

Making wind work

Together we power the future

For more than 30 years our efforts have been devoted to raising the profile of wind as a mainstream energy source.

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## Powering sustainability

The use of energy is growing rapidly and the resources of our planet are already under great pressure. We need to change the way we produce our energy. We need to produce more renewable energy, and the most promising source of energy is the power of wind.

At Vestas, we believe energy to be an important catalyst for founding a better quality of life. A stable energy supply is an essential part of the infrastructure for a developed society. Energy is central to nearly every major challenge and opportunity the world faces today. Be it jobs, security, climate change or food production - access to sustainable energy is essential for strengthening economies, protecting ecosystems, reducing poverty and achieving equity.

Read a [statement](#) from our President and CEO.



## Safety

Vestas' goal is zero injuries. We are of the belief that all injuries can be prevented if every hazard is managed and if the right behaviour is in place.

We work closely together with customers to fulfil the demand for the highest level of safety in our operations as this adds certainty for their business case. Also, we actively join hands with partners across the industry to mitigate general risks and improve training.

By putting safety first we have significantly improved our incident rate\* for eight years in a row.

However, we recognize that working with wind turbines is not hazard-free. Heavy components, dizzying heights, unpredictable weather conditions and demanding processes presents a challenging work environment.

Safety must be rooted in the business culture and in Vestas this starts at the top. Management is accountable, but all employees shoulder their share of responsibility for their own and their colleagues' well-being. A focus on the individual employee enforces that working safely is a condition for employment at Vestas. We view the employee as the most critical factor in our collective effort to stay safe.



Through root cause studies it's become apparent that more than 90 per cent of industrial injuries are related to people's behaviour. Central to decreasing this trend is our zero-tolerance approach towards actions or decisions that could undermine any aspect of safety, no matter how minor.

At Vestas, we believe that by being aware of safety hazards it is possible to change behaviour and prevent injuries.

Vestas has developed a safety roadmap to methodically approach safety challenges. The initiatives identified are spilt into yearly business plans to ensure that all activities and objectives are rolled out in a coordinated manner across all of Vestas.

\*Incidence of industrial injuries per one million working hours – Lost Time Injury

## Towards **zero** injuries

Vestas is on a cultural journey, moving towards taking a collective responsibility for safety. Since our journey began in 2006, the incidence of industrial injuries per one million working hours at Vestas has been reduced an average of 28 percent every year. It is now at the level of 1.6 per one million working hours.

In 2015, a new safety KPI is being introduced in Vestas, focusing on 'total recordable injuries', which in addition to 'lost time injuries' includes 'restricted work injuries' and 'medical treatment injuries'. The measure 'total recordable injuries' represents a broader number of injuries giving a broader perspective of where unsafe behaviour takes place and unsafe material is used. This allows Vestas to evaluate and target injury reduction programs more effectively.

Near miss reporting and hazardous observations  
At Vestas we register near misses and hazard observations as well as injuries. This is an important step towards achieving a zero injury

culture. The number of near miss and hazardous observations per lost time injury has remained constant from 2013 to 2014, maintaining that people anticipate injuries before they occur thereby preventing more injuries.

### **Incidence of lost time injuries** Per one million working hours



## Safety awareness

### Fostering a safety culture through awareness

Being aware of the safety hazards are key to managing and preventing them. Since 2007, Vestas has deployed a Safety Awareness Programme for employees and managers to raise the awareness of safety with the ultimate objective of eliminating all industrial injuries. All operational managers and team leaders in factories, service and construction sites and offices attend courses to strengthen the safety culture throughout Vestas and instil safe behaviour.

Through safety awareness, recognition programmes and safe behaviour programmes Vestas is moving towards establishing a team-based responsibility for safety. Top management's commitment to keep all employees safe and emphasize safe behaviour is being expressed through their participation in safety awareness programmes and their completion of Safety Walks.

A Safety Walk is an opportunity for managers in production, construction, service or administration to discuss safe behaviour and ways of improving safety with employees in their actual job function. The programme has been running since 2007 with consistently more managers participating every year. In 2014, 11,080 Safety Walks were conducted whereby the ambition of an average of twelve Safety Walks per manager was reached again.

Building on the manager's training, Vestas introduces more in-depth courses on how to become a better safety leader, how to change perceptions about safety, optimising behaviour change during safety walks, managing human behaviour and growing the safety culture. Studies indicate that managers and supervisors should be trained together as their alignment and collective buy-in to safety is essential.



Vestas prioritizes the implementation of global Safety Awareness programmes to cover all production and service managers and employees as well as administrative staff. Adapting the programme to local production facilities or sites has a positive impact on the injury statistics.

Maturing our safety culture through Behaviour-Based Safety programmes is an initiative which run at selected sites to ensure maximum results and safe behaviour improvements.

At Vestas, we continue to recognize and reward great safety behaviour with our Safety Ranger and the Safety Medal programmes. In 2011, Vestas introduced the global Safety Ambassador Award recognizing a company-elected employee who promotes safety. In 2014, Vasanth Kalaimani, a Service Manager in India won the award as he has proven himself to be a role model for safety in all elements of his work and is proactive in managing safety issues.

## Climate change

Climate change poses one of the most serious challenges for mankind. The predicted effects could be both devastating and irreversible.

