



One of the projects Vestas has completed on the Australian market is the erection of 46 V66-1.75 MW wind turbines by Lake Bonney Near Mount Gambier in the south of the country.

Management's environmental statement

The purpose of the environmental statement is to report and document environmental and occupational health and safety aspects at Vestas Wind Systems A/S. The environmental statement describes the overall objectives of Vestas' environmental and occupational health and safety work. It presents data reports and results achieved in 2004, and contains in-depth articles about specific areas at Vestas. In addition, it presents expectations for the future as regards environmental and occupational health and safety issues.

The environmental and occupational health and safety policy apply to all activities

Vestas develops and manufactures wind power systems that generate sustainable energy for consumers throughout the world. Vestas delivered 2,784 MW in 2004. The power generated annually by these turbines corresponds to the annual electricity consumption of approximately 2.1 million Danish households.¹⁾ The power generated annually by the turbines delivered means savings of approximately 4,009,000 tons of CO_2 in relation to the electricity generated in Europe, as on average the generation of European electricity results in emissions of 548 grams of CO_2 per kWh.²⁾

Vestas' environmental and occupational health and safety policy was revised in 2004. The most significant changes have to do with stressing that safety is always to have top priority, and that, as far as possible, Vestas' global activities must comply with Danish environmental and occupational health and safe-

ty legislation as standard – although with all due consideration for other national regulations and cultural differences.

Vestas' policy on the environment and occupational health and safety apply to all activities within the Vestas Group, and Vestas' objective is for all its employees to work with and according to the same environmental and occupational health and safety management system. In this way, the Group ensures that the environment and occupational health and safety are integrated into all stages of the process, from development and manufacture to sale, erection and service of the wind power systems. This, in turn, contributes to making improvements for the benefit of customers, shareholders, employees, other stakeholders and the environment.

The proportion of employees working at sites that have been certified and included in the environmental statement fell as a result of the combination with NEG Micon. This was due to the fact that NEG Micon did not operate environmental and occupational health and safety management systems or environmental reporting to the same extent as Vestas, cf. figure 1 on page 93.

Vestas' objective is still for all its activities to be certified according to the ISO 14001 environmental management standard and the OHSAS 18001 occupational health and safety standard. In line with this objective, it is pleasing to note that a further 9 per cent of those employed by the Vestas Group (878 people) now work at sites certified according to the ISO 14001 standard, and a further 11 per cent (1,065 people) are employed at sites certified according to the OHSAS 18001 standard, cf. figures 2 and 3 on page 93.

¹⁾ "Energy Statistics 2003", which is published by the Danish Energy Agency, states the electricity consumption for 2003 for an average Danish household exclusive electricity for heating to 3,430 kWh per year.

²⁾ Calculation based on "Opdatering af UMIP-databasen" (Updating the UMIP database), work report from the Danish Environmental Protection Agency, No. 27, 2002.

Figure 1:	Before the combination (%)	After the combination (%)	At 31 December 2004 (%)
ISO 14001	71	48	57
OHSAS 18001	6 4	40	51
Included in the environmental statement	68	45	61

The figure shows the development in the number of ISO 14001 and OHSAS 18001 certificates and the environmental statement for 2004.

Vestas continues to work towards its objective of an annual environmental statement that covers all the sites controlled by the Group, cf. figure 4 on page 93. It is thus pleasing to note that the expansion has continued such that the scope of the environmental statement for 2004 has been extended by 16 per cent, which is equivalent to 1,602 employees. The sites newly added to the environmental statement are: the nacelle factories in Galicia, Spain, and Wynyard, Australia; the tower and nacelle factory in Campbeltown, Scotland; the blade factory in Lauchhammer, Germany; and the sale and service unit in Husum, Germany. The list below names the sites covered by the 2004 environmental statement along with the year in which they were included for the first time:

2000 Vestas Towers - Varde, Denmark Vestas Nacelles - Viborg, Denmark Vestas Nacelles - Ringkøbing, Denmark Vestas Nacelles - Lem, Denmark Vestas Blades - Lem, Denmark Vestas Blades - Nakskov, Denmark Vestas Blades - Skjern, Denmark Vestas Control Systems - Lem, Denmark Vestas Northern Europe and Vestas Blades -Videbæk, Denmark 2002 Vestas Northern Europe - Falkenberg, Sweden 2003 Vestas Control Systems - Århus, Denmark Vestas Mediterranean East, Vestas Blades and Vestas Nacelles - Taranto, Italy Vestas Central Europe - Rheden, the Netherlands 2004 Vestas Nacelles - Galicia, Spain Vestas Nacelles - Wynyard, Australia Vestas Towers and Vestas Nacelles - Campbeltown, Scotland Vestas Blades - Lauchhammer, Germany Vestas Central Europe - Husum, Germany

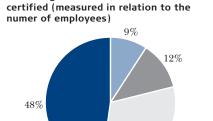
Detailed information about the environmental and occupational health and safety aspects of the sites included in the environmental statement is listed separately in the site descriptions for each facility. Site descriptions and other information about the environment and occupational health and safety are published online at www.vestas.com under the menu header "Environment".

Objectives

Vestas has highlighted waste, energy, absence due to illness, industrial injuries and environmental improvements of the product as the most significant aspects as regards the environment and occupational health and safety. Developments within the separate areas are followed continuously at all the

Figure 2:

Percentage of Vestas, which is ISO 14001



- ISO 14001
- ISO 14001 certified in 2004
- Scheduled for ISO 14001 certification in 2005

31%

■ Not certified

Figure 3:

Percentage of Vestas, which is OHSAS 18001 certified (measured in relation to the number of employees)

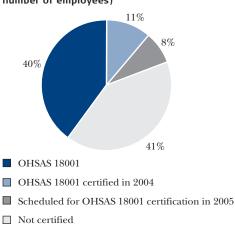
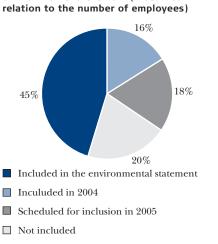


Figure 4:

Percentage of Vestas included in the environmental statement (measured in



Vestas' policy for the Environment and Occupational Health and Safety is:

- to give highest priority to safety
- to achieve continuous improvements in the fields of the environment and occupational health and safety
- to devote the necessary care as regards development, manufacture, service procedures and disposal
- to integrate consideration for employees and surroundings in the planning and performance of activities
- to ensure an open-minded and honest communication with the employees and other stakeholders
- to optimise the utilisation of resources
- to exert influence on suppliers so that they deliver environmentally safe products and services
- to ensure that, as a minimum, Vestas' activities comply with national legislation concerning environment and occupational health and safety.

