Wind Turbine Noise Effect on Human's Health and Well-being

The European Human Rights Perspective

By: Kinanya Pijl

Contact: K.C.I.Pijl@students.uu.nl

Under supervision of: Dr. A.C. Buyse (Utrecht University)

August 30, 2012

Universiteit Utrecht

TABLE OF CONTENTS

INTRODUCTION

Fear for the catastrophic consequences of climate change has driven many states worldwide to invest in renewable energy. Wind energy technology has been the highest achievement of renewable energy types and therefore the most economically beneficent. As a consequence wind turbines are popping up all over the world like mushrooms in fall. In 2011 more wind power capacity was installed than ever before; a total of 93,957 Megawatt (hereafter: MW) has been installed in the European Union, an increase in capacity of 11% compared to the previous year. This capacity is enough to supply 6.3% of the EU's electricity.[1]

However, wind turbines have not been welcomed in all areas where they have been planned to operate. Although general opinion polls show that people are in favor of wind power, people living in the vicinity of wind turbines have expressed that the noise is severely harming their well-being and health. A number of such adverse effects are sleep disturbance, hearing impairment, interference with speech communication, cardiovascular and physiological effects, mental health effects, effects on performance and annoyance.

On the one hand, there is a social and economic need for erecting more wind turbines so that electricity can be generated without harm to the environment and therefore to humans. On the other hand, there is a need for protecting human health and well-being from noise pollution. Governments focus their policies on achieving wind energy targets. The protection of commercial development and the economic well-being of the country are at daggers drawn with the protection of living in a healthy environment. If there is evidence demonstrating that when wind turbines are located too close to family homes, the prolonged exposure to wind turbine noise adversely affects people's health, human rights are at stake.

The EU adopted an ambitious and far-reaching 'climate change and energy' package which commits the member states to increase the share of renewable energy to 20% of Europe's total energy production by 2020.[2] Wind energy is destined to make a significant contribution to this target. This development touches upon human rights as guaranteed in the European Convention on Human Rights (hereafter: ECHR or Convention). The ECHR does not include a right to preservation of the natural environment. However, case law has been developed under the Convention in relation to the environment. The most frequently employed human right against environmental degradation that affects human beings is Article 8 ECHR.[3] The European Commission and the Court accepted that this 'right to respect for private and family life, home and correspondence' can be infringed by environmental factors, such as noise, odorous emissions or apprehension of explosion.[4] The Court repeatedly decided that 'severe

---

1 The European Wind Energy Association, 'Wind in Power: 2011 European Statistics' (February 2012) <www.ewea.org> accessed 21 July 2012

2 Commission, 'EU Guidance on Wind Energy Development in Accordance with the EU Nature Legislation' October 2010

3 See for example: ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00); ECtHR, *Kyrtatos v. Greece*, 22 May 2003 (Appl.no. 41666/98); ECtHR, *Guerra and others v. Italy*, 19 Februari 1998 (Appl.no. 14967/89); ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90)

4 C. Miller, 'Environmental Rights in a Welfare State? A Comment on DeMerieux', (2003) 23 (1) OJLS 112

environmental pollution may affect individuals' well-being and prevent them from enjoying their homes in such a way as to affect their private and family life adversely'.[5]

As in many countries the number of wind turbines is increasing, more and more individuals and families will be confronted with wind turbines in the proximity of their homes. If more wind turbines are sited without exercising due care and attention to noise pollution and related health effects, more people will possibly be harmed in their health and well-being. In the light of this development, the scope of European human right protection needs to be clarified. Therefore this thesis aims to answer the following question:

Under which circumstances can wind turbine noise pollution lead to a violation of Article 8 of the European Convention on Human Rights?

It is necessary to identify and parse the problem of nuisance caused by wind turbine noise, before this legal question can and needs to be addressed. Therefore, chapter one will examine the intersection of the science of acoustics, physics and medicine in order to understand whether, why, and under what circumstances people experience adverse health effects as a result of long-term exposure to wind turbine noise. Research in the field of acoustics and as well as medicine will play a central role in this assessment. This external non-legal perspective is needed to indicate the problem that arises under European human right protection. The second chapter explores the case-law of the European Court on Human Rights (hereafter: ECtHR or Court) on Article 8 ECHR in relation to the right to live in a healthy environment. The aim of this chapter is to assess the scope of human right protection related to environmental pollution. The problem of wind turbine noise is selected as one of the new problems arising under European human rights law. The outcomes are relevant to other forms of noise pollution and to other new problems that arise from for example new technologies, new insights or increased exposure. The results can also add to the body of knowledge on the scope of other fundamental rights.

To avoid a purely theoretical and abstract study, this study is carried out in combination with a case study of wind turbines in Houten, the Netherlands. This case study has led to the submission of a complaint at the ECtHR, in the name of 101 individuals living in the vicinity of an area where wind turbines are planned to be built. The case study gave body to the problem, but is not part of this paper. The complaint as filed at the ECtHR can be found in appendix A.

[5] ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90) para 51

1. WIND TURBINE NOISE AND ADVERSE HEALTH EFFECTS

In Sint Maartensbrug, the Netherlands, individuals living in the vicinity of wind turbines have indicated the turbines drive them crazy and prevent them from having a good night sleep. Some of them listen to the radio 24/7 to mask the wind turbine noise.[6] Complaints or – in the popular literature called- horror stories like this have grown in number in recent years.

This chapter deals with the question: To what extent can noise pollution caused by wind turbines in the proximity of homes lead to adverse health effects? Central to this question is the intersection of science of acoustics, physics and medicine in order to understand wind turbine noise and consequent adverse health effects due to prolonged exposure. First, wind turbine noise and its characteristics will be discussed, based on the perspective of acousticians, physicist and noise engineers. Attention is paid to low frequency noise and infrasound, as well as the particular sound character of wind turbine noise. These factors are identified in the literature as important causes of adverse health effects on human beings. Furthermore this chapter provides a literature review on the current evidence supporting or denying the harmful effect of wind turbine noise on human beings. Research in this field is mainly characterized by a large amount of adverse event reporting and case study designs using quantitative survey tools. More systematic studies show striking divergence in outcomes, often explicable by financial interests of parties. Existing research on adverse health effects caused by wind turbine noise is assessed based on the overarching concepts of 'validity' and 'reliability.' The following criteria fill in this concept: Size and composition of research population, completeness, accuracy and objectivity of the data collection, analysis and conclusions. The objective of this chapter is to provide a critical assessment of the outcomes of existing research, to give insight in the current scientific status of wind turbine noise and its effect on human beings whom are prolonged exposed to wind turbine noise. The limitation of this analysis is that my expertise is of a legal nature.

1.1 WIND TURBINE NOISE

The most commonly heard complaint about wind turbines is that they are noisy. Noise is physically the same as sound; however, noise can be described as unwanted sound. Sound is perceived and recognized by its loudness (pressure) and pitch (frequency). Loudness is indicated with the decibel (hereafter: dB), which is a logarithmic ratio, to mimic the behavior of the ear.[7] Human beings can hear sound between 0 dB and 130 dB, in which 130 dB is very loud and painful sound for most humans.[8] Humans do not perceive all pressure as being equally loud, due to the fact that the ear does not respond equally to all frequencies. Frequency is indicated with Hertz (hereafter: Hz). The human hearing is sensitive at frequencies between 500-10,000 Hz.

---

6 Telephone contact with Mrs. Vonk and Mrs. Kanis (30 March 2012)

7 Mark Roberts and Jennifer Roberts, 'Evaluation of the Scientific Literature on the Health Effects Associated with Wind Turbines and Low Frequency Sound', (prepared for Wisconsin Public Service Commission, Exponent, 2009)

8 Geoff Leventhall, Stefan Oerlemans, Andrew Bullmore, Bo Søndergaard, Frits van den Berg, David Hessler, Mark Bastasch, 'Wind Turbines Noise: How it is Produced, Propagated Measured and Received' (Multi-Science Publishing, 2011) Ch. 6

1.1.1 INFRA- & LOW FREQUENCY SOUND

Wind turbines produce a substantial amount of infra and low frequency sound.[9] Infrasound is the sound below 20 Hz and low frequency sound approximately between 10/20 Hz and 100/250 Hz. The issue of health effects stemming from this low end of the sound spectrum has been controversial for many years now. Infrasound was believed to be inaudible, but this has been determined to be a misconception.[10] Although hearing of infrasound does not occur through hearing in a normal sense, 'it can be detected as a result from nonlinearities of conduction in the middle and inner ear which produces a harmonic distortion in the higher frequency range'.[11] Furthermore infrasound detection entails more than direct hearing, namely also subjective effects such as annoyance and detection through the resonance of other body organs.[12] Present understanding of inner ear physiology and of the nature of wind turbine sounds demonstrates that infrasound that cannot be heard could influence human function and affect people living nearby.[13]

Low frequency noise is the dominant sound component of wind turbine noise at moderate and larger distances. Due to its long wavelengths, it travels long distances and penetrates through walls and windows easily.[14] A laboratory research by Vos (2010)[15] supports this when considering the effect of outdoor noise on a person being indoors. As a building façade reduces high frequency noise more effectively than low frequency noise, a low frequency sound impinging on the façade must be of lower level than a high frequency sound in order to arrive at the same indoor sound level.[16] Increasingly it is being recognized that the low-frequency audible sound could be a key factor in disturbance caused by wind turbines.[17]

---

9 As shown by S Wagner, R Bareiss, G Guidati, 'Wind Turbine Noise' (Springer: Berlin, 1996); G.P. van den Berg, 'The Sounds of High Winds'(doctoral thesis, University of Groningen, 2006)

10 B Berglund, P Hassmen and RF Job, 'Sources and Effects of Low-Frequency Noise'(1996) 99(5) Journal of the Acoustical Society of America 2985; G. Leventhall (2007) 93(1-3) Progress in Biophysics and Molecular Biology 130; C Maschke, 'Introduction to the Special Issue on Low Frequency Noise' (2004) 6(23) Noise and Health 1

11 B Berglund, P Hassmen and RF Job, 'Sources and Effects of Low-Frequency Noise'(1996) 99(5) Journal of the Acoustical Society of America 2985

12 Ibid.

13 John P Harrison, 'Wind Turbine Noise' (2011) 31:256 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/256>, accessed 22 July 2012; Alec N Salt and James A Kaltenbach, 'Infrasound From Wind Turbines Could Affect Humans' (2011) 31:296 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/296>, accessed 22 July 2012

14 K Waye, 'Effects of Low-Frequency Noise on Sleep'(2004) 6(23) Noise and Health 87

15 J Vos, 'On the Relevance of Non-Acoustic Factors Influencing the Annoyance Caused by Environmental Sound – A Literature Study'(Proceedings Internoise 2010) <http://www.vosanr.com/nl/publicaties/31-on-the-relevance-of-nonacoustic-factors-influencing-the-annoyance-caused-by-environmental-sound-a-literature-study.html> accessed 22 July 2012

16 Geoff Leventhall, Stefan Oerlemans, Andrew Bullmore, Bo Søndergaard, Frits van den Berg, David Hessler, Mark Bastasch, 'Wind Turbines Noise: How it is Produced, Propagated Measured and Received' (Multi-Science Publishing, 2011) Ch. 6

17 See for example: G Leventhall and others, 'A Review of Published Research on Low Frequency Noise and its Effects (Report for Defra: U.K. Department for Environment, Food and Rural Affairs, 2003) < http://archive.defra.gov.uk/environment/quality/noise/research/lowfrequency/ > accessed 22 July 2012

1.1.2 SOUND CHARACTER

Wind turbines generate sound through mechanical and aerodynamic routes.[18] The sound level depends on various factors including design and wind speed. The dominant sound source from modern wind turbines is aerodynamic, produced by the rotation of the turbine blades through air. The aerodynamic noise is present at all frequencies, from infra- and low frequency sound to the normal audible range, producing a characteristic 'swishing' 'lashing', 'beating' or 'thumping' sound.[19]

Wind farms are unique sound sources and exhibit special audible and inaudible characteristics that can be described as modulating sound. People living in the vicinity of wind turbines have stated that the variation in sound level makes it more annoying than other sources of noise at comparable sound pressure level. Human perception responds primarily to sound character rather than sound level.[20] Therefore, human hearing is relatively sensitive to wind turbine sound fluctuations and if it is unwanted, the disturbing character will be aggravated.[21] This sound character of wind turbine noise is an important factor in the adverse health effects reported.[22]

1.2 ADVERSE HEALTH EFFECTS

> 'I hear a whining mechanical noise, loud humming and grinding in the house day and night, since the wind turbines near my house are switched on. My radio is on 24/7 , to mask the terrible noise. The lack of sleep drives me crazy!'[23]

Anecdotal reports on adverse health effects caused by wind turbine noise have been published in the media and on the internet. This raises the question: 'What exactly are these health effects?' This question is central to this chapter. There is no universal definition of health. However, the definition used by the World Health Organization (WHO) is used in most of the literature on this topic. The Preamble to the constitution of

---

18 A Rogers; J Manwell, and S Wright, '*Wind turbine acoustic noise' (*A white paper prepared by the Renewable Energy Research Laboratory, Department of Mechanical and Industrial Engineering, University of Massachusetts, 2006)

19 Geoff Leventhall, 'Infrasound from Wind Turbines – Fact, Fiction or Deception' (2006) 24(2) Canadian Acoustics 29; WD Colby, R Dobie, G Leventhall, DM Lipscomb, RJ McCunney, MT Seilo, B Søndergaard, 'Wind Turbine Sound and Health Effects: An Expert Panel Review' (prepared for American Wind Energy Association and Canadian Wind Energy Association, 2009). See also: E Pedersen, F van den Berg, R Bakker, J bouma, 'response to Noise from Modern Wind Farms in The Netherlands (2009) 126(2) Journal of the Acoustical Society of America 634; B.J. Frey and P.J. Hadden, 'Noise radiation from Wind Turbines Installed near Homes: Effects on Health (2007) <http://docs.wind-watch.org/wtnoisehealth.pdf> accessed 22 July 2012.

20 Bob Thorne, 'The Problems With "Noise Numbers" for Wind Farm Noise Assessment (2011) 31:262 Bulletin of Science Technology & Society 262 <http://bst.sagepub.com/content/31/4/262>, accessed 22 July 2012

21 Geoff Leventhall, Stefan Oerlemans, Andrew Bullmore, Bo Søndergaard, Frits van den Berg, David Hessler, Mark Bastasch, 'Wind Turbines Noise: How it is Produced, Propagated Measured and Received' (Multi-Science Publishing, 2011) Ch. 6

22 Bob Thorne, 'The Problems With "Noise Numbers" for Wind Farm Noise Assessment (2011) 31:262 Bulletin of Science Technology & Society 262 <http://bst.sagepub.com/content/31/4/262>, accessed 22 July 2012

23 Telephone contact with Mrs. Vonk (30 March 2012)

the WHO[24] describes: 'Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'. The WHO defines adverse health effects of noise as: 'changes in the morphology and physiology of an organism that result in impairment of functional capacity, or an impairment of capacity to compensate for additional stress, or increases the susceptibility of an organism to the harmful effects of other environmental influences.'[25] The WHO furthermore listed the adverse health effects of which the following are part: hearing impairment, interference with speech communication, cardiovascular and physiological effects, sleep disturbance, mental health effects, effects on performance and effects on residential behavior and annoyance. These definitions are used in the following literature review.[26]

The amount of non-systematic studies and popular literature on this topic is overwhelming. On the contrary, well-developed systematic studies are not present in large numbers and all have their occasional flaws. In order to address public concerns and assess the effects of wind turbine noise on public health, adverse event reports and systematic studies will be assessed based on their methodology, as described in the introduction of this chapter.

1.2.1 ADVERSE EVENT REPORTING

'In cases of emerging and unpredictable disease risk, adverse event reports are the cornerstone of public health research'.[27] Adverse event reports indicate any adverse change in health or side effect that occurs in a person who is being exposed to a source (wind turbine or medicine for example) or within a previously specified period of time after the exposure has been completed. Obviously it is impossible to study every possible exposure-disease combination by systematic study methods. Therefore collecting reports of disease cases apparently attributable to a particular exposure source is an important first step.[28] Adverse event reporting is mainly used in infectious disease outbreaks or in case of side effects from pharmaceuticals, but reporting adverse health effects caused by wind turbines fit the pattern as well.[29] The number of adverse event reports in the media, case-studies or official reports[30] on this issue is ever

---

[24] Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948

[25] B. Berglund, T. Lindvall, DH Schwela, K.-T. Goh, 'Guidelines for Community Noise,' (Geneva, World Health Organization, 1999)

[26] B. Berglund, T. Lindvall, DH Schwela, K.-T. Goh, 'Guidelines for Community Noise,' (Geneva, World Health Organization, 1999)

[27] Carl V. Phillips, 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents' (2011) 31:303 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/303>, accessed 22 July 2012, 304

[28] Ibid.

[29] Ibid.

[30] Amanda Harry, 'Wind turbines, noise and health' (2007); Carmen ME Krogh, Lorrie Gillis, Nicolas Kouwen and Jeff Armani, 'WindVOiCe, a Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need for Vigilance Monitoring' (2011) 31:334 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/334>, accessed 31 July 2012; M Nissenbaum, '*Mars Hill wind turbine project health effects: Preliminary findings (2009)* <http://www.windaction.org/?module=uploads&func=download&fileId=1798 > accessed 1 August 2012; Robyn Phipps, Marco Amati, Sue McCoard and Rischard Fisher, 'Visual and noise effects

increasing, now numbering in the thousands, rather than the hundreds around the world.

Adverse event reporting is a suitable way of studying wind turbine noise and its effects on human beings. People living in the vicinity are capable of both recognizing the exposure and outcome, in contrast with people who are exposed to invisible chemicals and diseases such as cancer.[31] Residents of wind turbines can detect the noise as well as the effects of that noise on themselves. Additionally, they can even detect when the problems arise and terminate. This information is incredibly important to determine the causation, even without a formal comparison group.[32]

Reported symptoms associated with exposure to wind turbines include annoyance, sleep disturbance, stress or psychological distress, inner ear symptoms, headaches, excessive tiredness, and reduction of quality of life.[33] Nina Pierpont, pediatrician and expert in this field established a more extensive list of commonly mentioned symptoms, namely: sleep disturbance, headache, tinnitus, ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic episodes associated with sensations of internal pulsation or quivering when awake or asleep.[34] Adverse advent reports show a correlation between these health effects with proximity to wind turbines, the sound pressure level emitted by the turbines, the frequency of the noise, time of the exposure and individual response.[35]

The results of adverse event reporting should not be over interpreted. The outcomes are crude, control groups are often missing and potential selection bias cannot be prevented.[36] Moreover, it does not allow an estimate of what portion of the exposed

---

reported by residents living close to Manawatu wind farms: Preliminary survey results' (2007); Nina Pierpont, 'Wind turbine syndrome: A report on a natural experiment' (2009, Santa Fe, NM: K-Selected Books); Bob Thorne, 'The problems with noise numbers for wind farm noise assessment' (2011) 31:262 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/262>, accessed 1 August 2012

31 Carl V. Phillips, 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents' (2011) 31:303 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/303>, accessed 22 July 2012, 305

32 Ibid.

33 Brett Horner, Roy D Jeffery, Carmen ME Krogh, 'Literature Reviews on Wind Turbines and Health: Are They Enough?'(2011) 31:399 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/399>, accessed 1 August 2012. See also: Carmen ME Krogh, Lorrie Gillis, Nicolas Kouwen and Jeff Armani, 'WindVOiCe, a Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need for Vigilance Monitoring' (2011) 31:334 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/334>, accessed 31 July 2012; Amanda Harry, 'Wind turbines, noise and health' (2007)

34 Nina Pierpont, 'Wind turbine syndrome: A report on a natural experiment' (2009, Santa Fe, NM: K-Selected Books) 26.

35 Robert Y McMurtry, Towards a Case Definition of Adverse Health Effects in the Environs of Industrial Wind Turbines: Facilitating a Clinical Diagnosis' (2011,) 31:316 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/316>, accessed 31 July 2012

36 Carmen ME Krogh, Lorrie Gillis, Nicolas Kouwen and Jeff Armani, 'WindVOiCe, a Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need for Vigilance Monitoring' (2011) 31:334 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/334>, accessed 31 July 2012

population suffers health effects.[37] However, careful analysis of this information can expose causal relationships.

In the case of wind turbine noise and adverse health effects, the massive volume of reports that are available creates plausible evidence that there is a causal relationship. Statistically the quantity of evidence is beyond coincidence and the health problems are similar in the reports and seem to relate to the exposure. The studies all show a core list of symptoms, being sleep disorders, headaches, mood disorders, inability to concentrate, tinnitus and vestibular (balance) problems. Carl V. Phillips[38] concludes: 'The commonly reported problems all exist at the border of the psychological and physical and can all be caused by either of two very plausible effects of wind turbine exposure: stress reactions or vestibular disturbance'.[39]

In many of these reports individuals make substantial costs to reduce health impacts. Lots of money is being spent on retrofitting their houses to reduce noise, selling their properties at a loss, or even abandoning their homes without being able to sell them.[40] The decline of property values and sales collapse, as mentioned in several adverse event reports, suggests that the population in general does not believe that the turbines are harmless.[41]

1.2.2 SYSTEMATIC STUDIES

The large amount of adverse event reporting stimulated more systematic studies. The volume of systematic health impact studies is limited, contrary to the amount of literature reviews based on these studies. Below the most reliable and valid studies are presented. An analysis based on methodology of the systematic studies preceded this overview. All systematic studies that are currently available have their small or gross deficiencies. Within the scope of this research it is impossible to present all these systematic studies. The studies that are not presented in this overview mostly lacked validity due to small and highly selected research groups and non-objective researchers that conducted their studies by order of the government or pressure group. This list of most valid and reliable studies includes the study of Nissenbaum, Aramini, and Hanning (2011)[42], Janssen et. At (2011)[43], Pierpont (2009)[44], Pedersen, van den Berg, Bakker & Bouma (2009)[45], Pedersen & Persson Wayne (2007)[46] and (2004)[47].

---

37 Carl V. Phillips, 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents' (2011) 31:303 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/303>, accessed 22 July 2012, 305

38 Phillips is a consultant and author specializing in epidemiology, science-based policy making, and communicating scientific concepts to the public. He spent most of his career as a professor of public health and now works in litigation support, scientific advising and grant-supported research

39 Carl V. Phillips, 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents' (2011) 31:303 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/303>, accessed 22 July 2012, 305

40 Ibid, 306. Examples can be found in the appendix of this article

41 Ibid, 306

42 Michael Nissenbaum, Jeff Aramini, Chris Hanning, 'Adverse health effects of industrial wind turbines: a preliminary report (10th International Congress on noise as a Public Health Problem, 2011)

43 Sabine A. Janssen, Henk Vos, Arno R. Eisses and Eja Pedersen, 'A comparison between exposure response relationships for wind turbine annoyance due to other noise sources', (2011, Acoustical Society of America 130 (6)). This study is based on the data of Pedersen, van den Berg, Bakker & Bouma (2009), Pedersen & Persson Wayne (2007) and (2004)

Nina Pierpont, a physician with clinical experience worked on a very detailed, peer-reviewed case-control study of 10 families around the world. These families have been affected by wind turbines to that extent that they had to leave their houses; nine left permanently. [48] The turbines ranged from 1.5 to 3MW capacity at distances between 305 to 1500 meter. The group comprised 21 adults, 7 teenagers and 10 children of whom 23 were interviewed. The size and composition of the research population is limited, though the study creates the ability to examine symptoms before, during and after exposure to turbine noise. This approach is rarely found in similar case-control studies.[49] The research population described the following symptoms: sleep disturbance, fatigue, headaches, dizziness, nausea, changes in mood and inability to concentrate. Dr. Pierpont gave these symptoms the collective name 'Wind Turbine Syndrome.' All adult subjects reported 'feeling jittery inside' or 'internal quivering', which was often accompanied by anxiety, fearfulness, sleep disturbance and irritability. Changes occurred in sleep pattern, behavior and academic performance of children while exposed to wind turbine noise which recovered after exposure ceased. The subjects confirmed that all symptoms were not present before the turbines started operation and resolved once exposure ceased. Dr. Hanning stresses that 'Pierpont offers compelling evidence that these symptoms are related to low frequency sound and suggests very plausible physiological mechanisms to explain the link between turbine exposure and the symptoms'.[50] Pierpont's study is flawed with regard to size and composition of the research population and the consequent objectivity of the results. However, the study does not aim to give insight in the likelihood of occurrence of the symptoms. The study solely addresses the mechanism for health problems associated with exposure to wind turbine noise. This study is, given its purpose, valid and reliable and convincingly shows that wind turbine noise does cause the above mentioned symptoms for these specific people.

