EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

Noise regulation and wind energy deployment in EU Member States

A Report from the National Association Network

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Summary of Results

Noise is a considerable factor when it comes to planning and social acceptance of wind projects in Europe. Yet, some studies have associated concerns over noise with visual impact and perception which is considered to be the main factor for 'annoyance'. In most countries, noise legislation is based on national regulations. Allowable environmental noise limits are categorised by area and timing. Numerous countries have set night limits and, some, evening limits.

Noise emission limits

Proximity to dwellings and residential areas are a concern in most countries. Minimum and maximum levels usually vary between 40 to 55 dB during the day and are reduced by 5 to 10 dB during the night. Noise limits in recreational areas vary from 40 to 48 dB during the day and are reduced by approximately 5 dB during the night. Beyond residential and recreational areas, a number of countries also legislate on holiday cottages, agricultural areas, rural areas and hospitals.

Table 1 – Maximum and minimum noise emission limits in surveyed countries

Type of area	dB(A) near houses			
	DAY Min	DAY Max	NIGHT Min	NIGHT Max
Residential areas/ dwellings	40	55	35	45
Recreational areas	40	48	35	43

Denmark is the only country to have ratified the low frequency noise limits, with which wind developers have to comply with.

Noise measurement standards and control usually conform to the IEC 61400-11 standards.

Mitigation

The wind industry has been using mitigation and compensation techniques for reducing noise emissions. Noise modelling, acoustic data and detailed surveys during the planning phase are essential. Early community involvement and publication of noise model measurements are considered best practices. Yet, in most of the countries surveyed, citizens can address their concerns post construction and require additional mitigation techniques from the developers.

Table 2 – Main noise mitigation measures used in surveyed countries

Mitigation technique	Country
Noise measurement and modelling during EIA or pre-planning	all countries, EIA requirement
Landscaping, planting hedges & trees, noise barriers	Estonia, Poland, Portugal
Sound proofing windows and walls	Estonia, Portugal, UK
Reduce turbine speed, curtailment or shut down at night	Finland, Belgium, Italy, Poland, Portugal
Electronic damping controls for specific wind speeds and directions	Ireland
Burry lines	Italy

Harmonisation

As regards harmonisation of noise standards at EU- level, there is no clear consensus amongst the reporting countries. Most of the members are sceptical or have no consolidated opinion about the potential advantages a harmonisation will bring in reality.

Introduction and Background

Noise is considered one of the main challenges for the wind industry in Europe and can seriously restrict sites available for wind farm development. When it comes to public support, noise is a significant consideration and often presented as harmful human health. Noise regulation is usually very site-specific. Numerous studies have investigated the effects of noise from wind turbines, both in terms of infrasound and higher frequencies, on residents living in the proximity of wind farms.

A 2010 Canadian report 'The Potential Health Impacts of Wind Turbines' confirmed that noise level emissions complied with the World Health Organisation (WHO) recommendations for residential areas. Another study, 'Wind turbine sound and health effects' (2009) conducted by a panel of medical professionals from the US, Canada, Denmark and the UK concluded: there is no evidence that the audible or sub-audible sounds [including infrasound] emitted by wind turbines have any direct adverse physiological effects. In 2010, the Australian Government National Health Medical Research Council (NHMRC) concluded 'there are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines'.

Two major sources of noise are detected during wind turbine operation: mechanical and aerodynamic. Mechanical noise is attributed to different components of the wind turbine, such as the generator, the gearbox and the hydraulic system. However, concerns do not centre on the mechanical noise aspects since these have been reduced or mitigated significantly over the years. Aerodynamic noise caused by the downward movement of the blades and the swishing effect is a key concern. Techniques for reducing aerodynamic noise include adaptive approaches (e.g. varying speed of rotation and increasing pitch angle) and blade modification methods (e.g. adding serrations to trailing edge).

Scientific evidence concludes that wind turbines do not generate infrasound at a level that would damage human health. The research community confirmed infrasound and low frequency sound emitted by modern wind turbines are well below the level where known health effects occur.