Vestas implements this policy by:

- maintaining a certifiable management system according to ISO 14001 and OHSAS 18001
- integrating consideration for the environment and occupational health and safety in the development of products and processes
- communicating knowledge about the environment, occupational health and safety and improvement of health to the employees and other stakeholders
- measuring and documenting Vestas' impacts on employees and surroundings
- preparing an annual external environmental statement
- ensuring that Vestas' activities comply with national legislation and respect the Danish level wherever possible as the Vestas standard.

sites in question. On the basis of this work, significant areas of initiative are highlighted and specific improvement targets are laid down for all the sites concerned.

Energy consumption and the volume of waste generated are considered significant environmental aspects due to the quantitative scope. Therefore, the objective is to reduce the volumes of both waste generated and energy consumption. Moreover, Vestas wishes to contribute to the spread of sustainable energy by purchasing sustainable energy for its own activities. In 2004, sustainable energy accounted for 52 per cent of Vestas' total energy consumption.

The emphasis placed on absence due to illness and industrial injuries highlights the fact that Vestas considers employees to be the most important resource in the company's work to maintain its position as the leading supplier of wind power systems in the world.

Environmental improvement of the product should be seen as a long-term desire to reduce impact on the external environment and to improve the working environment. Vestas wishes to reach this objective by continuously developing more efficient wind turbines and by incorporating environmental and occupational health and safety considerations in the development of the turbines themselves. This is accomplished by viewing wind turbines from a life cycle perspective during the product development process, where, for example, the choice of technology is made on the basis of the environmental and occupational health and safety impact linked to each phase of the wind turbine life cycle.

Employee involvement

Employees are the Group's most important asset and are therefore involved in all phases of the environmental and occupational health and safety work. Employee involvement is thus an important part of everything from the identification of environmental and occupational health and safety aspects to the preparation of action plans and the establishment of targets. One of the tools used in this work is integrated product development, which involves employees from all parts of the organisation participating in the development of the wind power systems so as to ensure that environmental and occupational health and safety considerations are included in the evaluation of each solution proposed on a par with the other decisionmaking parameters.

Vestas is an international Group and involvement of employees is carried out with due consideration to this fact. Local conditions such as culture and legislation mean that the methods for involving employees are established locally as far as possible.

Suppliers

Vestas makes high demands on environmental and occupational health and safety aspects within the Group, so it is natural for the company to evaluate such aspects when selecting suppliers to the Group. Vestas expects all its suppliers to comply by existing legislation and to act responsibly with regard to the environment and occupational health and safety. At the same time, it should be stressed that Vestas recommends that suppliers obtain certification according to recognised management standards for quality, the environment and occupational health and safety.

Selected suppliers are also contractually obliged to observe the international set of ethical regulations laid down, and to abide by Vestas' chemical and material blacklist. The chemical and material blacklist are published online at www.vestas.com under the heading "Environment".

Events in 2004

In 2004, Vestas experienced two tragic accidents that had fatal consequences. Vestas' management neither can nor will accept risks to the safety of its employees and the two accidents have increased the focus even more clearly on employee safety. The causes of the two incidents have been investigated, and it was established that the product and the documentation material pertaining to the performance of the work did live up to the applicable requirements. Both accidents occurred because safety regulations had been ignored, and the management has therefore stressed to all employees that all safety regulations must be followed and that safety must always be given the highest priority – as is clearly stated in Vestas' policy on the environment and occupational health and safety.

The incidents naturally affected all areas of the Vestas organisation, and a number of initiatives have been implemented to ensure that accidents of this kind never happen again. For example, a new training programme for safety procedures has been set up and will be run for all employees who work in and around installed turbines.

The development in absence due to illness in 2004 shows that work on environmental and occupational health and safety management does pay off, as absence due to illness was cut by 20 per cent (from 4.4 per cent to 3.5 per cent) during 2003 to 2004

The work to map the various aspects of environmental and occupational health and safety impact within the casting group Windcast Group AS continued in 2004. On the basis of this mapping process, the conditions registered were evaluated and prioritised, leading to initiatives including the implementation of action plans for improving the occupational health and safety. Additionally plans for reducing external noise and emissions are in operation.

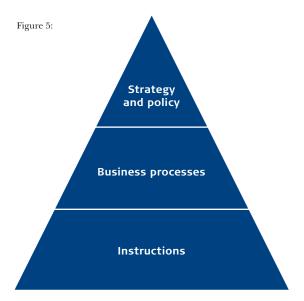
In 2004, Vestas completed a life cycle assessment of the V90-3.0 MW turbine. The results of this assessment highlight the positive results of the product development carried out in that with the V90-3.0 MW turbine, Vestas has improved the energy balance even further. In this context, "energy balance" is taken to mean an expression for the time it takes the wind turbine to generate the same volume of energy as is used throughout its life cycle - i.e. from extraction of the raw materials to final disposal. Compared to that of a V80-2.0 MW offshore turbine, the energy balance for a V90-3.0 MW offshore model has been improved from 6.8 months to 9.0 months. This result highlights the fact that Vestas is living up to its aim of developing turbines that continue to improve in all areas - including that of the environment. The life cycle assessments for V90-3.0 MW and V80-2.0 MW are both prepared according to the principals in ISO 14040-14043.

Since 2003, Vestas has been participating in a project focusing on making use of hardened composite materials – primarily in connection with ex-service wind turbine blades. In 2003, it proved possible to exploit the energy from the composite materials in a combined heat and power plant while simultaneously reducing the volume requiring disposal as landfill. In 2004, work continued on decomposition and treatment techniques intended to make it possible to break down the composite materials into uniform material types, as a number of recycling options are available for uniform materials. The current status is that technical solutions have been developed for both the decomposition and subsequent recycling of parts of the materials, but these solutions need to be developed further before they are commercially competitive. This work will continue in 2005.

It is satisfactory to note that the work to expand the scope of certified environmental and occupational health and safety management systems continued in 2004. The controller factory in Hammel, Denmark, was certified to the OHSAS 18001 occupational health and safety standard, while the sales and service unit in Husum, Germany was certified to the same standard and was also awarded environmental certification to the ISO 14001 standard.

Environmental and occupational health and safety management at Vestas

Vestas works systematically to improve the environmental and occupational health and safety aspects of the process from the development and manufacture to the sale, erection and service of wind power systems.



The figure shows the structure of the management system at Vestas.