According to the Intergovernmental Panel on Climate Change (IPCC), the effects of climate change will be broad-ranging, affecting water supplies, ecosystems, food availability, health and the economy and will devastate coastal regions. It is crucial that greenhouse gas emissions are limited, and that low carbon energy generation technologies take over.

Even though wind energy's lifecycle carbon footprint is extremely low when compared to other sources such as oil and gas, we continuously work to reduce the carbon footprint of wind energy. Our goal is to make our turbines at least 15 per cent more carbon efficient compared to a 2010 baseline, emitting only six grams of CO<sub>2</sub> per kWh during their lifetimes.

Fossil fuel-based power generation causes poor air quality, contributes to global climate change and consumes significant amounts of water. As water becomes more scarce in many regions (a

tendency to be amplified by climate change), existing water supplies will not be sufficient in many countries to support the installation of new water-intensive power plants – putting economic growth at risk.

To mitigate climate change, power generation must globally become low carbon, and wherever water locally is or is expected to become scarce, power generation must become low water. During operation, wind power plants do not consume water nor do they emit climate-changing greenhouse gases. Wind power is among the solutions to the challenges our world is facing today.

### Caring for Climate

Vestas is participating in the Caring for Climate initiative under the United Nations Global Compact. Caring for Climate is aimed at advancing the role of business in addressing climate change. It's done through a commitment by businesses who pledge to take action and a call to governments, incorporating transparency on their environmental strategies.

## Carbon footprint

By 2015, Vestas' aim is that turbines will be at least 15 per cent more efficient compared to a 2010 baseline, emitting only six grams of CO<sub>2</sub> per kWh during their lifetimes. Today, Vestas contributes approximately seven per cent of the total CO<sub>2</sub> emission for the V112-3.0 MW turbine. Of the remaining amount, approximately 85-90 per cent is contributed by material and component suppliers, and 4-10 per cent is for transport of materials and components for construction, decommissioning and recycling.

The latest results released in 2014, which have been externally reviewed, confirm that the turbine's environmental performance has improved significantly; where the carbon footprint of the V112-3.3 MW turbine has reduced by around 12% to 6.1 grams of CO<sub>2</sub> per kWh.

The reasons for improvements are firstly due to environmentally-led initiatives. Vestas has introduced a take-back scheme for customers to safely dispose worn-out switchgears. This avoids potential release of a highly potent greenhouse gas, called SF<sub>6</sub> gas, which is reclaimed. Secondly, the wind turbine has undergone significant design improvements which have had a great impact on performance, for example, through implementing an increased generator rating that has increased from 3.0 MW to 3.3 MW, leading to increased energy production if the wind turbine, as well as the design optimisation giving reduced material requirements.

In order to further reduce its carbon footprint, Vestas needs to continue improving wind turbine performance and lowering material and energy consumption in factories and within the supply chain.

### Quick facts

Target for 2015:

## Reduce Carbon Footprint by 15%

In 2014: 6.1g CO<sub>2</sub>/kWh\*

The sum of the net greenhouse gas emissions that contribute to global warming. Quantified by six grams CO<sub>2</sub> equivalents/kWh.

\*Baseline is the Life Cycle Assessment performed on the V112-3.0 MW (Class IECII wind turbines, 8m/sec wind speed)



## Renewable energy

As a company, Vestas aims to decrease our overall use of energy, increase our use of renewable energy, and use less carbon-intensive energy forms.

Vestas aims to lead by example, showing other corporations how businesses can reduce their impact on the environment and spearhead the drive for a low-carbon society. The objective is for 100 percent of the total electricity consumption to come from renewable sources. Vestas has a commitment to source renewable electricity where available, which is done through local renewable purchase agreements. In addition to this, Vestas currently owns some wind turbines, which are used to balance out the non-renewable electricity from units where local renewable electricity purchase is not possible.

Vestas' share of renewable electricity reached 100 per cent in 2014. As a result, Vestas also lives up to the WindMade™ criteria by having all its electricity coming from WindMade™ compliant energy.

### Sustainable Energy for All

Up to 1.2 billion people across the globe currently lack access to affordable and reliable electricity – with dramatic consequences for human health, education and economic well-being. These numbers show us that there is still much work to be done to ensure a sustainable global energy supply.

In 2011, the UN Secretary General set out his Vision for [Sustainable Energy for All](#) and 2014-2024 is the decade of sustainable energy for all. The vision is centered on three goals to be achieved by 2030. These are:

- efficiency
- Doubling the share of renewable energy in the global energy mix

Vestas' supports demand for renewable energy in two ways, firstly through our own procurement and investment in renewable energy and secondly by supporting others in their own renewable energy procurement and investment (see [WindMade](#) and the [Transparency Agenda](#)). Another initiative is the [Wind for Prosperity](#) business model that combines robust, factory-refurbished wind turbines with advanced diesel power generation to form hybrid systems that are well-suited for operation on mini-grids in remote locations with limited infrastructure. The initiative creates an opportunity for business, government and financial institutions to combine their talents to improve people's lives and generate returns for private investors.

## Quick facts

Target for 2015:

**Achieve renewable energy of 55%**

In 2014: 56%

- Ensuring universal access to modern energy services
- Doubling the rate of improvement in energy

## Suppliers

Our business partners play an important role in Vestas' drive to reach our sustainability goals and in promoting wind energy as a beneficial solution for society as a whole.

In order to improve the sustainability of our products, Vestas works closely with sub-suppliers of components and raw materials, which today account for more than 80 per cent of the energy consumed in the product manufacturing process.

