndrome (WTS) have attributed their ill-health and particularly their sleep disturbance to the signature pattern of infrasound. Critics have argued that these symptoms are psychological in origin and are attributable to nocebo effects. OBJECTIVES: We aimed to test the effects of 72 h of infrasound (1.6-20 Hz at a sound level of formula presented dB pk re formula presented , simulating a wind turbine infrasound signature) exposure on human physiology, particularly sleep. METHODS: We conducted a randomized double-blind triple-arm crossover laboratory-based study of 72 h exposure with a formula presented washout conducted in a noise-insulated sleep laboratory in the style of a studio apartment. The exposures were infrasound (formula presented dB pk), sham infrasound (same speakers not generating infrasound), and traffic noise exposure [active control; at a sound pressure level of 40-50 dB formula presented and 70 dB formula presented transient maxima, night (2200 to 0700 hours)]. The following physiological and psychological measures and systems were tested for their sensitivity to infrasound: wake after sleep onset (WASO; primary outcome) and other measures of sleep physiology, wake electroencephalography, WTS symptoms, cardiovascular physiology, and neurobehavioral performance. RESULTS: We randomized 37 noise-sensitive but otherwise healthy adults (18-72 years of age; 51% female) into the study before a COVID19-related public health order forced the study to close. WASO was not affected by infrasound compared with sham infrasound (formula presented min; 95% CI: formula presented , 3.88, formula presented) but was worsened by the active control traffic exposure compared with sham by 6.07 min (95% CI: 0.75, 11.39, formula presented). Infrasound did not worsen any subjective or objective measures used. DISCUSSION: Our findings did not support the idea that infrasound causes WTS. High level, but inaudible, infrasound did not appear to perturb any physiological or psychological measure tested in these study participants.

Referentie: Marshall, N. S., Cho, G., Toelle, B. G., Tonin, R., Bartlett, D. J., D'Rozario, A. L., Evans, C. A., Cowie, C. T., Janev, O., Whitfeld, C. R., Glozier, N., Walker, B. E., Killick, R., Welgampola, M. S., Phillips, C. L., Marks, G. B. & Grunstein, R. R. (2023). The Health Effects of 72 Hours of Simulated Wind Turbine Infrasonid: A Double-Blind Randomized Crossover Study in Noise-Sensitive, Healthy Adults. *Environmental health perspectives*, 131(3), 37012.

Link naar bron: <https://doi.org/10.1289/EHP10757>

9. Titel: Understanding subjective and situational factors of wind turbine noise annoyance

Samenvatting (gekopieerd uit artikel): One of the most relevant acceptance factors of local wind turbines (WTs) are noise emissions. To better understand why some residents experience stress effects from wind turbines a field study with strongly annoyed residents (SAR) was conducted. A convenience sample of residents (N = 148) in the proximity of a wind farm in Germany were interviewed using a standardised questionnaire. Objective features, such as number of visible WTs and distance to the nearest WT, could not explain the experienced noise annoyance substantially. Instead, SAR were characterised by a negative perception of both procedural as well as distributive fairness, the assumed decrease of property value due to the WTs, a negative attitude towards the local wind farm (but not to WTs in general), and higher noise sensitivity. Additionally, SAR reported to be affected daily during the night in their bedrooms, while other residents experience annoying situations more likely when they

are directly exposed to WTs. Fast wind speeds, wet weather and, occasionally, frost or fog were associated with annoying situations. In accord with recent research, we recommend to increase consideration of participation and fairness in the initial planning of a wind farm to increase acceptance and reduce annoyance. Additionally, to reduce the fear of negative health impacts and to increase acceptance, mitigation measures depending on specific weather conditions seem to be promising. © 2022

Referentie: Müller, F. J. Y., Leschinger, V., Hübner, G. & Pohl, J. (2023). Understanding subjective and situational factors of wind turbine noise annoyance. *Energy Policy*, 173.