Table 3 – Sources of noise disturbance from wind farms

Mechanical (components in nacelle)	×
Aerodynamic (movement of blades)	✓
Infrasound	×

The present report summarises the findings from questionnaires sent to the National Association Network. It reviews existing knowledge on perception and annoyance of noise from wind turbines in residential areas and summarises regulations in European countries. The report serves as a base for further discussions on regulations and guidelines on noise from wind turbines.

Results

Noise legislation

Noise emissions from wind turbines are a key concern for developers. In most countries environmental noise legislation is based on national regulations. Certain countries have developed wind turbine-specific guidelines. Noise assessment, modelling and measurements are included in the planning phase as a part of the EIA process.

Allowable environmental noise emission levels are often categorised by area (residential, recreational, medical institutions, industrial and so on) and by timing. During the day acceptable noise levels vary from 45 db(A) (for hospital, recreational areas) to 70 db(A) (industrial areas) but during the night the values are reduced by approximately 10 to 15 dB(A). In Flanders and Bulgaria, there is an additional time period in the evening.

In Denmark, following a 2012 regulation, applications for wind turbines have to comply with both current limit values for 'general noise' and low frequency noise (20 dB indoors at 6 and 8 m/s wind speeds).

Table 4 – Summary of noise legislation in surveyed countries

	Noise legislation
Belgium (Flanders)	Regional: Based on VLAREM, noise modelling during EIA and for building permit.
Belgium (Wallonia)	Regional: Based on 'Cadre de reference éolien' (not mandatory) but Wallonia is now developing new piece of legislation.
Bulgaria	National: based on PENA (Protection from Environmental Noise Act), during EIA.
Czech Republic	National level: governmental public notice, during EIA process and then during building permit, different noise levels for day/ night.
Denmark	National: Danish Ministry of Environment's Order, no 1284 (15/12/2011) no specific timings for wind turbines.
Estonia	National: modelling during EIA, different categories but the local government has the right to set stricter rules. (Regulation of the Ministry of Social Affairs: https://www.riigiteataja.ee/akt/163756)
Finland	National: Special guidelines for wind farms by the Ministry of Environment in summer 2012 (used in EIA, building permit phase and spatial planning).
Germany	National: Bundesimmissionsschutzgesetz (Federal Emissions Control Act) Permission per BImSchG (Federal Emission Control Act), technical guidance for wind turbines.
Ireland	No specific national legislation but Environmental Protection Agency (EPA) has set environmental noise regulations, ETSU- R-97. Guidance on noise assessment of wind turbine operations at EPA licensed sites (2011).
Italy	National: EIA requirement, noise regulation can be adapted for the scope of wind energy developments.

The Netherlands	National: L-den and L-Night system (max allowable noise level in nearby residential areas, calculated over a year).
Poland	National: Ministry of Environment Regulation on 'allowable environmental noise levels' (14/06/2007) set during EIA process, specific dB levels for day (6-22h) and night (22-6h).
Portugal	National: EIA requirement to comply with decree law 9/2007 from January 17th.
Switzerland	National: see Lärmschutzverordnung of 15.12.1986, Appendix 6 set during building permit process, specific timings (7-19h).
UK	National: Compliance with non-statutory guidance ETSU-R-97 during EIA or planning phase (where EIA is not required). Turbine noise can be subject to control through EPA (1990) and CPA (1965) schemes.

Noise measurement standards and control

In most reporting countries, noise emissions forecasting and measurements are carried out at the immediate vicinity of the houses, i.e. at the receptor's side to protect residential amenity. The allowed levels usually depend on wind speed. There can be also differentiation between indoor and outdoor measurement methods. Technical specifications on noise control and measurement standards need to conform to the IEC 61400-11 and/ or ISO 1996-2 standards.

Belgium
There is no standard methodology for conducting specific measurements and control. Due to poor quality of past noise controls, the Wind Energy Associations (VWEA, EDORA) are working with sound experts to develop a common methodology.

Bulgaria
Noise control is performed on the basis of Ordinance No2/05.04.2006. When commissioning a new industrial facility, the owner or the user has to undertake a periodical assessment of the noise indicators: once at the commissioning and then every 2 years.

To determine noise inside houses form "industrial sources", noise measurement methods are legally provided for (Item 4 of Attachment No3 of Ordinance 6), methods for measurement and evaluation of residential premises, public buildings and populated places (set by Bulgarian State Standard 15471:1982) and requirements for conducting self-monitoring and submitting information from 'industrial sources' of environmental noise (set by Ordinance No54/13.12.2010).