The aim is for all Vestas employees to work with and according to the same management systems for the environment and occupational health and safety. By implementing a global management system, Vestas will be in a position to create improvements for the benefit of customers, shareholders, employees, other stakeholders and the environment.

The management system is built up around an overall strategy for the environment and occupational health and safety, a strategy concretised in an environmental and occupational health and safety policy that applies to all areas of the Vestas Group. A number of overriding requirements have been laid down for this work on the environment and occupational health and safety, and these requirements have also been integrated into Vestas' process model. Everyday work processes are described in a range of business procedures and instructions that are supported by a variety of auxiliary tools. The Vestas process model has been built up so as to ensure that, as a minimum, all the requirements of the ISO 9001, ISO 14001 and OHSAS 18001 quality, environmental and occupational health and safety standards are met. For example, reports have to be filed about significant environmental and occupational health and safety aspects at fixed, regular intervals. The reporting procedure is a tool for Vestas' management to follow up on all significant environmental and occupational health and safety aspects throughout the Group. The management system is illustrated in figure 5.

A range of Vestas' activities have already been certified to ISO 9001, ISO 14001 and/or OHSAS 18001 standard. This documents the fact that the requirements in Vestas' process model – and, as a result, the individual management standards – are met. For example, documentation shows that work is carried out in a structured manner according to a management cycle in which the environment and occupational health and safety are mapped and prioritised annually. Action plans are subsequently prepared and published for the entire organisation. Finally, overriding targets are laid down for the entire area, and audits are carried out to evaluate both the suitability and the efficiency of the management systems.

Responsibility for environmental and occupational health and safety aspects follows Vestas' organisational structure. Environmental and occupational health and safety functions have been set up in each business unit and in Vestas' staff department to collate, utilise and disseminate knowledge and experience.

Performance 2004

Principal activities	Achieved	Ongoing and future tasks
System		System
Certification of selected functions according to the ISO 14001 and OHSAS 18001 standards Vestas Control Systems in Hammel, Denmark, was certified in accordance with the OHSAS 18001 standard, and the sales and service unit Vestas Central Europe in Husum, Germany, was certified according to the ISO 14001 and OHSAS 18001 standards.	V	Certification of selected organisational units according to the ISO 14001 and OHSAS 18001 standards Vestas will continue to systematise the work on environmental and occupational health and safety aspect through the introduction of certified management systems for all Vestas activities. The target for 2005 is that additional 12 per cent of the organistion is covered by an ISO 14001 certificate and additional 8 per cent is covered by an OHSAS 18001 certificate.
Expansion of Vestas' environmental statement to cover more departments The environmental statement has been expanded to include five new sites: Vestas Towers and Vestas Nacelles – Campbeltown, Scotland; Vestas Nacelles – Galicia, Spain; Vestas Nacelles – Wynyard, Australia; and Vestas Blades – Lauchhammer and Vestas Central Europe – Husum, Germany.	V	Expansion of Vestas' environmental statement to cover more organisational units The work to expand the environmental statement to cover more organisational units continues. An action plan has been drawn up for the expansion of the environmental statement and covers all Vestas activities. The target for 2005 is for the environmental statement to cover additional 18 per cent of the organisation.
The environment and occupational health		The environment and occupational health
and safety		and safety
LCA of the V90-3.0 MW wind turbine Vestas has completed a life cycle assessment of a V90-3.0 MW wind turbine. The assessment reveals where the most significant areas of potential environmental impact are located in the individual phases of the turbine life cycle. This assessment can then be used as a decision-making tool in product development, in the choice of production technology, and for performing environmental comparisons between products and technologies.	V	LCA Vestas will continue work on the preparation of life cycle assessments for the entire product range. In 2005, a LCA will be prepared for the V82-1.65 MW turbine. The result of the assessments will be used to integrate consideration for environmental and occupational health and safety aspects into the development process and for the preparation of environmental information about Vestas' products.
Minimum standard for turbine sites worldwide Vestas has prepared an internal standard for dealing with quality, environmental and safety aspects in connection with sales projects. The standard is built on the relevant legislation and external stand- ards. A pilot project has been selected to test implementation of the standard.	V	The phasing out of lead in soldering processes and electronics products In 2005, an action plan will be adopted for the switch to lead-free components with the result that from 1 July 2006, such components will no longer be used in Vestas' electronic products. For reasons of quality, leaded soldering will continue until the applicability of a lead-free alternative has been sufficiently documented within Vestas' area of use.
The phasing out of lead in soldering processes and electronics In 2004, Vestas finished mapping the use of lead in soldering processes and electronic components. Wind turbines are not covered by the regulations of the RoHS Directive that apply to other products that contain electronic components. Nevertheless, it has been decided that all new designs are to be based on lead-free components, and work has been started on the preparation of an action plan for the switch to lead-free components.	V	Systematic integration of environmental and occupational health and safety aspects into product development Vestas will continue to systematise the work to integrate environmental and occupational health and safety aspects into the development of new products. In practice, the evaluation of environmental and occupational health and safety aspects will be implemented further in the Vestas project model for development.
Analysis of industrial injuries at the machining factory in Lem, Denmark The purposes of this completed project were to optimise the registration of injuries and near misses and to improve safety levels. In the concluding questionnaire-based survey, employees stated that the project had contributed to: increased focus on safety, a higher level of information about safety, and better knowledge about safety. However, the project also showed that it is still necessary to work on attitudes to the registration of near misses and the causes of accidents.	V	Phasing out problematic substances and materials from blade production Vestas will continue to systematise the work to phase out problematic substances and materials pursuant to Vestas' environmental and occupational health and safety policy and to the company's materials blacklist. Specifically, an action plan will be prepared for phasing out lead and toxic substances from blade production.
Transfer of experience from CAF to overseas blade factories The good results and experience from the CAF occupational health and safety project – of which the aims included reducing the incidence of epoxy allergy among employees at the blades factories in Denmark - are now being transferred to the blade factories in Germany and Italy. A knock-on effect of the project is the substitution in Denmark of a range of products containing epoxy and isocyanate. This substi- tution has similarly been completed at Vestas' blade factories abroad.	ж	Transfer of experience from CAF to overseas blade factories In 2005, Vestas will complete the transfer of experience from the CAF project, which includes the area of working with epoxy, at the blade factories in Germany, Italy and Great Britain.