Other significant studies are those of Pedersen, van den Berg, Bakker, and Bouma (2009) on wind turbine noise in the Netherlands and two earlier Swedish studies reported by Pedersen and Persson Waye (2007, 2004). These three studies were conducted in different areas, types of terrain and varying degrees of urbanization. The three studies together sent questionnaires to 3770 subjects, of which 1830 (49%) were returned. The significance and validity of these studies is based on the size and composition of the research group, the inter-comparison between the studies and the

---

[44] Nina Pierpont, 'Wind turbine syndrome: A report on a natural experiment' (2009, Santa Fe, NM: K Selected Books)

[45] Eja Pedersen, Frits van den Berg, Roel Bakker, Jelte Bouma, 'Response to noise from modern wind farms in The Netherlands' (2009), 126 (2) J. Acoust. Soc. Am.

[46] Eja Pedersen and Kerstin Persson Waye, 'Wind turbine noise, annoyance and self-reported health and well-being in different living environments', (2007) 64 Occ. Environ. Med.

[47] Eja Pedersen, and Kerstin Persson Waye, 'Perception and annoyance due to wind turbine noise—a dose-response relationship', (2004) 116 J. Acoust. Soc. Am.

[48] Nina Pierpont, 'Wind turbine syndrome: A report on a natural experiment' (2009, Santa Fe, NM: K Selected Books). See also: Christopher Hanning, 'Sleep Disturbance and Wind Turbine Noise' (2009)

[49] See also: Christopher Hanning, 'Sleep Disturbance and Wind Turbine Noise' (2009)

[50] Christopher Hanning, 'Sleep Disturbance and Wind Turbine Noise' (2009) 13

relevant experience of the researchers.[51] Janssen et al. (2011) collected the results of the three studies. Results from the studies show a dose or exposure response relationship between sound pressure levels and reported perception and annoyance. The studies show that wind turbine noise is perceived as annoying at much lower noise levels than transportation noise or industrial noise at comparable levels, possibly due to specific sound character.[52] The term annoyance in these studies seems a bit trivial, due to its everyday meaning. In the context of human health, however, annoyance is an adverse health effect.[53] The study furthermore shows a relationship between economic benefits and disturbance as well as visibility and disturbance; disturbance was lower among residents who received economical benefit from wind turbines and higher among residents for whom the wind turbine was visible from the dwelling. The study is capable of indicating the expected percentage of 'annoyed' people, in contrary to the previous mentioned study. However, the term 'annoyed' remains unclear and it is difficult to distill its relation to the symptoms as mentions by inter alia Nina Pierpont.

The last reliable and sufficiently valid study is that of Nissenbaum, Aramini, and Hanning (2011), which assessed the effects of wind turbine noise on sleep and health. Residents living near turbines were surveyed as well as people living further away with regard to most of the aforementioned health conditions. The size of research population (38 near wind turbines and 41 at a greater distance) is limited. However, the response rate among the residents is great, which adds trust in the validity of the outcomes. The results show that those living within 1.4 km of wind turbines have suffered sleep disruption which is sufficiently severe as to affect their daytime functioning and mental health. Moreover it shows that at least some of the residents living near the turbines have suffered serious harm to their sleep and health. 'The significant relationship between the symptoms and distance from the wind turbines, the subjects' report that their symptoms followed the start of wind turbine operations, the congruence of the symptoms reported here with previous research and reports and the clear mechanism is strong evidence that wind turbine noise is the cause of the observed effects'.[54] The researchers conclude that wind turbines can prevent the onset of sleep and the return to sleep after a spontaneous or induced awakening.

1.2.3 SET BACK DISTANCE

The systematic studies indicate that some subjects are severely affected by wind turbine noise at distances thought by the industry and government to be safe.[55] Most jurisdictions have noise regulations, which are used to determine the setback of turbines from homes. These noise limits varies from 35 dBA for quiet regions of New Zealand and

---

51 John P Harrisson, 'Wind Turbine Noise, (2011) 31:256 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/256>, accessed 3 August 2012

52 See also: Frits van den Berg, 'Criteria for wind farm noise: Lmax and Lden,' (2008) in Proceedings of the 7th European Conference on Noise Control, EURONOISE, Acoustics 08, Paris, France

53 B. Berglund, T. Lindvall, DH Schwela, K.-T. Goh, 'Guidelines for Community Noise,' (Geneva, World Health Organization, 1999)

54 Michael Nissenbaum, Jeff Aramini, Chris Hanning, 'Adverse health effects of industrial wind turbines: a preliminary report (10th International Congress on noise as a Public Health Problem, 2011)

55 See for example: Amanda Harry, 'Wind turbines, noise and health' (2007)

for nighttime in Germany up to 50 dBA in many jurisdictions in the United States.[56] Pierpont, Nissenbaum et al. and others that are not mentioned above express that a setback distance of less than 1.5 km must be regarded as unsafe and recommend a setback of residential properties from wind turbines between 1.5 and 2 km.[57] Only a few jurisdictions have established noise distance setbacks in compliance with these standards.

1.2.4 CONCLUDING REMARKS

Based on a review of the evidence there is a significant probability of adverse health effects for human beings living within 1,5-2.0 km of wind turbines. Globally individuals have reported annoyance, sleep disturbance, stress or psychological distress, inner ear symptoms, headaches, excessive tiredness, and reduction of quality of life. Systematic studies find a causal link between annoyances and sleep disturbance, but fail to find a causal link between the other symptoms frequently listen in adverse event reports. These studies do find it plausible that annoyance and sleep disturbance will lead to the other listed symptoms. A side note to this, is that no systematic study appeared whose results support the claim that the relevant health problems are similar in unexposed and exposed populations. Moreover, evidence shows that factors, such as the visibility of the turbine and attitude or noise sensitivity of the residents influence the annoyance rates. However, this does not make the wind turbine noise disturbance less real. It is inevitable that there are causal co-factors, such as personal characteristics, for the wind turbine to cause adverse health effects. This is, however, true for every exposure-disease combination. The conclusion that there is a significant probability of adverse health effects for human beings living within 1,5-2.0 km of wind turbines is an important starting point for the following chapter. The next chapter assesses the legal consequences of this conclusion on the level of European human right protection.

[56] John P Harrisson, 'Wind Turbine Noise, (2011) 31:256 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/256>, accessed 3 August 2012

[57] An extensive list of recommended setbacks by experts can be found in Christopher Hanning, 'Sleep Disturbance and Wind Turbine Noise' (2009) table 1

2. ARTICLE 8 ECHR AND THE RIGHT TO LIVE IN A HEALTHY ENVIRONMENT

The European Convention on Human Rights is the most important human rights instrument in Europe and sets out to protect basic human rights and fundamental freedoms. The European Court of Human Rights was introduced in 1959 to act as an independent adjudicator of the Convention. The European Court on Human Rights has frequently developed its human rights law. The Court has noted the 'Convention is a living instrument which (…) must be interpreted in the light of present day conditions.'[58] Regarding this evolving character of the Convention, this chapter will examine the scope of Article 8 ECHR. This Article provides the following:

1. Everyone has the right to respect for his private and family life, his home and his correspondence.
2. There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.

In an era where sustainable development takes a central place in national politics, the literature on this topic increasingly discusses 'the right to the environment' in relation to Article 8 ECHR. It is important is to emphasize that the commonly adopted name for this 'right' (the right to the environment) is poorly chosen. Subjects of human rights are human beings, meaning that the literature in general and this paper is not discussing the rights of the environment, but the rights of individuals to live in a healthy environment.[59] This chapter will examine Article 8 ECHR in relation to the right to live in a healthy environment. Article 8 is chosen because it is the most frequently employed human right against environmental degradation that affects human beings.[60] Environmental pollution is the umbrella term where wind turbine noise is part of. The question central to this assessment is: 'Which environmental and health aspects involve a breach of Article 8 ECHR'? To find an answer to this question, it is necessary to parse all elements of Article 8 and discuss it separately. Therefore this case law assessment first deals with the paragraph 1 of Article 8 ECHR. The scope of Article 8 and the positive obligations resting on states are consecutive being discussed. Thereafter the justification test, as set out in paragraph 2 of the Article is set out. Lastly, the margin of appreciation is being discussed. This margin determines the degree of intensity of the 'balance of interests test' made. This method, of parsing the elements, is also used by the ECtHR when assessing a case. The elements are being discussed on the basis of a large amount of case law relating to environmental degradation. As a consequence, the interdependence of the various elements and criteria become clear.

---

[58] ECtHR, *Tyrer v. the United Kingdom*, 25 April 1978 (Appl.no. 5856/72) para 31

[59] See also: Nükhet Yılmaz Turgut, 'The European Court Of Human Rights And The Right To The Environment' (2007) 4(1) Ankara Law Review, 16/17

[60] See for example: ECtHR, *Guerra and others v. Italy*, 19 Februari 1998 (Appl.no. 14967/89); ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90); ECtHR, *Kyrtatos v. Greece*, 22 May 2003 (Appl.no. 41666/98); ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00)

2.1 APPLICABILITY OF ARTICLE 8

2.1.1 THE SCOPE OF ARTICLE 8

A complaint needs to fall within the scope of Article 8, to fall within its protection. Therefore the right protected need to concern one of the personal interests protected, being: private life, family life, home and correspondence. Consequently the question arises: 'Do environmental pollution issues, such as wind turbine noise, fall within the scope of one of the rights protected by Article 8 par.1?'

The Convention does not explicitly refer to a human right to live in a healthy environment nor does it address environmental issues explicitly. In 1976, The European Commission on Human Rights, which was abolished in 1998, confirmed that 'no right to preservation of the natural environment as such was included among the Convention's rights'.[61] However, since then case law has been developed under the Convention in relation to environmental pollution. The European Commission and the Court accepted in several cases that the right to respect for domestic and family life, home and correspondence can be infringed by environmental factors, such as noise, odorous emissions or apprehension of explosion.[62] In 1990, the Commission decided in *S. v. France* that considerable noise and other nuisances could undoubtedly affect the well-being of a person and thereby interfere with the Convention's rights.[63] In one of the most important cases in this regards the Court stated: 'severe environmental pollution may affect individual's well-being and prevent them from enjoying their homes in such a way as to affect their private and family life adversely'.[64] Seeing the ECHR is a living instrument which must be interpreted in the light of present day condition[65] Article 8 now protects the whole personal sphere, including interrelations of the individual to his direct environment.[66] Noise, odors and other nuisance can lead to a violation of Article 8, under the condition that some preconditions are fulfilled. To date, the Court has dealt with one case concerning wind turbines. In *Fagerskiold v Sweden*[67] the Court held that the nuisance in this case did not constitute 'severe environmental pollution' and insufficient evidence was brought to establish that the applicants had been physically affected by the nuisance.

A precondition for environmental interferences to fall under the scope of Article 8 is that the interference needs to be present in the 'direct environment' of the applicant. More specific, an individual needs to be 'directly and seriously' affected by noise or other

---

61 *See:* ECtHR, *X v. Germany*, 13 May 1976 (Appl. no. 7407/76); Ole W Pedersen, 'European Environmental Human Rights and Environmental Rights: A Long Time Coming?' (2008), 21(1) Georgetown International Environmental Law Review, available at <http://ssrn.com/abstract=1122289>, accessed 1 August 2012, 15

62 C Miller, 'Environmental Rights in a Welfare State? A Comment on DeMerieux', (2003) 23 (1) Oxford Journal of Legal Studies, 112

63 *See:* ECtHR, *S. v. France*, 17 May 1990 (Appl. no. 13728/88); ECtHR, *Arrondelle v. United Kingdom*, 15 July 1980 (Appl. no. 7889/77)

64 ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90), para 51

65 ECtHR, *Tyrer v. the United Kingdom*, 25 April 1978 (Appl.no. 5856/72)

66 See also: Christian Schall, 'Public Interest Litigation Concerning Environmental Matters before Human Rights Courts: A Promising Future Concept?' (2008) 20:3 Journal of Environmental Law, Oxford University Press

67 ECtHR, *Fägerskiöld v Sweden*, 25 March 2008 (Application No: 7664/04)

pollution in his or her home, to fall within the scope of Article 8.[68] In the cases *Athanassoglou v Switzerland* and *Balmer-Schafroth v Switzerland*, concerning government licenses to operate Swiss nuclear power plants, the ECtHR held that it is essential for the parties to show that they are personally exposed to a danger that is 'not only serious but also specific and, above all, imminent'.[69]

Furthermore the disturbance needs to be 'sufficiently serious' to affect the applicants or prevent them from enjoying their home and their private and family life.[70] In the case *Kyrtatos v. Greece*[71] the Court noted that the crucial element in order for a case of environmental pollution to severely affect the right of Article 8, is the existence of a 'harmful effect on a person's private or family sphere and not simply the general deterioration of the environment'. The continuity of the interference is an important factor in this respect. Prolonged exposure appears to be a precondition for an interference to be sufficiently serious. To illustrate this, the ECtHR accepted in the case of *Fadeyeva v Russia* that the prolonged exposure 'inevitably made the applicant more vulnerable to various diseases' and 'adversely affected the quality of life at her home.'[72] The interference by the State was also found to be in violation of Article 8 in the case of *Lopez Ostra v. Spain*, since the applicant and her family had had to live with the plant for a number of years.

The term 'proximity' is not made explicit in the case law. There are no clear guidelines for determining what 'proximity' is, while it seems to depend on the type of polluter. In three different cases 'close proximity' could be 30 meter,[73] 100 meter,[74] or (within) 1000[75] meter from a plant or coal mine.

According to the Court's recent case law, the requirement of 'sufficiently severe disturbance' does not require actual damage to health. [76] The *Lopez Ostra v. Spain* case shows that evidence is needed to illustrate an infringement with the enjoyment of home and family life; but the applicants do not have to establish a clear and direct causal link between the interference and health problems. In the case *Di Sarno and others v. Italy* applicants had not complained of any medical disorders linked to their exposure to the waste plant and the scientific studies produced by the parties had made conflicting findings as to the existence of a link between exposure to waste and an increased risk of cancer or congenital defects. Despite these findings, the Court came to a violation of

---

68 ECtHR, *Apanasewicz v. Poland*, 3 May 2011 (Appl. no: 6854/07)

69 ECtHR, *Balmer-Schafroth and others v. Switzerland*, 26 August 1997 (Appl. no 22110/93), para. 40.

70 See: ECtHR, *Kyrtatos v. Greece*, 22 May 2003 (Appl.no. 41666/98); ECtHR, *Fägerskiöld v Sweden*, 25 March 2008 (Application No: 7664/04); ECtHR, *Mileva and others v. Bulgaria*, 25 November 2010 (Appl. no: 43449/02, 21475)

71 ECtHR, *Kyrtatos v. Greece*, 22 May 2003 (Appl.no. 41666/98); ECtHR, *Di Sarno and others v. Italy*, 10 January 2012 (Appl. no. 30765/08)

72 ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00) under' Applicability'

73 In the case of *Giacomelli v. Italy*, the applicant lived in the 'close proximity', 30 metres away from a plant for the storage and treatment of "special waste"

74 In the case of *Dubetska and others v. Ukaine* applicants lived 100 metres from the spoil heap of the Velykomostivska No. 8 coal mine

75 In the case *Fadeyeva v. Russia* living within 1000 meter from The Severstal steel plant was regarded as close proximity

76 See: ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90); ECtHR, *Marckx v.Belgium*, 13 June 1979 (Appl.no. 6833/74) para 27; ECtHR, *Inze v. Austria*, 28 October 1987 (Appl.no. 8695/79) para 32

Article 8 ECHR. In doing so, the Court establishes a low threshold to fall within the scope of Article 8.[77]

In sum, the Court creatively interprets article 8 ECHR in an evolutionary manner, to let 'new problems', such as wind turbine nuisance fall under its scope. To date, the Court has dealt with only one case concerning wind turbines. This case, of *Fagerskiold v Sweden*[78] shows that wind turbine nuisance falls under the scope of Article 8, though in this specific case, the nuisance did not constitute 'severe environmental pollution' and insufficient evidence was brought to establish that the applicants had been physically affected by the nuisance. Moreover, applicants are not obliged to specify which of the rights under Article 8 (1) are claimed to be violated. Private life, family life and home are lumped together. Environmental pollution does not interfere in an individual's right to correspondence.

2.1.2 POSITIVE OBLIGATIONS

In the case *Marckx v. Belgium*[79] the Court inferred a positive obligation on states next to the duty of non-interference from the term 'respect' in Article 8 (1) ECHR. Hence, next to the negative obligation not to interfere with an individual's private-, family life and home, the State has to engage in activities to secure the effective enjoyment of these rights.[80] The Court emphasized that this obligation may also require the State to protect persons from the activities of other individuals that contravene the effective enjoyment of their rights. In the case *Fadeyeva v. Russia*[81] the Court for the first time held a state responsible for damage caused by a private company. The Court ruled that governments are legally responsible for preventing serious damage to their citizens' health caused by pollution from industrial installations, even when they are privately owned and run.

Whether there rests a positive obligation on states in a specific situation is unclear. Positive obligations are interpreted into Article 8 to make the enjoyment of it more effective. This effectiveness needs to be found in a rather ambiguous word: respect. The notion of respect is not clear-cut and differs per country due to the contrasting conditions and circumstances in contracting states.[82] This leaves the States a wide margin of appreciation in deciding when positive action is needed.

In the Case *Rees v. The United Kingdom* the Court established a test in determining whether or not a positive obligation exists.[83] This fair balance test is:

---

77 ECtHR, *Di Sarno and others v. Italy*, 10 January 2012 (Appl. no. 30765/08)

78 ECtHR, *Fägerskiöld v Sweden*, 25 March 2008 (Application No: 7664/04)

79 ECtHR, *Marckx v.Belgium*, 13 June 1979 (Appl.no. 6833/74). *See also*: ECtHR, *Abdulaziz, Cabales, and Balkandali v UK*, 28 May 1985 (Application nos. 9214/80; 9473/81; 9474/81) para 67

80 Ursula Kilkelly, 'The right to respect for private and family life. A guide to the implementation of Article 8 of the European Convention on Human Rights' (Human Rights handbooks, no. 1, 2003) 20

81 ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00). In the case ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90), which was decided more than 10 years before Fadeyeva v. Russia, the court decided similar, but this concerned a partly-public partly-private waste plant in Spain

82 ECtHR, *Abdulaziz, Cabales, and Balkandali v UK*, 28 May 1985 (Application nos. 9214/80; 9473/81; 9474/81) para 67

83 ECtHR, *Rees v. the United Kingdom*, 17 October 1986 (Appl.no. 9532/81) para 37

> 'In determining whether or not a positive obligation exists, regard must be had to the fair balance that has to be struck between the general interest of the community and the interests of the individual.'

In determining the steps to be taken to ensure compliance with this positive obligation the margin of appreciation is of major importance.

The fair balance test is an odd man out in the structure of this provision. To illustrate this, if the Court decides that the state did not establish a fair balance, paragraph 1 of Article 8 has been violated.[84] Consequently, there is no room left to examine the violation for its justification under the limitation clause of paragraph 2. This follows from the Court in *Rees v. The United Kingdom*:

> 'In striking this balance the aims mentioned in the second paragraph of Article 8 may be of a certain relevance, although this provision refers in terms only to "interferences" with the right protected by the first paragraph - in other words is concerned with the negative obligations flowing there from.'[85]

The Court refined its stance and brought the balance-tests from paragraph 1 and 2 closer together in the case of *Lopez Ostra v. Spain* by stating:

> 'Whether the question is analysed in terms of a positive duty on the State - to take reasonable and appropriate measures to secure the applicant's rights under paragraph 1 of Article 8 (...), or in terms of an "interference by a public authority" to be justified in accordance with paragraph 2, the applicable principles are broadly similar. In both contexts regard must be had to the fair balance that has to be struck between the competing interests of the individual and of the community as a whole, and in any case the State enjoys a certain margin of appreciation. Furthermore, even in relation to the positive obligations flowing from the first paragraph of Article 8, in striking the required balance the aims mentioned in the second paragraph may be of a certain relevance.'[86]

2.1.2.1 KINDS OF POSITIVE OBLIGATIONS

The positive obligations of states under Article 8 ECHR are of several kinds. Firstly, in case there is a potentially harmful activity that contravenes domestic rules, 'the national authorities need to take the necessary steps to end it or ensure that it conforms to the rules in force'.[87] This could include obligations to regulate and control harmful activities by licensing, setting up, operation, security and supervision of dangerous activities. This kind of positive obligation was the case in *Fadeyeva v. Russia,* where the state had failed

---

84 See: ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00); ECtHR, *Taşkın and Others v. Turkey*, 10 November 2004 (Appl. no. 46117/99); ECtHR, *Giacomelli v. Italy*, 2 November 2006 (Appl. no: 59909/00)

85 ECtHR, *Rees v. the United Kingdom*, 17 October 1986 (Appl.no. 9532/81) para 37

86 ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90) para 51

87 Jean-Francois Akandji-Kombe, 'Positive obligations under the European Convention on Human Rights. A guide to the implementation of the European Convention on Human Rights'(Council of Europe, 2007)

to protect Ms. Fadeyeva's health from long-term exposure to pollution from a Severstal steel plant. The State failed to resettle inhabitants, contrary to a Decree of the Council of Ministers of the RSFSR and operated in breach of domestic environmental standards., by either resettling her away from the plant or reducing its pollution level. Positive obligations of this kind were also at stake in the case of *Lopez Ostra v. Spain,* the waste-treatment plant at issue was illegal in that it operated without the necessary license and the municipal authorities resisted judicial decisions to take steps to protect the applicant's right. In *Guerra and Others v. Italy,* the violation was of a similar kind, as the applicants had been unable to obtain information that the State was under a statutory obligation to provide.