Denmark
Technical specifications on noise control and measurement standards are described in Ministerial Decree (no 1284 from 15/12/2011 and are also conform to the IEC 61400-11 standards[1]. There are no specific measurement requirements around housing; noise is measured

[1] The requirements are described in Annex 1, p. 5-14: http://www.mst.dk/NR/rdonlyres/E8562E10-2B2D-4BF3-BAE0-A265C5A0B86E/0/engelsk_vindmoellebekendtgoerelse.pdf

close to the turbine and values in the proximity are estimated on the basis of the original measurements.

Estonia

Noise control is performed according to Ambient Air Protection Act No135. There are no specific measurement standards but in practice the WindPro module 'Decibel' is used (in line with ISO standards 1996-2). Project developers have to model noise emission levels for dwellings in the vicinity of wind farms with a wind speed of approximately 8m/s.

Two parameters are measured in wind farms located close to residential areas:

- Noise emissions in immediate vicinity of houses (300-400m from wind turbines)
- Noise emissions of the turbine itself according to the EVS EN standard 61400 from distance 150m when the wind speed is between 8-10 m/sec at 90m height.

Finland

The Ministry of Environment has a working group to define the standards, of which the Wind Energy Association is a member. Measurements are performed on the receptor's side (houses) and not next to the turbines.

Germany

Noise controls are undertaken by means of forecast and Immissionsschutz- Nachweismessung[i] (emission control measurement). A technical guideline to determine noise emission values from wind turbines exist. Emission forecasting is also carried out around housing. The provisions for the determination of noise emission for the forecast or measurement are stipulated in the Annex of the TA Lärm. Further information is available at: http://www.repowering-kommunal.de/uploads/tx_tcdownloadmngr/RIB_Schallimissionen_11-08-30.pdf

Ireland

Noise measurements are typically taken in accordance with ISO 1996 Acoustics- Description and Measurement of Environmental Noise. Measurements are subject to best practice recommendations of Section 7 'Noise monitoring' of ETSU- R-07.

Italy

A law in 1997 (D.P.C.M. 14/11/97) required each community draw an Acoustic Zone Plan (A.Z.P) in order to identify the different allowed noise pressure values at specific locations. Other national legislation schemes include D.P.C.M. (01/03/91) 'Limits of exposure to noise in residential areas and in the external environment as well as D.M.A. (16/03/98) 'Techniques for detection and measurement of noise'.

Measurement standards are indicated by the law CEI EN 61400-11. It is also necessary to respect certain minimal distances from dwellings. Regional Health and Safety Agencies might perform the noise controls.

Poland

Noise measurements are usually carried out by experts. The Ministerial Decree for the Environment Regulation of 4/11/2008 sets the requirements for carrying out measurements of emissions. The model is compatible with PN ISO 9613-2.

Portugal

Turbine emission specifications (in dB levels) must comply with IEC 61400. Portuguese legislation requires the noise measurements to be made near the receptors and not near the wind turbines.

APA (Portuguese Environmental Agency) has published a practical guide for environmental noise measurements.

In addition, the Portuguese Standard NP ISO 1996 'Acoustic, Description, measurement and assessment of environmental noise' (2011) is harmonised with the International ISO standard. It includes the noise parameters which need to be taken into account for a proper selection of the specific times for the evaluation of noise levels as well as the necessary equipment and corresponding accuracy class. It also includes recommendations on the measurement locations, as well as different proposed measurements indoor and outdoor.

Switzerland

A detailed calculation is essential to confirm that the project is in line with the values defined by legal requirements.

UK

In England, reference to ETSU-R-97 is contained within national planning policy (the National Planning Policy Framework). In Northern Ireland, Scotland and Wales ETSU-R-97 is referenced in practice guidance that accompanies national planning policies, through Best Practice Guide to Planning Policy Statement 18 (Northern Ireland), Technical Advice Note 8 (Wales) and Technical Advice Note 45(Scotland). Schemes of over 50MW capacity or greater in England and Wales are considered against National Policy Statements 1 and 3. ETSU is referenced in the latter.