Link naar bron: <https://doi.org/10.1016/j.enpol.2022.113361>

10. Titel: Sound emergence as a predictor of short-term annoyance from wind turbine noise

Samenvatting (gekopieerd uit artikel): While sound emergence is used in several countries to regulate wind energy development, there is no published evidence that it is a relevant noise descriptor for this purpose. In the present work, we carried out two listening tests to evaluate the merits of sound emergence. Three definitions of sound emergence were considered: the one in ISO 1996-1, sound emergence under audibility condition eUAC, and spectral emergence eSP. We also considered the specific to residual ratio and loudness metrics. In each listening test, the sound stimuli consisted of 48 sound stimuli at three A-weighted sound pressure levels {30, 40, 50} dB and four specific-to-residual ratios {-10,-5,0,+5} dB. The results lead to the conclusion that short term annoyance is better predicted by the total sound pressure level than by sound emergence, whatever the definition considered for the latter, or than by the specific to residual ratio. Short-term annoyance is slightly better predicted by eUAC than by e, while e is a better predictor than eSP. The total sound pressure level and the loudness metrics performed similarly. Furthermore, the results provide evidence that sound emergence is a poor predictor of the audibility of wind turbine sounds.

Referentie: Ruaud, E. & Dutilleux, G. (2023). Sound emergence as a predictor of short-term annoyance from wind turbine noise. *The Journal of the Acoustical Society of America*, 153(2), 925.

Link naar bron: <https://doi.org/10.1121/10.0017112>

11. Titel: An analysis of the factors affecting Irish citizens' willingness to invest in wind energy projects

Samenvatting (gekopieerd uit artikel): Wind energy has a pivotal role to play in the transition to renewable energy. However, social opposition to developer-owned wind farms is a key barrier to its deployment. While research suggests that co-ownership arrangements between developers and communities could help to alleviate opposition, such arrangements are subject to market acceptance issues related to citizens' appetite for investing. This paper explores the issue of market acceptance of citizen investment opportunities in wind farms by examining citizens' willingness to invest in projects. Based on a survey of 2,023 Irish citizens, we find that 56% of citizens would invest in a local project, 41% would invest in a portfolio of projects, and 29% would invest in a non-local project. Our empirical analysis reveals a number of socio-demographic, locational, community and attitudinal variables that affect both the decisions of citizens to invest in projects and the monetary amount that they are willing to invest. The findings of the paper provide insights into policy measures that could help to strengthen the market acceptance of citizen investment opportunities and will be useful for policymakers who are seeking to mobilise citizen investment with a view to enhancing the deployment of wind energy. © 2022 Elsevier Ltd

Referentie: Sirr, G., Power, B., Ryan, G., Eakins, J., O'Connor, E. & le Maitre, J. (2023). An analysis of the factors affecting Irish citizens' willingness to invest in wind energy

projects. *Energy Policy*, 173.

Link naar bron: <https://doi.org/10.1016/j.enpol.2022.113364>

12. Titel: Acceptance should not be assumed. How the dynamics of social acceptance changes over time, impacting onshore wind repowering

Samenvatting (gekopieerd uit artikel): Local community acceptance is a key influence on wind farm siting decisions. However, there is a temporal limitation to much social acceptance literature in that it does not consider how perceptions of the local community may change over the operational life of a wind farm and in the context of end-of-life applications for repowering or life-extension. In response, this paper increases the temporal depth of our understanding of social acceptance through presenting the results of survey research undertaken with communities living close to two English wind farms that have experienced end-of-life applications. For many respondents, perceptions of their local wind farm did not change following construction or over the life of the scheme, contrasting with common expectations that acceptance will increase over time. The findings reveal that community support for applications to repower or life-extend is influenced by experiences of living with the wind farm over time. It also shows how factors that have been found to impact perceptions of new wind farms, particularly the benefits that people experience, involvement in the planning process, and relationships with the developer, can influence responses to end-of-life applications. These insights are used to provide recommendations for end-of-life policy. © 2022

Referentie: Windemer, R. (2023). Acceptance should not be assumed. How the dynamics of social acceptance changes over time, impacting onshore wind repowering. *Energy Policy*, 173.