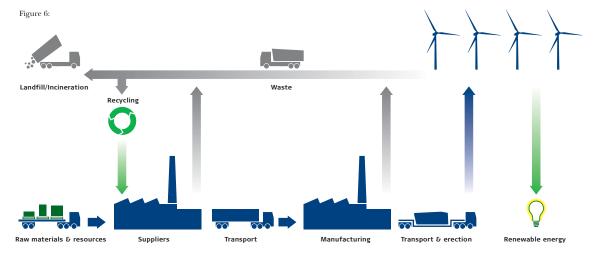
Target for sites 2004	Target achieved	Target for sites 2005
Environmental targets In all, Vestas set up 27 environmental targets for 2004. Detailed information about these is included in the descriptions of the individual sites. The extent of the target fulfillment has not been satisfactory.	18	Environmental targets In all, Vestas has set up 25 environmental targets for 2005. Detailed information about these is included in the descriptions of the individual sites.
Occupational health and safety targets In all, Vestas set up 22 occupational health and safety targets for 2004. Detailed information about these is included in the descriptions of the individual sites. The extent of the target fulfillment has not been satisfactory.	13	Occupational health and safety targets In all, Vestas has set up 39 occupational health and safety targets for 2005. Detailed information about these is included in the descriptions of the individual sites.







Vestas expects India to be one of the markets that will develop most positively in the short term. In 2004, Vestas' deliveries to the Indian market increased by approximately 41 per cent to 241 MW, making India Vestas' largest market outside Europe. The pictures above are from three different projects completed in India and involving NM48-750 kW, NM54-950 kW and NM82-1.65 MW wind turbines.



The figure presents an overview of the activities that make up the life cycle of a wind turbine from the extraction of raw materials and resources to final disposal.

The environmental impact of a wind turbine from cradle to grave

In 2004, Vestas completed a life cycle assessment (LCA) of a V90-3.0 MW wind turbine. The assessment was carried out on both onshore and offshore models of the turbine.

The life cycle assessment is both a mapping and an evaluation of the potential impact of the wind turbine on the external environment throughout its life time.

The evaluation presents a qualified estimate of where the most significant environmental impacts are positioned within the individual phases of life cycle of the turbine. A life cycle assessment can be used as a decision-making tool in product development, in the choice of production technology, and for performing environmental comparisons between products.

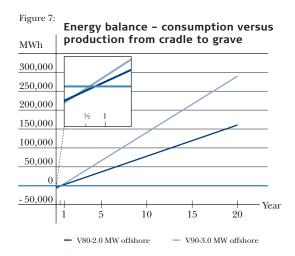
In order to compare two products appropriately, a common basis for comparison is essential. In a life cycle assessment, this is known as the functional unit. For the life cycle evaluation of the V90-3.0 MW wind turbine, the functional unit is 1 kWh of electricity generated. This unit makes it possible to compare the electricity generated by a conventional power station with that generated by a wind turbine.

Vestas previously completed a life cycle assessment on a V80-2.0 MW wind turbine, so it is now possible to compare the environmental performance of these two turbine types – and thus establish the results of the development that has taken place from the V80-2.0 MW to the V90-3.0 MW model.

Environmental impact during the life cycle

The life cycle assessment for the V90-3.0 MW turbine is divided into four phases:

- the production phase, which covers the period from obtaining the raw materials to the completion of the wind turbine
- transport of the wind turbine components and erection of the wind turbine



The figure shows the net electricity generation of V90-3.0 MW and V80-2.0 MW offshore wind turbines. It also presents the energy balance and the significance of this balance for the net production of the turbines.

- \cdot operation and maintenance throughout the 20-year design lifetime of the wind turbine
- \cdot disposal of the wind turbine.

The production phase covers the extraction of the raw materials, production by suppliers and Vestas' own production. This phase includes the most significant incidences of impact on the external environment. The environment is primarily affected by the extraction of iron ore for the production of steel components and by the casting of these components. Epoxy materials used in blade production are made using crude oil, and this is another aspect of the production phase that generates environmental impact. From an environmental perspective, the consumption of iron ore and crude oil involves drawing on limited resources. Therefore, the challenge in this area is to minimise the withdrawal while simultaneously optimising return on these resources, cf. figure 8 on page 99.

Taking the life cycle as a whole, the transport and erection phase is of only minor importance. During this phase, the greatest environmental impact is attributable to energy consumption. This refers primarily to the fuel used to transport components to the erection site and the consumption of fuel by the cranes, for example, during the erection of the wind turbine itself.

The Meroicinha project in Portugal consists of one V90-3.0 MW turbine and three V80-2.0 MW models.

During the operational phase, the environmental impact generated is also minor in relation to the life cycle of the wind turbine as a whole. The impact that is generated here stems from energy consumption in connection with the transport of personnel to and from the wind turbine. This can take the form of fuel for vehicles, boats, helicopters and the like. At the same time, there is some impact connected to service procedures such as oil changes.

The disposal phase covers the dismantling, division and final disposal of the wind turbine. As approximately 80 per cent of a V90-3.0 MW offshore wind turbine on a 80-metre tower can be recycled, this means that the environment is spared the impact of extracting a corresponding volume of new material. This saving is entered as an "asset" in the LCA and results in a considerable reduction in the total environmental impact of the wind turbine, cf. figure 8.

There is also some negative environmental impact linked to the disposal phase, although the scope of this is limited. For example, it has not yet proved possible to identify recycling options for some materials and products. These include various composite materials used, for example, in blades, nacelle cabins and the spinner (which covers the blade hub). However, it is now possible to exploit the energy contained in the composite materials through incineration. At the same time, the cranes, ships and lorries involved in the decommissioning process all consume energy.

Conclusions

One of the most significant conclusions of the Vestas life cycle assessment is that the relationship between consumption of materials for the production of a wind turbine and the energy subsequently generated by the turbine is crucial to the environmental impact of the wind turbine.

Figure 8:

V90-3.0 MW erected:		Offshore	Onshore
Total energy consumption	•	8,098 MWh	4,311 MWh
Production phase	•	12,255 MWh	7,795 MWh
Transport and erection phase		477 MWh	74 MWh
Operating phase		117 MWh	14 MWh
Disposal phase	•	-4,751 MWh	-3,572 MWh

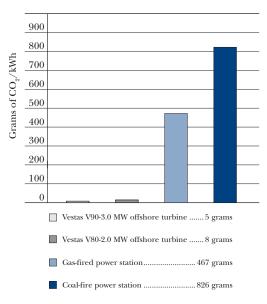
The consumption of energy during the entire life cycle of the V90-3.0 MW turbine divided into the four phases. By way of comparison, the offshore wind turbine is expected to generate 284,600 MWh and the onshore model 157,800 MWh during their 20-year design lifetimes.