The Institute of Acoustics in the UK is currently consulting on the implementation of ETSU guidelines, which has been interpreted in different ways by different parties. The results are expected in early 2013.

Noise mitigation techniques

Summary

Table 5 – Noise mitigation techniques and countries where commonly used

Mitigation technique	Country
Noise measurement and modelling during EIA or pre-planning	all countries, EIA requirement
Landscaping, planting hedges & trees, noise barriers	Estonia, Poland, Portugal
Sound proofing windows and walls	Estonia, Portugal, UK
Reduce turbine speed, curtailment or shut down at night	Finland, Belgium, Italy, Poland, Portugal
Electronic damping controls[2] for specific wind speeds and directions	Ireland
Burry lines	Italy

[2] Damping: steady diminution of the amplitude of successive vibrations, reduction in magnitude of oscillation

The wind industry has been using techniques for reducing noise emissions. Apart from the standard mitigation techniques (change pitch angle of blades or blade rotation), manufacturers now use aero acoustically optimised airfoils and trailing edge serrations (teeth like shapes along the trailing edge) to produce low-noise turbine models. Optimised airfoils are an asset for blade manufacturers, as noise is generally linked to turbulences generated by the blade, which reduce turbine power output. Optimising blades for noise, means also optimising for turbulence, which essentially increases yields. Therefore, manufacturers have a 'selfish' interest in decreasing noise, and this trend is bound to continue. Yet, in higher frequencies it is argued that noise produced by serrations can be actually greater than the noise produced by the BAU noise. Experts suggest these modifications should retract at the frequencies when they add up to standard noise output.

Many respondents noted that low-noise turbine models/blades are now available on the market and that dB per MW, on the whole, are decreasing. Mechanical noise has been already tackled and not considered as a problem of a modern turbine.

In general, during project development, developers have to:

- Obtain qualitative acoustic data describing the noise emission of operational turbines
- Guarantee these levels will be maintained
- Obtain a good knowledge of the location of the site, topography, weather conditions
- Perform background noise surveys
- Compile this information to determine appropriate noise limits for local residences
- Provide this information to the authorities and permitting agencies in a systematic and competent way
- Agree on appropriate noise control measurements

<u>Further details</u>

Bulgaria

The mitigation techniques used include measurements of the background noise levels by the developer for the submission of the EIA and modelling of noise levels during the preparation phase.

Estonia

The main mitigation technique is noise modelling during the EIA. This should prevent noise disturbance. Some additional measures include landscaping (planting hedges or trees or noise walls) and use of sound proof windows and proper house insulation in rural areas.

Finland and **Belgium**, several wind turbines operate in reduced capacity during the night because of the noise levels effects.

Ireland, typical mitigation measures include preplanning siting practices (incorporating preliminary noise constraints), increased limit of 45 dB(A) for noise sensitive receiver with a financial interest in the farm (as described in ETSU- R97 guidelines) and electronic dampening controls for specific wind speeds and directions.

Italy

Noise control strategies are applicable to mitigate adverse effects (e.g. shut-down during nights or reduced noise setting at certain time/ day). In addition, the use of generators at low speed with airfoils optimised to reduce noise emission and –where possible- the use of buried lines with

a minimum depth of 1 m is recommended. New turbine models have also the transformer placed inside the tower.

Poland
Where a pre-construction study shows excessive noise values, the developer may apply various compensation methods, such as noise reduction screens or remote decrease in blade speed.

Portugal
When possible, wind farms should be at least located 500 m away from dwellings, irrespective of the noise emission levels. This is not a general rule, but rather a best practice.

Switzerland
Siting practices and public consultation.

United Kingdom
Impacts are assessed in accordance with ETSU-R97 guidelines. Such assessments will inform siting decisions, often involving public consultation. Finally, mitigation measures such as triple-glazing for windows might be offered in exceptional circumstances.

Best practices

Summary

Table 6 – Best practices for increased social acceptance of wind turbines regarding noise emissions

Best practice examples
Publish guidelines on noise calculation methodology
Early community involvement / publicise noise models
Design mitigation measures into the wind farm before submitting planning application

Further details

Publish guidelines on noise calculation methodology
Flanders, Belgium
VWEA members with noise experts are working on a best practice which will be used by the administration as guidance. The paper will mainly contain a calculation methodology and suggestions on how to control the overall sound pressure during pre- and post- construction.