Secondly, 'where a State must determine complex issues of environmental and economic policy, the decision-making process must firstly involve appropriate investigations and studies in order to allow them to predict and evaluate in advance the effects of those activities which might damage the environment and infringe individuals' rights and to enable them to strike a fair balance between the various conflicting interests at stake'.[88] The Court applies a wide margin of appreciation in this respect. It does not express a clear threshold for which kind of policies these investigations and studies are or are not obliged, though in line with the threshold for having an arguable claim under Article 8, 'the environmental hazard at issue needs to attains a level of severity resulting in significant impairment of the applicant's ability to enjoy her home, private or family life'.[89] The assessment of that minimum level is relative and depends on all the circumstances of the case, such as the intensity and duration of the nuisance and its physical or mental effects on the individual's health or quality of life.[90] The Court seems to believe the states are in a better place to assess when and whether investigations and studies are needed. Therefore the states are in the position of determining the threshold for investigation and studies, mainly by their legislation on 'Environmental Impact Assessment (EIA).' Member states of the EU have based this EIA on the EC Directives concerning Environmental Impact Assessment[91]. The Court solely assesses whether these impact assessments have been conducted properly and in a complete way. In *Hatton a.o. v. the United Kingdom* (Grand Chamber) the Court emphasized: 'this does not mean that decisions can only be taken if comprehensive and measurable data are available in relation to each and every aspect of the matter to be decided'. The Court's case law also shows that no such thing as a 'human-rights-impact-assessment' is needed to predict and evaluate in advance the effects of those activities which might damage the environment and infringe individuals' rights.

Thirdly, in the light of Article 8 there rests a positive duty on states to create public access to the conclusions of the aforementioned studies and to information which

---

88 ECtHR, *Hatton a.o. v. the United Kingdom* (Grand Chamber), 8 July 2003 (Appl.no.36022/97) para 128; ECtHR, *Taşkın and Others v. Turkey*, 10 November 2004 (Appl. no. 46117/99) para 119. See also: ECtHR, *Grimkovskaya v. Ukraine*, 21 July 2011 (Appl. no: 38182/03)

89 ECtHR, *Grimkovskaya v. Ukraine*, 21 July 2011 (Appl. no: 38182/03)

90 Ibid.

91 Directive 85/337/EEC (known as 'Environmental Impact Assessment' – EIA Directive); Directive 2001/42/EC (known as 'Strategic Environmental Assessment' – SEA Directive)

would enable members of the public to assess the danger to which they are exposed.[92] This positive duty on states is of general nature and not restricted to governments engaged in hazardous activities.[93]

Fourthly, public participation in environmental decision-making needs to be safeguarded, for ensuring rights protected by Article 8.[94] The lack of participation from the beginning of the procedure for a proposed development, 'when all options are open and effective public participation can take place[95]' can lead to a violation of Article 8. Due account needs to be taken of the outcome of the public participation in reaching the final decision, which must also be made public.[96] No violation solely based on this ground has occurred so far, though it is highly related to access to information as mentioned above and appeal to the court as mentioned hereafter.

Fifthly, 'the individuals concerned must be able to appeal to the domestic court against any decision, act or omission where they consider that their interests or their comments have not been given sufficient weight in the decision-making process'.[97] It is the Courts well-established case law that these implicit procedural requirements are integrally part of Article 8. The Court built its case-law concerning Article 8 of the Convention in matters of environmental protection largely on the basis of principles enshrined in the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (ECE/CEP/43). The Aarhus Convention is of importance for the interpretation of the positive obligation of States in the light of Article 8 ECHR.

Lastly, the precautionary principle can impose a duty for positive intervention on States. The precautionary principle comes down to the idea that if there are reasonable scientific grounds for believing that a product may cause adverse health effects, it should not be on the market or in case of wind turbines, in operation, until scientific evidence proofs that the benefits outweighs the costs or risks. In the case of *Tatar v. Romania*, which was decided in 2009 the Court for the first time explicitly found a violation of the precautionary principle. In that case, the absence of certainty with regard to current scientific and technical knowledge could not justify any delay on the part of the State in adopting effective and proportionate measures'[98]

In sum the ECtHR has derived the following types of positive obligations from the Convention. When the potentially harmful activity contravenes domestic rules, the national authorities need to take the necessary steps to end it or ensure that it conforms

---

92 ECtHR, *Guerra and others v. Italy*, 19 Februari 1998 (Appl.no. 14967/89) para. 60; ECtHR, *McGinley and Egan v. The United Kingdom*, 9 June 1998 (Appl. no. 21825/93, 23414/94) para 97; ECtHR, *Hasan Taskin v. Turkey*, 13 September 2005 (Appl. no: 71913/01) para. 119

93 ECtHR, *Öneryildiz v. Turkey* (Grand Chamber), 30 November 2004 (Appl.no. 48939/99). Via: Daniel García San José, 'Environmental protection and the European Convention on Human Rights, (Council of Europe Publishing, 2005) 65

94 ECtHR, *Grimkovskaya v. Ukraine*, 21 July 2011 (Appl. no: 38182/03) para 69

95 Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (ECE/CEP/43), 1998, Article 6 para 4

96 ECtHR, *Taşkın and Others v. Turkey*, 10 November 2004 (Appl. no. 46117/99), para. 99

97 ECtHR, *Hatton a.o. v. the United Kingdom* (Grand Chamber), 8 July 2003 (Appl.no.36022/97), para 127-1288; ECtHR, *Hasan Taskin v. Turkey*, 13 September 2005 (Appl. no: 71913/01) para 119

98 ECtHR, *Tatar v. Romania*, 27 January 2009 (Application No: 67021/01)

to the rules in force. States must undertake appropriate investigations and studies in order to allow them to predict and evaluate in advance the effects of those activities and safeguard the individual procedural rights to access to information, public participation in decision making and access to justice in environmental matters, such as wind turbine nuisance. Moreover, the absence of certainty with regard to scientific and technical knowledge can result in the positive obligation to adopt effective and proportionate measures.

2.2 THE JUSTIFICATION TEST OF ARTICLE 8 (2)

The essential object of Article 8 is preventing the government, the police or other state bodies to interfere with the rights protected. On the state rests a negative obligations to refrain from taking certain action, unless these actions can be justified under the second paragraph of the Article. Article 8 (2) reads:

> 'There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.'

This chapter will describe the line of reasoning of the Court related to these justifications in cases related to environmental pollution. These criteria as set out in the second paragraph are applicable to negative state obligations. However, these are relevant to the fair balance test of paragraph 1 as well. In what follows, first it will be discussed what an interference is and when is it justified. Thereafter, the elements 'in accordance with the law', 'legitimate aim' and 'necessary in a democratic society' will consecutively be set out.

2.2.1 EXISTENCE OF AN INTERFERENCE

Article 8 (2) states '*there shall be no interference by a public authority,'* except if the state complies with a specific set of requirements. To define the scope of Article 8, the question what this '*inference by a public authority'* means, needs to be answered. Interferences can constitute of restrictions and formalities, such as the existence of a law or the requirement of a permit or even the denying of a permit. [99] Interferences can also constitute of penalties.

Interferences can also relate to positive obligations, as is mostly the case in environmental degradation cases. In the case of *Lopez Ostra v. Spain* the State interfered in the health and well-being of the applicants through the hazardous operation of industrial facilities, by not taking the necessary steps to stop the alleged harmful effects of the plant from affecting the applicant and her family.[100] Similar interferences have been adopted in cases where the State failed to suspend operation of a plant that

[99] Douwe Korff, 'The standard approach under Article 8-11 ECHR and Article 2 ECHR' (2008) 2. See also: ECtHR, *Dudgeon v. the United Kingdom*, 22 October 1981 (Appl. no 7525/76)

[100] ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90)

generate toxic emissions[101] or stop excessive noise of a nightclub.[102] Additionally, interference in the health and well-being of the applicant has been accepted where the authorities allowed the operation of a gold mine so as to create risks to human health and the environment, contrary to the decisions of a national administrative court.[103] An interference can also be related to procedural positive obligations. Examples are: failing to provide information about risk factors and how to proceed in the event of an accident at the nearby privately owned chemical factory, or in case of exposure to toxic chemicals during tests related to chemical weapons or methane-gas explosion in a garbage dump.[104]

Having this said, it is obvious that there is no clear distinction between positive obligations and interferences. Positive obligations can be distinguished from negative obligations by the requirement of positive intervention, given that the latter requires to refrain from interference. The Court expressed: 'The boundaries between the State's positive and negative obligations under this provision do not lend themselves to precise definition'.[105] Therefore the following phrase is resorted to by the Court often:

> 'Whether the present case be analyzed in terms of a positive duty on the State to take reasonable and appropriate measures to secure the applicants' rights under paragraph 1 of Article 8 or in terms of an "interference by a public authority" to be justified in accordance with paragraph 2, the applicable principles are broadly similar'.[106]

It is up to the applicant to show the State interferes with the rights protected in Article 8 ECHR. If the applicant cannot establish the certainty of the material damage which would constitute the interference, it is sufficient to demonstrate the likelihood that the interference occurred.[107] The State then bears the onus to prove that that interference was lawful and justified under Article 8 (2) ECHR.

2.2.1.1 INTERFERENCES JUSTIFIED?

Inferences with the rights protected in Article 8 (1) must fulfill all the criteria listed in Article 8 (2). These interferences need to be 'in accordance with the law', 'pursue a legitimate aim or aims' and be 'necessary in a democratic society'. Interferences stemming from negative obligations are strictly tested on its accordance with these limited list of criteria. In case of interferences stemming from positive obligations the test of accordance with these criteria is applied more loosely. In what follows, the scope

---

[101] ECtHR, *Giacomelli v. Italy*, 2 November 2006 (Appl. no: 59909/00); ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00)

[102] ECtHR, *Moreno Gómez v. Spain*, 16 November 2004 (Appl.no. 4143/02)

[103] ECtHR, *Taşkın and Others v. Turkey*, 10 November 2004 (Appl. no. 46117/99)

[104] ECtHR, *Guerra and others v. Italy*, 19 Februari 1998 (Appl.no. 14967/89); ECtHR, *Roche v. The United Kingdom*, 19 Oktober 2005 (Appl. no. 32555/96); ECtHR, *Öneryildiz v. Turkey* (Grand Chamber), 30 November 2004 (Appl.no. 48939/99)

[105] ECtHR, *Keegan v. Ireland*, 26 May 1994 (Appl. No. 16969/90)

[106] ECtHR, *Powell & Rayner v. the United Kingdom*, 21 February 1990 (Appl.no. 9310/81) para 41; See also: ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90) para 51

[107] Ursula Kilkelly, 'The right to respect for private and family life. A guide to the implementation of Article 8 of the European Convention on Human Rights' (Human Rights handbooks, no. 1, 2003) 23

of these criteria will be set out in relation to the environmental pollution case law under 8 ECHR.

2.2.2 IN ACCORDANCE WITH THE LAW

An interference with Article 8 (1) is permissible if it is in accordance with the law. 'Law' refers to a proper legal basis and includes not only primary legislation, but also subsidiary rules and judicial case law. Consequently, non-binding guidelines and administrative practice fall outside the scope of this concept of law.[108] The Court assesses, next to the assessment whether the interference is in accordance with the law, the quality of the law. In doing so, it examines whether the rules that authorize the interference is compatible with the rule of law, accessible and sufficiently clear and precise to be foreseeable in its application.[109] This foreseeability requirement means: 'The law needs to be formulated with sufficient precision to enable individuals, if necessary with appropriate advice, to foresee, to a degree that is reasonable in the circumstances, the consequences which a given action may entail'.[110] Some areas of law require more discretion than others and it is not always possible to phrase rules with absolute precision. The area of environmental pollution and in particular wind turbine noise is an area in which the law quickly evolves. Constant developments in scientific knowledge and related policy adjustments in this field have led to less precisely defined laws. However, this does not seem to be bothered by this; it solely applies a marginal test and has barely judged there was no national legal basis. Additionally, the Court it merely seems to demand there are procedural safeguards in place, to make sure the rule is not arbitrarily applied. In the case *Kyrtatos v. Greece* the Court even leaves out this criterion in its assessment.[111]

2.2.3 LEGITIMATE AIM OF INTERFERENCE

If the interference is 'in accordance with the law', it needs to be assessed whether the interference pursues a legitimate aim. These aims are listed in Article 8 (2), being in the interest of: national security, public safety, the economic well-being of the country, the prevention of disorder or crime, the protection of health or morals, and the protection of the rights and freedoms of others. Although this is an exhaustive list, the grounds are so broad, the State usually does not find it difficult to find a suitable legitimate aim for which the interference was imposed. In *Fagerskiold v Sweden*[112] interference with the rights was even justified by the contribution to sustainable development provided by the wind turbine.

In case of environmental pollution the economic well-being of the country is often used as the ground for justifying state interference. In the case *Fadeyeva v. Russia*,

---

[108] ECtHR, *Malone v. The United Kingdom*, 2 August 1984 (Application No. 8691/79); ECtHR, *Khan v. The United Kingdom*, 12 may 2000, (Application No. 35394/97)

[109] ECtHR, *Malone v. The United Kingdom*, 2 August 1984 (Application No. 8691/79) paras 66/ 67/68; ECtHR, *Sunday Times v. The United Kingdom*, 26 April 1979 (Application No. 6538/74) para 49; ECtHR, *Silver and others v. The United Kingdom*, 25 March 1983 (Application Nos. 5947/72, 6205/73, 7052/75, 7061/75, 7107/75, 7113/75, 7136/75) paras 87/88/ 90

[110] ECtHR, *Margareta and Roger Andersson v. Sweden*, 25-02-1992 (Appl. no. 12963/87) para 75

[111] ECtHR, *Kyrtatos v. Greece*, 22 May 2003 (Appl.no. 41666/98). Judge Zagrebelsky expresses in his dissenting opinion that the interference by the State failed to comply with the criteria of 'in accordance with the law' and as a consequence should have led to a violation of Article 8

[112] ECtHR, *Fägerskiöld v Sweden*, 25 March 2008 (Application No: 7664/04)

for example, the Court agreed that the continuing operation of the steel-plant in question contributed to the economic system of the Vologda region and, to that extent, served a legitimate aim within the meaning of § 2 of Article 8. In *Powell and Rayner v the United Kingdom* the Court decided the economic well-being of the country to be a legitimate aim, even in case the negative consequences on the environment could not be entirely eliminated. The Court expressed in *Hatton a.o. v. the United Kingdom* (chamber judgment) that although the economic well-being is a legitimate aim, 'in the particularly sensitive field of environmental protection, mere reference to the economic well-being of the country was not sufficient to outweigh the rights of others'.[113]

2.2.4 NECESSARY IN DEMOCRATIC SOCIETY

The last step to be taken in the test of Article 8 (2) is determining whether the interference is necessary in a democratic society. An interference will be considered necessary in a democratic society to achieve the legitimate aim if it corresponds to a pressing social need.[114] The national authorities have a certain margin of appreciation in deciding whether this need exists. This evaluation, however, remains subject to review by the ECHR for conformity with the Convention.

Another aspect of the 'necessity-criterion' is that the interference needs to be proportionate to the legitimate aims pursued.[115] More specifically, there needs to be proportionality between the means employed and the aim sought to be achieved. As being part of the proportionality criterion, the Court must determine whether the reasons adduced by the national authorities to justify the interference were relevant and sufficient. Additionally, procedural matters have increasingly been taken into account as well. The term necessary implies that the legitimate aim that is pursued by the interference cannot be achieved by less restrictive measures and is achieved 'in the least onerous way as regards human rights'.[116] However, this does not mean that least restrictive alternative needs to be chosen by the State; it is sufficient if the State at least tries to find the least restrictive alternative.

The proportionality criterion also refers to a fair balance between the general interest of the community and the rights of the individual. This fair balance test, included implicitly in paragraph 2, is similar to the fair balance test of paragraph 1. If the balance of interests had not been properly struck or no relevant and sufficient reasons had been given for the interference, the Court concludes there is a violation of Article 8. This balancing test is guided by a number of criteria, to provide a foothold in the assessment. These criteria are similar as mentioned above, in discussing the fair balance test of Article 8 (1). For completeness' sake, these are shortly mentioned again. First, the interest to be protected from interference can be of influence. Rights, such as the right to sleep at night are more fundamental than others, thus more difficult to justify. Second, the nature of the interference demands that stronger justification is needed for more far reaching interferences. An example is the difference between interfering in the applicants health instead in its well-being. Third, different legitimate aims correspond to the need for less or more justification. Protecting the national security, for example, is

[113] ECtHR, *Hatton a.o. v. the United Kingdom* (chamber judgment), 2 October 2001 (Appl.no. 36022/97)
[114] ECtHR, *Olsson v. Sweden*, 24 March 1988 (Appl. no. 10465/83)
[115] ECtHR, *Olsson v. Sweden*, 24 March 1988 (Appl. no. 10465/83)
[116] ECtHR, *Peck v. The United Kingdom*, 28 January 2003 (Appl. no. 44647/98)

easier to justify than the economic well-being of the country. Lastly, pressing social need is not a static factor. The more there is a pressing social need for a specific interference, the less justification is needed to comply with Article 8 ECHR.

Finally, the phrase 'in a democratic society' creates room to examine the interference of a State in the light of what that specific society requires. The standards set by the Council of Europe and its Member States are the main yardstick in this, though other COE Conventions, and law and practice in Member State can be of influence. These sources can show the extent of agreement on an issue and can indicate what the specific democratic society needs. [117]

2.3 THE MARGIN OF APPRECIATION

States have a certain degree of discretion in determining whether measures taken by that State are in compliance with Article 8. This discretion was first established in *Handyside v. the United Kingdom*, in which was held that 'state authorities are in principle in a better position than the international judge to give an opinion on the (…) "necessity" of a "restriction" or "penalty"'.[118] Although this was a case under Article 10 ECHR, the concept is equally applicable in 8 ECHR cases. This margin does not give the contracting states an unlimited power of appreciation; the ECtHR gives the final ruling on whether interference can be justified under Article 8 (2). This margin is of importance for two sets of circumstances. Namely, when needs to be determined whether the interference of the State is justifiable under Article 8 (2) or whether the state has fulfilled its positive obligation.

For the purpose of this study, there is a need to determine the extent of the margin, regarding the respect for private and family life under Article 8 ECHR in environmental pollution cases. In general states have been granted a wide margin of appreciation in environmental cases.[119] The extent of the margin mainly seems to depend on the nature of the right affected by the environmental interference and its importance for the applicant.[120] As noted by Daniel García San José in a Council of Europe publication[121] the Court will grant a narrower margin of appreciation for the national authorities and will carry out a strict review of the way the authorities have complied with their positive obligations under Article 8 to ascertain whether a fair balance has been struck,

> 'if the right at stake is one of the core rights and freedoms in the Convention (e.g. some intimate aspect of a person or his physical or mental health under Article 8) and not merely the most generic aspect of those (in Article 8, e. g., the right to respect of the home and well-being of a person)'.[122]

---

[117] Ibid.

[118] ECtHR, *Handyside v. the United Kingdom*, 12 December 1976 (Appl.no. 5493/72), para 48

[119] ECtHR, *Buckley v. the United Kingdom*, 25 September 1996 (Appl. no. 20348/92)para 74-77; ECtHR, *Powell & Rayner v. the United Kingdom*, 21 February 1990 (Appl.no. 9310/81) para 44; ECtHR, *Hatton a.o. v. the United Kingdom* (Grand Chamber), 8 July 2003 (Appl.no.36022/97) para 100; ECtHR, *Dubetska and others v. Ukraine*, 10 Februari 2011 (Appl. no: 30499/03) para 141

[120] See: Daniel García San José, 'Environmental protection and the European Convention on Human Rights, (Council of Europe Publishing, 2005) 68

[121] Ibid.

[122] Ibid, 58

In this distinction between 'health' and 'well-being', the right to sleep at night has undoubtedly been closely linked to the right to health.[123] In case there is an environmental interference in the core rights of Article 8, the margin of appreciation is limited. The interests of the individuals are then very important and need to be taken into serious consideration by the State. On the contrary, when the right at stake is not a core right of Article 8, the authorities are left a wider margin of appreciation. The State then has more leeway in balancing the interest. Seeing the above drawn conclusion that it is sufficiently plausible that wind turbine noise causes adverse health effects, the margin of appreciation in establishing a fair balance between the interests is limited. The extent to which the margin is limited depends on the seriousness of the health effects.

[123] See for example: ECtHR, *Moreno Gómez v. Spain*, 16 November 2004 (Appl.no. 4143/02)

3 CONCLUSION

The European Convention on Human Rights does not encapsulate any individually justiciable rights to live in a healthy environment. In the meantime, the European human right perspective on environmental law and policy is continuously developing and the Court is facing new challenges over and over again.

To this day, the health effects reported by individuals living in close proximity to wind turbines are poorly understood. Reasons for this can be found in difficulties in measuring wind turbine noise as well as the limited amount of valid and reliable scientific research in this area. Obviously there are currently knowledge gaps in this area, though there is sufficient reliable evidence, showing there is a significant probability of adverse health effects for human beings living within 1,5-2.0 km of wind turbines. Systematic studies find a causal link between annoyances and sleep disturbance. It is plausible that annoyance and sleep disturbance will lead to other symptoms, such as stress or psychological distress, inner ear symptoms, headaches, excessive tiredness, and reduction of quality of life. Wind turbine noise pollution therefore intervenes with the health and well-being of people living in close proximity.

Wind turbine noise is part of the concept of environmental pollution. There is no doubt the Court made a considerable contribution to the concept of environmental protection, due to the broad interpretation of the right to home, private- and family life under Article 8 of the Convention. Today, 'severe environmental pollution may affect individuals well being and prevent them from enjoying their homes in a way as to affect their private and family life adversely, without however seriously endangering their health'.[124] The Court decided various types of environmental pollution cases caused, where state (in-)action interfered with the well-being and health of individuals. The circumstances under which wind turbine noise pollution can lead to a violation of Article 8 ECHR can therefore be distilled from its case law.

Firstly, the applicants needs to be directly and seriously affected by the noise of the wind turbine. They need to show they are personally exposed to a danger that is not only serious but also specific and imminent. Sufficiently severe disturbance does not require actual damage to health. With regard to the latter, the Courts decision in Tatar v. Romania, where a violation of the precautionary principle was concluded, is of great importance to environmental pollution cases. Such cases often concerns a complaint of supposed damage and health risks. It is highly recommendable the Court continues its chosen path according to which the absence of certainty with regard to current scientific and technical knowledge could not justify any delay on the part of the State in adopting effective and proportionate measures.

Secondly, wind turbine noise interferes not only in the well-being of a person, but in its health as well. Therefore the normally wide margin of appreciation in environmental cases is limited. Especially since the right to sleep is regarded part of human health and one of the core rights protected under the Article. This limited margin of appreciation places increased demands on the justification of States for their (non-)interference. Relevant and sufficient reasons are needed to justify the interference.

Thirdly, if a State fails to comply with the positive obligations that are interpreted in the Article, there will be a violation of Article 8. The positive obligations imposed on

[124] ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90) para 51

States are comprehensive and versatile. The varied range of positive obligations tremendously extended the amount of legal protection offered by Article 8. When the wind turbine activity contravenes domestic rules, the national authorities need to take the necessary steps to end it or ensure that it conforms to the rules in force. States must undertake appropriate investigations and studies in order to allow them to predict and evaluate in advance the effects of the noise and safeguard the individual procedural rights to access to information, public participation in decision making and access to justice. The absence of certainty with regard to scientific and technical knowledge, as is the case for wind turbine noise pollution and infrasound in particular, can imply the duty of the State to interfere.

Fourthly, almost every action taken or not taken by a State can constitute an interference. The two justification-criteria, demanding that an interference needs to be in accordance with the law and pursue a legitimate aim, are not stringently applied by the Court. Therefore these criteria do not function as a proper assessment tool for (un)justified interferences. The criteria that the interference needs to be necessary in a democratic society, however, is more stringent and functions as the heart of the justification test. Both the circumstances that there is a pressing social need for the interference or no proportionality between the means employed and the aim sought to be achieved, leads to a violation of Article 8. The presence of other methods of sustainable development that interfere less in the health and well-being of individuals as well as the possibility of building wind turbines at sea or in more remote area's can possibly lead to the verdict that there is no pressing social need or proportionality.