Link naar bron: <https://doi.org/10.1016/j.enpol.2022.113363>

13. Titel: Acceptability of amplitude modulated tonal wind farm noise for sleep: a laboratory study

Samenvatting (gekopieerd uit artikel): This study investigated self-reported sleep acceptability of wind farm noise (WFN) containing low-frequency amplitude modulated tones during evening listening tests in an acoustics and sleep laboratory. A range of 29 WFN samples with and without low-frequency amplitude modulated tonal noise were synthesised and delivered via headphones to participants who were asked to adjust the sound pressure level to the highest level they felt was acceptable for sleep. Fifty-five participants were recruited from four groups; N = 8, living <10 km from a wind farm and reporting WFN related sleep disruption; N = 18, living <10 km from a wind farm and reporting no WFN sleep disruption; N = 15, reporting road traffic noise (RTN) related sleep disruption; and N = 14 control participants living in a quiet rural area. In general, participants had normal hearing and were aged between 18 and 80 years. The WFN disturbed group overall mean acceptable sound pressure level for sleep was 33.9 dBA, which was the lowest among groups and 10.7 dBA (95% confidence interval, 7.9–13.6) lower than for the control group. There were negligible differences in acceptable levels for sleep of low-frequency amplitude modulated tonal wind farm noise compared to the reference sample, which was the same stimulus without tonality or amplitude modulation. Only the participant group reporting RTN related sleep disruption preferred lower noise levels for the amplitude modulated tonal wind farm noise compared to the reference sample (mean -1.4 dBA, 95% confidence interval: -2.7--0.1). © 2023 Elsevier Ltd

Referentie: Zajamsek, B., Hansen, K. L., Nguyen, P. D., Lechat, B., Micic, G. & Catcheside, P. (2023). Acceptability of amplitude modulated tonal wind farm noise for sleep: a laboratory study. *Applied Acoustics*, 205.

Link naar bron: <https://doi.org/10.1016/j.apacoust.2023.109234>

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

	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)	Müller (2023)			Hübner (2023), Sirr (2023), Windemer (2023), Brennan (2023), le Maitre (2023)
Experimenteel	Ruaud (2023)	Marshall (2023), Zajamsek (2023)	Małeckı (2023), Marshall (2023)	
Review	Ata (2023)	Ata (2023)	Ata (2023), Flemmer (2023)	Ata (2023)
Anders (bijv. theoretisch model, opinie,...)				Brennan (2023), Hübner (2023), Knauf (2023)

Relevante (Nederlandse) onderzoeksrapporten en overige relevante grijze literatuur

Overzicht van relevante grijze literatuur

1. Titel: Windpark De Drentse Monden en Oostermoer Akoestisch onderzoek

Beschrijving (gekopieerd uit inleiding rapport): In opdracht van de gemeente Aa en Hunze en de gemeente Borger-Odoorn is een onderzoek verricht naar de geluidimmissie van het recent gerealiseerd windpark De Drentse Monden en Oostermoer. Doel van het onderzoek is het verschil te bepalen in laagfrequent geluid voor en na realisatie van het windpark. Dit onderzoek is uitgevoerd door DGMR en LBP|SIGHT. Hierbij zijn de metingen uitgevoerd door DGMR en de analyse en rapportage door LBP|SIGHT.

Referentie: Dijkstra, M. (2023). *Windpark De Drentse Monden en Oostermoer Akoestisch onderzoek* (R068502aa.22CH7TH.md). LBP Sight - DGMR.