In addition, it is clear that work must be done to increase the proportion of the material that can be recycled. The greater the level of recycling, the lower the environmental impact. The weight of a V90-3.0 MW wind turbine has been significantly optimised in relation to that of a V80-2.0 MW. For example, the nacelle and blades are approximately the same weight, while the tower weighs relatively less. At the same time, a V90-3.0 MW wind turbine generates more electricity than a V80-2.0 MW.

In comparison with conventionally generated electricity, it is clear how environmentally superior a wind turbine is when viewed from the perspective of a complete life cycle.

This means that in 20 years, a V90-3.0 MW offshore wind turbine on a good site will generate 284,600 MWh – thus sparing the environment the impact of a net volume of approximately

Figure 9:



Application of a life cycle assessment to compare a Vestas V90-3.0 MW offshore wind turbine with corresponding assessments of a V80-2.0 MW offshore wind turbine, a gas-fired and a coal-fired power station.³⁾

233,657 tons of CO_2 , as compared to the figures for energy generated by a coal-fired power station, cf. figure 9.

Another important result from the life cycle evaluation is the energy balance, an evaluation of the relationship between the energy consumption of the product and its energy output throughout its life cycle. For a V90-3.0 MW onshore wind turbine, the energy balance is 6.6 months, while the figure for a corresponding offshore wind turbine is 6.8 months. This constitutes an improvement of approximately 2.2 months in relation to the V80-2.0 MW offshore wind turbine, cf. figure 7 on page 98.

The life cycle assessments for the V90-3.0 MW and V80-2.0 MW turbines are published on the Vestas Web site at www.vestas.com under the heading "Environment".

Occupational health and safety

Consideration for occupational health and safety in all phases

Vestas has always focused heavily on the environment and occupational health and safety, so it is only natural that both aspects should be included in a life cycle context.

As early as the initial phases of the development of new turbine models, occupational health and safety aspects are included in connection with the production, transport, installation and service of the turbine as a natural part of the development process. The project groups that work on the development of the wind turbines of the future are composed of representatives

of all parts of the organisation. This means that, for example, service technicians and employees from Vestas' production facilities participate actively in the development of the wind turbines. The advantage of this approach is that the experience that the production employees and service technicians have built up in the field of occupational health and safety is integrated into the development of new wind turbines.

The following section describes some of the occupational health and safety activities included in an actual project – the North Hoyle offshore wind farm consisting of 30 V80-2.0 MW wind turbines, which was established in 2004.

Systematic improvement of occupational health and safety

Years ago, the manufacture of blades was a traditional manual craft, but on the basis of years of experience with blade production, Vestas has developed equipment that can handle the most strenuous operations. At the blade factory in Lem, Denmark, the production of the root joints for the blades is fully automated, and a robot has been installed to glue in place the 90 steel pins used in each blade for the V80-2.0 MW turbine.

One of the most recent initiatives in the field of occupational health and safety is the introduction of participatory groups, at the factories in Lem and Nakskov, Denmark, in which each member of the group is responsible for areas such as improvements in occupational health and safety, environmental aspects and quality. The introduction of participatory groups is considered to have made a significant contribution to improvements in occupational health and safety. For example drops of 22 per cent from 2003 to 2004 in the incidence of injuries (from 44.2 to 34.3) and drops of 25 per cent in absence due to illness (from 5.1 per cent to 3.8 per cent) during the same period have been recorded at the blade factory in Lem, Denmark.

The transition from conventional stand assembly to line assembly has been initiated at selected nacelle factories. This change means that it is now possible to set up workplaces for more specific assembly tasks, which is expected to improve occupational health and safety conditions. For example of line assembly has made it possible to develop specialist equipment for specific tasks with the result that, for example, heavy manual lifting has been eliminated from a number of operations. In addition, lifts will be installed to raise components to a height that allows employees to carry out their work in an ergonomically correct manner. The concept of introducing line assembly is to be transferred from the nacelle facility in Viborg, Denmark, to other nacelle factories.

Special training programme

As soon as the various turbine components for the North Hoyle offshore wind farm had been manufactured and transported out to the site, it was time to start work on the erection and

³⁾ "Global Emission Model for Integrated Systems - version 4.14", published by the Öko-institut (Institute for Applied Ecology), Germany, September 2002.



The offshore North Hoyle wind farm consisting of 30 V80-2.0 MW turbines has been set up approximately 7 km off the north coast of Wales.

commissioning of the turbines. A great many Vestas employees were involved in this work. Even though the work was carried out away from Vestas' "home turf", the same focus was maintained on occupational health and safety during this phase.

As the erection of wind turbines offshore involves risks other than those associated with the erection of turbines on dry land, Vestas has prepared a special offshore training programme. This programme includes thorough theoretical training and practical training in safety and in the risks involved in erecting wind turbines offshore.

For the erection phase at the North Hoyle site, reporting of near misses was introduced. This means that near misses were recorded and investigated. These records constitute an important tool in the work to eliminate industrial injuries entirely. In order to maintain the desired and necessary focus on safety, information meetings were held regularly with a view to reducing the risk of accidents and injuries. The results for North Hoyle were than during the 713 days that the work lasted, 7 near misses and 2 industrial injuries with absence were reported.

The wide range of activities and initiatives therefore generated good results. Through management systems, a high level of systematisation is applied to the work on occupational health and safety. In addition, a great emphasis was placed on training employees at all levels.

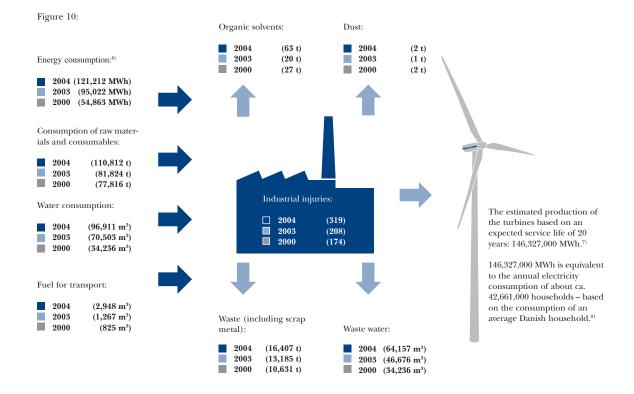
Major focus on safety

Vestas' attitude is that industrial injuries are not acceptable and generate unease among employees. Even though the project at North Hoyle shows that Vestas has made great progress in the field of occupational health and safety, the company will continue to focus heavily on this area in the future.