Fifthly, the circumstance that a fair balance is lacking between the general interest of the community and the rights of the individual leads to a violation of Article 8 ECHR. The limited margin of appreciation means that weight should be given to the right to live in a healthy environment of the individual. The fair balance test as used by the Court to balance the protection of commercial development and the economic well-being of the country with the protection of health and well-being of individuals living in the vicinity of wind turbines is the core of European human right protection in cases of wind turbine noise pollution. This test leaves much room for the Court to include all relevant reasons and aspects.

BIBLIOGRAPHY

Articles, books and working papers

Akandji-Kombe J, 'Positive obligations under the European Convention on Human Rights. A guide to the implementation of the European Convention on Human Rights' (Council of Europe, 2007)

Berglund B, Hassmen P and Job RF, 'Sources and Effects of Low-Frequency Noise'(1996) 99(5) Journal of the Acoustical Society of America 2985

Berglund B., T. Lindvall, DH Schwela, K.-T. Goh, 'Guidelines for Community Noise,' (Geneva, World Health Organization, 1999)

Colby WD, Dobie R, Leventhall G, Lipscomb DM, McCunney RJ, Seilo MT, Søndergaard B, 'Wind Turbine Sound and Health Effects: An Expert Panel Review' (prepared for American Wind Energy Association and Canadian Wind Energy Association, 2009)

Frey BJ and Hadden PJ, 'Noise radiation from Wind Turbines Installed near Homes: Effects on Health (2007) <http://docs.wind-watch.org/wtnoisehealth.pdf> accessed 22 July 2012

García San José D, 'Environmental protection and the European Convention on Human Rights, (Council of Europe Publishing, 2005)

Hanning C, 'Sleep Disturbance and Wind Turbine Noise' (2009)

Harrisson JP, 'Wind Turbine Noise, (2011) 31:256 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/256>, accessed 3 August 2012

Harry A, 'Wind turbines, noise and health' (2007)

Horner B, Jeffery RD, Krogh CME, 'Literature Reviews on Wind Turbines and Health: Are They Enough?'(2011) 31:399 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/399>, accessed 1 August 2012

Janssen SA, Vos H, Eisses AR and Pedersen E, 'A comparison between exposure response relationships for wind turbine annoyance due to other noise sources', (2011, Acoustical Society of America 130 (6))

Kilkelly U, 'The right to respect for private and family life. A guide to the implementation of Article 8 of the European Convention on Human Rights' (Human Rights handbooks, no. 1, 2003)

Korff D, 'The standard approach under Article 8-11 ECHR and Article 2 ECHR' (2008)

Krogh CME, Gillis L, Kouwen N and Armani J, 'WindVOiCe, a Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need for Vigilance Monitoring' (2011) 31:334 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/334>, accessed 31 July 2012

Leventhall G and others, 'A Review of Published Research on Low Frequency Noise and its Effects (Report for Defra: U.K. Department for Environment, Food and Rural Affairs, 2003) <http://archive.defra.gov.uk/environment/quality/noise/research/lowfrequency/ > accessed 22 July 2012

Leventhall G, 'Infrasound from Wind Turbines – Fact, Fiction or Deception' (2006) 24(2) Canadian Acoustics

Leventhall G (2007) 93(1-3) Progress in Biophysics and Molecular Biology 130

Leventhall G, Oerlemans S, Bullmore A, Søndergaard B, Berg van den F, Hessler D, Bastasch M, 'Wind Turbines Noise: How it is Produced, Propagated Measured and Received' (Multi-Science Publishing, 2011)

Maschke C, 'Introduction to the Special Issue on Low Frequency Noise' (2004) 6(23) Noise and Health 1

McMurtry RY, Towards a Case Definition of Adverse Health Effects in the Environs of Industrial Wind Turbines: Facilitating a Clinical Diagnosis' (2011,) 31:316 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/316>, accessed 31 July 2012

Miller C, 'Environmental Rights in a Welfare State? A Comment on DeMerieux', (2003) 23 (1) Oxford Journal of Legal Studies

Nissenbaum M, '*Mars Hill wind turbine project health effects: Preliminary findings (2009)* <http://www.windaction.org/?module=uploads&func=download&fileId=1798 > accessed 1 August 2012

Nissenbaum M, Aramini J, Hanning C, 'Adverse health effects of industrial wind turbines: a preliminary report (10th International Congress on noise as a Public Health Problem, 2011)

Pedersen E, Persson Waye K, 'Perception and annoyance due to wind turbine noise—a dose-response relationship', (2004) 116 J. Acoust. Soc. Am.

Pedersen E and Persson Waye K, 'Wind turbine noise, annoyance and self-reported health and well-being in different living environments', (2007) 64 Occ. Environ. Med.

Pedersen E, van den Berg F, Bakker R, Bouma J, 'response to Noise from Modern Wind Farms in The Netherlands (2009) 126(2) Journal of the Acoustical Society of America 634

Pedersen OW, 'European Environmental Human Rights and Environmental Rights: A Long Time Coming?' (2008), 21(1) Georgetown International Environmental Law Review, available at <http://ssrn.com/abstract=1122289>, accessed 1 August 2012

Phillips CV, 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents' (2011) 31:303 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/303>, accessed 22 July 2012

Phipps R, Amati M, McCoard S and Fisher R, 'Visual and noise effects reported by residents living close to Manawatu wind farms: Preliminary survey results' (2007)

Pierpont N, 'Wind turbine syndrome: A report on a natural experiment' (2009, Santa Fe, NM: K-Selected Books)

Roberts M and Roberts J, 'Evaluation of the Scientific Literature on the Health Effects Associated with Wind Turbines and Low Frequency Sound', (prepared for Wisconsin Public Service Commission, Exponent, 2009)

Rogers A, Manwell J and Wright S, 'Wind turbine acoustic noise' *(*A white paper prepared by the Renewable Energy Research Laboratory, Department of Mechanical and Industrial Engineering, University of Massachusetts, 2006)

Salt AN and Kaltenbach JA, 'Infrasound From Wind Turbines Could Affect Humans' (2011) 31:296 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/296>, 22 July 2012

Schall C, 'Public Interest Litigation Concerning Environmental Matters before Human Rights Courts: A Promising Future Concept?' (2008) 20:3 Journal of Environmental Law, Oxford University Press

Thorne B, 'The problems with noise numbers for wind farm noise assessment' (2011) 31:262 Bulletin of Science Technology & Society <http://bst.sagepub.com/content/31/4/262>, accessed 1 August 2012

Turgut NY, 'The European Court Of Human Rights And The Right To The Environment' (2007) 4(1) Ankara Law Review

Van den Berg GP, 'The Sounds of High Winds'(doctoral thesis, University of Groningen, 2006)

Vos J, 'On the Relevance of Non-Acoustic Factors Influencing the Annoyance Caused by Environmental Sound – A Literature Study'(Proceedings Internoise 2010) < http://www.vosanr.com/nl/publicaties/31-on-the-relevance-of-nonacoustic-factors-influencing-the-annoyance-caused-by-environmental-sound-a-literature-study.html> accessed 22 July 2012

Wagner S,Bareiss R, Guidati G, 'Wind Turbine Noise' (Springer: Berlin, 1996)

Waye K, 'Effects of Low-Frequency Noise on Sleep'(2004) 6(23) Noise and Health 87

van den Berg F, 'Criteria for wind farm noise: Lmax and Lden,' (2008) in Proceedings of the 7th European Conference on Noise Control, EURONOISE, Acoustics 08, Paris, France

Resolutions, regulations, conclusions & decisions

Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (ECE/CEP/43), 1998

Directive 85/337/EEC (known as 'Environmental Impact Assessment' – EIA Directive)

Directive 2001/42/EC (known as 'Strategic Environmental Assessment' – SEA Directive)

Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948

Case law: European Court of Human Rights

ECtHR, *X v. Germany*, 13 May 1976 (Appl. no. 7407/76)

ECtHR, *Handyside v. the United Kingdom*, 12 December 1976 (Appl. no. 5493/72)

ECtHR, *Tyrer v. the United Kingdom*, 25 April 1978 (Appl. no. 5856/72)

ECtHR, *Sunday Times v. The United Kingdom*, 26 April 1979 (Application No. 6538/74)

ECtHR, *Marckx v.Belgium*, 13 June 1979 (Appl.no. 6833/74)

ECtHR, *Arrondelle v. United Kingdom*, 15 July 1980 (Appl. no. 7889/77)

ECtHR, *Dudgeon v. the United Kingdom*, 22 October 1981 (Appl. no 7525/76)

ECtHR, *Silver and others v. The United Kingdom*, 25 March 1983 (Application Nos. 5947/72, 6205/73, 7052/75, 7061/75, 7107/75, 7113/75, 7136/75)

ECtHR, *Malone v. The United Kingdom*, 2 August 1984 (Application No. 8691/79)

ECtHR, *Abdulaziz, Cabales, and Balkandali v UK*, 28 May 1985 (Application nos. 9214/80; 9473/81; 9474/81)

ECtHR, *Rees v. the United Kingdom*, 17 October 1986 (Appl.no. 9532/81)

ECtHR, *Inze v. Austria*, 28 October 1987 (Appl.no. 8695/79)
ECtHR, *Olsson v. Sweden*, 24 March 1988 (Appl. no. 10465/83)
ECtHR, *Powell & Rayner v. the United Kingdom*, 21 February 1990 (Appl.no. 9310/81)
ECtHR, S. v. France, 17 May 1990 (Appl. no. 13728/88)
ECtHR, *Margareta and Roger Andersson v. Sweden*, 25 February 1992 (Appl. no. 12963/87)
ECtHR, *Keegan v. Ireland*, 26 May 1994 (Appl. No. 16969/90)
ECtHR, *López Ostra v. Spain*, 9 December 1994 (Appl.no. 16798/90)
ECtHR, *Buckley v. the United Kingdom*, 25 September 1996 (Appl. no. 20348/92)
ECtHR, *Balmer-Schafroth and others v. Switzerland*, 26 August 1997 (Appl. no 22110/93)
ECtHR, *Guerra and others v. Italy*, 19 Februari 1998 (Appl.no. 14967/89)
ECtHR, *McGinley and Egan v. The United Kingdom*, 9 June 1998 (Appl. no. 21825/93, 23414/94)
ECtHR, *Khan v. The United Kingdom*, 12 may 2000 (Application No. 35394/97)
ECtHR, *Hatton a.o. v. the United Kingdom* (chamber judgment), 2 October 2001 (Appl.no.36022/97)
ECtHR, *Peck v. The United Kingdom*, 28 January 2003 (Appl. no. 44647/98)
ECtHR, *Kyrtatos v. Greece*, 22 May 2003 (Appl.no. 41666/98)
ECtHR, *Hatton a.o. v. the United Kingdom* (Grand Chamber), 8 July 2003 (Appl.no.36022/97)
ECtHR, *Taşkın and Others v. Turkey*, 10 November 2004 (Appl. no. 46117/99)
ECtHR, *Moreno Gómez v. Spain*, 16 November 2004 (Appl.no. 4143/02)
ECtHR, *Öneryildiz v. Turkey* (Grand Chamber), 30 November 2004 (Appl.no. 48939/99)
ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00)
ECtHR, *Hasan Taskin v. Turkey*, 13 September 2005 (Appl. no: 71913/01)
ECtHR, *Roche v. The United Kingdom*, 19 Oktober 2005 (Appl. no. 32555/96)
ECtHR, *Giacomelli v. Italy*, 2 November 2006 (Appl. no: 59909/00)
ECtHR, *Fägerskiöld v Sweden*, 25 March 2008 (Application No: 7664/04)
ECtHR, *Tatar v. Romania*, 27 January 2009 (Application No: 67021/01)
ECtHR, *Mileva and others v. Bulgaria*, 25 November 2010 (Appl. no: 43449/02, 21475)
ECtHR, *Dubetska and others v. Ukraine*, 10 February 2011 (Appl. no: 30499/03)
ECtHR, *Apanasewicz v. Poland*, 3 May 2011 (Appl. no: 6854/07)
ECtHR, *Grimkovskaya v. Ukraine*, 21 July 2011 (Appl. no: 38182/03)
ECtHR, *Di Sarno and others v. Italy*, 10 January 2012 (Appl. no. 30765/08)

Other documents (institutions as author or no author)

Commission, 'EU Guidance on Wind Energy Development in Accordance with the EU Nature Legislation' October 2010
The European Wind Energy Association, 'Wind in Power: 2011 European Statistics' (February 2012) <www.ewea.org> accessed 21 July 2012

Other sources

Telephone contact with Mrs. Vonk and Mrs. Kanis (30 March 2012)

Appendix A: Complaint at the European Court of Human Rights

La Greffe
Cour Européenne des Droits de l'Homme
Conseil de l'Europe
F– 67075 STRASBOURG CEDEX.
FRANCE

(Also) By fax: 0033 – 3 88 41 27 30

YOUR REFERENCE:
OUR REFERENCE:
IN THE MATTER OF: Bakker and others
UTRECHT, 12 June 2012

HANDLED BY:
mr. J. van de Riet

Email:
j.vande riet@amice-advocaten.nl

Honourable Court,

Under Article 34 of the European Convention on Human Rights (ECHR) and articles 45 and 47 of the Rules of Court, I hereby submit a petition on behalf of the following persons, who have authorized me (all of the authorisations are enclosed) for this purpose as per the attached authorizations.

I. The parties

A. Applicants:

1. **M.E. BAKKER, DUTCH CITIZEN, …**
2. **…**

The aforementioned persons have asked Mr mr. J. van de Riet, lawyer at Utrecht at the offices of Amice Advocaten BV (Emmalaan 23, PO Box 13112, 3507 LC Utrecht) to represent them in proceedings before the European Court of Human Rights as well as in any secondary proceedings of the European Convention on Human Rights, with respect to their petition as referred to in article 34 of the Convention, against the State of the Netherlands.

B. The High Contracting Party

This petition is directed against the High Contracting Party: The State of the Netherlands.

II. Statement of the facts

1. The municipality of Houten (the Netherlands) published its intention in the legally prescribed way in a door-to-door magazine, to grant a building permit and exemption of

the applicable land use plan to Eneco New Energy B.V. (now: Eneco Wind B.V.) for a wind farm at the Veerwagenweg and Heemsteedseweg in Houten. The wind farm consists of three wind turbines, a consumer substation and some related facilities. The application for the building permit was submitted on 24 May 2007.

2. The wind turbines are the type Vestas 90 2 Megawatt (hereinafter: Mw), which are to be set up in a straight line and have a hub height of 105 meters and a rotor diameter of 90 m, each with an electrical capacity of 2 Mw each. The total height of each wind turbine is 150 metres. Applicants live 309 meters or further from one of the turbines. Approximately 1,000 households are situated at a distance of < 1.5 km and approximately 1,500 households are situated at a distance of < 2.0 km from the wind turbines. The wind farm consists of three 150 meter high wind turbines (6 Mw) in total. After the aforementioned publication, the individuals could send their viewpoint to the municipality until 31 December 2009. All applicants have sent their viewpoints in time.

3. The municipality of Houten responded to the viewpoints, but the submitted viewpoints did not lead to changes or adaption in the intention to grant the building permit and exemption. The building permit and exemption were granted on 21 June 2010.

4. Petitioners appealed at the Court of Utrecht. On 4 May 2011 the Court decided 3 similar cases, which all concerned the same issue. These decisions can be found at www.rechtspraak.nl: LJN: BQ5252, Rechtbank Utrecht, SBR 10-2456, LJN: BQ5164, Rechtbank Utrecht, SBR 10/2305, LJN: BQ5237, Rechtbank Utrecht, SBR 10/2455). The Court of Utrecht declared several applicants inadmissible, for living at too great a distance from the wind farm, for failing to submit their view to the municipal council against the exemption and building permit for the wind farm, or for handing in their objections too late (as under the CHW). The Court of Utrecht declared the other applicants admissible. These applicants are residents living in the proximity of the location for the wind turbines and feared for noise pollution and shadow flickering of the blades. All the applicants also complained that the '*Crisis en Herstelwet'* (an Act that allows for shorter (court) procedures, specifically designed to speed up the realisation of construction projects), should not be applicable and that the effects of the wind farm on flora and fauna were insufficiently investigated. The applicants that were judged as admissible furthermore complained that the necessary exemption that was granted for the building permit should not be granted because there was no longer any legal assessment whatsoever regarding the noise standards contained in environmental legislation, through the commencement in effect of the Activities Act, such that the environmental permit that was also required for the relevant wind turbines retroactively went out of force. Furthermore they complained that the building permit caused unacceptable harm to their living and residential environment, whereby the weighing of interests unfairly came out to the advantage of the permit holder. Finally some applicants complained that alternative locations were erroneously not considered. The Court decided in favour of the municipality of Houten.

5. All applicants appealed to the '*Raad van State' (Council of State),* the highest Court. These cases can be found on: www.raadvanstate.nl, case numbers: 201106887/1, 201106769/1, 201107133/1, 201106997/1, 201106510 and 201107137/1. The Council of State declared most complaints ill-founded. It declared several complaints well-founded, but the effects of the decision did not lead to a ruling of annulment. The parties fear for

adverse health impacts and believe their right to respect for health, private and family life and home has been violated.

III. Statement of alleged violation(s) of the Convention and/or Protocols and of relevant arguments

6. Below applicants will explain in as much detail as possible what the complaints are under the convention. They will explicitly state to what convention rights applicants are taking recourse, and explain why the facts, as presented in summary above under II, represent a violation of those convention rights. Applicants claim that the Netherlands violated the following rights:

    - Article 6: Right to a fair trial
    - Article 8: Right to respect for private and family life
    - Article 13: Right to an effective remedy

A. National legal framework, relevant domestic law

7. Given the importance of explaining the violations of the convention, some knowledge concerning the applied regulations and legal rules is essential. It shall become clear that interim amendments, the ambiguities of certain legislative changes and the accumulation of these have led to unfair proceedings. In addition, it will also be substantiated in this context that the parties concerned are harmed in terms of their interests protected as per 8 ECHR.

8. On 1 July 2008 the Spatial Planning Act (new Wro) went into effect. Under the transitional provisions (article 9.1.10 of the Implementation Act Spatial Planning) with regard to an application for planning permission and a decision to grant this in accordance with an exemption as meant in article 19, second paragraph of the Act on Spatial Planning (old WRO), which was filed before 1 July 2008, the act as it existed before that time continues to apply. The present application for a building permit dates from 24 May 2007, so that the application should be assessed according to the predating version WRO (old). This assessment has taken place in the present case.

9. The Council of State ruled - according to the applicants, wrongly - that the present construction plan is subject to the Crisis and Recovery Act. The Crisis and Recovery Act (CHW) has been in force since 31 March 2010. This law allows for shorter legal procedures, so that building projects can be executed faster. Among other things this includes the construction of roads and industrial estates and the construction of housing and wind farms. With the Crisis and Recovery Act, the government aims to ensure that in these tough economic times healthy companies do not fail, that people keep their jobs and the economic structure of the Netherlands becomes stronger. The CHW changed a large number of laws permanently, including the new Wro (Spatial Planning Act) and the 'Wet Geluidshinder' (Noise Abatement Act). The changes range from minor amendments to changes with a major impact on the practice of law.

10. Under article 1.1, first paragraph, opening words and under a of the CHW, section 2 applies, among other things, to all decisions that are required according to any legal

stipulations for the development or realisation of the categories of spatial and infrastructural projects referred to in appendix I to said Act.

11. Category 1.1 of appendix I to the CHW reads as follows:

'the construction or expansion of production facilities for the generation of sustainable electricity using wind power as referred to in article 9b, first paragraph, introduction and parts a and b, and Article 9e of the Electricity Act 1998.'

12. Pursuant to article 9e, first paragraph, of the Electricity Act 1998, provincial councils are authorised to specify grounds and establish an integration plan as meant in article 3.26 of the new Wro for the construction or expansion of a production plant for the generation of sustainable electricity with the aid of wind energy with a capacity of at least 5 but not more than 100 MW, including the connection of that installation to a network. From the above it follows that the new Wro, and thus also article 3.26 of the WRO, does not apply to the present project. An integration plan is a measure from the Spatial Planning Act of 2008. Thanks to this plan, a province, in that it can also 'overrule' a recalcitrant municipality can develop and execute projects itself. That was not possible under the old WRO. Then the province was the supervisor (over the municipality). Applicants believe - this will be explained further later - that opaque or inadequate legislation has led to conflict with the principle of legal certainty and that the court erroneously sat on the chair of the legislature and declared the law applicable.

13. The construction plan foresees the establishment of three wind turbines, each with a capacity of 2 Mw, together 6 Mw. The reference in the CHW to article 9e of the Electricity Act 1998 applies to a production plant for the generation of sustainable electricity with the aid of wind energy with a capacity of at least 5 but not more than 100 Mw, including the connection of that installation to a network, as meant in article 9e, first paragraph, of the Electricity Act.

14. The Council of State, in its judgment of 14 December 2011, considered that it follows from the capacity of the wind turbines to be set up, which together form a production plant as referred to above, that the exemption resolution and the building permit concern a project as meant in article 1.1, first paragraph, opening words and under a of the CHW, read in conjunction with category 1.1 of appendix I to the CHW and article 9e of the Electricity Act 1998, and that these therefore fall under the scope of the CHW. For that reason, article 1.6 of the CHW was also applicable, which article implies that within the stipulated period of 6 weeks a (higher) appeal must immediately be filed that includes all the grounds for that appeal. A so-called 'pro forma' appeal on grounds to be presented can therefore lead to inadmissibility, if the period of 6 weeks is exceeded. This has led, in a number of cases of appeal (according to applicants, wrongfully) to inadmissibility.

15. On 1 October 2010 the General Provisions on Environmental Law (Wabo) went into effect. With the introduction of this law, a number of other laws, including the Housing Act, were amended. From transitional law (article 1.2, second paragraph of the Wabo), however, it follows that the Wabo does not apply here, because the application dates

from before 1 October 2010. In the present case there was correctly no assessment as per the Wabo.

16. For this reason, article 40 of the Housing Act applies. This article states that it is forbidden to build without a building permit. Article 44 of the Housing Act stipulates that the building permit must, and only then may, be refused in a number of specific situations, including if the building plan is in violation with the applicable zoning plan as established by a municipality for a specified planning area within municipal limits. It has been established between parties that the present building plan is in conflict with 2 current zoning plans: 'Globaal Bestemmingsplan (Global Zoning Plan) Houten and 'Globaal Bestemmingsplan Houten Vinex. Article 19 paragraphs 1 or 2 (old) WRO make it possible, in principle, to correct conflict with a zoning plan. The municipality made use of the exemption option as per article 19 paragraph 2 (old) WRO. If the legal conditions are met and the exemption is granted, the municipality does not need to establish a new zoning plan, but can make use of the exemption. Article 19 paragraph 1 and 2 (old) WRO reads:

    1. *'The municipal council may, subject to the provisions in the second paragraph and third paragraph, for the realization of a project grant exemption from the applicable zoning, provided that the project has good spatial substantiation and first the statement has been obtained from the provincial executive that they have no objection to the granting of said exemption. Good spatial substantiation can preferably comprise a municipal or inter-municipal structural plan. If there is no structural plan or none is prepared, the spatial substantiation in any case addresses the relationship with the current zoning plan, or there is motivation as to why the project to be realised fits within the future zoning of the relevant area. The municipal council may delegate the exemption authorisation referred to in the first full sentence to the mayor and aldermen.*

    2. *The mayor and aldermen may grant exemption from the zoning plan in cases specified by the provincial executive in accordance with the inspector of spatial planning. The provincial executive may thereby also determine under what conditions a statement in advance from the provincial executive that they have no objection to the granting of the exemption is required. That stipulated in the first paragraph with regard to good spatial substantiation is correspondingly applicable.'*

17. The provincial executive of the province of Utrecht adopted a document on 4 July 2006 (No 2006EG001841i) entitled 'Circular Article 19 Act on Spatial Planning ', which entered into force on 1 September 2006. In this circular a number of limitative categories were established as meant in article 19 paragraph 2 (old) WRO. For the exemption regulated in paragraphs 1 and 2 of article 19, this actually comprises a decreasing degree of severity, whereby the exemption of paragraph 1 is more severe than paragraph 2. In the circular, the provincial executive specified categories of cases for which the mayor and aldermen may grant exemption from the zoning plan without a prior declaration of no objection (general certificate of no objection) as meant in article 19 paragraph 2 (old) WRO.

