

Amsterdam, March 29, 2021

To the City Council of the Municipality of Amsterdam

Dear members of the City Council,

In recent months there has been much activity concerning the search areas for the placement of wind turbines in and around the city of Amsterdam.

Clean energy is indispensable, not only in regard to realizing climate goals, but also for improving health standards.

In Amsterdam, sites are being sought for the installment of wind turbines with heights ranging from 146 to 200 meters, at a mere distance of 350 meters from inhabitants. With this council address, comprised by both physicians and paramedics, we mean to express severe concerns. These concerns stem forth from substantial scientific literature about the adverse health effects of wind turbines in close proximity to family homes.

1. The Municipal Executive, which is in regard to this subject represented by Alderman M. van Doorninck, attaches great importance to the results of the RIVM report "Health Effects of Wind Turbine Noise: An Update" 2020.¹ Due to the following reasons, however, this report cannot be applied to the Amsterdam areas:

A. In the RIVM report¹ reference is made to 102 scientific studies.²⁻²¹ of which the majority is about nuisance and the acceptance of wind turbines, only 15 studies are dealing with health effects and wind turbines. In these studies, all wind turbines are located in sparsely populated areas and have a maximum tip height of 120 meters. In addition, in these studies the vast majority of local residents lives at more than 500 meters from the wind turbines and the noise exposure is lower than 42 dB.

B. In the much discussed Danish studies (The Danish Wind turbine Study,⁵⁻⁹), in which health risks affecting 711,000 residents living in sparsely populated areas living within a 10 km radius of wind turbines were researched, only 1100 inhabitants live within 500 meters of wind turbines with a tip height of up to 100 meters and a noise level of 42 dB and higher. Predictably, in this small group (which comprises less than 1% of the total number of residents studied), a significantly increased risk of heart disease, vascular diseases⁹, insomnia, depression and increased use of antidepressants and sleep medication is demonstrated⁸.

C. In the same Danish studies there is a significantly increased risk of hypertension, demonstrated in people over 65 years of age living in the vicinity of wind turbines with an outdoor noise level of 42 dB and above; indoors 15 dB and above⁵.

D. No scientific studies are available on the health effects of wind turbines with a tip height exceeding 120 meters that are within 2000 meters of local residents and/or have a noise production of 42dB or higher. The principal investigator of the Danish studies (Mrs. Dr. M. Sørensen⁵⁻⁹) as well as the author of the RIVM report (Mr. Dr. F. van den Berg¹) confirm this. The conclusions of the RIVM report "Health effects of wind turbine noise: an update" from 2020 are therefore not applicable to the situation, as planned in and around Amsterdam.

E. In the WHO report Environmental Noise Guidelines for the European Region¹⁵ it is confirmed in the discussion of the chapter concerning noise pollution from wind turbines that the investigations have taken place in sparsely populated areas². No scientific research has yet been conducted investigating negative health effects manifesting in children growing up near wind turbines. The earlier cited RIVM report does not state which implications should be assigned to the fact that no knowledge is available about this. Unfortunately, in Danish studies residents under 18 years of age were excluded from participation. It is known that sound of road and air traffic have a significant negative impact on learning performance and memory functions of children²⁰. Although such a relationship with regards to turbine noise seems plausible, scientific research to underline this relationship is lacking. Much scientific research has been conducted regarding the effects of sleep disorders on brain development in

children. Sleep disorders in children (which can be assumed to arise from wind turbine noise) can lead to loss of neurons, loss of memory function, stagnant cognitive abilities, increases in blood pressure, behavioral problems and impaired well-being¹⁶⁻¹⁹. Finally, disturbed sleep of children correlates with increased obesity and metabolic dysregulation.

3. There is a lot of scientific evidence that noise pollution from traffic and airports is associated with an increased risk of cardiovascular disease^{10-13, 20, 22}. Noise pollution caused by wind turbines is experienced as equivalently discomforting when compared to noise produced by air traffic and experienced as 3 times more unsettling than road and rail traffic at a comparable noise level¹⁴.

4. Various scientific studies have shown that local residents experience mild to severe nuisance when sound levels exceed 35 dB (A). This can be seen in the diagram presentation of the results of the review study done by sound experts R.W. Rand and S.E. Ambrose (2013). It can be concluded from this representation that the current Dutch noise standards for wind turbines cause serious nuisance to a much larger group of

local residents, as assumed based on the calculations of TNO and RIVM.