The work to implement management systems throughout the Group will continue. At the same time, one of the stated aims is to improve dialogue with customers, authorities, shareholders and employees with regard to the expectations the various stakeholders have for Vestas. Only through dialogue can Vestas remain in the vanguard of development and thus ensure that existing and future turbines are developed, manufactured, transported, erected and serviced in accordance with the applicable requirements for occupational health and safety.

Input/output 2004

The figures below illustrate the overall input and output for the sites included in the 2004 environmental statement. The output is shown as the total energy production of the turbines delivered during their expected service life of 20 years. Detailed data about the sites are published online at www.vestas.com – under the heading "Environment". They are also available as hard copy data sheets.



Indirect impact

Production processes at Vestas produce some indirect environmental impact. The table below lists the most important types

of impact and explains the effects these can cause. It also details the positive effects wind turbines help to generate.

Indirect impact	Type of impact
Emission - Consumption of energy, diesel oil and organic solvents results in	These emissions primarily contribute to the greenhouse effect (CO_2 and
emissions, primarily of CO ₂ , SO ₂ and VOC. Emissions from suppliers of raw	VOC) and to acid rain (SO ₂).
materials likewise contribute to indirect impact.	
Waste - Results from the manufacture of wind turbines and the activities of	The generation of high-volume waste takes up landscape resources as a result
suppliers.	of landfill. Hazardous waste is waste that must receive special treatment.
Waste water – Waste water from Vestas sites is primarily sanitary waste water.	Emissions of waste water cause nutrient salt load and ecotoxicity, for example.
Emissions from suppliers in the product chain are similarly considered an	
indirect impact.	
Sustainable energy – On the positive side, wind turbines generate sustainable	Efficient and competitive options to conventional energy production will help
energy for customers throughout the world. The wind turbines manufactured	to reduce emissions that contribute to the greenhouse effect and acid rain.
thus contribute to reducing impact and load stemming from conventional	In addition, sustainable energy will help to reduce the creation of radioactive
sources of energy such as coal-fired power. The environmental advantages	waste from the production of electricity.
far outweigh the effects arising from both direct and indirect environmental	
impact ⁹⁾	

 $^{^{\}rm 6)}$ Of this, sustainable energy accounts for 52 per cent.

⁷⁾ The value is calculated on the basis of an expected service life of 20 years and a capacity factor of 30 per cent. The figure should be considered only indicative, as it stems from a calculation based on an estimate.

⁸⁾ In "Energistatistik 2003" (Energy Statistics 2003), published by the Danish Energy Authority, electricity consumption – excluding electricity for heating – for a standard Danish household is estimated at 3,430 kWh per year.

⁹⁾ Life cycle assessment carried out by Vestas in 2004. Explanatory comments on the life cycle assessment are listed in the report "Life cycle assessment of off-shore and onshore wind power plants based on Vestas V90-3.0 MW turbines", March 2005.

Development in relation to 2003

The 2004 Environmental Statement has been extended to cover an additional five sites. As a result, the total volumes stated and the number of industrial injuries have increased. The five new sites are Vestas Blades in Lauchhammer, Germany; Vestas Central Europe in Husum, Germany; Vestas Nacelles in Galicia, Spain; Vestas Nacelles in Wynyard, Australia; and Vestas Nacelles and Vestas Towers in Campbeltown, Scotland. The specific environmental and occupational health and safety data for these sites are listed in the appropriate site descriptions. Site descriptions can be found at www.vestas.com under the heading "Environment".

Consumption of raw materials rose in 2004. In addition to the inclusion of, in particular, the blade factory in Lauchhammer, Germany and the tower factory in Campbeltown, Scotland – which both run traditionally resource-intensive processes – the rise is attributable to an increase in steel consumption at the tower factory in Varde, Denmark. This rise in steel consumption stems from an increase in tower manufacture and from the fact that the average weight of the towers has risen.

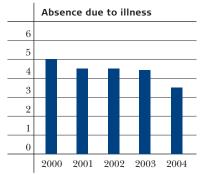
Total energy consumption rose in 2004. This is due to the inclusion of the blade factory in Lauchhammer, Germany in particular, as this facility operates energy-intensive processes. To a lesser extent, it is also due to the inclusion of the nacelle and tower factory in Campbeltown, Scotland and the sales and service unit in Husum, Germany. However, a comparison of the energy consumption of the sites included in the 2003 report with their consumption in 2004 shows that their total energy consumption has actually fallen by 6 per cent. This drop stems primarily from the site in Videbæk, Denmark, the nacelle factory in Viborg, Denmark, and the blade factory in Nakskov, Denmark. The Videbæk site succeeded in making considerable energy savings by optimising its CTS installation. This involved, for example, lowering the temperature at weekends, when no work is done in the production department. The fall achieved at the Viborg site is similarly attributable to optimisation of the CTS installation. The lower figures for the Nakskov site are due to the fact that production here was lower in 2004 than in 2003.

Fuel consumption has increased by 132 per cent. This is primarily attributable to the inclusion of the sales and service unit in Husum, Germany, which is currently the largest unit of its kind in the Vestas Group.

Inclusion of the tower factory in Campbeltown, Scotland has contributed to an increase in the emission of organic solvents and dust from 2003 to 2004. At this site, organic solvents are released during the surface treatment of towers.

The total incidence of industrial injuries rose in 2004 compared to 2003. Vestas Mediterranean East, Vestas Blades and Vestas Nacelles in Taranto, Italy, constituted the principal source of this rise, as they experienced 42 more industrial injuries in

Figure 11:



Development in absence due to illness among blue-collared employees.

2004 than in 2003 – an increase of 87 per cent. At the Vestas Northern Europe facility in Videbæk, Denmark, the number of industrial injuries rose by 19 in relation to 2003 – a 49 per cent increase. However, a number of sites have succeeded in reducing the incidence of industrial injuries locally. For example, the blade factories in Lem and Nakskov, Denmark, introduced a project entitled "zero injuries, zero errors, zero waste" and implemented participatory groups. These initiatives generated positive results in that the total number of industrial injuries was cut by 30 – a reduction in the total incidence of 39 per cent. Overall, the development in 2004 is not satisfactory, and Vestas will continue to focus clearly on systematic occupational health and safety management. For example, the Group is currently working on a project for the global exchange of experience in the field of safety.

Absence due to illness among salaried employees fell markedly in 2004, which is a very positive development. This positive trend is attributable to the systematic work on occupational health and safety management in the long term, which is reflected in the development in the rate of absenteeism due to illness, cf. figure 11. At the blade factories in Denmark, the introduction of the project entitled "zero injuries, zero errors, zero waste" and the implementation of participatory groups have had a significant effect. Absence due to illness in Nakskov, Denmark, has fallen by 46 per cent, from 6.7 per cent in 2003 to 3.6 per cent in 2004, while the figures for Lem, Denmark, for the same period show a 25 per cent drop, from 5.1 per cent to 3.8 per cent.