18. In article 3.1.2, under c, subsection n, of the circular it is stated that the mayor and aldermen may grant exemption in rural areas for the establishment of wind turbines at the locations specified in paragraph 8.2 of the Regional Plan 2005-2015, bearing in mind the quantities, capacities and framework conditions specified therein. In addition, in the circular conditions are specified that apply to the stipulated categories. For example, on

page 12 of the circular it is stipulated that the project may cause no disproportionate inconvenience or bother for adjacent functions or destinations.

19. Furthermore, article 19 (old) WRO therefore states that in such cases as in paragraph 1 and paragraph 2, the project must be provided with good spatial substantiation. From legislative history (Explanatory Memorandum) it is noted that said substantiation means that the exemption resolution *must comprise the vision of the future spatial development of the relevant area, and the spatial effects of the project on its surroundings.* Actually the spatial substantiation 'replaces' what would normally be the basis of a zoning plan. The law does not expressly define the form that spatial substantiation must have. From the legal explanation, it also follows that a good spatial substantiation must in any case consist of the description of the planning area, the current planning situation, the vision of the future spatial development of the area and the spatial effects of the project on the environment. In addition, the circular stipulates that the spatial substantiation must relate to an account of economic feasibility, if the project has financial consequences for the municipality, an assessment as per federal, provincial and/or regional policy (in this case the policy as established in the Wind Plan Utrecht), an assessment of the relevant legislation in such fields as the environment and water, and a weighing of possibly involved cultural and historic interests, including archaeology.

20. In the present case, the exemption was provided with a spatial substantiation that was assessed in terms of the aforementioned aspects (Circular, Regional Plan, Wind Plan Utrecht).

21. It was therefore important to determine whether the municipality of Houten was authorised in this case to make use of the exemption authorisation meant in article 19, second paragraph, of the (old) WRO. The building plan would then have to fit within the scope of the circular, in particular within article 3.1.2 (Limitative List), under c (rural area), under n. It had to be determined whether the building plan at the relevant location is indicated in the Regional Plan 2005-2015 and whether it fulfilled the framework conditions specified in the Wind Plan Utrecht established by the provincial executive on 9 July 2002. A summary of the Wind Plan is included as appendix 5 to the Regional Plan 2005-2015.

22. From the Regional Plan 2005-2015 one notes that for wind energy four locations are specified in the province of Utrecht, whereby among other things the Wind Plan Utrecht (and the environmental report) was the starting point. The locations that are mentioned are:

    1. Location along the Amsterdam-Rijn Canal near Baambrugge (5 turbines, 15 MW);

    2. Location along the A2 near Breukelen in the municipality of Loenen (3 turbines, 7.5 MW);

    3. Location along the A12 southwest of Woerden (4 turbines, 6 MW);

    4. Location along the Amsterdam-Rijn Canal near Schalkwijk (8 turbines, 20 MW);

23. In addition to these locations, per region space was provided for a maximum of two small-scale plants (3 to 6 wind turbines), where the framework conditions apply as these are included in the Wind Plan. The regions are indicated on a map, 8.2 appended to the

Regional Plan. The present plan falls within such a region and the definition of small-scale. The Wind Plan stipulates that arrangement of the turbines should preferably be in rows. The present case meets this requirement.

24. The Wind Plan further stipulates that the province, on specific requests, should assess case by case whether placement of wind turbines is acceptable and has a positive effect on the landscape quality. It is certain that this assessment is not available in writing. The Council of State has nevertheless considered that, inter alia, from a decision of the provincial executive dated 27 November 2007 in which the present project was stated to be acceptable, it must follow that the provincial executive assessed the plan and found it acceptable as meant in the Wind Plan Utrecht.

25. One of the 3 windmills is situated at a location that is regarded in the Wind Plan Utrecht as a so-called area category III location. This is a location where no possibilities for wind energy are present (exclusion). The following overview indicates that an important test that gives the applicants the ability to seek legal protection, was abolished. In earlier proceedings against the zoning plan 'Windturbines Veerwagenweg', which zoning plan never made it to the finish and was annulled bij the Council of State, which was the impetus to apply the present exemption procedure of article 19 paragraph 2 (old) WRO, the Council of State ruled (www.rechtspraak. LJN:http://www.rechtspraak.nl/ BB5861, Council of State, 200604701/1) in the judgment dated 17 October 2007, in legal consideration 2.11.10'

2.11.10. The Department is faced with the question of whether the location of the wind turbines in the planning area is in conflict with the regional plan and wind plan. The area categories formulated in the regional and wind plan involving the (im)possibilities for wind turbines are shown on the policy probability map. The red coloured areas on this map mark the category III areas, where wind turbines are not allowed. Not in dispute is that the location where wind turbine 3 is planned is marked in red on the policy probability map and therefore classified as Category III.

According to the regional and wind plan, within the category III first of all the areas are included that, in view of natural values present there, or because of safety considerations, are not eligible for the establishment of wind turbines. In this context [applicants sub 1] argued that the planning area is classified as an existing ecological corridor and also part of fly-in funnel of the military airport of Soesterberg and as such should be classified as a category III area. The Department considers that, according to the regional plan map, the plan area is not designated as an ecological corridor. Although the foregoing zoning plan 'Global Zoning Plan Houten-Vinex' took into account the possibility of developing an ecological corridor, that does not mean that there is an existing ecological corridor where, under the regional and wind plan, wind turbines are excluded. Regarding the fly-in funnel of military airport Soesterberg, it is important that the Airports and Airspace Monitoring Unit of the CAA has expressed no objections to this plan.

The fact that wind turbine 3 is considered on the policy probability map as category III does not in itself mean that the establishment of this wind turbine would be in conflict with the regional and wind plan. Here it is important that in the wind plan it is explicitly stated that further studies may show that the possibilities for the establishment of wind turbines are somewhat greater than shown on the policy probability map. Moreover, it is

important that on regional plan map 8.2. the planning area be delineated as search location for the establishment of a small-scale group of wind turbines.
According to the regional and wind plan, in addition in principle there must be a distance of 4 km between large and small-scale wind power installations. The argument of [applicants sub 1] that it is not clear whether the relevant wind park must be classified as small-scale does not hold water, because in the regional and wind plan it is clearly formulated that wind parks with 3 to 6 wind turbines are classified as small-scale. The Department also considers that the distance between this small-scale installation and the large-scale installation planned for south of the Amsterdam Rhine Canal will be less than 4 km, but that, differently than [applicants sub 1] argue, the regional plan makes an explicit exception for this situation. Therefore there is no conflict on this point with the regional plan or wind plan.

Given the above, the regional and wind plan do not in this context rule out the establishment of these wind turbines in the planning area.

26. From the underlined passage it is revealed that further investigation **may** reveal that the possibilities for the establishment of wind turbines are somewhat greater than indicated.

27. The Council of State then continues with such considerations as the following: '

2.11.11. It is also stipulated in the regional and wind plan that wind turbines may not be established within a radius of 350 meters from homes[125]. This minimal distance to be maintained between homes and wind turbines is derived from the Decision on facilities and installations of environmental management and relates to its scope. If the distance is less than 350 meters, the wind turbine is not within the scope of the decision and a separate environmental permit must be applied for. The argument of [applicants sub 2] that the wind turbines, in conflict with the decision, are planned at too small a distance from homes is erroneous in light of the foregoing, because the distance of 350 meters only applies to the question of whether or not an environmental permit must be applied for. Failure to comply with this distance does not, therefore, in itself have any consequences in terms of the acceptability of this wind farm.

The Department further considers that it is not excluded in advance that, despite the fact that, given consideration 2.11.3., the wind turbines are planned for a shorter distance than 350 meters from some houses, nonetheless this location can be chosen, as long as this location does not encounter objections from a planning point of view and therefore an acceptable living and residential environment can be guaranteed at that location. This is supported by the previously quoted passage from the wind plan stating that further studies may reveal that the possibilities for the establishment of wind turbines are greater than had been thought.

2.11.12. In those further studies, the aspects of noise, vibration, shadow and safety

[125] As hereafter will be further indicated an excess of this brought that an environmental permit must be obtained, which in this case it did. The standard was a distance from the wind turbine to a property of 4 times the hub height. In the present case there was a hub height of 105 meters, so the minimum distance was 420 meters. The Wind Plan went into her text from a different type of wind turbine and was thus 350 meters from where the Wind Plan not passed to the legal rule of 4 times the hub height.

must be involved.

Regarding the aspect of noise, it is important that the environmental permit was indeed revoked by decision of 21 June 2006 due to insufficient acoustic studies, but that it does not follow from this that no acceptable noise climate can be realised. From the acoustic studies referred to in 2.11.6., as well as that dealt with at the session, it follows that in any case various types of turbines can be established with which for the significant night period no excess of noise level would occur. The Department also does not consider it likely that as a consequence of the wind turbines such bother from vibrations would occur that no good residential and living environment for applicants could be guaranteed. Here it is considered important that at the issue of the environmental permit attention can be given to this aspect. To the extent that [applicants sub 3] argue that the animals in their kennel would experience unacceptable discomfort as a consequence of noise and shadow disturbance from the wind turbines, the Department does not consider it likely that such unacceptable discomfort will occur.

The promise of Eneco, Uwind and Wind Energy Development Company to the Board of Mayor and Aldermen that no stroke shadow will occur is, in any case, of no significance in the context of the zoning plan. The prevention of unacceptable stroke shadow nuisance can be fully addressed in the context of the environmental permit. In view of this, the Department does not consider it necessary that a regulation must be included on this point in the zoning plan.

28. From the underlined passages one can see that the Council of State values the possibility assumed in the Wind Plan Utrecht/Regional Plan 2005-2015 that further studies may show that the relevant location for wind turbine 3 is after all possible. Regarding those further studies there is then, at least partially, reference to the considerations that will be addressed at the new application for the environmental permit (because the earlier environmental permit had, after all, already been revoked by resolution of 21 June 2006 at the time of this decision). In view of this, the Department does not consider it necessary that a regulation must be included on this point in the zoning plan. The studies themselves will therefore still have to be further addressed (for the new environmental permit) with regard to the aforementioned aspects, with which the Wind Plan Utrecht can be fulfilled. The legal protection and the considerations to be taken in the area of noise, vibration etc. can, in other words, still be brought up and addressed in this procedure.

29. The Council of State, in its decision on 14 December 2011, underlines the decision to the District Court of Utrecht, when it refers to the aforementioned decision of 17 October 2007 in which it was established that the location of wind turbine 3 in itself does not lead to conflict with the Regional Plan and Wind Plan Utrecht and accepts that decision. Furthermore, the Council of State considers that the mere fact that the municipality of Houten established no new zoning plan in response to the annulment of the earlier zoning plan by the Council of State on 17 October 2010, does not mean that the spatial substantiation was insufficient at the exemption on the grounds of article 19 paragraph 2 WRO. Subsequent to the annulment of the environmental permit of 21 June 2006, on 15 December 2009 the municipality of Houten established a new environmental permit.

30. The Council of State considers in its judgment dated 14 December 2011:

2.8.3. By decision of 15 December 2009, the Executive granted a permit on the basis of article 8.1 of the Act on Environmental Management for the establishment and operation of wind turbines (hereinafter: environmental permit). This permit is based inter alia on the noise prognosis Wind Farm Veerwagenweg in Houten from the consultancy Lichtveld Buis & Partners of 8 March 2007.

The court rightly held that at the time of taking the decision on 21 June 2010, after considering the environmental permit, that no situation existed in which the court should have had serious doubts with regard to the question of whether the noise standards in the environmental legislation could be fulfilled. That at the time of the decision of 21 June 2010, an appeal had been filed against the environmental permit, is insufficient to conclude that such a situation indeed existed. Nor does the undated reaction of F. van den Berg, employed at GG&GD in Amsterdam, submitted by [applicant] and others in appeal, provide any basis for such a conclusion. In this reaction the formation of the report from Lichtveld Buis & Partners of 8 March 2007 is criticized, but it contains no conclusions about whether the noise standards applicable at the time of the resolution of 21 June 2010 stand in the way of the feasibility of the project. The fact that the environmental permit then, as considered by the Department in the decision of 23 February 2011 in case no. 201001296/1/M1 (http://www.raadvanstate.nl/uitspraken/zoeken_in_uitspraken/zoekresultaat/?verdict_id=QRMWpq11Igs%3D), legally lost effect, because with the amendment of the Decision general rules for establishments for environmental management (hereinafter: Activities Act) no obligation to obtain a permit existed any longer and that as of that date the standards as delineated in article 3.14a of the Activities Act apply for wind turbines, concerns circumstances of after the decision of 21 June 2010 that can therefore not lead to the decision that this decision is not lawful. The question of whether the wind turbines can meet the noise standards under the Activities Act, which according to [applicant] and others, according to the conclusion of a report by AV Consulting that they submitted on 31 August 2011, must be answered negatively, is therefore not relevant.

31. Here the Council of State applies the effect of the so-called '*ex tunc*' assessment, which means that assessment is only done of information applicable at the time at which the disputed decision was taken. No consideration is taken of circumstances of decisions taken or events occurring after that time. On the one hand the Council of State did consider, in the decision of 17 October 2009 referred to above, that future studies and an assessment of the environmental permit still to be granted in the future were sufficient to leave the disputed decision in effect. On the other hand, the Council of State ruled in the decisions of 14 December 2011 that it was not (no longer) of any significance whatsoever that recently adopted new legislation, specifically the Activities Act, retroactively ('changing the rules during the game') did away with the environmental permit (including with regard to the relevant project). The question, too, of whether the wind turbines would then meet the noise standards of the Activities Act (to be explained hereinafter) was not relevant. This meant that all the applicants in the case cited above, dated 23 February 2011, after years of struggle, were still nonetheless declared inadmissible in their proceedings against the (second) environmental permit (the first had already been annulled), which (also) applied to the relevant wind turbines, that thus no substantive judicial review was performed or available, whereas this had been referred to

earlier as a justification of the argument that the disputed decision was lawful. Applicants will later still contend that their defence was harmed through this twisted reasoning and accumulation of interim amendments to legislation, which is incompatible with article 6/8 ECHR.

32. On 1 January 2011, the decision amending the Act in general rules for environmental management (hereinafter: the Activities Act) and the Act on environmental law (amendment of environmental rules on wind turbines) went into force. In appendix I accompanying the decision on environmental law, categories of institutions are named that are obliged to hold a license.

33. In part C, category 20 of appendix I to the decision on environmental law read in conjunction with part B, under 1, opening words and under c of this appendix, it follows that an installation for converting wind energy into mechanical, electrical or thermal energy requires a permit solely if it is an installation for the establishment of which, pursuant to part C of the appendix to the Act on environmental effects reporting, the preparation of an environmental effects report (hereinafter: MER) is required, or if it concerns an installation the establishment of which is subject to MER pursuant to part D of the Act on environmental effects reporting, and regarding which the authorities have decided that a MER must be prepared at the preparation of the relevant decision.

34. Between the parties there is, in itself, no dispute over the fact that the relevant installation, with effect on 1 January 2011, came to be under the effect of the Activities Act, and for that reason the installation no longer required a permit. As a result of this, it must be ruled that the environmental permit granted at the disputed decision on 1 January 2011 has legally lapsed, which the Council of State also decided accordingly. Applicants believe that the Activities Act itself is contrary to article 6/8 ECHM

4 times the hub height

35. In the General Rules for Decision Systems Environment (2007) was stated, before the amendment of Article 3.13, paragraph 1 (old), that houses need to be located at least 4 times the hub height away from the wind turbine:

Article 3.13 (old)

This section applies to:
a wind turbine with a rotor diameter larger than two meters;
b. wind turbines, each of which have a fixed connection with the ground or the water bottom, in the form of a mast;
c. wind turbines which are provided with a horizontal axis of rotation of the rotor;
d. wind turbines with a combined capacity of less than 15 megawatts;
e. facilities with up to nine wind turbines, and
f. wind turbines in which the distance between the individual wind turbine and the nearest house or other 'sensitive objects', is at least four times the hub height.

36. This article has now changed again, by decision of 14 October 2010 (Staatsblad 2010, No. 749). From the distance criterion of four times the hub height is abolished because it sometimes led to unnecessary long distances, which consequently led to the exceeding of

this criterion. The distance can now be determined by ministerial regulation, according to Article 3.15a paragraph 3:

Article 3.15a

1. The local risk for a vulnerable object that is situated outside of the facility, caused by a combination of a wind turbine or wind turbine, is not higher than 10^{-6} per year.
2. The local risk for a vulnerable object that is situated outside of the facility, caused by a combination of a wind turbine or wind turbine, is not higher than 10^{-5} per year.
3. For the purpose of determining the individual risk, as referred to in the first and second paragraph, may distances be set by ministerial regulation, that at least need to be present between a wind turbine or a combination of wind turbines and an outside the facility located vulnerable or limited vulnerable object.
4. If under paragraph 3 distances are determined, then these are applicable and those determined under paragraph 1 or 2 shall not apply.
5. Rules on the calculation of the individual risk may be laid down by means of a ministerial regulation.

37. The proposed wind turbines were then at the time the application is not under the Order in Council facilities and installations Environment, because the distance to the closest house was less than 4 times the hub height, as it was defined in Article 3.13 (old) and was also shown in the Wind Plan Utrecht. For that reason, an environmental permit was required.
    By force of the Decision Activities (1 January 2011) the permit was then not required anymore. Since Article 6.21a / 6.21 b provides that, as long as the permit was not yet final, the Activities Decree became applicable (also permits objection or appeal which still ran like the present environmental).

B. Violation of Article 6 and 13 of the Convention

38. Article 1.6 of the CHW was applicable in this case, which article implies that within the stipulated period of 6 weeks a (higher) appeal must immediately be filed that includes all the grounds for that appeal. A so-called *'pro forma'* appeal on grounds to be presented can therefore lead to inadmissibility, if the period of 6 weeks is exceeded. This has led, in a number of cases of appeal (according to applicants, wrongfully) to inadmissibility. Limitations on Article 6 are permitted, as long as the right is not affected in its core. Given the complexity of the case, the enormous size and amount of reports stemming from the Dutch government and its unlimited financial resources, the applicants have not had a fair trial. The core of Article 6 includes equality of arms, which was definitely not the case. The applicants did not have the time and financial sources to properly contest the government's comprehensive and very expensive reports and therefore lacked the chance to contest the Dutch Government's evidence. No effective remedy before the national authority had taken place. Consequently Article 6 and 13 ECHR have been violated.

39. Additionally, the applicants were limited in their access to justice. Due to twisted reasoning and accumulation of interim amendments to legislation, several opportunities to bring violations to light and to test the state measurement's validity in the light of

national and international law were abolished. After years of struggle, the applicants were declared inadmissible in their proceedings against the (second) environmental permit (the first had already been annulled), which (also) applied to the relevant wind turbines, that thus no substantive judicial review was performed or available, whereas this had been referred to earlier as a justification of the argument that the disputed decision was lawful. All due to the new '*Activiteitenbesluit*' taking effect amidst the legal proceedings, the applicants could suddenly no longer appeal against aspects such as noise, vibrations or shadow flicker. These aspect influence the living environment of the applicants extremely. A fortiori the applicants should have been able to provoke judicial review on these aspects.

40. The direct (immediate) effect is the order under Article 6.21a/21b of Barim / Activities Decree. By the action of the Activities Act no judicial review took place concerning the matter of distance or where the order came to what extent the distance unacceptable impact could have on nearby residences in the context of noise, vibration, residential and environment. The Activities Decree, specifically Article 6.21a and 6.21 c, is therefore in breach of Article 6 and 8 ECHR.

41. Applicants could not defend themselves, although the state measurements influence their living environment extremely and therefore is 'spatially relevant'. The degradation in opportunities assert themselves makes there is no fair trial nor an effective remedy. Therefore article 6 and 13 ECHR have been violated. See for sophisticated substantiation numbers 25-31.

C. Violation of Article 8 of the Convention

42. The applicants alleged that there had been a violation of Article 8 of the Convention on account of the following. Below applicants first give insight in the current scientific status of wind turbine noise and its effect on human beings. This information is needed to show that the violation is sufficiently severe and of added value in relation to the precautionary principle. Second, the applicants show why the Netherlands are violating Article 8 and 10, in the light of the ECHR's case law. Lastly, the importance of the precautionary principle will be explained for this case.

C.1 Wind turbine noise and adverse health effects

Wind turbine noise

43. The most commonly heard complaint about wind turbines is that they are noisy. Noise is physically the same as sound, which is a sensory perception and a complex pattern of sound waves.[126] Noise can however, be described as unwanted sound. Sound is perceived and recognized by its loudness (pressure) and pitch (frequency). Loudness is indicated with the decibel (dB), which is a logarithmic ratio, to mimic the behavior of the ear. Human beings can hear sound between 0 dB and 130 dB, in which 130 dB is very

[126] B. Berglund, T. Lindvall, DH Schwela, K.-T. Goh, 'Guidelines for Community Noise,' (Geneva, World Health Organization, 1999)

loud and painful sound for most humans.[127] Humans do not perceive all pressures as being equally loud, due to the fact that the ear does not respond equally to all frequencies. Frequency is indicated with Hertz (Hz). The human hearing is sensitive at frequencies between 500-10,000 Hz. Very low frequencies, which is called infrasound (below 20 Hz) cannot be heard by the human ear, as well as very high frequencies, called ultrasound (over 20,000 Hz). There is variation between people in their ability to perceive sound, meaning that infrasound can be heard by some and even felt in the body.[128]

44. Wind turbines generate sound through mechanical and aerodynamic routes.[129] The sound level depends on various factors including design and wind speed. The dominant sound source from modern wind turbines is aerodynamic, produced by the rotation of the turbine blades through air. The aerodynamic noise is present at all frequencies, from infra- and low frequency sound to the normal audible range, producing a characteristic 'swishing' sound.[130]

Sound character

45. Wind farms are unique sound sources and exhibit special audible and inaudible characteristics that can be described as modulating sound. People living in the vicinity of wind turbines have stated that the variation in sound level makes that is more annoying than other sources of noise at comparable sound level pressure. This sound has mainly been characterized as 'swishing, lashing, beating or thumping.[131] Human perception responds primarily to sound character rather than sound level.[132] Human hearing is relatively sensitive to wind turbine sound fluctuations and if it is unwanted, the disturbing character will be aggravated.[133] The constantly shifting character of sound, as

[127] Email from Frits van den Berg on a chapter in the book 'Wind Turbines Noise: How it is Produced, Propagated Measured and Received' Multi-Science Publishing September 2011 (13 April 2012)

[128] Geoff Leventhall 'A Review of Published Research on Low Frequency Noise and its Effects' (2003)

[129] Renewable Energy Research Laboratory 'Wind Turbine Acoustic Noise' (2006) <http://www.minutemanwind.com/pdf/Understanding%20Wind%20Turbine%20Acoustic%20Noise.pdf> accessed 8 June 2012

[130] Geoff Leventhal 'Infrasound from Wind Turbines – Fact, Fiction or Deception' (2006) 24(2) Canadian Acoustics, 29.; WD Colby, R Dobie, G Leventhall, DM Lipscomb, RJ McCunney, MT Seilo et al. 'Wind turbine sound and health effects. An expert panel review' (2009) Prepared for the American Wind Energy Association & Canadian Wind Energy Association

[131] See for example: BJ Frey, PJ Hadden, 'Noise radiation from wind turbines installed near homes: effects on health' (2007 <www.windnoisehealthhumanrights.com> accessed 8 June 2012; GP van den Berg, E Pedersen, J Bouma et al. 'Project WINDFARMperception. Visual and acoustic impact of wind turbine farms on residents' (2008). FP6-2005-Science-and-Society-20. Specific Support Action Project no. 044628. Final report. <http://www.windaction.org/?module=uploads&func=download&fileId=1615> accessed 8 June 2012; E Pedersen, F van den Berg, R Bakker et al. 'Response to noise from modern wind farms in The Netherlands' (2009), J Acoust Soc Am 126: 634-643.