Early community involvement / publicise noise models
In **Denmark**, early involvement of the local community is always recommended in order to ensure local acceptance.

In **Estonia**, noise modelling at an early project stage and making the results public can help with local acceptance.

In **Germany**, public opposition to projects may often be attributed to other reasons but noise. Concerns regarding infrasound may be addressed by means of involving the community.

In **Poland**, public consultation is strictly related to the EIA procedure, hence mandatory. The planning stage is to determine turbine locations that are most profitable while complying with requirements applicable to allowable noise levels.

Community involvement (voting on spatial planning) is a standard practice in **Switzerland**.

In the **UK**, community engagement is increasingly used by project developers as a means of identifying concerns and proposing mitigation measures. This is done in a non-statutory basis. Schemes of over 50 MW in England and Wales are subject to statutory consultation with the local community.

Design mitigation measures into the wind farm before submitting planning application
In **Ireland**, it is suggested that noise mitigation be designed into wind farm layout prior to applying for planning to ensure post planning mitigation is not necessary. This pre-planning mitigation design entails assessment of noise constraints including nearest noise sensitive locations, noise prediction modelling of preliminary layouts, long-term measurements to ascertain baseline noise levels and impact of preliminary layouts on receivers. Turbines can be relocated, removed from layout, re-sized or agreed reduced power output at this stage to negate adverse noise impacts.

Can wind projects be legally challenged on the grounds of noise emissions?

In most of the reporting countries, wind projects can be legally challenged on the grounds of noise with direct implications on their operation and profitability. If need be, developers have to offset excessive noise limits with mitigation techniques and suggest compensation measures. Citizens on the other hand are usually involved during the consultation phase and even during post-construction have the right to address their concerns in local authorities.

In **Belgium** (Flanders), a project developer can apply for a permit for a wind project which will not operate during the night. So, it is possible to have a permit that stipulates that wind turbines need to run in reduced mode during the night and in full mode during daytime and evening. Now this has changed: Local residents are encouraged to address their 'annoyance' and 'adverse effects' at the authorities and even if it is proven the limits are below recommended thresholds, the turbines may be required to run in reduced mode. In Wallonia there is no noise legislation, consequently wind farm approvals can easily be challenged at the Council of State. Regulations are be revised to clarify rules for wind farm noise.

In **Finland** there are noise guidelines since 1993. In the meantime, wind turbine specific guidelines have also been adopted. But it is, now, unclear which of the two are valid to be followed.

In **Ireland**, a wind project can be challenged at pre-planning stage t which incorporates a noise impact assessment in the EIS by any interested party. The noise can be challenged on any aspect. Post construction, a noise complaint can be made under Section 108 of the Environment Protection Agency Act 1992 by private individual or group. Local authorities can serve a notice relating to noise nuisance under Section 107 of the same Act.

In **Italy**, it is relatively easy to challenge projects as a proper assessment requires indoor and outdoor background noise measurements. As it is difficult to undertake indoor measurements, wind energy projects are often challenged.

In **Estonia** once a wind farm is operational, developers have to take mitigation and compensation measures if noise values are not met.

In **Germany**, wind projects can be legally challenged in case of non- compliance with the Federal Immission Control Act. Generally, concerns are scrutinised during the authorisation procedure. If emission standard values (at the receptor's side) exceed allowable levels during the night, the project can be approved with restrictions (for example temporary shut-down at night).

In **Poland**, if noise levels of an operational wind farm are not met, the investor is obliged to apply mitigation and compensation measures. In practice, these obligations are often dictated by the environmental authorities.

In **Portugal**, post-construction, on the basis of complaints by residents to the Environment Authority, further restrictions can be imposed to wind farms.

In **Switzerland**, wind projects can be also challenged on the grounds of excessive noise emissions by a vote on spatial planning from the citizens.