Data statement 2004

The statements below present the most significant environmental and occupational health and safety data that are systematically collected by Vestas Wind Systems A/S.

Environment	Total 2003	Total 2004 Previously included sites ¹⁾	Total 2004
Raw materials and consumables (t)	81,824	95,437	110,812
· Metals	66,093	80,164	90,732
· Oil products	961	913	1,274
· Composite materials	14,157	13,559	17,589
· Other products	613	801	1,217
Energy (MWh)	95,022	89,042	121,212
· Electricity	50,389	51,860	68,8562)
· Gas	13,413	10,791	12,058
· District heating	30,837	26,232	36,104
· Oil	383	159	4,194
Fuel (m³)	1,267	1,213	2,948
Water (m³)	70,503	79,697	96,911
Waste and scrap (t)	13,185	13,446	16,407
· Combustion	3,189	2,980	4,301
· Landfill	2,512	2,192	2,827
· Recycling	7,484	8,274	9,279
Waste water (m³)	46,676	46,943	64,157
Emissions of dust (t)	1	1	2
Emissions of organic solvents (t)	20	36	63
Volume of flue gasses (normal 1,000 m³)³)	12,048	9,741	15,789
Neighbour complaints (number)	0	2	2
Breaches of internal inspection conditions ⁴⁾	1	1	1
Environmental accidents (number)	0	3	5

Occupational health and safety	Industry figures ⁵⁾	Total 2003	Total 2004 Previously included sites ¹⁾	Total 2004
Injuries (number) ⁶⁾	N/A	208	218	319
Incidence of injuries ⁷⁾	43.8	39.3	43.3	42.5
Absence due to injuries ⁸⁾	3.7	4.8	4.3	3.8
Absence due to illness, blue-collar workers (%)	4.2	4.4	3.7	3.5
Absence due to illness, white-collar workers (%)	1.9	1.4	1.5	1.6

¹⁾ "Previous sites" refers to the sites that were included in the Environmental Statement for 2003.

 $^{^{\}rm 2)}$ Of this, sustainable energy accounts for 52 per cent.

³⁾ Flue gases stem from gas and oil-fired boilers that are principally used to heat buildings.

⁴⁾ Details of breaches of own control conditions and the associated corrective actions are listed under the descriptions of the individual sites.

⁵⁾ The sector figures apply to the iron and metal goods industry and are drawn from reports prepared by the Confederation of Danish Employers for 2003.

⁶⁾ The figures refer to industrial injuries that result in an absence of more than one day in addition to the day on which the incident occurred.

⁷⁾ The incidence of injuries is defined as the number of industrial injuries per 1,000,000 working hours.

⁸⁾ The incidence of absence due to injury is defined as the number of hours lost to absence due to industrial injuries per 1,000 working hours.

Accounting policies

Accounting policies and measurement and statement methods applied are unchanged from 2003, except for waste and scrap, where the precision of the methods for measurement and accounting has been increased through the inclusion of new sites. Adjustments made to comparative data are disclosed in notes if they have influence on the achievement of targets or involve a significant change of the total environmental impact.

Raw materials and consumables

Raw materials are recognised in the statement on the basis of consumption drawings from stocks to manufacturing in the first phase of manufacture and to servicing of wind turbines, respectively, as recorded in the company's ordinary registration systems.

Consumables are recognised in the statement on the basis of supplier statements and own lists, respectively, of quantities delivered in the financial year collected decentrally per site.

Relevance has been determined on the basis of approvals by the authorities followed by a selection in relation to material quantities consumed compared with the activities carried out on the sites.

Energy and water consumption

Electricity, gas, district heating and water are recognised in the statement on the basis of quantities consumed according to direct meter readings per site with related administration.

The consumption of electricity comprises both electricity purchased externally and consumption of production from own wind turbines.

Oil for heating is recognised in the statement on the basis of external purchases adjusted for stocks at the beginning and at the end of the period. Fuel for transport has been recognised on the basis of supplier statements.

Waste and scrap

Waste is recognised in the statement on the basis of weight slips received from the waste recipients for deliveries effected in the financial period, apart from a few types of waste and not significant amounts of waste, which are estimated on the basis of subscription arrangement and load. Scrap is recognised in the statement on the basis of weight slips from the scrap dealers collected decentrally per site.

Emission to air and waste water

Emissions of organic solvents have been calculated on the basis of quantities of mould preparation agents, coating materials and acetone purchased as well as information from suppliers concerning evaporation during use in processes.

Emission of dust is based on the discharge determined by the authorities which is to be included in the total dust emission calculations, estimated operating times of the individual plants and measurements or information from the suppliers as regards dimensions and filter efficiency.

Waste water is recognised as water consumption reduced by utilised water, which does not end as waste water e.g. water humidification, green areas or other processes where the consumption is documented through measurement.

Materiality is determined on the basis of regulatory approvals and conditions.

The total volume of flue gases from incineration processes has been calculated based on the consumption of fuel oil and natural gas as well as measured or estimated oxygen percentage.

Neighbour complaints

Neighbour complaints are recognised in the statement as the number of complaints received resulting in operating or layout changes.

Internal inspection conditions exceeded

Internal inspection conditions exceeded are recognised in the statement as the conditions for which there is a measurement requirement and the measurement has shown the conditions being exceeded.

Environmental accidents

Environmental accidents are recognised in the statement as the accidents occurred which should be or have been reported to the authorities.

Occupational health and safety

Occupational health and safety are recognised for all activities under the organisational structure.

Industrial injuries are recognised in the statement on the basis of records of injuries resulting in more than one day of absence in addition to the day on which the injury has happened.

Absence due to injuries is defined as hours absent due to industrial injuries. The number of working hours and absence frequency due to injuries have been calculated on the basis of daily time cards registered in the payroll system.

Absence due to illness is defined as hours absent due to illness, exclusive of absence caused by industrial accidents, maternity leave and child's first day of illness. Absence frequency due to illness has been calculated by means of registrations in the payroll system based on daily time cards (blue-collar workers) and absence records (white-collar workers), respectively.

Auditor's report

Auditors' Report to the Shareholders and Other Stakeholders of Vestas Wind Systems $\rm A/S$

We have performed an assessment of Vestas Wind Systems A/S' Environmental Statement for 2004, which comprises the pages 92-105.