In order to ensure the health and safety of all persons involved, customers and sub-suppliers must be both aware of – and follow – the Vestas safety rules and procedures, during all stages of the turbine installation process through to service.

In order to support this partnership, Vestas has prepared a [Code of Conduct](#) in accordance with the [UN Global Compact](#), the International Bill of Human Rights and the International Labour Organization conventions. Vestas works diligently to ensure that partners also respect the Code of Conduct, and, to the greatest extent possible, will prioritise working with business partners who are dedicated to and support Vestas' view on sustainability, with particular emphasis on the following:

- ensuring that work is carried out safely – the first priority in any situation
- respecting the freedom of association and the right to collective bargaining with respect to legislation in the country the business partner operates in
- eliminating all forms of forced labour
- eliminating all forms of corruption

discrimination

- protecting the environment

A wind turbine consists of several thousand components each with its own sub-suppliers. Thus, Vestas' supply chain is complex. Vestas Business Units have their own procurement functions, which are responsible for handling their respective business partners. In total, there are several thousand partners worldwide.

### Responsible Supplier Management

Vestas is devoted to the principle of Responsible Supplier Management.

All purchase agreements presented to our suppliers today include our policies regarding human rights and environment, as well as a commitment to work with our suppliers on initiatives relating to sustainability going forward.

With 95 per cent of our signed purchase agreements based on Vestas templates, and with all of these including either directly or by reference the above principles, we believe we are well on the way.

Vestas also takes action to ensure that suppliers comply with our policies by screening significant suppliers on sustainability issues, including human rights and labour standards using the supplier assessment tool.

When so-called red flags are identified – that is when suppliers are not living up to the Vestas standards - the suppliers are requested to take corrective action.

In 2014, 116 suppliers were assessed in 25

- eliminating child labour
- eliminating all forms of work-related

countries. Of these 102 were approved, 9 were rejected and 5 are under approval.

## Anti-corruption

Since 2010, Vestas has been a signatory to the Partnering Against Corruption Initiative (PACI). PACI is a business-driven global anti-corruption initiative within the World Economic Forum. The signatories to PACI firmly believe that corruption cannot be countered without leadership and commitment from the top management.

While the United Nations Global Compact offers a principles-based approach to fighting corruption, based on its 10th principle, PACI offers an implementation framework, developed by companies for companies - the UN Global Compact recognizes PACI as a means of implementing its 10th principle.

In addition to providing a framework for the design and implementation of effective policies and systems to prevent, detect and address corruption, PACI also offers a platform to help companies benchmark internal practices against global best practice through peer exchange and learning and level the playing field through collective action with other companies, governments and civil society.

Vestas Code of Conduct set forth a zero tolerance policy towards any form of bribery which is required under the PACI principles. Since becoming a signatory to PACI, Vestas has developed further supporting guidelines and procedures to implement the PACI principles and will continue these efforts during the coming years. In particular, Vestas has developed an anti-corruption due diligence program for its

business partners. This is currently being implemented throughout Vestas.

As part of Vestas' anti-corruption initiatives and as part of the Code of Conduct, Vestas has established a process for registering gifts, entertainment and hospitality. All Vestas employees are obliged to register gifts, entertainment and hospitality when certain criteria are met. Approval from a manager or executive is needed when the value of the received gift, entertainment or hospitality reaches a certain level. In 2013 detailed instructions on avoiding Conflict of Interest in connection to employees' investments in Vestas turbines was implemented and the Integrity Committee was established. The role of the Integrity Committee is to agree on disciplinary actions in EthicsLine cases and manage the approval process of employees' investments in Vestas wind turbines.

To implement the principles of Vestas' Code of Conduct, all employees on and above manager or specialist level must annually acknowledge that they understand the Code of Conduct and behave accordingly. Furthermore, it is expected that employees becoming aware of any violation of the Code of Conduct will take actions through either nearest manager or the EthicsLine.

All new employees are being introduced to the Vestas Code of Conduct through compulsory e-learning, some of which is tailored for particular job roles.

## Human rights and labour

Vestas recognizes its responsibility to respect human rights, and commits to avoid infringing on human rights as set out in the United Nations Universal Declaration of Human Rights and to addressing any adverse human rights impacts with which Vestas may be involved. Our [Human Rights Policy](#) outlines our commitments and approach. They apply to Vestas' global operations, and cover both Vestas business as well as our approach to business partners.

One of the latest initiatives in implementing the Human right policy is the social and environmental due diligence (SEDD) process. Turnkey projects globally were subject to a SEDD in 2014. Going forward, Vestas aims to strengthen the SEDD and related tools in order to integrate these in even more activities.

The Human right policy is communicated to internal and external stakeholders on Vestas's intranet and website. In case of any complaints by employees or business partners on breaches of the policy these can be submitted to the [Vestas EthicsLine](#).

### Internal training

Vestas's policies are supported by internal training such as e-learnings or in person workshops. The e-learning on fundamental

global labor standards e-learning is e.g. targeting all human resources business partners as well as employees operating in emerging markets.

The training ensures that the policies are understood and implemented in the local context. The training is supported by a toolbox that includes guidelines for implementation of the Vestas freedom of association policy, guidelines on child labour, a checklist on forced and compulsory labour and checklists for forced labour and child labour in vendor management.