[132] Bob Thorne, 'The problems with noise numbers for wind farm noise assessment' (2011) 31 Bulletin of Science, Technology & Society 262

[133] Email from Frits van den Berg on chapter 6 in the book 'Wind Turbines Noise: How it is Produced, Propagated Measured and Received' Multi-Science Publishing September 2011 (13 April 2012)

described as 'fluctuations compared to waves on the beach, rumble-thump and planes that never land' apparently is an important factor in the reported adverse health.[134]

Low frequency noise and infrasound

46. Wind turbines produce a substantial amount of low frequency- and infrasound.[135] The issue of health effects stemming from this low end of the sound spectrum has been controversial for many years now. Infrasound was believed to be inaudible, but this has been determined to be a misconception.[136] Although hearing of infrasound does not occur through hearing in a normal sense, it can be detected as a result from nonlinearities of conduction in the middle and inner ear which produces a harmonic distortion in the higher frequency range.[137] Furthermore infrasound detection entails more than direct hearing, namely also subjective effects such as annoyance and detection through the resonance of other body organs.[138] Present understanding of inner ear physiology and of the nature of wind turbine sounds demonstrates that infrasound that cannot be heard could influence human function and affect people living nearby.[139]

47. Low frequency noise is the dominant sound component of wind turbine noise at moderate and larger distances. Due to its long wavelengths, it travels long distances and penetrates through walls and windows easily.[140] A laboratory research by Vos (2010)[141] supports this when considering the effect of outdoor noise on a person being indoors. As a building façade reduces high frequency noise more effectively than low frequency noise, a low frequency sound impinging on the façade must be of lower level than a high frequency sound in order to arrive at the same indoor sound level.[142] Increasingly is

---

[134] Bob Thorne, 'The problems with noise numbers for wind farm noise assessment' (2011) 31 Bulletin of Science, Technology & Society 262

[135] as shown by S Wagner, R Bareiss, G Guidati, 'Wind turbine noise' (1996) EUR 16823 Springer; GP van den Berg 'The sound of high winds: The effect of atmospheric stability on wind turbine sound and microphone noise'(2006) (Doctoral dissertation). University of Groningen, Netherlands. <http://dissertations.ub.rug.nl/faculties/science/2006/g.p.van.den.berg/ > accessed 8 June 2012

[136] B Berglund, Th Lindvall, DH Schwela, 'Guidelines for community noise' (2000), Geneva: World Health Organisation; G Leventhall 'What is infrasound?' (2007) Progress in Biophysics and Molecular Biology, 93, 130-137; C Maschke, 'Introduction to the special issue on low frequency noise'. Noise Health [serial online] 2004;6:1-2 <http://www.noiseandhealth.org/text.asp?2004/6/23/1/31668> accessed 8 June 2012

[137] B Berglund, P Hassmen, RF Job, 'Sources and effects of low-frequency noise' (1996) Journal of the Acoustical Society of America. 99(5) 2985 -3002

[138] B Berglund, Th Lindvall, DH Schwela, 'Guidelines for community noise' (2000), Geneva: World Health Organisation

[139] John P Harrison, 'Wind turbine noise' (2011) Bulletin of Science Technology & Society 2011 31: 256, 258; Alec N Salt, 'Infrasound From Wind Turbines Could Affect Humans (2011) Bulletin of Science Technology & Society 2011 31: 296, 300/301

[140] E Pedersen, KP Waye, 'Perception and annoyance due to wind turbine noise: A dose-response relationship'(2004) Journal of the Acoustical Society of America, 116, 3460-3470.

[141] J Vos, 'On the relevance of nonacoustic factors influencing the annoyance caused by environmental sound – a literature study' (2010). Proceedings Internoise 2010 < http://www.vosanr.com/images/stories/downloads/vos2010rel.pdf> accessed 8 June 2012

[142] Email from Frits van den Berg on chapter 6 in the book 'Wind Turbines Noise: How it is Produced, Propagated Measured and Received' Multi-Science Publishing September 2011 (13 April 2012)

being recognized that the low-frequency audible sound could be a key factor in disturbance caused by wind turbines.[143]

Measurement uncertainties

48. Wind turbine noise is being measured in the same way as other noise sources, such as traffic or industry. However, anecdotal evidence and field studies suggest that turbine noise has a character that makes it far more annoying and stressful than other sources of noise at the same A-weighted sound level.[144] Several studies have criticized the A-weighted scale measurements as not being accurate indicators of the disturbing effects.[145] Several reasons are adduced to explain this perception of wind turbine noise, such as the amplitude modulation associated with the blade passage past the tower, the turbulence of the air that blows past the blades, the dominance of low frequencies in the received sound spectrum, and the association between the acoustic and visual impacts.[146]

49. Measurements of wind turbine sound levels are typically in the range of 30 to 50 dBA, which is a similar sound level as an ordinary living room. However, study shows that the level required to cause annoyance in 30% of people was over 70 dBA for other environmental noise (road traffic, aircraft, railway), for wind turbine noise caused annoyance of 30% of people at a far lower level, at around 40 dBA.[147] This major discrepancy is caused by the fact that low-frequency components are excluded in the measurement.[148]

50. Moreover, measurements and noise regulations are based on averages, while human perception responds to the peak sound levels, rather than averages.[149] Additionally, sounds that are highly variable in short time spans are more perceptible than sounds at a steady level or closely varying around the average, because human ears are very attuned to patterns in sound.[150] Considering peak levels are often not measured, low frequency- and infrasound could be more perceptible than is shown in current measurements.

51. Lastly, no studies were found that replicate the long-term exposure to infrasound and low frequency sound experienced by those living nearby. Exposure duration is an important element of wind turbine noise exposure and is currently lacking in exposure

[143] See for example: Geoff Leventhall 'A Review of Published Research on Low Frequency Noise and its Effects' (2003)

[144] John P Harrison, 'Wind turbine noise' (2011) Bulletin of Science Technology & Society 2011 31: 256, 256

[145] B Berglund, Th Lindvall, DH Schwela, 'Guidelines for community noise' (2000), Geneva: World Health Organisation

[146] John P Harrison, 'Wind turbine noise' (2011) Bulletin of Science Technology & Society 2011 31: 256

[147] E Pedersen, KP Waye, 'Perception and annoyance due to wind turbine noise: a dose-response relationship' (2004) Journal of the Acoustical Society of America 116, 3460–3470

[148] Alec N Salt, 'Infrasound From Wind Turbines Could Affect Humans (2011) Bulletin of Science Technology & Society 2011 31: 296, 299

[149] Wade Bray, Richard James, 'Dynamic measurements of wind turbine acoustic signals, employing sound quality engineering methods considering the time and frequency sensitivities of human perception', Noise-Con 2011; Møller, CS Pedersen, 'Low-frequency noise from large wind turbines,' J. Acoust. Soc. Am. 129 (6), June 2011, 3727-3744

[150] Wade Bray, Richard James, 'Dynamic measurements of wind turbine acoustic signals, employing sound quality engineering methods considering the time and frequency sensitivities of human perception', Noise-Con 2011

studies. These measurement deficiencies created discrepancy between the actual noise emissions and the noise emissions that are measured. Consequently, noise emissions are assumed to be higher than measured.

Adverse health effects

52. People all over the world have reported experiencing adverse health effects as a result of living in the environs of wind turbines. People who are not expose to wind turbine noise find it extremely difficult to understand the health problems of residents living nearby wind turbines. The author therefore, next to reading all possible literature available, interviewed 'wind turbine noise victims' to get an idea of the influence of the turbines on their lives. Their compelling story on sleep disturbance, headaches, excessive tiredness, and reduction of quality of life created valuable incentives to get to the bottom of this issue.

53. There is no universal definition of health, but the definition used by the World Health Organization (WHO) is used in most of the literature on this topic. The Preamble to the constitution of the WHO is: '*Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'*. The WHO defines adverse health effects of noise as: '*changes in the morphology and physiology of an organism that result in impairment of functional capacity, or an impairment of capacity to compensate for additional stress, or increases the susceptibility of an organism to the harmful effects of other environmental influences'*. It furthermore listed adverse effects of which the following are part: hearing impairment, interference with speech communication, cardiovascular and physiological effects, sleep disturbance, mental health effects, effects on performance and effects on residential behavior and annoyance. This definition is used in the following literature review.

54. The amount of non-systematic studies and popular literature on this topic is overwhelming. On the contrary, well-developed systematic studies are not present in large numbers and all have their occasional flaws. In order to address public concerns and assess the effects of wind turbine noise on public health, adverse event reports and systematic studies will be discussed. The evidence discussed below is selected based on completeness, accuracy and objectivity of their contents and conclusions.

Adverse event reporting

55. In cases of emerging and unpredictable disease risk, adverse event reports are the cornerstone of public health research.[151] Obviously it is impossible to study every possible exposure-disease combination by systematic study methods. Therefore collecting reports of disease cases apparently attributable to a particular exposure source is an important first step.[152] Adverse event reporting is mainly used in infectious disease outbreaks or in case of side effects from pharmaceuticals, but reporting adverse health effects caused by wind turbines fit the pattern as well.[153] There are reports of individuals experiencing adverse health effects attributed to wind turbines in the media, case-

[151] Carl V Phillips 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents', Bulletin of Science Technology & Society 2011 31: 303, 304

[152] Ibid.

[153] Ibid.

studies[154] or official reports. The number of adverse event reports on this issue is ever increasing, now numbering in the thousands, rather than the hundreds around the world.

56. Adverse event reporting is a suitable way of studying wind turbine noise and its effects on human beings. People living in the vicinity are capable of both recognizing the exposure and outcome, in contrast with people who are exposed to invisible chemicals and diseases such as cancer.[155] Residents of wind turbines can detect the noise as well as the effects of that noise on themselves. Additionally, they can even detect when the problems arise and terminate. This information is incredibly important to determine the causation, even without a formal comparison group.[156]

57. Reported symptoms associated with exposure to wind turbines include annoyance, sleep disturbance, stress or psychological distress, inner ear symptoms, headaches, excessive tiredness, and reduction of quality of life.[157] Nina Pierpont, pediatrician and expert in this field established a more extensive list of commonly mentioned symptoms, namely: sleep disturbance, headache, tinnitus, ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic episodes associated with sensations of internal pulsation or quivering when awake or asleep.[158] Adverse advent reports show a correlation between these health effects with proximity to wind turbines, the sound pressure level emitted by the turbines, the frequency of the noise, time of the exposure and individual response. [159]

58. The results of adverse event reporting should not be over interpreted. The outcomes are crude, control groups are often missing and potential selection bias cannot be

---

[154] Amanda Harry, 'Wind turbines, noise, and health'(2007), http://www.wind-watch.org/documents/wp-content/uploads/wtnoise_health_2007_a_harry.pdf accessed 8 June 2012; Carmen M.E. Krogh, Lorrie Gillis, Nicholas Kouwen and Jeff Aramini, WindVOiCe, a Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need for Vigilance Monitoring, Bulletin of Science Technology & Society 2011 31: 334; M Nissenbaum, 'Mars Hill wind turbine project health effects: Preliminary findings'(2009); R Phipps, M Amati, S McCoard, R Fisher, 'Visual and noise effects reported by residents living close to Manawatu wind farms: Preliminary survey results'(2007); N Pierpont, 'Wind turbine syndrome: A report on a natural experiment' (2009) Santa Fe, NM: K-Selected Books; Bob Thorne, 'The problems with noise numbers for wind farm noise assessment' (2011) 31 Bulletin of Science, Technology & Society 262

[155] Carl V Phillips 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents', Bulletin of Science Technology & Society 2011 31: 303, 305

[156] Carl V Phillips 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents', Bulletin of Science Technology & Society 2011 31: 303, 305

[157] B Horner, RD Jeffery, CME Krogh, 'Literature Reviews on Wind Turbines and Health: Are They Enough?' Bulletin of Science Technology & Society 2011, 31: 399; See also: Carmen M.E. Krogh, Lorrie Gillis, Nicholas Kouwen and Jeff Aramini, WindVOiCe, a Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need for Vigilance Monitoring, Bulletin of Science Technology & Society 2011 31: 334; Amanda Harry, 'Wind turbines, noise, and health'(2007), http://www.wind-watch.org/documents/wp-content/uploads/wtnoise_health_2007_a_harry.pdf accessed 8 June 2012

[158] N Pierpont, 'Wind turbine syndrome: A report on a natural experiment' (2009) Santa Fe, NM: K-Selected Books, p. 26

[159] Robert Y. McMurtry, 'Towards a Case Definition of Adverse Health Effects in the Environs of Industrial Wind Turbines, *Bulletin of Science Technology & Society* 2011 31: 316

prevented.[160] Moreover, it does not allow an estimate of what portion of the exposed population suffers health effects.[161] However, careful analysis of this information can expose causal relationships.

59. In the case of wind turbine noise and adverse health effects, the massive volume of reports that are available creates plausible evidence that there is a causal relationship. The quantity of evidence is statistically beyond coincidence or a few rare individuals who are extremely susceptible.[162] Furthermore, most reported health problems are similar in all reports and are plausibly related to each other and the exposure.[163] All studies show a core list of symptoms which match significantly. Examples of these symptoms are sleep disorders, headaches, mood disorders, inability to concentrate, tinnitus and vestibular (balance) problems. Carl V. Phillips[164] concludes: 'The commonly reported problems all exist at the border of the psychological and physical and can all be caused by either of two very plausible effects of wind turbine exposure: stress reactions or vestibular disturbance'.[165]

60. The existence of a causal relation between wind turbine noise and adverse health effects is strengthened by the amount of information on costs made by people living near wind turbines because of the conviction that wind turbine noise influences their health and well-being. In many of these reports individuals make substantial costs to reduce health impacts. Lots of money is being spend on retrofitting their houses to reduce noise, selling their properties at a loss, or even abandoning their homes without being able to sell them.[166] The fact that these individuals bear personal financial loss, to escape from wind turbine noise shows great confidence in the adverse health effects experienced stemming from wind turbine noise. The decline of property values and sales collapse, as mentioned in several adverse event reports, suggests that the population in general does not believe that the turbines are harmless.[167]

Systematic studies

61. Increasing health concern about health impact emitted from wind turbine noise has spurred several more systematic studies. The amount of health impact studies is limited,

---

[160] Carmen M.E. Krogh, Lorrie Gillis, Nicholas Kouwen and Jeff Aramini, 'WindVOiCe, a Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need for Vigilance Monitoring', *Bulletin of Science Technology & Society* 2011 31: 334.

[161] Carl V Phillips 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents', Bulletin of Science Technology & Society 2011 31: 303, 305

[162] Ibid.

[163] Ibid.

[164] Phillips is a consultant and author specializing in epidemiology, science-based policy making, and communicating scientific concepts to the public. He spent most of his career as a professor of public health and now works in litigation support, scientific advising and grant-supported research

[165] Carl V Phillips 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents', Bulletin of Science Technology & Society 2011 31: 303, 305

[166] Carl V Phillips 'Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents', Bulletin of Science Technology & Society 2011 31: 303, 306. Examples can be found in the appendix of this article

[167] Ibid.

meanwhile the amount of literature reviews based on these studies is present in larger numbers. This paragraph deals with the most valuable and reliable studies on health effects on human beings caused by wind turbine noise. This list of studies does not pretend to be exhaustive and include the studies of Nissenbaum, Aramini, and Hanning (2011)[168], Janssen et. At (2011)[169],Pierpont (2009)[170], Pedersen, van den Berg, Bakker & Bouma (2009)[171], Pedersen & Persson Wayne (2007)[172] and (2004)[173]. Below their studies will be highlighted.

62. Nina Pierpont, a physician with clinical experience worked on a very detailed, peer-reviewed case-control study of 10 families around the world. These families have been affected by wind turbines to that extent that they had to leave their houses; nine left permanently. [174] The turbines ranged from 1.5 to 3MW capacity at distances between 305 to 1,500m. The group comprised 21 adults, 7 teenagers and 10 children of whom 23 were interviewed. Although this is a highly selected group, the ability to examine symptoms before, during and after exposure to turbine noise gives it a strength rarely found in similar case-control studies.[175] The subjects described the following symptoms: sleep disturbance, fatigue, headaches, dizziness, nausea, changes in mood and inability to concentrate, which Dr. Nina Pierpont named "wind turbine syndrome." All adult subjects reported *'feeling jittery inside'* or *'internal quivering'*, which was often accompanied by anxiety, fearfulness, sleep disturbance and irritability. Of particular concern were the changes in sleep pattern, behavior and academic performance of children, including toddlers and school and college aged children. 7 of 10 children had a decline in their school performance while exposed to wind turbine noise which recovered after exposure ceased. In total, 20 of 34 study subjects reported problems with concentration or memory. The subjects confirmed that all symptoms were not present before the turbines started operation and resolved once exposure ceased. Dr. Hanning stresses that '*Pierpont offers compelling evidence that these symptoms are related to low frequency sound and suggests very*

[168] Michael Nissenbaum, Jeff Aramini, Chris Hanning, 'Adverse health effects of industrial wind turbines: a preliminary report' (2011), 10th International Congress on noise as a Public Health Problem

[169] Sabine A. Janssen, Henk Vos, Arno R. Eisses and Eja Pedersen, 'A comparison between exposure response relationships for wind turbine annoyance due to other noise sources' (2011), J. Acoust. Soc. Am. 130 (6), December 2011. This study is based on the data of E Pedersen, F van den Berg, R Bakker and J Bouma 'Response to noise from modern wind farms in The Netherlands,' (2009) J. Acoust. Soc. Am. 126, 634–643; E Pedersen, and K Persson Waye, 'Wind turbine noise, annoyance and self-reported health and well-being in different living environments,' (2007) Occ. Environ. Med. 64, 480–486; E Pedersen and K Persson Waye 'Perception and annoyance due to wind turbine noise—a dose-response relationship,' (2004) J. Acoust. Soc. Am. 116, 3460–3470.

[170] N Pierpont, 'Wind turbine syndrome: A report on a natural experiment' (2009) Santa Fe, NM: K-Selected Books

[171] E Pedersen, F van den Berg, R Bakker and J Bouma 'Response to noise from modern wind farms in The Netherlands,' (2009) J. Acoust. Soc. Am. 126, 634–643

[172] E Pedersen, and K Persson Waye, 'Wind turbine noise, annoyance and self-reported health and well-being in different living environments,' (2007) Occ. Environ. Med. 64, 480–486

[173] E Pedersen and K Persson Waye 'Perception and annoyance due to wind turbine noise—a dose-response relationship,' (2004) J. Acoust. Soc. Am. 116, 3460–3470.

[174] N Pierpont, 'Wind turbine syndrome: A report on a natural experiment' (2009) Santa Fe, NM: K-Selected Books. See also: Christopher Hanning, 'Sleep disturbance and wind turbine noise' (2009)

[175] Christopher Hanning, 'Sleep disturbance and wind turbine noise' (2009)

plausible physiological mechanisms to explain the link between turbine exposure and the symptoms'.[176] Pierpont's study does not aim to give insight in the likelihood of occurrence of these symptoms, but does address the mechanism for the health problems associated with exposure to wind turbine noise. Her study convincingly shows that wind turbine noise does cause the above mentioned symptoms, including sleep disturbance.

63. Other significant studies are those of Pedersen, van den Berg, Bakker, and Bouma (2009) on wind turbine noise in the Netherlands and two earlier Swedish studies reported by Pedersen and Persson Waye (2007, 2004). These three studies were conducted in different areas, in different types of terrain and varying degrees of urbanization. Questionnaires were used. The three studies together sent questionnaires to 3,770 subjects, of which 1,830 (49%) were returned. The significance of these studies is based on the size of the samples, the experience of the investigators and the intercomparison between the studies.[177] Janssen et al. have collected the results of these three studies. Results from the studies show a dosed-response relationship between calculated A-weighted sound pressure levels and reported perception and annoyance. Apparently wind turbine noise is perceived as annoying at much lower noise levels than transportation noise or industrial noise at comparable levels, possibly due to specific sound properties, such as a 'swishing' quality, temporal variability and lack of nighttime abatement.[178] The study furthermore shows that annoyance was lower among residents who received economical benefit from wind turbines and higher among residents for whom the wind turbine was visible from the dwelling. A causal relation between wind turbine noise and annoyance was clearly found in this study. Moreover, wind turbine noise as a hindrance to psycho-physiological restoration could not be excluded. This study emphasizes that sleep difficulties, as well as feelings of uneasiness associated with annoyance could be an effect of exposure, but no direct connection was found.

64. The study by Nissenbaum, Aramini, and Hanning (2011) is an controlled study of the effects of wind turbine noise on sleep and health. It surveyed residents living near turbines about most of the aforementioned health conditions and compared them with similar people living further away. The total number of participants (38 near wind turbines and 41 at a greater distance) is limited. However, the response rate among the residents is great, which adds trust in the validity of the outcomes. The results show that those living within 1.4 km of wind turbines have suffered sleep disruption which is sufficiently severe as to affect their daytime functioning and mental health. Moreover it shows that at least some of the residents living near the turbines have suffered serious harm to their sleep and health. '*The significant relationship between the symptoms and distance from the IWTs, the subjects' report that their symptoms followed the start of IWT operations, the congruence of the symptoms reported here with previous research and reports and the clear mechanism is strong evidence that IWT noise is the cause of the observed effects*'.[179] The researchers conclude that

[176] Christopher Hanning, 'Sleep disturbance and wind turbine noise' (2009), p 13.

[177] John P Harrison, 'Wind turbine noise' (2011) Bulletin of Science Technology & Society 2011 31: 256, p 257

[178] See also: F van den Berg, 'Criteria for wind farm noise: Lmax and Lden' (2008) in Proceedings of the 7th European Conference on Noise Control, EURONOISE, Edinburgh, United Kingdom.

[179] Michael Nissenbaum, Jeff Aramini, Chris Hanning, 'Adverse health effects of industrial wind turbines: a preliminary report' (2011), 10th International Congress on noise as a Public Health Problem

wind turbines can prevent the onset of sleep and the return to sleep after a spontaneous or induced awakening.