Datum van publicatie: 30 januari 2023

Link naar bron: <https://www.borger-odoorn.nl/geluid-gezondheidsonderzoek>

Opmerkingen: In opdracht van Gemeente Aa en Hunze en gemeente Borger-Odoorn

2. Titel: A review of noise guidance for onshore wind turbines

Beschrijving (gekopieerd): This report documents a review of the current onshore commercial wind turbine noise assessment guidance applied in the UK. The research has incorporated a scoping review of evidence, a stakeholder engagement exercise, and a limited sample of field measurements. In view of the results of the research, this report concludes that the guidance would benefit from further review and updating of the aspects identified. This could be supported by currently available evidence, which is summarised in this report. However, the study has also highlighted gaps in the state of knowledge, which should be addressed by further research, to support any updates to

the guidance. (Tekst van:

https://www.researchgate.net/publication/368395690_A_review_of_noise_guidance_for_onshore_wind_turbines). Voor meer informatie zie ook WSP website:

<https://www.wsp.com/en-gb/insights/wind-turbine-noise-report>

Referentie: Lotinga, M., Lewis, T. & Powlson, J. (2023). *A review of noise guidance for onshore wind turbines* (70081416-001-03-03). WSP Environment and Energy.

Datum van publicatie: Datum in rapport: 10-22; online gepubliceerd: 02-23

Link naar bron: <https://www.wsp.com/en-gb/insights/wind-turbine-noise-report>

Opmerkingen: In opdracht van de overheid van het Verenigd Koninkrijk

3. Titel: Legitimiteit van beleid in beleidsevaluaties. Een analysekader en een empirische toepassing op evaluatie van de Regionale Energie Strategieën (RES)

Beschrijving (gekopieerd): In beleidsevaluaties staan de effectiviteit en efficiëntie meestal centraal. Maar beleid heeft vaak ook andere (onbedoelde) effecten. Burgers vinden effectief en efficiënt beleid dan ook niet per definitie legitiem. In dit rapport presenteert PBL een analysekader om de legitimiteit van beleid (de 'licence to act') in kaart te brengen, waarmee alle relevante waarden systematisch meegenomen kunnen worden in beleidsevaluaties.

Analysekader legitimiteit van beleid geschikt voor beleidsevaluatie

We passen het analysekader toe op beleid rond de Regionale Energie Strategieën (RES), waarmee we laten zien dat het analysekader bruikbaar is voor beleidsevaluaties. We kijken vanuit het perspectief van burgers, wat een beeld oplevert van door burgers ervaren legitimiteit. Zo krijgt het burgerperspectief een volwaardige plaats in de beleidsevaluatie, zonder dat deze zich beperkt tot het vaststellen van de mate van steun voor beleid (=draagvlak). Burgers zijn goed in staat om een oordeel te vormen over de legitimiteit van het beleid. Daarmee lijkt onze aanpak geschikt om in een vroege fase van beleidsvorming inzicht te krijgen in de door burgers ervaren legitimiteit van nog uit te voeren beleid. Dit is waardevol omdat het vaak lastig is burgers vroegtijdig te betrekken, terwijl er juist dan beter rekening gehouden kan worden met hun voorkeuren.

Burgers vinden RES plannen legitiem, onder voorwaarden

Burgers ervaren het bestaan van de Regionale Energie Strategieën (RES) als legitiem. De meeste burgers gaven aan dat zij het belangrijk vinden klimaatverandering tegen te gaan en minder afhankelijk te zijn van andere landen wat betreft de energievoorziening. De beleidskeuzes die een RES-plan vormgeven hebben daarbij een grote invloed op de ervaren legitimiteit. Burgers vinden RES plannen legitiemer als geprobeerd wordt de invloed op het landschap bij de plaatsing van wind- en zonneparken zo klein mogelijk te houden, de winst gelijk te verdelen over iedereen in de gemeente, wind- en zonneparken eigendom worden van de gemeente, het proces zorgvuldig doorlopen wordt, hun mening een belangrijke rol speelde en zij volledig en tijdig geïnformeerd worden. Twee punten vallen daarbij op: 1. We hebben gevonden dat burgers in dunbevolkte gebieden anders denken over waar wind- of zonneparken moeten komen. Maar het verschil met burgers in dichtbevolkte gebieden is klein. 2. Hoewel burgers een voorkeur hebben dat gemeenten eigenaar zijn van wind- en zonneparken, is het huidige beleid erop gericht dat bewoners en bedrijven eigenaar zijn. Zij hebben daarbij ook de voorkeur dat niet enkel investeerders of omwonenden de vruchten plukken van de wind- en zonneparken, maar dat alle inwoners van een gemeente daarin delen. [Samenvatting gekopieerd van <https://www.pbl.nl/publicaties/legitimiteit-van-beleid-in-beleidsevaluaties>]