### Due diligence

Vestas' social and environmental due diligence (SEDD) process for turnkey contracts in emerging markets, developed to spearhead the implementation of the Human Rights policy, ensures the integration of social and environmental risk assessment into the sales process. This process includes document review, customer dialogue, and additionally site visits, and thereby establishing a sound basis for identifying, preventing and mitigating risks and potential negative impacts during project execution for both the business and the local communities.

## Commitments



Vestas is a signatory to the United Nations Global Compact and World Economic forums Partnering Against Corruption Initiative. These commitments support our intent to power sustainability, both within the organization and beyond.

The commitments are reflected in the sustainability policies. For instance, policies on human rights and freedom of association have been embedded to enforce human rights practices and ethical behaviour in the business.

# Code of Conduct

As a global company with more than 80 different nationalities employed, Vestas is home to a wide range of cultures, religious beliefs and political views. This calls for commonly agreed upon ethical practices and standards.

The Vestas Code of Conduct is the guiding ethical document outlining Vestas' global commitment and expectations to people, environment, sustainable goals and our business partners. It clearly states what is expected and what is acceptable behaviour from employees and people acting on behalf of Vestas.

Vestas aims to ensure a high degree of business integrity and compliance with the code from an employee's first day on the job. All new employees are introduced to the Vestas Code of Conduct as part of their induction.

To anchor the values and principles in the organisation, commitment from top management is mandatory. Acknowledgement of the Vestas Code of Conduct is carried out for top management and the scope has been expanded year by year to now include all employees on manager/specialist level and above. The acknowledgement is an annual activity where employees confirm that they have read and understood Vestas Code of Conduct and that they are not aware of any unaddressed violations of Vestas Code of Conduct. Acknowledgement is expected as part of our commitment to UN Global Compact and the commitment to the World Economic Forum's Partnering Against Corruption Initiative.

In addition, all employees are informed of Vestas' EthicsLine which can be used for reporting violation of company policies and to seek guidance when faced with an ethical dilemma.

## Related Information

[Code of Conduct](#)

[Quality and Sustainability policy](#)

[Human Rights Policy](#)

[Freedom of Association Policy](#)





## EthicsLine

### Vestas' whistle-blower system, EthicsLine, was introduced in 2007

Vestas is committed to securing an ethical environment in our company, and Vestas' EthicsLine has been established to ensure that inappropriate behavior or incidents are brought forward and handled.

The purpose of the EthicsLine is first to ensure that Vestas employees, business partners or anyone associated with Vestas have a place to report inappropriate behavior or practices which may be experienced within the Vestas workplace. Secondly, the EthicsLine provides guidance when in doubt about ethical issues.

Vestas' EthicsLine can be used to:

- report malpractice that has been observed or is suspected;
- ask questions about Vestas policies, or difficult issues of behaviour or ethics, when the answers cannot be found elsewhere

Vestas' EthicsLine is operated by an independent company. Except where specifically prohibited by local law, anyone using Vestas' EthicsLine may remain anonymous. Subject to applicable laws, all matters reported through Vestas' EthicsLine will be investigated. Everyone involved will be treated fairly. Vestas will not tolerate retaliation against anyone who files a report in good faith, regardless of whether or not the claim can be substantiated.

## Related Information

[Vestas EthicsLine](#)

## UN Global Compact

Vestas committed to the United Nations [Global Compact](#) in 2009. The United Nations Global Compact is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption.

Vestas identifies business ethics and social responsibility as vital for both our sustainability focus and ultimate business success as it aids to build competitive advantage .

With the participation in United Nations Global Compact, Vestas commits to report and publish its progress on implementing these principles in the organisation on an annual basis. The implementation of these requirements in the organisation is an integral part of the Vestas Management System.

### Local networks

At Vestas, we have made an effort to demonstrate our sustainability leadership locally by joining the United Nations Global Compact Local Networks including, the Indian and Nordic networks. Vestas considers this as an opportunity to promote stronger sustainability efforts for businesses in their local context.

### Memberships

[WindMade](#), founding partner

[Global Wind Energy Council](#) (GWEC)

[World Economic Forum](#)

[American Wind Wildlife Institute](#), founding member (AWWI)

[Global Green Growth Forum](#) (3GF)

Member of more than 25 national wind associations around the World

## Sustainable **products**

A single Vestas wind turbine will generate more than 25 times the energy than it uses in its entire lifecycle and return this back to society. And, a single Vestas wind turbine only emits around one percent of carbon dioxide when compared to a coal power plant. However, it's important that we acknowledge that when producing solutions to harness wind energy a small negative impact on the environment is made. Vestas is committed to reducing this impact to the extent possible together with our suppliers and customers. This is achieved through a range of initiatives and programs that simultaneously reduce stress on the environment and improve business case certainty for our customers.