Set back distance

65. Many studies indicate strongly that some subjects are severely affected by wind turbine noise at distances thought by the industry and government to be safe.[180] Most jurisdictions have noise regulations, which is used to determine the setback of turbines from homes. These noise limit varies from 35 dBA for quiet regions of New Zealand and for nighttime in Germany to 50 dBA in many jurisdictions in the United States.[181] Researchers conclude that wind turbine noise disrupts the sleep and adversely affects the health of those living nearby. All emphasis that future research is needed to determine a safe setback distance and to investigate the mechanism of causation. [182] The most experts in the field express that a setback distance of less than 1.5 km must be regarded as unsafe. These experts recommend for setback of residential properties from wind turbines between 1.5 and 2 km.[183] Only a few jurisdictions have established noise distance setbacks in compliance with these standards. The current set-back distance allow noise levels inside and outside homes that can and have been resulted in negative health impacts. Of course future research can reveal that wind turbines can be sited in the proximity of homes under certain circumstances. Nevertheless, our current knowledge does not offer ways to reduce the substantial health risks other than creating distance between the turbines and homes.

Concluding remarks

66. Based on a review of the evidence there is a significant probability of adverse health effects for human beings living within 1.5-2.0 km of wind turbines (in Houten over 1,500 residences). Globally individuals have reported annoyance, sleep disturbance, stress or psychological distress, inner ear symptoms, headaches, excessive tiredness, and reduction of quality of life. Systematic studies find a causal link between annoyance and sleep disturbance, but do not find a causal link with the other symptoms frequently listed in adverse event reports. These studies do find it plausible that annoyance and sleep disturbance will lead to the other listed symptoms. Dr Hanning[184], specialist in this field for example expresses that inadequate sleep not only is associated with fatigue, sleepiness, and cognitive impairment but also with an increased risk of obesity, impaired glucose tolerance (risk of diabetes), high blood pressure, heart disease, cancer and

[180] See for example: Amanda Harry, 'Wind turbines, noise, and health'(2007), http://www.wind-watch.org/documents/wp-content/uploads/wtnoise_health_2007_a_harry.pdf accessed 8 June 2012

[181] John P Harrison, 'Wind turbine noise' (2011) Bulletin of Science Technology & Society 2011 31: 256

[182] Michael Nissenbaum, Jeff Aramini, Chris Hanning, 'Adverse health effects of industrial wind turbines: a preliminary report' (2011), 10th International Congress on noise as a Public Health Problem

[183] An extensive list of recommended setbacks by experts can be found in Christopher Hanning, 'Sleep disturbance and wind turbine noise' (2009) table 1

[184] Christopher Hanning, 'Sleep disturbance and wind turbine noise' (2009). Dr Hanning is a Honorary Consultant in Sleep Disorders Medicine to the University Hospitals of Leicester NHS Trust, having retired as Consultant in Sleep Disorders Medicine. He holds a First class Honours BSc in Physiology and is qualified in medicine, MB, BS, MRCP, LRCP from St Bartholomew's Hospital Medical School

depression. The WHO (2009) also acknowledged the well-established effects of sleep loss and daytime sleepiness on cognitive function, accident rate and mental health.

67. In everyday language, the term annoyance, which is frequently used in above presented studies, may be viewed as a bit trivial. In the context of human health, however, annoyance is an adverse health effect.[185] The term annoyance has been used to describe the interpretation of noise, though some have suggested that this term tends to minimize its impact.[186] Other terms, such as distress covers the subject in a better way. The burden of annoyance should not be underestimated and includes degradation of health as well as degradation of the quality of life. As mentioned above, annoyance contradicts the WHO's definition of health. Annoyance can have severe health consequences, especially when residents are forced to be in a permanent state of annoyance. Evidence shows that factors, such as the visibility of the turbine and attitude or noise sensitivity of the residents influence the annoyance rates. However, this does not make the wind turbine noise disturbance less real. It is inevitable that there are causal co-factors, such as personal characteristics, which is a necessary condition for the wind turbine to cause adverse health effects. This is, however, true for every exposure-disease combination. Noteworthy is also that no systematic study appeared whose results support the claim that the relevant health problems are similar in unexposed and exposed populations.

D. Violation of Article 8 in the light of the ECHR case law

D.1 Admissibility criteria; the concept of victim

68. In the case of wind turbines in Houten, it is necessary to dwell on an important admissibility criterion, namely the concept of victim. Article 34 ECHR states:

The Court may receive applications from any person, non-governmental organization or group of individuals claiming to be the victim of a violation by one of the High Contracting Parties of the rights set forth in the Convention or the protocols thereto(…)

69. Only applicants who consider themselves victims of breaches of the Convention can complain to the Court. To be a victim the existence of injury is not required,[187] though the state interference must directly affect the applicant. However, the Court also accepted appeals from 'potential victims'. A law may by itself violate the rights of an individual if the individual if the individual is directly affected by the law in the absence of any specific measure of implementation.[188] In the case P. and A. Marckx versus Belgium (1979) the Court built on this concept by adding that a law can violate applicants rights by itself, in the absence of an individual measure of implementation, if

[185] B Berglund, Th Lindvall, DH Schwela, 'Guidelines for community noise' (2000), Geneva: World Health Organisation

[186] AH Suter, 'Noise and its effects'(1991). Administrative Conference of the United States, <http://www.nonoise.org/library/suter/suter.htm> accessed 12 June 2012

[187] ECtHR, *Marckx v.Belgium*, 13 June 1979 (Appl.no. 6833/74) para 27; ECtHR, *Inze v. Austria*, 28 October 1987, Series A no. 126, para 32

[188] ECtHR, *Klass and others v Germany*, 6 September 1978 (Series A, NO 28). Via: Antônio Augusto Cançado Trindade, 'The access of individuals to international justice' (2011), Oxford University Press, 2011, p. 128

they run the risk of being directly affected by it.[189] In the case Dudgeon v. the United Kingdom[190] the existence of legislation criminalizing homosexual conduct continuously and directly affected the private life of the applicant.

70. In the case of Houten the existence of injury is not (yet) present, due to the fact that the wind turbines have not yet been build. Although not denying the permit for building 3 wind turbines in the proximity of homes creates fear for adverse health effects caused by the turbines for the applicants, the actual placement of the wind turbines seems to be a precondition for being directly affected in their right to private- and family life and home. However, applicants can be regarded as 'potential victims'. No medical certificates to substantiate that their health has been adversely affected by the noise of wind turbines can be put forward, because no injury is caused yet. However, seeing the current scientific knowledge on wind turbine noise and its adverse health effects and the Dutch regulation allowing to build in the proximity of homes makes these applicants potential victims. The mere existence of the Dutch legislation and consequent risk of being directly affected leads to this conclusion.

71. The mere fact that the individuals are not suffering from adverse health effects caused by wind turbines, does not affect the victim status of applicants. The current scientific knowledge of wind turbines on human health creates enough evidence to show that the states interference, of not denying the permit, will lead to adverse health effects. It would be unethical to wait for the turbines to be build, and consequent health effects to appear, to conclude that fundamental rights are violated. The broad notion of victim in this sense is necessary to offer the necessary protection.

The margin of appreciation

72. In principle the Netherlands have a wide margin of appreciation in this case, as in other environmental cases.[191] The extent of the margin of appreciation depends on the nature of the right and there is less discretion for the state if the right at stake is one of the core rights and freedoms in the Convention, such as intimate aspect of a person or his physical or mental health. In the case of Houten, both human health and well-being are at stake. Wind turbine noise is designated as causing sleep disturbance, interference with speech communication, cardiovascular and physiological effects, mental health effects, effects on performance and annoyance. The right to sleep at night has undoubtedly been closely linked to the right to health.[192] Therefore the margin of appreciation is limited and the interest of the individuals need to be considered extremely carefully. The Court requires the authorities have relevant reasons for their interference as well as sufficient reasons. This brings that it is not sufficient to pose ´the economic well-being of the

[189] ECtHR, *Marckx v.Belgium*, 13 June 1979 (Appl. no. 6833/74). See also ECtHR, *Johnston and others v. Ireland*, 18 December 1986 (Appl. no. 9697/82)

[190] ECtHR, *Dudgeon v. the United Kingdom*, 22 October 1981 (Appl. no 7525/76)

[191] ECtHR, *Buckley v. the United Kingdom*, 25 September 1996 (Appl. no. 20348/92) Para. 74-77; ECtHR, *Powell & Rayner v. the United Kingdom*, 21 February 1990 (Appl.no. 9310/81) para. 44; ECtHR, *Hatton a.o. v. the United Kingdom* (Grand Chamber), 8 July 2003 (Appl.no.36022/97) para. 100; ECtHR, *Dubetska and others v. Ukraine*, 10 Februari 2011 (Appl. no: 30499/03) para 141

[192] See for example: ECtHR, *Moreno Gómez v. Spain*, 16 November 2004 (Appl.no. 4143/02)

country' but a justification and precision is needed to make clear there are no less grievous interferences possible from a human rights perspective.[193]

Applicability of Article 8 ECHR

73. Applicant needs to be directly and seriously affected by noise or other pollution in his or her home, to fall within the scope of Article 8.[194] In the case of Houten, the interference is present in the 'direct environment' of the applicant, seeing that the applicants live 309 meter from one of the turbines that emits a constant, pulsating sound while functioning and others respectively 343, 399 meter or further. Furthermore, the applicants are personally exposed to a danger that is 'not only serious but also specific and, above all, imminent'.[195] There is a direct connection between the measures of the State and the fact that the applicants are personally places in specific, grave and imminent danger. The well-document scientific knowledge, as presented in Chapter 1, shows that wind turbine noise is sufficiently serious to affect the applicants or prevent them from enjoying their home and their private and family life. The harmful effect on a person's private or family sphere of this noise leads to nuisance, sleep disturbance and consequently drove people out of their houses. Obviously the applicants not simply complain about the general deterioration of the environment. Moreover, in the cases of Roche, Lopez-Ostra, Guerra and Hatton as well as in the Öneryıldız v. Turkey case the Court decided that the constant fear of possible future damage (odours, noise, etc.) forms sufficient grounds to take this as a violation of private and family life.[196] In the case of Houten the constant fear of future damage and health impacts caused by wind turbine noise is clearly present in the community. The increasing amount of scientific and non-scientific evidence on adverse effects due to wind turbine noise (audible and non-audible) is ground for this anxiety.

Positive obligation

74. The Netherlands have a positive duty to take appropriate measures to prevent industrial pollution or other forms of environmental nuisance from seriously interfering with health or the enjoyment of private life or home. This duty may also require the Netherlands to protect individuals from the activities of other individuals or companies that contravene the effective enjoyment of their rights. The Dutch government is legally responsible for preventing serious damage to its citizens' health caused by pollution from industrial installations, even when they are privately owned and run. [197] The Dutch government needs to take reasonable and appropriate preventive measures to secure the applicant's right under paragraph 1 of Article 8. In the light of Article 8, the Netherlands have the following positive obligations when granting an exemption and building permit to build wind turbines in the close proximity to homes:

75. Where the Netherlands define an economic and social policy which by harming the environment, is susceptible of affecting the right persons to respect for their homes and private and family life, it must first carry out appropriate inquiries and studies so that the

[193] Daniel Garcia San Jose, 'Environmental protection and the European Convention on Human Rigths' (2005) Council of Europe, p. 58

[194] ECtHR, *Apanasewicz v. Poland*, 3 May 2011 (Appl. no: 6854/07)

[195] ECtHR, *Balmer-Schafroth and others v. Switzerland*, 26 August 1997 (Appl. no 22110/93), para. 40

[196] Hannes Veinla, 'Precautionary Environmental Protection and Human Rights', Juridica international XII/2007, p. 95

[197] See: ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00)

interest of the persons concerned may be taken into account.[198] An appropriate assessment of the risks for people living in the vicinity has not been done. Due to the '*Activiteitenbesluit*' an environmental permit is no longer needed. As a consequence no adequate noise impact assessment is needed nor done, even though the interference is severely affecting the people living in the vicinity. The test that has been done to assess whether the noise requirements are met are inappropriate. The methods used to measure the noise level is inappropriate and inaudible noise is not measured at all. Moreover the fact the government did not do a proper environmental feasibility study before granting the exemption and building permit, undoubtedly needs to lead to a violation of Article 8 ECHR. As stated above, under 31, the applicants, after years of struggle, were still nonetheless declared inadmissible in their proceedings against the (second) environmental permit (the first had already been annulled), which (also) applied to the relevant wind turbines, that thus no substantive judicial review was performed or available, whereas this had been referred to earlier as a justification of the argument that the disputed decision was lawful. Applicants claim that their defence was harmed through this twisted reasoning and accumulation of interim amendments to legislation, which is incompatible with 8 ECHR.

76. Additionally the Netherlands solely studied whether there was support in the area of Houten for sustainable development and wind energy in general. And of course, there was support for that! An independent study bij the Utrecht University of Applied Sciences however showed that 91,49% of the people in Houten are not in favor of building wind turbines in the vicinity of homes.[199] Granting permits without support of the locals seems to be at odds with the principle of public participation as formulated in the Aarhus Convention, which was signed by the State of the Netherlands. It is the Courts well-established case law that these implicit procedural requirements are integrally part of Article 8. The Court built its case-law concerning Article 8 of the Convention in matters of environmental protection largely on the basis of principles enshrined in the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (ECE/CEP/43). The Aarhus Convention imposes a positive obligation on States to provide information, public participation and access to justice. The ECtHR emphasized 'the importance of public participation in environmental decision-making as a procedural safeguard for ensuring rights protected by Article 8 of the Convention'[200] and added that the lack of participation from the beginning of the procedure for a proposed development, "when all options are open and effective public participation can take place[201]" can lead to a violation of Article 8. Due account is to be taken of the outcome of the public

[198] See also: Jean-Francois Akandji-Kombe, 'Positive obligations under the European Convention on Human Rights. A guide to the implementation of the European Convention on Human Rights' (2007), Council of Europe, p. 47

[199] Hogeschool Utrecht 'Onderzoek draagvlak en wensen ten aanzien van ontwikkeling buitengebied Veerwagenweg te Houten' (2011) < http://www.platformwindenergiedezijpe.nl/wp-content/uploads/2012/02/110301-HU-onderzoek-Gigawiek.pdf> accessed 12 June 2012

[200] ECtHR, *Grimkovskaya v. Ukraine*, 21 July 2011 (Appl. no: 38182/03), para. 69

[201] Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (ECE/CEP/43), Article 6 para 4

participation in reaching the final decision, which must also be made public.[202] In the present case, the Netherlands violates on this ground Article 8.

77. Furthermore, the government did not made sufficient efforts to mitigate the plausible harmful effects on human health. Even more because the municipality refused to investigate alternatives as suggested by the province. On another location named '*Schalkwijk',* an assessment showed the location was more suitable than the location the government gave the permit and exemption for, due to the fact that is was located at a greater distance from homes. Furthermore, the social and environmental concerns of onshore wind turbines is a hot topic in the Netherlands, and its noise effects and the visual degradation of the already small country is often put forward as an argument to invest in offshore wind turbines. Therefore, investigating the possibilities of building wind turbines offshore meets the social needs and could not have been neglected.

78. A fair balance has to be struck between the competing interests of the individual and of the community as a whole. In doing so, the Netherland enjoys a certain margin of appreciation. The interest of protecting the economic well-being of the country and the rights and freedoms of others by contributing to the sustainable development of the Netherlands' resources needs to be weighed against the right of the people living in the vicinity of wind turbines to be protected from interference with health or the enjoyment of private life or home. These interests include public health benefits, due to the fact that wind turbines are claimed to produce less pollution than conventional energy sources. Consequently, we are told to expect less disease burden on the general public from wind turbines than from fossil sources. This assertion has been challenged and contested in science.[203] Even if public health *benefits* were established, there are also clear public health *risks* associated with wind turbines. In this case, the lack of appropriate assessment of the risk and the lack of study on alternatives that were there, the Netherlands failed to take reasonable and appropriate measures to secure the applicants rights. Particularly because better alternatives were present and experts recommend not to build wind turbines within the scope of 1,5-2 km near houses.

The justification test of Article 8 (2)

79. The Netherlands interfered in two ways in the right to health or the enjoyment of private life or home. Firstly, the existence or application of the CHW and the laws that are interrelated and changed by the CHW can be regarded as an interference. The mere existence of these laws interferred in the applicants legal protection in that way that their right to health or the enjoyment of private life or home is violated. The Netherlands introduced an *'Activiteitenbesluit'*, also known as '*Besluit algemene regels voor inrichtingen milieubeheer'* (BARIM), by which the environmental permit, previously needed before building wind turbines, was abolished. On this ground pending cases against the environmental permits in this case were dismissed. As a consequence a thorough assessment of noise effects on human beings was no longer a legal precondition. Before, this assessment was needed in case this would be 'spatially relevant,' which is a common concept in Dutch case-law. Regarding the level and characteristics of wind turbine noise

[202] ECtHR, *Taşkın and Others v. Turkey*, 10 November 2004 (Appl. no. 46117/99), para. 99

[203] Martin Shain, 'Public Health Ethics, Legitimacy, and the Challenges of Industrial Wind Turbines: The Case of Ontario, Canada' (2011), Bulletin of Science Technology & Society 2011 31: 346, p. 346

and its effects on human health, this assessment obviously is 'spatially relevant'. Due to the retroactive cancellation of the required environmental permit, an important assessment of risks was abolished related to granting a permit for building wind turbines in the proximity of homes. As a consequence no adequate assessment of noise effects was needed or performed prior to authorizing a permit. As a consequence, legal protecting can only be granted afterwards. Only in cases of administrative enforcement, when the wind turbines are institutionalized and violating noise norms, individuals can seek for legal protection.

80. Additionally, article 3.14a paragraph 1 of the BARIM declares that wind turbine noise needs to be limited to a maximum of 47 dB Lden and 41 dB Lnight[204] on the facade of sensitive buildings and sensitive areas on the border of the area. The noise measure Lden stands for Level day-evening-night and noise in the evening and at night weighs more heavily than daytime noise. In order to determine Lden within an area, the sound level is measured during one year. Lden is therefore difficult to enforce, since it is based on annualized noise levels. And impossible to show for common citizens that these levels are violated, unless government will measure continuously. They will not do so. As a consequence it can be possible that the noise level is 60 dB in summertime and 35 in wintertime and still be in compliance with the law. The competent authority can take customization requirements to take into account the cumulative effects of several wind turbines to lower the maximum noise level allowed. This standard is extremely difficult or even impossible to function as an enforcement standard, because it is difficult to measure or enforce it. Especially on budget of ordinary citizens.

81. Furthermore, B&W (the administrative of the municipality of Houten) granted an exemption under article 19, paragraph 2 of the 'Law on Spatial Planning' (old WRO) and building permit to Eneco New Energy BV. Article 19 old WRO consist of inter alia paragraph 1, 2 and 3 on which exemptions of the applicable land use plan can be based. Paragraph 1 applies if the intrusion is severe, paragraph 2 if the intrusion is less severe and paragraph 3 to the least severe intrusions. It is being contested whether a severe intrusion by enormous wind turbines in the proximity of homes can fall under the scope of article 19 paragraph 2. In any case, it is clear to applicants that the spatial substantiation was flawed, because due to the annulment of the environmental permit, little or no further investigation took place and environmental aspects were not legally assessed on important points, as indicated heretofore in underlined passages of jurisprudence. In the absence of that further investigation and a legal assessment of noise, vibration, flickering etc. in the context of an environmental permit, while the court consciously did not assess the building permit and exemption on that point, applicants did not have a fair day in court and their rights as protected in article 6 and 8 ERCH were violated. The exemption required for the building permit was therefore established in conflict with articles 6 and 8 ECRH. In sum, solely the 'light' exemption was needed in this case, where wind turbines were planned to be build in the vicinity of homes. This light exemption allows for a marginal test of risk assessment and takes away most procedural guarantees to assess whether wind turbines can be build in that area properly.

[204] 'Lden' : The noise indicator as stated in article 3, under f, of Directive 2002/49/EC of the European Parliament and the Council of the European Union on 25 June 2002 on the evaluation and the management of environmental noise; 'L night': The noise indicator as stated in article 3, under i, of Directive No. 2002/49/EC of the European Parliament and the Council of the European Union on 25 June 2002 on the evaluation and management of environmental noise

This light exemption is disproportional for a heavy intrusion in a peaceful area as Houten. The legal system therefore does not offer sufficient legal protection, which leads to a violation of the right to health and the enjoyment of private life and home.

82. Secondly, the granting of the exemption and permit in itself constitutes an interference in the light of Article 8.[205] The likelihood that this interference will lead to adverse health effects and degradation of the enjoyment of private life and home is demonstrated by the scientific evidence presented in chapter 1.

83. The Netherlands bear the onus to prove that the first interference (the existence and application of the CHW) is lawful and justified under Article 8 (2) ECHR. The exemption and permit are granted in accordance with the law. However, the law itself is being contested. The rule that authorizes an interference with Article 8 must be compatible with the rule of law, accessible and sufficiently clear and precise to be foreseeable in its application.[206] The CHW and the related laws however are not. According to its explanatory memorandum, the Act is written to overrule the municipality if they refuse to cooperate with measures that stimulate economic well-being of the country, such as providing building permits. This is not explicitly mentioned in the Act itself, what is common to Dutch legislation. However, the scope of the CHW is extremely broadened, since the Netherlands are applying this law in every case, even when the municipality is cooperating. The fact that the CHW and its related laws are not at all precise and clear has been proved by the fact that even the Court of Utrecht twice wrote the CHW was not applicable, before stating it was applicable.

84. Moreover, this is shown by the fact the Councli of State decided unambiguous. A new paragraph was added which determines that if an exemption based on the old WRO was already granted under Article 19, first or second paragraph, even after the entry into force of the new WRO a building permit in accordance with an exemption may be granted. The Council of State determined by judgment of 1 December 2010 that this is applicable to projects that have been established by Article 3.26, paragraph 1 new WRO.[207] However, in this case, the building permit and exemption had been based on a request before the entry into force of the new WRO. The Council of State determined in a decision of 1 December 2010 that article 3.1 appendix 1 CHW states that the CHW is not applicable to projects of 20+ buildings (i.e. a building project of more than 20 houses), if the project falls under the old WRO instead of under the new WRO. Therefore it is questionable whether the CHW is even applicable in this case.

---

[205] See also: Douwe Korff, 'The standard approach under Article 8-11 ECHR and Article 2 ECHR'(2008) <http://ec.europa.eu/justice/news/events/conference_dp_2009/presentations_speeches/KORFF_Douwe_a.pdf> accessed 12 June 2012, p.2. See also: ECtHR, *Dudgeon v. the United Kingdom*, 22 October 1981 (Appl. no 7525/76)

[206] Douwe Korff, 'The standard approach under Article 8-11 ECHR and Article 2 ECHR'(2008) <http://ec.europa.eu/justice/news/events/conference_dp_2009/presentations_speeches/KORFF_Douwe_a.pdf> accessed 12 June 2012, p.2

[207] Article 3.26, paragraph 1 new WRO 3.26: If there are provincial interests, the Provincial Council can hear the municipal council and create an integration plan, with exclusion of the jurisdiction of the municipal council to make a land use plan

85. Article 1.1 appendix 1 of the CHW concerns construction or expansion of production facilities for the generation of renewable electricity using wind energy. The provisions of relevance to this case study are article 9b paragraph 1, opening words and a and b, and Article 9e Electricity Act 1998. These provisions concern huge wind farms upwards of 100 MW of production facilities, with a capacity of at least 50 MW generated not using wind energy and the construction or expansion of a production facility for generating wind energy between 5MW and 100 MW, in the situation that the provincial council has to use its jurisdiction of creating an integration plan under Article 3.26 new WRO, to overrule the municipality. The legal system and explanatory memorandum make it very clear that this 'overruling' is only possible if the municipality is not cooperating in the realisation of a project. If this is not the case, if the municipality cooperates, the legal system and explanatory memorandum indicate that the CHW cannot be applied. There is also no need for application. Applicants may infer from the foregoing that if and when the CHW refers to a procedure from the new Spatial Planning Act, the CHW applies to cases (building applications) that predate the commencement in effect of the new Spatial Planning Act, as in this case. Should this be otherwise, applicants make the following observation.