In the **UK**, Environmental Protection Act (EPA 1990) and private action through the courts allow for individual rights of appeal where noise limits are breached or limits are not breached but the individual nevertheless feels the quality of life is being impacted. The Control of Pollution Act 1974 (CPA) confers powers of investigation on Local Authorities where a valid complaint relating to noise has been received. Formally, any on-going legal action is pursued by the Local Authority, not the complaint under CPA. ETSU guidelines primarily relate to dwellings but also to any relevant receptor.

Harmonisation

Wind energy associations in Estonia, Finland, Switzerland and Italy support the idea of harmonising of noise standards across the EU Member States. The Swiss association considers this difficult to apply.

Associations in Belgium (Flanders, Wallonia), Denmark, Portugal and Ireland are sceptical about harmonisation since noise constitutes the most important regulation when it comes to spatial planning. Enforcement of new and potentially stricter regulations can therefore have far reaching consequences for planning opportunities at national level. In addition, the Danish Association questions whether it would not be more pertinent to compare noise regulations between industries at national level instead of harmonising turbine noise standards across the Member States.

The Polish wind energy association mentions that allowable noise levels are comparable in EU MS. However, implementing general, specified distances to different facilities is challenging as there are several parameters affecting noise propagation. In line with this the Bulgarian association (APEE) agrees that harmonisation of noise standards won't be useful for the industry.

In the UK, there are no firms currently manufacturing turbines but as a mature and significant market, manufacturers engage closely with the UK developers on turbine design aspects and their acceptability in the planning system. RenewableUK feels that Member States rightly continue to set their own policies as regards noise, reflecting different citizens' attitudes. Another remark is acknowledging the introduction of separation distances from receptors. These policies are in conflict with national planning policies and do not provide the best approach for addressing the potential impacts from wind turbine operation (regensw, 2012). The Members States should resist this arbitrary introduction and assess each case on its merits, having due regard to the surrounding environment, including background noise and topography, size and types of turbines used, and the nature and situation of the relevant receptor.

Therefore, there is no clear consensus on whether noise standards should be harmonised across Europe. Most of the countries are sceptical or have no consolidated opinion about the potential advantages a harmonisation will bring whilst they find it difficult to achieve.

Annex: Allowable environmental noise levels categorised by noise sources

Belgium

Flanders

VLAREM: http://www.lne.be/themas/vergunningen/regelgeving
Allowable noise values:

Type of area	dB(A) near houses		
	Day (7 – 19 h)	Evening (19-22h)	Night 22-7h)
1° touristic	44	39	39
2a° less than 500 m from industrial zone (urban area excluded)	50	45	45
2b° urban area less than 500 m from industrial zone	48	43	43
4° urban	44	39	39
5° industrial	60	55	55
5bis° agricultural	48	43	43
6° recreation (except houses)	48	43	43
7° others	44	39	39
9° gravel extraction and grubbing	48	43	43

Wallonia

Emission levels (at the receptor's side) are measured outside the houses. The allowed levels depend on wind speed and are coupled to a minimum distance from houses of 350m. Since we have larger turbines, distance is not relevant anymore and wind farms should be located at least 500m from houses.
A simple rule based on 45 dBA at the perception level not taking into account any wind speed will be probably put in force in the coming months.

Bulgaria

Pursuant to Art 11, Item 5 of PENA, the Ordinance No6/ 26.06.2006 are passed the following indicators: environmental noise indicators, limit value indicators of environmental noise, methods for estimating the levels of noise, methods for estimating the harmful effects of noise.
The indicators depend on: the nature of noise, time (day/ evening/night), premises, nature of territories and areas.
The allowable noise values can be categorised as such:

	level of noise in dB (DAY)	level of noise in dB (EVENING)	level of noise in dB (NIGHT)
Residential zones and territories	55	50	45
Zones for public and individual recreation	45	40	35
City centre	60	55	50
Industrial and storehouse facilities	70	70	70
Zones with heavy traffic	60	55	50
Medical institutions, hospitals and sanatoria	45	35	35

Denmark

There are no exemptions from the maximum allowable dBA levels which are applicable both day and night. In addition, there are max low-frequency levels in force. This noise level (indoor) cannot exceed 20 dBA low frequency in neighbour's houses in all types of areas, day and night.