Referentie: Martens, A., Vringer, K., Porsius, J. & Tennekes, J. (2023). *Legitimiteit van beleid in beleidsevaluaties. Een analysekader en een empirische toepassing op evaluatie van de Regionale Energie Strategieën (RES)* (3850). Planbureau voor de Leefomgeving.

Datum van publicatie: maart 2023

Link naar bron: <https://www.pbl.nl/publicaties/legitimiteit-van-beleid-in-beleidsevaluaties>

4. Titel: Nut en noodzaak extra wind op land in 2030 en 2050. Uiteenzetting mogelijke scenario's en afweging

Beschrijving (gekopieerd): Om klimaatdoelen voor 2030 en 2050 te behalen is een forse toename van de productie van CO₂-vrije energie noodzakelijk. Hernieuwbare elektriciteitsproductie op land, in de vorm van windmolens op land en zonneparken, dragen op dit moment flink bij aan het verduurzamen van de Nederlandse elektriciteitsproductie. Maar door de snelle uitrol van windparken op zee en zon op dak ontstaat de vraag of extra windmolens op land en zonneparken, boven op de doelstelling van 35 TWh vanuit de RES, noodzakelijk zijn voor het behalen van de klimaatdoelstellingen. Of dat de verhoogde klimaatdoelstelling voor 2030 en de klimaatdoelstelling voor 2050 ook behaald kunnen worden zonder verdere groei van deze energiebronnen.

Het doel van dit onderzoek is om een beeld te schetsen op welke wijze de 2030- en 2050-doelen gehaald kunnen worden, met en zonder extra wind op land en zonneparken. En om de afwegingen tussen de verschillende energiebronnen in kaart te brengen.

Voor 2050 kunnen de klimaatdoelstellingen ook gehaald worden zonder extra wind en zon op land. Wind op zee en zon op dak (met of zonder kernenergie) in combinatie met regelbare waterstofcentrales en import van waterstof is voldoende. Er is dus ruimte om keuzes te maken tussen verschillende energiebronnen. Er zijn verschillende combinaties van energiebronnen denkbaar voor de invulling van de toekomstige energievraag, met elk zijn eigen maatschappelijke voor- en nadelen. Aangezien investeringen in duurzame energie voor een lange periode gedaan worden, is het wenselijk om hier snel keuzes in te maken.

Voor 2030 geldt dat de tijd bepalend is welke technieken in de nog zeven resterende jaren gerealiseerd kunnen worden om de doelen (van het kabinet én van de EU) te halen. Een nog verdergaande versnelling van de uitrol van windparken op zee voor 2030 is niet realistisch. Daardoor zijn andere bronnen nodig om deze doelstelling te halen, of is het nodig de doelstelling naar achteren te verschuiven. [Samenvatting gekopieerd van: <https://ce.nl/publicaties/nut-en-noodzaak-extra-wind-op-land-in-2030-en-2050/>]

Referentie: Vendrik, J., Groenewegen, H. & Rooijers, F. (2023). *Nut en noodzaak extra wind op land in 2030 en 2050. Uiteenzetting mogelijke scenario's en afweging* (22.220235.197). CE Delft.

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Link naar bron: <https://ce.nl/publicaties/nut-en-noodzaak-extra-wind-op-land-in-2030-en-2050/>

Opmerkingen: In opdracht van Stichting Windalarm, Nederlandse Vereniging Omwonenden Windturbines (NLVOW)