## Life cycle assessment

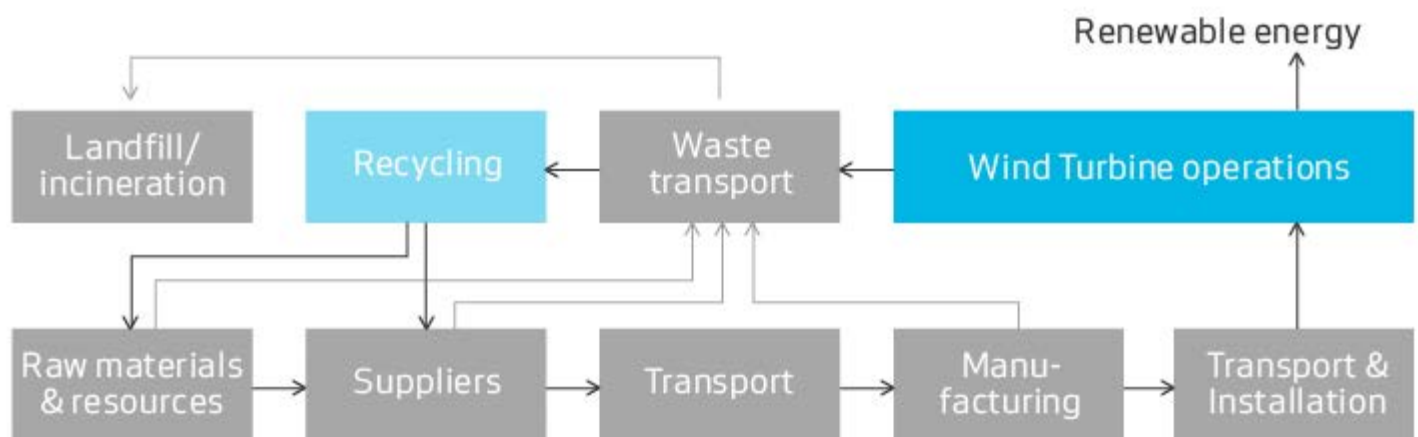
Vestas strives to continually improve people's lives through having a responsible interaction with the environment, respect for society and a productive economy. To make that goal a reality Vestas works with Life Cycle Assessments (LCA) to develop increasingly energy-efficient products and production whilst mitigating the environmental impacts throughout the turbine's lifetime.

Transparency, in all instances, and especially in regards to the environmental impacts and benefits of wind power, is vital to affirm Vestas' product performance and financial competitiveness when stating the Cost of Energy.

Since 1999, Vestas has been developing Life Cycle Assessments of wind power to give a 'cradle to grave' evaluation of the environmental impacts of Vestas' products and activities. These concentrate on two key actions:

- Document the environmental performance of Vestas wind turbines
- Analyse the results to improve or develop wind turbines with less environmental impact

The studies assess a wind turbine's entire bill-of-materials accounting for the approximately 25,000 parts that make up a wind turbine. In a Life Cycle Assessment, a complete wind power plant is assessed up to the point of the electricity grid, including the wind turbine itself, foundation, site cabling and the transformer station.



### Life Cycle Assessment scope

## Available reports

### Current Portfolio

V90-1.8/2.0 MW	Yes (2011)
V100-1.8 MW/V100-2.0 MW	Yes (2011)
V110-2.0 MW	No
V100-2.6 MW	Yes (2013)
V90-3.0 MW	Yes (2013)
V112-3.0 MW	Yes (2011)
V105-3.3 MW	Yes (2014)
V112-3.3 MW	Yes (2014)
V117-3.3 MW	Yes (2014)
V126-3.3 MW	Yes (2014)
Other	
V80-2.0 MW	Yes (2011)
V82-1.65 MW	Yes (2007)

## Benchmark performance

Vestas' wind turbines are designed to meet different functional requirements for both onshore and offshore environments, as well as the wind class for which they are designed to operate. The wind class determines which turbine is suitable for a particular site, and influences the total electricity output of the wind power plant.

When benchmarking an array of wind turbine's performance it is important that it's done on an equivalent functional basis, so they can be compared within similar wind classes. There are three wind classes for wind turbines which are defined by an International Electrotechnical Commission standard (IEC), corresponding to high (IEC I), medium (IEC II) and low (IEC III) wind.

The various Vestas wind turbines have been designed to operate under high, medium or low wind conditions. For each study the specific wind conditions have been selected to evaluate the turbines environmental performance.



## SiteLCA™

Vestas offers customers the opportunity to acquire a customised Life Cycle Assessment, called Vestas SiteLCA™, of their own wind power plant. This determines key indicators of environmental performance and takes into consideration the wind turbine type, site specific conditions and the production supply chain.

The environmental performance of a wind power plant is site and layout specific and varies across the globe according to local site performance and manufacturing supply chain. SiteLCA™ provides customers or project developers with transparent environmental facts (such as carbon footprint, return on-energy, water-use or environmental benefits, etc) of a specific wind plant. These fact-based indicators increase business case certainty by supporting the customer's energy strategy (energy case, power plant benefits, index ratings, etc) and supporting the project planning / permitting process (e.g. decommissioning plan, public acceptance, consultation and response).

By identifying key environmental indicators early in the project, customers are well-placed for successful and trustworthy external communications of power plant performance and to inform their energy strategy utilising fact-based information. SiteLCA™ may also quantify the power plant's key environmental benefits

(such as turbine recycling or repowering options at end-of-life) and identify potential management risks of the plant, such as providing material breakdown for decommissioning plans or identifying potential key environmental impacts.

Vestas Site LCA™ is delivered by experienced experts and builds upon a long track-record of disclosing turbine environmental performance data since 1999. The service utilises advanced turbine models developed in-house by Vestas, complying with international ISO standards and third party review, which have been critically acknowledged as state-of-the-art analysis of wind power<sup>1</sup>.