	Max level in dBA (for 8 m/s wind speed)	Max level in dBA (for 6 m/s wind speed)
Outdoors and in open spaces	44	42
Densely populated areas	39	37

For low frequency, the limit is 20 dB indoors for wind speeds of 6 and 8 m/s.

Estonia

Application level numbers for planning areas:

	DAY	NIGHT
I category	45	35
II category	50	40
III category	55	45
IV category	65	55

Application level numbers for already existing areas:

	DAY	NIGHT
I category	50	40
II category	55	40
III category	60	45
IV category	65	55

Highest allowed noise limits:

	DAY	NIGHT
I category	55	40
II category	60	45
III category	65/60*	50/45*
IV category	70	60

*recommended level of anti-noise measures

**Categories:
I category – recreation areas, national parks, etc.
II category – children's and educational institutions, healthcare and welfare institutions, residential areas, recreational facilities and parks in cities and towns.
III category – residential and public use buildings, commercial , service and manufacturing companies.
IV category – industrial area.

Finland

The noise levels according to the guidelines published by the Ministry of Environment in summer 2012:

	Day (7-22.00)	Night (22-7.00)
Outside housing area	45 dBA	40 dBA
Outside recreational areas,	40 dBA	35 dBA

summer cottages ..		

However, developers and authorities have problems with which regulations they should comply: the wind-specific guidelines or the traditional guidelines referring to human actions as defined by the Government in 1993 (which have stricter limits).

Germany

Emissions (at the receptor's side) standard values are based on TA Larm. The compliance with these values should be proven by an emission prognosis/ noise certificate (Schallgutachten).

	Tags (dBA)	Nachts (dBA)
Industriegebiete (Industrial area)	70	70
Gewerbegebiete (Small industrial area)	65	50
Kerngebiete, Dorfgebiete, Mischgebiete (Central area- cities, rural areas, mixed areas)	60	45
Wohngebiete, Kleinsiedlungsgebiete (residential areas, small residential areas)	55	40
Reine Wohngebiete (pure residential areas)	50	35
Kurgebiete, Krakenhauser, Pflegeanstalten (recreation areas, hospitals, recreation cliniques)	45	35

Ireland

The DoEHLG (Department of the Environment Heritage and Local Government) guidelines provide limits for noise sensitive locations as follows:

- 35 to40 dB(A) LA90 for quiet daytime environments of less than 30 dB LA90 (7-23.00h)
- 45 dB(A) LA90 for daytime environments greater than 30 dB(A) LA90 or a maximum increase of 5 dB(A) LA90 above background noise
- 43 dB(A) LA90 for night-time periods (23.00-7.00h)

The EPA guidance provides limits of

- 55 dB LAr,T for daytime (8-19.00h) and 19-23.00h for evening time
- 45 dB LAeq for night-time (23-8h)
- Wind turbine noise not to exceed 45 dB LAeq at any time

Italy

No specific criteria, however certain regions suggest setback distances from dwellings. There are different limits during night and day.

Poland

Health resort 'A' protection zone	45 dB during the day, 40 dB during the night
Hospital areas outside cities	45 dB during the day, 40 dB during the night
Single family residential development	50 dB during the day, 40 dB

	during the night
Development areas related to permanent or temporary presence of children and young people	50 dB during the day, 40 dB during the night
Nursing homes	50 dB during the day, 40 dB during the night
Hospital areas in cities	50 dB during the day, 40 dB during the night
Multi-family residential and apartment development	55 dB during the day, 45 dB during the night
Farmstead development	55 dB during the day, 45 dB during the night
Recreation and leisure areas	55 dB during the day, 45 dB during the night
Residential and service areas	55 dB during the day, 45 dB during the night
Areas within the centre of cities above 100,000 inhabitants	55 dB during the day, 45 dB during the night

Portugal
Allowable noise levels as set up on the Decree Law 9/2007:
63 dBA (20-23.00 h)
53 dBA (23-7.00h)

UK
ETSU R97 sets variable limits assessed against background noise levels and permits 5 dBA above LA90 background noise, subject to a lower limit of 43 dbA at night and 35-40 dBA during the day at residential properties. As a result, distance requirements are identified on a case-by-case basis, subject to these noise limits.
Extract of legislation: http://regmedia.co.uk/2011/08/02/etsu_r_97.pdf

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