Criteria for the Preparation of the Environmental Statement

On page 93 of the Environmental Statement, Management describes the sites comprised by the Environmental Statement for 2004.

On page 93 of the Environmental Statement, under the heading "Objectives", Management states the reasons for its choice of waste, energy, absence due to illness, industrial injuries and environmental improvements of the product as suited criteria for describing the Company's environmental and occupational health and safety aspects.

Environmental and occupational health and safety data are incorporated in the Environmental Statement according to the accounting policies and measurement and computation methods stated on page 105.

Responsibilities

Company Management is responsible for the preparation of the Environmental Statement, including the establishment of recording and internal control systems to ensure a reliable reporting basis, for the determination of acceptable reporting criteria and choice of data to be collected.

Our responsibility is to express an opinion on the Environmental Statement based on our assessment.

Basis of Opinion

We planned and performed our work in accordance with the International Standard on Assurance Engagements, ISAE 3000, to obtain reasonable assurance that the data stated on pages 92-105 of the Environmental Statement for 2004 in respect of the activities of the sites comprised have been prepared in accordance with the above criteria for the preparation of the Environmental Statement.

Based on an assessment of materiality and risk, our work included accounting analyses, inquiries, testing of systems, data and underlying documentation, including verification of compliance with the guidelines stated for measurement and computation of data. Furthermore, we assessed the propriety of the internal recording and reporting systems as basis for uniform recording of and reporting on environmental and occupational health and safety data for the sites comprised.

Opinion

In our opinion, the data stated on pages 92-105 of the Environmental Statement for 2004 have been prepared in accordance with the above criteria.

Herning, 30 March 2005

PricewaterhouseCoopers

Statsautoriseret Revisionsinteressentskab

Niels Jørgen Lodahl State Authorised Public Accountant Birgitte Mogensen
State Authorised
Public Accountant

Conversion factors

1 GW	1,000 MW
1 MWh	1,000 kWh
1 Nm³ natural gas	11 kWh
1 litre heating oil	9.89 kWh
1 ton	1,000 kg

Glossary

Absentee rate:

The absentee rate is defined as the number of absentee hours per 100 working hours.

Capacity factor:

An expression for the number of hours that the turbine operates at full capacity during a year.

CNC processing:

CNC (Computer Numerical Control). An expression used for computer-controlled processing.

Consumables:

Chemicals and materials which are used in the production process.

Design service life:

The design service life has been set at 20 years.

Energy balance:

The energy balance of a wind turbine is an expression of how long the turbine has to operate before it has produced sufficient energy to cover the volume of energy consumed in its entire life cycle, from extraction of the raw materials to final disposal.

Environmental improvements of the product:

In the context of wind power, environmental improvements mean more efficient wind turbines and environmental evaluation of the substances and materials used in the product.

Epoxy:

Epoxy is a thermosetting plastic available in a wide range of forms. Typically, epoxy consists of several components in liquid form which, having been blended with a hardening agent, become a solid plastic. The hardening process typically involves the application of heat.

Estimated turbine production:

The value is calculated on the basis of an expected service life of 20 years and a capacity factor of 30 per cent. The figure should be considered only indicative, as it stems from a calculation based on an estimate.

Flue gas:

Combustion gas from gas and oil-fired installations.

GAP analysis:

Identification of the difference (the gap) between the current practice in the fields of the environment and occupational health and safety and Vestas' internal requirements.

Internal inspection conditions:

Conditions laid down by the supervisory authority for the measurement of noise, odours, waste water and emissions into the air.

ISO 9001:

International standard for quality management systems.

ISO 14001:

International standard for environmental management.

ISO 14040-43:

International standard for environmental management, Life Cycle assessment.

LCA:

An LCA (Life Cycle Assessment) is a report on the environmental impact generated by a specific product throughout its lifetime (the cradle to grave principle). Life Cycle Assessments are carried out on the basis of the UMIP method (Udvikling af Miljøvenlige IndustriProdukter – Development of Environmentally Friendly Industrial Products), which, in turn, is based on ISO 14040-43.

At Vestas, LCAs are used as a work method for the environmental improvement of the products.

Material blacklist:

A list of substances and materials that may not be used in Vestas' products, as well as substances and materials that may only be used to a limited extent.

Mould preparation agents:

Umbrella term for the following groups of auxiliary agents: mould cleaning agents, mould sealants and release agents.

Nacelle

The turbine housing at the top of the tower.

Near miss:

An incident that occurs unexpectedly, which does not result in personal injury, but may have caused material damage and could conceivably have led to personal injury.

OHSAS 18001:

Standard for Occupational Health and Safety management (OHSAS = Occupational Health & Safety Assessment Series).

Prepreg:

Epoxy laminate consisting of fibreglass weave impregnated with epoxy. The product is subsequently hardened and therefore takes the form of a dry material.

Root joint:

The "root" end of the blade (made of prepreg).

Safety audit:

Systematic examination of a department or machine with the purpose of constantly checking for and repairing any errors and defects that may affect safety.

Sanitary waste water:

Waste water from baths, kitchen use, ordinary cleaning, etc.

Spar:

Blade component that determines the strength and rigidity of the blade (made of prepreg).

Sustainable energy:

CO₂-neutral energy generated from the combustion of biomass in the form of wood, straw and biogas, refuse incineration, wind power, heat pumps, solar power installations and geothermic heat.

Unwanted substances and materials:

Substances and materials covered by "Effektlisten 2000" (Effect List 2000) – guideline No. 6/2000 from the Danish Environmental Protection Agency and "Listen over uønskede stoffer" (List of unwanted substances) – guideline No. 9/2000 from the Danish Environmental Protection Agency, as well as substances and materials that Vestas unilaterally wishes to stop using on account of their potential impact on the environment and/or occupational health and safety.

VOC

VOC (Volatile Organic Compounds). Term for organic solvents

Constant focus on safety, the environment and occupational health and safety

The environment and occupational health and safety – including employee safety – have a considerable influence on Vestas' business development and operations. As such,

regard for the environment and occupational health and safety is deeply rooted in the Vestas organisation. In addition to supplying wind power systems for the generation of sustainable energy, Vestas considers it natural to include consideration for the environment and occupational health and safety in all its operations and development activities.



Vestas has always given high priority to safety at work, and over the years has made a concerted effort to improve safety in all aspects of its employees' everyday work situations. One of the tools used to improve safety and prevent industrial injury is the registration of both industrial injuries and near misses. The registered incidents provide the basis for corrective actions intended to prevent industrial injuries.







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