<sup>1</sup> Garrett, P., Rønde, K., (2012). Life cycle assessment of wind power: comprehensive results from a state-of-the-art approach. International Journal of Life Cycle Assessment (DOI) 10.1007/s11367-012-0445-4

### Related information

[The Vestas SiteLCA™ brochure](#)



## Energy payback

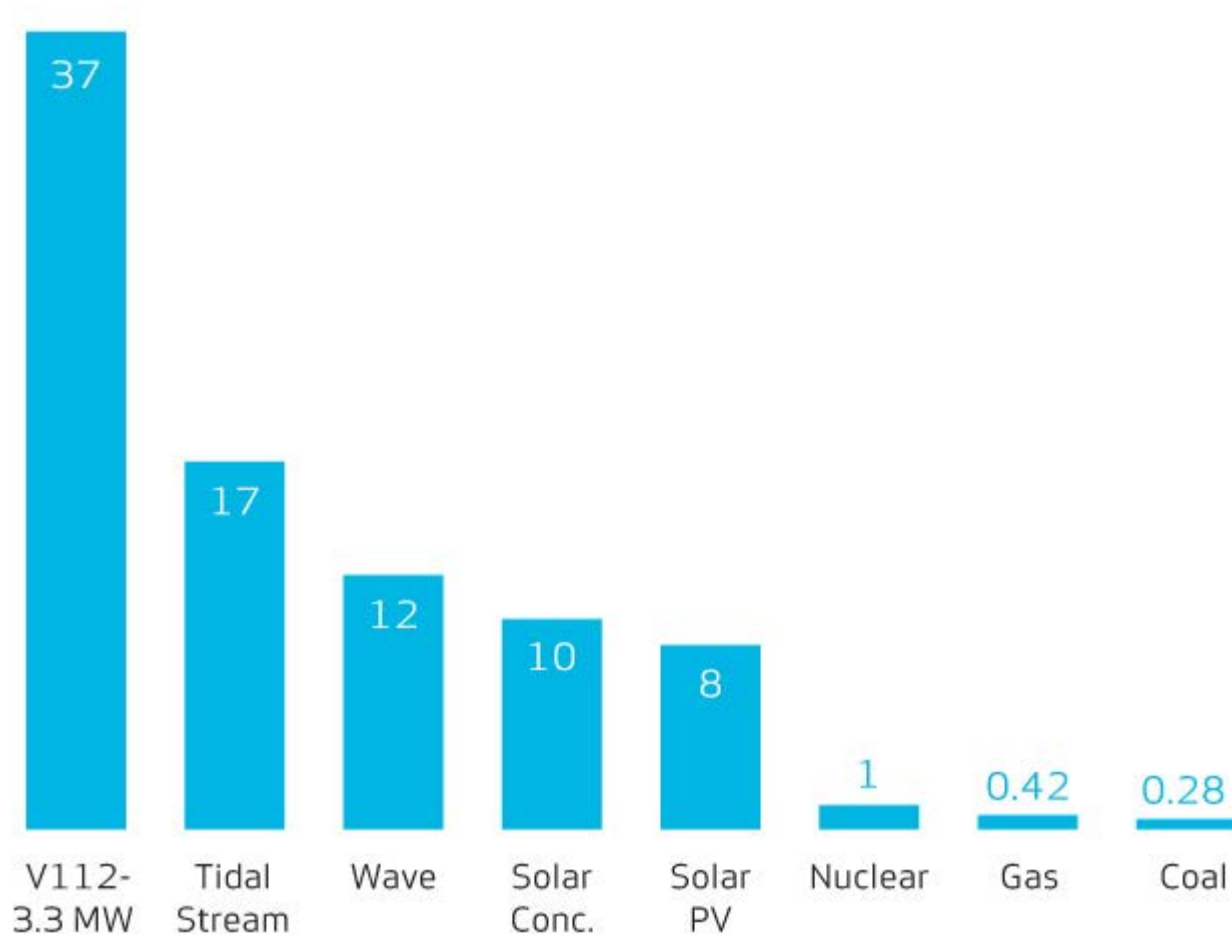
### Comparing energy payback

The long-term impact on the environment for a wind turbine's life cycle of 20 years is minimal when compared to that from average European electricity production by other means.

The energy balance of a wind power plant shows the relationship between the energy requirement over the whole life cycle of the power plant (i.e. to manufacture, operate, service and dispose) versus the energy generated by the wind power plant. This energy payback period is measured in 'months to achieve payback', where the energy requirement for the life cycle of the power plant equals the energy it has produced. Alternatively, energy payback may be measured by 'number of times payback', where this shows the number of times more energy the wind plant generates over its lifetime versus the amount consumed during its lifetime.

For Vestas wind turbines, the breakeven period generally ranges from around five to 12 months. For instance a V112-3.3 MW wind power plant has a payback period of 6½ months for medium wind conditions. While over the life cycle of a V112-3.3 MW wind power plant it will return 37 times more energy back to society than it consumed. So when 1 kWh is invested in a wind energy solution you get 37 kWh in return. Whereas if you invest 1kWh in coal you typically get 0.28 kWh in return<sup>1</sup>.

Furthermore, V112-3.3 MW turbine has significantly improved its return-on energy by around 23% in comparison to the previous V112-3.0 MW turbine from 2010.