During the expert session, dr. Ir. De Laat presented the above figure, in which the relationship between the noise level of wind turbines and their nuisance is shown. Also, he explained that a noise level of 35 dB (A) correspond to a distance of 10x the nacelle height of a modern wind turbine. A wind turbine with a tip height of 200 meters has a nacelle height of approximately 150 meters. This type of wind turbine should therefore be placed on a distance of at least 1500 meters from houses, schools, care centers and others sensitive buildings, to avoid noise and secondary minimize health effects. When installing a wind turbine on or near water this distance should be at least 1.5x greater, given that sound carries much further over water compared to land.

The following figure of the Amsterdam search areas shows the range of the sphere of influence of 1500 meters inside and outside the search areas. It is estimated that tens of thousands of inhabitants will experience negative health effects.

5. The WHO notes that noise sources, including wind turbines, pose a major threat to public health and recommends a stricter noise standard than the prevailing Dutch legal noise standard for wind turbines¹⁵.

6. In 2009, the RIVM recommended a lower noise standard with a preferred value of 40 dB_(Lden) and a maximum value of 45 dB_(Lden) to avoid serious nuisance caused by wind turbines. At the time, this advice was not followed by national legislators and a maximum value of 47dB_(Lden) was set.

7. Wind turbine noise is not masked at night by the noise of traffic such as this may be the case during the day⁴. This leads to additional noise nuisance from wind turbines along roads and highways and to an increase in insomnia. It has long been known that chronic insomnia leads to hypertension, depression, obesity and diabetes. Higher incidence of these syndromes is already present in the search areas, as they are densely populated, working-class neighborhoods²⁴. It is expected that these adverse syndromes are to increase even further after placement of wind turbines.

8. To conclude, there are indications that low-frequency and infrasonic sound due to wind turbines (both audible and inaudible) are of nuisance to a considerable group of local residents and can adversely affect health. During the expert session in the city council has Dr. ir. de Laat explained this to you. He bases his conclusions on a study of more than 300 scientific articles concerning the subject, which will be published in the near future. Additionally, a recently published study in Nature Scientific Reports, presents evidence of a decrease in gray matter volume in some areas of the brain in subjects, who have been exposed to infrasonic sound. The researchers consider their findings a plausible case for further research²⁵.

Based on the foregoing, we are deeply concerned about the adverse health effects of wind turbines in the immediate vicinity of family homes.

These concerns are not allayed by the RIVM report “Health effects of wind turbine noise: an update”, as this report is incomplete and does not cover all of the relevant aspects of this problem.

Moreover, its conclusions are not applicable to the unique situation present in Amsterdam. For this reason, this report does not constitute a useful starting point for responsible decision-making by the city council about the installation of wind turbines in the Amsterdam area.

That is why we ask the following questions:

I. We ask you to comment on the above points. We would be happy to see that you indicate for each point what this means for the Amsterdam intention to place wind turbines as near as 146 to 200 meters near family homes.

II. Do you share our opinion, that it cannot be justified -on the basis of the RIVM report- to install wind turbines this close near residential areas? If not, why not?

III. Are you aware of the fact, that precisely children, who still have developing brains, are particularly vulnerable to sleep disturbance and that this can have negative consequences for brain development and that wind turbines are an additional source of sleep disturbance?

IV. We ask you to instruct the RIVM to conduct a thorough investigation into the specific health risks related to the Amsterdam search areas for wind turbines with a height of 146 meters and above, within 2000 meters of homes, and / or with a noise level of 42 dB and higher.

V. We ask you not to limit the research under point IV to the effects on adults, but also to investigate the potential health effects on children.

VI. a. How do you intend to fulfill your responsibility as a representative to apply the precautionary principle and to protect your residents against the aforementioned health risks?

b. Do you, like us, believe that you should only implement the intended plans, if it has been conclusively demonstrated that they are not an important health risk? If not, why not?

VII. Do you see it as your responsibility to minimize noise pollution in the city? and therefore to look for green (energy) alternatives, which don't have negative health effects? If not, why not?

We would like to receive an answer to our questions within the specified period.

Yours sincerely,

Simone Brands, child and adolescent psychiatrist

Jeroen Bucx, cardiologist

Esther Schadd, Internist

Anne-Marika Smit, midwife and clinical epidemiologist

Robert André, ENT specialist

Edwin van de Heresij, molecular pharmacologist

Signed by:

Total: 104

Authors 6

Co-signatories 98

Per profession:

Cardiologists 3

General practitioners 20

Internists 8
Pediatricians 5
TNE doctors 8
Psychiatrists 6
Surgeons 11
Radiologists 9
Psychologists 15
Anesthesiologists 2
Neurologists 2
Gynecologists 2
Doctors, other 6
Paramedics, other 7

References:

1. RIVM rapport "Gezondheidseffecten van windturbinegeluid: een update"
2. Bruner, (2019b). Association Between Long-Term Exposure to Wind Turbine Noise and the Risk of Stroke: Data From the Danish Nurse Cohort. *Journal of the American Heart Association*, 8(14)
3. Michaud, (2018a). Clarifications on the design and interpretation of conclusions from health Canada's study on wind turbine noise and health. *Acoustics Australia*, 46(1), 99-110
4. Pedersen et al, (2010) Can road traffic mask sound from wind turbines? Response to wind turbine sound at different levels of road traffic sound. *Energy Policy* Vol. 38 no. 5, 2520-2527.
5. Poulsen, (2018a). Long-term exposure to wind turbine noise and redemption of antihypertensive medication: a nationwide cohort study. *Environment international*, 121, 207-215.
6. Poulsen, (2018b). Long-term exposure to wind turbine noise at night and risk for diabetes: a nationwide cohort study. *Environmental research*, 165, 40-45.
7. Poulsen, (2018c). Pregnancy exposure to wind turbine noise and adverse birth outcomes: a nationwide cohort study. *Environmental research*, 167, 770-775.
8. Poulsen, (2019a). Impact of long-term exposure to wind turbine noise on redemption of sleep medication and antidepressants: a nationwide cohort study. *Environmental health perspectives*, 127(3).
9. Poulsen, (2019b). Long-term exposure to wind turbine noise and risk for myocardial infarction and stroke: a nationwide cohort study. *Environmental health perspectives*, 2019(3).
10. van Kamp, (2020a). Evidence Relating to Environmental Noise Exposure and Annoyance, Sleep Disturbance, Cardio-Vascular and Metabolic Health Outcomes in the Context of IGCB (N): A Scoping Review of New Evidence. *International journal of environmental research and public health*, 17(9), 3016.
11. van Kamp, I, (2020b). Review of Evidence Relating to Environmental Noise Exposure and Annoyance, Sleep Disturbance, Cardio-Vascular and Metabolic Health Outcomes in the Context of the Interdepartmental Group on Costs and Benefits Noise Subject Group (IGCB (N)). RIVM Report 2019-0088; Netherlands.
12. Van Kempen, (2012), The quantitative relationship between road traffic noise and hypertension: a meta-analysis. *J Hypertens*, 30, 1075-1086.
13. Van Kempen, (2018). WHO environmental noise guidelines for the European region: a systematic review on environmental noise and cardiovascular and metabolic effects: a summary. *International journal of environmental research and public health*, 15(2), 379.
14. Verheijen et al, (2009). Evaluatie nieuwe normstelling windturbinegeluid. Invloed van verschillende grenswaarden op blootstelling, hinder en mogelijkheden ontwikkelingslocaties. RIVM Rapport 680300007
15. WHO, Environmental Noise Guidelines for the European Region (2018) WHO, Bonn.
16. Kiran P.Maski et al, (2013) Sleep deprivation and neurobehavioral functioning in children, *International Journal of Psychophysiology*, Volume 89, Issue 2, Pages 259-264
17. James E.Jan et al, (2010) Long-term sleep disturbances in children: A cause of neuronal loss *European Journal of Paediatric Neurology*, Volume 14, Issue 5, Pages 380-390
18. Leila Tarokh et al, (2016) Sleep in adolescence: physiology, cognition and mental health, *Neurosci Biobehav Rev*; 70: 182-188.
19. Lercher, P. et al, (2003) Ambient noise and cognitive processes among primary school children. *Environment & Behavior*, 35 (6): 725-735
20. Kempen, E. et al (2010), The effects of road and aircraft noise exposure on children's episodic memory. *Noise & Health*, 12 (49): 244-54
21. Basner, M et al, (2014) Auditory and non-auditory effects of noise on health. *The Lancet*, 2014 383 (9925):1325-1332
22. Hahad O et al (2020), Midregional pro atrial natriuretic peptide: a novel important biomarker for noise annoyance-induced cardiovascular morbidity and mortality? *Clinical Research in Cardiology* 110(1): 29-39.
23. J. de Laat et al, Health Effects of Sounds produced by Wind Turbines: a systematic review. publication under review. Bron Argos: <https://www.vpro.nl/argos/lees/onderwerpen/windmolens/2020/onhoorbaar-geluid-schadelijkvoor-gezondheid.html>
24. <https://amsterdam.ggdgezondheidinbeeld.nl/opdekaart>
25. Ascone, L., Kling, C., Wiczorek, J. et al. A longitudinal, randomized experimental pilot study to investigate the effects of airborne infrasound on human mental health, cognition, and brain structure. *Sci Rep* 11, 3190 (2021). <https://doi.org/10.1038/s41598-021-82203-6>