86. The legislature has stated in the legal notes that in case of a recalcitrant municipality a provincial integration plan can always accelerate the decision making. Hence the obligation assumed, unless an appeal to 'escape' is made (article 9e paragraph 5 Electricity Act) ['Ewet] or an alternative location must be designated if no recourse can be taken to escape.

87. From the legislative systematology and legal commentary on article 9e Electricity Act, it is noted that the legislature has linked the stated category of wind projects to the question of whether an impasse exists (stagnation) which must be broken through. If it appears that the municipality agrees to the designated alternative location, then the obligation of article 9e Electricity Act paragraph 2 does not apply. Everything is designed to remove any possible obstacles. If such obstacles do not occur, then a category as meant in article 9e of the Ewet does not exist. In order to realise this acceleration of procedures or break through impasses, in the legal notes the legislature nota bene recommends that when initiatives are taken, an application be submitted both to the municipality and the province. From this it follows that the legislature did not intend for the CHW to apply if an integration plan as per 3.26 WRO (new) did not exist. In the legal explanation this is expressed once again thusly:

'What is concerned, after all, is a refusal of a municipality to change the zoning plan on behalf of a plan to establish or expand a production installation for the generation of sustainable electricity with the aid of wind energy with a capacity of at least 5 but not more than 100 MW.'

88. The aforementioned mandatory application of an integration plan makes it easier for provincial governments to achieve the provincial target for wind energy, because they are authorized to take all necessary decisions. According to the legislature, these measures contribute to the accelerated increase in production capacity of sustainable energy as envisaged by the government.

89. The legislature would not have conceived the entire layout of article 9 Ewet in this way if it had wanted to place the realisation of windmills under the CHW separately from the

authorisation as per 3.26 WRO. Article 1.1 of appendix I CHW could then, after all, have sufficed with only this single unqualified category allocation. In article 1.1, appendix I, it is not for nothing that the words '*as meant in'* are in article 9e Ewet. This intention has already been explained. So the entire point is not whether a capacity between 5 and 100 MW exists or not.

90. The 'Ministry of Public Housing, Spatial Planning and Environmental Management' (VROM) expects that new projects will not fall under the scope of the CHW, because wind is seldom of provincial interest. So VROM was also obviously amiss in terms of the correct application of legislation. From the studies done on behalf of VROM, it is noted that provinces are cautious about integration plans.[208] Petitioners may not be the dupe of an interpretative hocus-pocus of words in legal texts. The legislature should make explicit statements about the envisaged intentions of the law, as this has already happened on other subjects regarding the CHW. Also typical is the phrase in consideration 2.8.1 of the District Court at Utrecht '*...the Court can come to no other decision than that...*'.

91. The court does not substantiate this with history itself, but by taking on 'counter-reasoning' from the petitioner that the explanation could lead to a situation in which, in view of article 9e, second paragraph of the Electricity Act 1998, the applicability of the CHW by a municipality could intentionally be effected by not cooperating in a necessary amendment of the planning regime. The consequences, however, are regulated in law, not possible intentions of municipalities. This says that intentions, whether or not they are deliberate, are not relevant. Only the desire to break through a deadlock, which also includes a municipality that does not cooperate.

92. The applicants complain that the Netherlands created a system of unclear and vague laws, to make it possible to achieve wind energy targets while opting to ignore scientific evidence demonstrating the risks of wind turbines in the proximity of homes and opting to ignore the the will of its citizens as well as studying alternative locations. Due to the created system of law which are extremely vague, unclear and not precise, the interference does not fulfill the requirement of 'in accordance with the law.'

93. The aim of the interference is protecting the economic well-being of the country and the rights and freedoms of others by contributing to the sustainable development of the Netherlands. Seeing that the list of legitimate aims mentioned in Article 8 (2) are so wide, this aim will be regarded as legitimate by the ECtHR.

94. The last step to be taken in the test of Article 8 (2) is determining whether the interference is necessary in a democratic society. An interference will be considered necessary in a democratic society if it answers a pressing social need and, in particular, if it is proportionate to that aim and if the reasons adduced by the national authorities to justify it are relevant and sufficient. Regarding the existence of the CHW, the following can be said. The Netherlands express the pressing social need of this Act in the explanatory memorandum, being economic development in times of financial malaise.

[208] Vrom-inspectie 22 juni 2010, Uitvoering windenergie in relatie tot Crisis- en herstelwet/Elektriciteitswet 1998, Bijlage 4, Deelrapport Utrecht p. 10 bij Windenergie sneller ingepast?

The requirement of pressing social need can be seen as a gliding scale, some needs are more pressing than others. Protecting the national security for example can be easier to justify than the economic well-being of the country. In this case, the economic well-being of the country is the sole pressing social need and therefore more difficult to justify than other pressing social needs. Whether the Netherlands may reasonably rely on the idea that investing in wind energy will advance economic stability and well-being is contested in the literature.

95. The explanatory memorandum emphasizes that the measures proposed in the Act significantly simplify decision making, to accelerate achieving a number of projects in the next four years, without compromising the necessary administrative care and adequate legal protection. If this would be true, the interference presumably can be regarded proportionate. However, as mentioned above, the legal protection of people living in the vicinity is adversely and severely affected. No adequate assessment of noise effects is needed and individuals can only seek for justice after the wind turbines have been build and are violating noise standards.

96. Do the Netherlands provide relevant and sufficient reasons to justify this measure? Relevant reasons are presented and can be found in financial interests and sustainable development. Whether this measure allows for degrading individual legal protection is not addressed. No sufficient reasons are given to substantiate why these interests is of greater importance than legal protection.

97. Furthermore needs to be assessed whether the second interference, being the granting an exemption and building permit fulfills the justification test of Article 8 (2). The pressing social need is assumedly the same as in the foregoing and set out in the explanatory memorandum. Again, the pressing social need in this case, consisting of economic interests asks for strong reasons to justify it, since it is a less pressing social need than for example protecting national security. However, the term necessary implies that the least restrictive measures is achieved 'in the least onerous way as regards human rights'. [209] The Netherlands refused to investigate other area's in which wind turbines could have been build, even though the province suggested other location. No sufficient and relevant reasons were given for this refusal. The interference is far reaching and interferes in human health and the right to sleep at night. As a result, strong reasons to justify it are needed to be in compliance with Article 8 ECHR. The lack of strong reasons to justify this administrative neglectancece shows that the balancing of interests has not been adequate. No fair balance has been struck.

98. The Netherlands require measures to protect the economic well-being of the country. However this happens at the expense of civilians' legal protection. Balancing the potential local economic and national climate change benefits against the likelihood of a diminished rural quality of life for local citizens, and effects on health and well-being is a difficult task. Although the Netherlands' interest is reasonable and understandable, an unreasonable risk is taken and no sufficient measures are taken to provide sufficient legal protection. Therefore, no fair balance has been struck. The Netherlands have focused their policies on achieving wind energy targets while opting to ignore evidence

[209] ECtHR, *Peck v. The United Kingdom*, 28 January 2003 (Appl. no. 44647/98)

demonstrating that when wind turbines are located too close to family homes, the prolonged exposure to the audible and inaudible range of acoustic characteristics of wind turbine noise adversely affects people's health. The protection of commercial development and the economic well-being of the country seem to be more important than the protection of private life, family life, home and health.

The Precautionary principle

99. The European Convention on Human Rights does not encapsulate any individually justiciable rights to a healthy environment. The European Human Rights perspective on environmental law and policy is continuously developing and the Court is facing new challenges over and over again. Due to these developments and the consequent legal uncertainty, the question arises as to whether individuals could rely on the environmental principles in cases falling within the scope of the ECHR. In particular, in spite of the absence of individually justiciable rights to live in a healthy environment, should ECtHR as well as national courts take into consideration the precautionary principle? This chapter aims to shed some light on the interrelation between the precautionary principle and the environmental-related protection under Article 8. The precautionary principle states that if there are reasonable scientific grounds for believing that a product may cause adverse health effects, it should not be in place until scientific evidence proofs that the benefits outweighs the costs or risks.

100. The precautionary principle is detailed in Article 191 of the Treaty on the Functioning of the European Union (EU). It aims at ensuring a higher level of environmental protection through preventative decision-taking in the case of risk. [210] The WHO endorses the precautionary principle and emphasizes: ' In all cases, noise should be reduced to the lowest level achievable in a particular situation. Where there is a reasonable possibility that public health will be damaged, action should be taken to protect public health without awaiting full scientific proof.'[211] The principle is far wider than environmental protection and plays part in consumer policy and European legislation concerning health.

101. In a Communication from the Commission on the precautionary principle, of 2 Februari 2000[212] is emphasized that the definition of the principle shall also have a positive impact at international level, so as to ensure an appropriate level of environmental and health protection in international negotiations. According to the Commission the precautionary principle may be invoked when a phenomenon, product or process may have a dangerous effect, identified by a scientific and objective evaluation, if this evaluation does not allow the risk to be determined with sufficient certainty. The commission stresses its relation with risk analysis and more particularly risk management

[210] Europa. Summaries of EU legislation (2011) <http://europa.eu/legislation_summaries/consumers/consumer_safety/l32042_en.htm> accessed 12 June 2012

[211] B Berglund, Th Lindvall, DH Schwela, 'Guidelines for community noise' (2000), Geneva: World Health Organisation

[212] European Commission, Communication from the Commission on the precautionary principle, COM/200/0001 final, <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52000DC0001:EN:NOT> accessed 12 June 2012

and indicates that the precautionary principle may only be invoked in the event of a potential risk and that it can never justify arbitrary decisions. Preconditions that have to be met are identification of potentially adverse effects, evaluation of the scientific data available and the extent of scientific uncertainty. The level of risks determines the degree of precaution that is needed.

102. Internationally several definitions of the precautionary principle exist, but most of them share a three-part structure. This structure first includes the level of damage, determining under which conditions the principle should be applied. Second, the scientific criterion, to specify the status of knowledge according to the relationship between a given activity and a given effect. Lastly, the remedy the authorities should offer in response to the activity.[213] In sum can be said that 'the consideration of serious consequences to the environment, combined with uncertainty about the situations in which these consequences might materialize, creates a condition where precautions should be taken'.[214]

103. The ECJ and the Court of First Instance (CFI) have dealt with the precautionary principle in many cases.[215] The case law of the ECtHR on this principle however is scarce. The case of Balmer-Schafroth and others v. Switzerland is a remarkable first step in this regard. Plaintiffs lived in the proximity of the Mühleberg nuclear power station, which according to them, did not fulfill the safety requirements. They required safety measures to be takens as preliminary measures. The Court however, found that they failed to prove direct connection between the operation of the nuclear power station and the alleged violation of their rights and failed to prove that they were personally placed in 'specific, grave, and imminent danger.' Remarkably, seven judges issued a dissenting opinion, based *expressis verbis* on the precautionary principle, in which they deemed it necessary to guarantee human rights also in cases involving not only dangers but possible dangers and risks as well.[216]

104. In environment-related cases the complaint often concerns supposed damage and health risks. The courts line of reasoning so far has been that applicants have to produce "reasonable and convincing evidence of the likelihood that a violation affecting him personally would occur; mere suspicion or conjecture is insufficient in this regard." In *Fadeyeva*, the ECtHR stressed that there was "a very strong combination of indirect evidence and presumptions" which made it possible to conclude that the applicant was suffering from a prolonged exposure to hazardous pollutants[217].. The line of reasoning of Court often has been that strong combination of factors were needed for an applicant to

[213] NA Manson, 'Formulating the precautionary principle'(2002), Environ Ethics 24:263–264, p. 265.
[214] Runyu Wang ,The precautionary principle in maritime affairs, World Maritime University J Marit Affairs (2011) 10:143–165
[215] See for example: Case C-180/96 *United Kingdom v Commission (BSE case)* [1998] *ECR*I-2265
[216] ECtHR, *Balmer-Schafroth and others v. Switzerland*, 26 August 1997 (Appl. no 22110/93), dissenting opinion of Judge Pettiti, joined by Judges Gölcüklü, Walsh, Russo, Valticos, Lopes Rocha and Jambrek. Via: Hannes Veinla, Precautionary Environmental Protection and Human Rights, Juridica international XII/2007, p. 95
[217] ECtHR, *Fadeyeva v. Russia*, 9 June 2005 (Appl.no. 55723/00) paras 80-88

have the status of victim. This is at odds with the precautionary principle, a principle the Court itself declared to be part of European Community law. [218]

105. In this case, Tatar v. Romania, which was decided in 2009 the Court for the first time explicitly found a violation of the precautionary principle. More explicitly, the Court read the principle, as already recognized in other international provisions, explicitly into Article 8 ECHR.The case concerns a gold mine, using sodium cyanide in its extraction process, which released about 100,000 m3 of cyanide-contaminated tailings water into the environment following an environmental accident in January 2000. After this accident the mine did not stop its activities. The applicants, living in the vicinity of the gold mine complained that the mining process was a health hazard for the people living near it, that it posed a threat to the environment and that it was aggravating their son's asthma. As in similar cases, the Court found that the applicants had failed to prove a causal link between the exposure and the son's asthma. However, the mining company had continued its industrial operations after the accident, in breach of the precautionary principle, according to which the absence of certainty with regard to current scientific and technical knowledge could not justify any delay on the part of the State in adopting effective and proportionate measures. The Courts angle of incidence is the protection of human health under the ECHR and not environmental degradation. In this respect the Court cites inter alia principle 15 of the Rio Declaration 1992, the precautionary passage from the Gabikovo-Nagymaros decision of the ICJ and refers to the codification in the EC Treaty and the use of this principle by the European Court of Justice.[219] Consequently the Court concluded that the Romanian authorities had failed in their duty to assess, to a satisfactory degree, the risks that the company's activity might entail, and to take suitable measures in order to protect people's right to private life and home, within the meaning of Article 8, and more generally their right to enjoy a healthy and protected environment. A violation of the precautionary principle does not lead to the allocation of compensation by the Court. The fact the applicants failed to demonstrate there is a causal link between the activity and health issues makes that there does not rest an obligation to compensate on the shoulders of the state. However, this does lead to a violation of the precautionary principle, since the authorities should have taken steps, due to the scientific uncertainty.

Shift in the burden of proof?

106. The burden of proof can be employed to allocate the risk of uncertainty[220] The shift of the burden of proof is often seen as one of the main components of the precautionary principle. This concept brings that the party who initiates environmental sensitive activity needs to prove it is harmless. As a result, the parties who are protecting the environment and human health are released from the burden of proof. This idea of shift in the burden of proof is based on the presumption that an activity is harmful to the environment or

[218] In ECtHR, *Tatar v. Romania*, 27 January 2009 (Application No: 67021/01) para. 120, the ECHR noted that the precautionary principle was part of European Community law, 'qui « a vocation à s'appliquer en vue d'assurer un niveau de protection élevée de la santé, de la sécurité des consommateurs et de l'environnement, dans l'ensemble des activités de la Communauté »'

[219] ECtHR, *Tatar v. Romania*, 27 January 2009 (Application No: 67021/01), paras 69/70.

[220] Daniel Bodansky, 'New developments in international environmental law—remarks by Daniel Bodansky' (1991) Am Soc Int Law Proc 85:413–417

human health unless proven otherwise.[221]The level of proof remains the same, meaning that the party who intends to engage in the environmentally sensitive activity needs to demonstate the product is safe 'beyond reasonable doubt'. This shift does not bring a zero-risk-approach in which technological and economic development is altered until proved to be 100% safe. In most definitions operators or manufacturers have to prove their activities would not result in 'serious or irreversible damage.[222]

The Precautionary Principle & wind turbines in Houten

107. There are unanswered questions about the risk of short and long term exposure to wind turbines. The long-term health impacts to people living in the vicinity as is the case in Houten and children in particular and workers such as farmers who work in close proximity to wind turbines are unknown.[223] Based on the foregoing, the application of the precautionary principle is essential where there is any possibility of noise disturbance and consequent adverse health effects from wind turbines. [224] The case of wind turbines in the proximity of homes definitely falls within the damage threshold of the precautionary principle. Protests in the Netherlands against the placement of wind turbines in the proximity of homes, due to inter alia noise effects on human beings, is a hot issue. The Netherlands definitely need to be aware of health effects that have been experienced in their own country as well as worldwide, due to the fact that a large amount of valid scientific evidence supporting the claim that wind turbine noise can lead to adverse health effects if they are placed too close to homes stem from Dutch studies. The Dutch government are not respecting the precautionary principle and the policy is focused on achieving wind energy targets. The protection of commercial development and the economic well-being of the country seem to be more important than the protection of private life, family life, home and health. Seeing the plausibility of noise disturbance and consequent health effects from wind turbines, the Dutch approach seems to have lost track of the interests of their people. Allowing the placement of wind turbines this close to homes, will result in serious and irreversible damage. Consequently the applicants claim that the Dutch authorities fail in their duty to assess, to a satisfactory degree, the risks that wind turbines in the proximity of homes might entail, and fail to take suitable measures in order to protect people's right to private life and home, within the meaning of Article 8, and more generally their right to enjoy a healthy and protected environment. On the basis of scientific and medical research this has led in France and also in other countries to national legislation in which it is ensured that wind turbines may never be realised within a radius of 1.5 kilometres from residential areas.

IV Statement relative to article 35 para. 1 of the Convention

A. Final decision (date, court or authority and nature of decision)

---

[221] Runyu Wang, 'The precautionary principle in maritime affairs', World Maritime University J Marit Affairs (2011) 10:143–165

[222] MG Faure, E Vos, red. Juridische afbakening van het voorzorgsbeginsel: mogelijkheden en grenzen. Den Haag: Gezondheidsraad, 2003; publicatie nr A03/03, p. 73

[223] See also: Carmen ME Krogh, 'Industrial Wind Turbine Development and Loss of Social Justice?' (2011) Bulletin of Science Technology & Society 2011 31: 321, p. 330

[224] Christopher Hanning, 'Sleep disturbance and wind turbine noise' (2009), p.19

There are several final decisions applicable. These cases can be found on: www.raadvanstate.nl, case numbers: 201106887/1, 201106769/1, 201107133/1, 201106997/1, 201106510 and 201107137/1. The following decisions are hereby enclosed:

1) Raad van State 201106769/1, 14 December 2011 (Bakker, de Bruijne and 177 others);

2) Raad van State 201106510/1/H1, 14 December 2011 (Puijk, Van Doorn);

Within a short period of time the applicants will send a copy of all the other final decisions per post to the registry of the ECHR.

B. Other decision (list in chronological order, giving date, court or authority and nature of decision for each of them)

On 4 May 2011 the Court decided 3 similar cases, which all concerned the same issue. These decisions can be found at www.rechtspraak.nl: LJN: BQ5252, Rechtbank Utrecht, SBR 10-2456, LJN: BQ5164, Rechtbank Utrecht, SBR 10/2305, LJN: BQ5237, Rechtbank Utrecht, SBR 10/2455). The following decisions are hereby enclosed:

1) Rechtbank Utrecht SBR 10/2455, 18 May 2011, (A. de Bruijne, 177 others);

2) Rechtbank Utrecht SBR 10/2305, 18 May 2011, (Puijk, Van Doorn);

3) Rechtbank Utrecht SBR 10/2456, 18 May 2011, (H. Van Doorn, 119 others);

Within a short period of time the applicants will send a copy of all these decisions per post to the registry of the ECHR. All these decisions are relevant to this complaint to the ECtHR. The decision of the municipality of Houten that followed on the viewpoints of the residents is enclosed. This decision is the same for all of the applicants in this case. All of them received the same decision as a respond of their viewpoints. Therefore it is unnecessary to enclose more decisions followed on the viewpoints.

C. Is there or was there any other appeal or other remedy available to you which you have not used? If so, explain why you have not used it.

No there was not.

V. Statement of the object of the application (see 19 e of the notes)

Applicants object is that the European Court of Human Rights determines:

1)that the 'Activiteitenbesluit', specifically Article 6.21a and 6.21 b, is in violation of Article 6 and 8 ECHR;

2) that the Netherlands by allowing wind turbines to be in operation in the vicinity of the residences (within a distance of 1.5 - 2 km) is acting in violation of Article 6 and 8 ECHR;

3) that the Netherlands is acting in violation of Article 6 and 13 by allowing wind turbines to be in operation in the vicinity of the residences (within a distance of 1.5 - 2 km) without the application of a judicial review in advance;

4) that the municipality of Houten is acting in violation of Article 6 and 8 ECHR by

granting a building permit and/or exemption to allow wind turbines to be build in the vicinity of homes;

5) that the State of the Netherlands has violated its own laws by retroactively abolishing the environmental permit, which is a essential preconditioning for legal protection in case of building projects, while an appeal was still pending, without providing that a judicial review could take place, and that that by itself is contrary to Article 6 and 13 ECHR;

6) that the Crisis and Recovery Act (CHW), specifically Article 1.6, is in violation of Article 6 and 13 ECHR;

7) that the State of the Netherlands has violated its own laws, as the Council of State excluded the applicability of the CHW in a case with parallels as determined in a decision of 1 December 2010 that article 3.1 appendix 1 CHW states that the CHW is not applicable to projects of 20+ buildings (i.e. a building project of more than 20 houses), if the project falls under the old WRO instead of under the new WRO while the same Council of State declared this law in the present cases did declared applicable and that the Netherlands consequently violate Article 6 and 8 ECHR;

8) that the State of the Netherlands shall pay compensation under Article 41 ECHR in connection with the necessary attorney's fee (€ 49.000 ex 19 % VAT) € 58.310,-. The deployment of a lawyer was necessary because of the complexity of the legal issues. The applicants were unable to understand the legal merits of legislation and the jurisprudence of the Court. For this reason the lawyer's office had to research the current jurisprudence and legislation that is applicable to this case of Houten. Because of the fact that only one person, Mr. M.E. Bakker, was able to finance the legal costs, he made an agreement with the lawyer that he should only pay a fixed fee for all total cost, in total € 58.310,- (incl. VAT).

VI. Statement concerning other international proceedings (19f)

A. Have you submitted the above complaints to any other procedure of international investigation or settlement? If so, give full details.

No, the applicants have not.

VII. List of documents

(no original documents, only photocopies, do not staple, tape or bind documents)
(See § 19 (g) of the Notes. Include copies of all decisions referred to in Parts IV and VI above. If you do not have copies, you should obtain them. If you cannot obtain them, explain why not. No documents will be returned to you.)

The list of documents will be send per post as soon as possible after sending this application form. We would like to ask the ECtHR lawyer to contact us about the list of documents that need to be send. We prefer to speak to a Dutch lawyer. If that's not possible telephone contact in English is possible.

VIII. Declaration and signature (19h)

I hereby declare that, to the best of my knowledge and belief, the information I have given in the present application form is correct.

Place
Date

Signature of the applicant or of the representative

Amice Advocaten B.V.,

J. van de Riet