**Sources:**

1. World Coal Association. Coal & the Environment - Coal Use & the Environment - [Improving Efficiencies](#).
2. The Offshore Valuation: A valuation of the UK's offshore renewable energy resource. Published in the United Kingdom 2010 by the Public Interest Research Centre. ISBN 978-0-9503648-8-9.
3. PE International (2012). PE International - GaBi 6 databases 2011, LBP, University of Stuttgart and PE INTERNATIONAL GmbH
4. PE International (2011) Life cycle assessment of electricity production from a V112-3.0 MW wind plant - February 2011, PE International, Leinfelden-Echterdingen, Germany.
5. Vestas, (2014). Life Cycle Assessment of Electricity Production from an onshore V112-3.3 MW Wind Plant – 6 June 2014, Version 1.0. Vestas Wind Systems A/S, Hedeager 42, Aarhus N, 8200, Denmark

## Material use

By knowing how Vestas' products and materials contribute to the environmental performance of the wind plant it is possible to make fact-based and informed decisions that will minimise overall environmental impacts. Life Cycle Assessment is used to provide the detailed knowledge regarding the material composition of the wind plant from a life cycle perspective. The figure shows a typical material breakdown of Vestas turbines. Typically, for example, a V112-3.3 MW turbine which is composed of around 86% metals (e.g. steel, iron, copper and aluminium), 12% polymers and composite materials, and the remainder a mixture of electronics/electrical items, lubricants and fluids, etc. A brochure of material use can be [downloaded here](#) for all turbines.

### Rare Earth Elements from a Life Cycle Assessment perspective

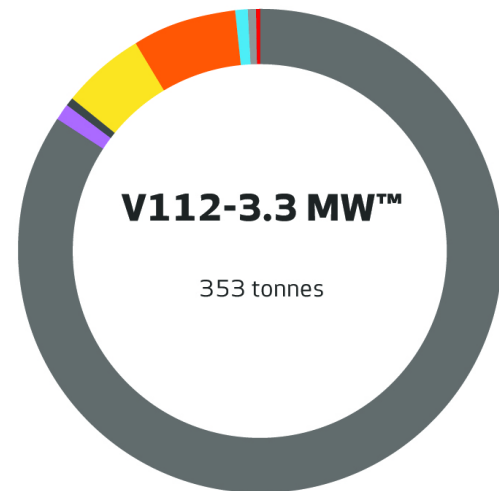
Rare earths elements are naturally-occurring elements that, once mined and processed, can be used in a variety of industrial applications such as permanent magnets in wind turbines, hybrid car motors, components for military hardware and other high-tech applications. In Vestas, rare earth elements are used in the magnets found in the towers of all new models of Vestas turbines, whereas rare earth elements are only used in the permanent-magnet generators for the older GridStreamer™ turbine models (i.e. the V112-3.0 MW and the 2.0 MW GridStreamer™ platform). The rare earths elements are used to improve the performance of turbines by making the generators more efficient and more grid-compatible. This allows Vestas to reduce the size of the generator and therefore use fewer other resources (steel,

technology using conventional drive trains. The contribution of rare earth elements (such as neodymium and dysprosium) used in the turbine generator magnets, and also in the magnets used in the tower, make a negligible contribution to total resource depletion, contributing below 0.1% of total life cycle impacts<sup>1</sup>.

### End-of-life solutions

Constantly and simultaneously lowering the Cost of Energy for wind and the environmental impact of wind power is the focus of end-of-life solutions. Through research and application on how best to recover and recycle the various components and materials in a wind turbine, after its power production ceases, the end-of-life phase enhances the overall environmental performance seen from a lifecycle perspective. The studies also supplement knowledge on how best to design the next generation of wind turbines from an environmental perspective, as well as, how to gain the most value at end-of-life from both existing turbines and new turbines being developed.

### Material breakdown of a Vestas turbine



- Steel and iron materials 84,4%
- Glass/Carbon composites 7%
- Aluminium and alloys 1,1%
- Electronics/electrics 1%
- Copper and alloys 0,5%
- Lubricant and fluids 0,5%
- Polymer materials 5,4%
- Not specified 0,1%

Note: 84m hub height and wind class IEC2A

## Sources

Vestas, (2014). Life Cycle Assessment of Electricity Production from an onshore V112-3.3 MW Wind Plant – 6 June 2014, Version 1.0. Vestas Wind Systems A/S, Hedeager 42, Aarhus N, 8200, Denmark.

composite structural materials, etc.) and create a smaller carbon footprint.

It is important to understand the difference between different types of turbine designs and how each design uses rare earths elements.

There are two types of turbine drive train concepts using rare earth elements:

conventional geared drive train and direct-drive (without a gearbox). The amount of rare earths elements used in direct-drive turbines is substantially higher – up to 10 times as much as a generator in a conventional drive train. Today, all Vestas turbines are based on proven

# Recyclability

## Vestas abides by a strict definition of recyclability

When recycled, both the value and the essential properties of the materials must be preserved. By this definition, 83 per cent of Vestas V112-3.3 MW can be usefully recycled at the end of its lifetime. Because Vestas believes that a sustainable product should leave the smallest possible environmental footprint when decommissioned, it aims to increase the recyclability of its turbines, in comparison to a 2010 baseline, to reach 85 per cent by 2020.

Vestas is working proactively on initiatives to improve the recyclability of its turbines. The range of these initiatives run from the research on how to recycle glass and carbon fibres, to exploring the full recycling of test nacelles.

In 2013 Vestas joined the [GenVind Innovation Consortium](#) to develop enabling technologies for a sustainable recycling of plastic composites and demonstrate the reuse of composite waste.

In 2011/12, Vestas carried out a complete dismantling of a wind turbine nacelle to trace additional possibilities for increasing the recyclability rate of Vestas' wind turbines.

## Quick facts

Target for 2015:

# Increase Recyclability to 85%

In 2014: 83%\*

A material which maintains its initial properties when recycled, including re-use for the same function. Quantified by % weight of the materials that can be usefully recycled.

\*Baseline is the Life Cycle Assessment performed on the V112-3.0 MW (Class IECII wind turbines, 8m/sec wind speed)

## Product responsibility

Vestas' wind turbines, options and service offerings are the result of not only a thorough development process but also comprehensive analysis of market forecasts. The top-level Vestas process which allows us to fulfill our customer requests is known as the Vestas product market strategy. The product market strategy is the result of a complex series of analyses including market forecasts, customer trends, competition, technical predictions and grid requirements. Macro-economic factors such as national government targets for renewable energy are also studied. Based on this input, a series of strategic decisions are made regarding which products, technologies, configurations and service offerings to make available in which markets and when. By involving relevant stakeholders in the development process, requirements can be built into the design of the products at an early stage.

By knowing how Vestas' products and materials contribute to the environmental performance, it is possible to make fact-based and informed decisions at an early stage in the product design and development phases. Life Cycle Assessment is used to provide in-depth knowledge regarding the environmental 'hot spots' of the wind plant life cycle i.e. from raw material production, through to manufacturing, operation, servicing and plant decommissioning.

When designing our products, sustainability requirements are taken into consideration and ensured through Vestas' development process, the 'Vestas Way to Market.'

Vestas Way to Market

rethink some aspects or stop the project. This process ensures, amongst other things, that the specification requirements are met. The specifications are based on internal Vestas commitments such as Vestas' chemical black list, international legislation such as the European directives, and internationally recognised codes and standards such as the ASMA, ISO and IEC.

In order to ensure regulatory compliance, it's our ambition to share knowledge of how regulatory requirements, including transportation and HSE requirements and grid codes requirements as well as standards and certification should be complied with in the respective departments in Vestas. The purpose is to strengthen Vestas' product regulatory compliance to ensure market access.

It is vital to identify business risks early in the development process in order to ensure that the project will not have a negative impact on Vestas' business and strategy, reputation etc. as well as on our customers' business. Risk management is a continuous process throughout the entire project, and a business risk overview is presented and reviewed at each gate meeting. It is the project manager's responsibility to identify and assess key risks and present mitigation actions. The risk analysis must include input regarding health and safety aspects, product and commercial issues, process risk analyses as well as an investigation into the IPR issues.

Continuous Improvement

Part of Vestas' business approach is to

Vestas' Way to Market is Vestas' global framework for planning, managing and executing technology and product development projects and actively involving the whole value chain in our company. As such, we strive to ensure that these projects start and end with customer requirements in focus.

The core of Vestas Way to Market is the stage-gate process consisting of seven stages and seven gates with a group of gatekeepers at each stage. The gatekeepers decide whether to let the project move on to next stage, whether to

constantly develop new and better technical solutions that can improve the performance of our current operating fleet or the safety connected to operating the products.

Use of new technical solutions will very often have a positive influence on the Lost Production Factor (LPF) for a given wind farm. The LPF is the share of the potential energy from the wind not harvested by the turbines. The LPF has been substantially reduced in recent years. The average LPF has been below two percent since 2012.

## Impact assessment

When establishing a wind farm, an important part of planning should be an assessment of the proposed location and the surrounding environment. This includes the local communities and how the proposed wind farm could potentially impact the physical and socio-economic environment. In many countries, environmental and social impact assessments are required by law, or are part of the sustainability requirements of international financial institutions which support infrastructure projects. In most cases Vestas' main business partner – our customers – have the primary responsibility for undertaking the environmental and social impact assessment and for developing the environmental and social management systems for the wind plant. Vestas seek to work closely together with our customers throughout the project life.

The environmental aspects of such an environmental and social assessment typically take into account direct and indirect impacts, including, for instance:

- Landscape and visual impressions
- Flora

- Fauna (e.g. Birds)
- Noise
- Shadows

The social aspects typically identify issues such as:

- Community health and safety
- Land rights
- Cultural heritage
- Local employment and livelihoods including job creation

To view publicly available environmental and social impact assessments for wind farm projects, see the European Bank for Reconstruction and Development's database at [Environmental and Social Impact Assessments \[EBRD - Projects\]](#).

An example of an environmental impact assessment of an offshore wind farm – Horns Rev Reef in Denmark – provides interesting reading. This includes studies on the environmental impact the finished project had locally on birds, fish, porpoises, seals and fauna. You can find these at [www.hornsrev.dk](http://www.hornsrev.dk).



## Managing **sustainability**

To encourage a company-wide sustainability culture, Vestas invests in nurturing and developing knowledge and skills of our employees, so everyone is empowered to work towards a shared vision of sustainability. At every level of the organisation awareness is raised to minimize sustainability risks. Decisions should always take into consideration not only the financial impacts, but also the ecological and social consequences.



## Stakeholder engagement

As a global company, Vestas has many stakeholders who are interested in our sustainability performance.

We understand that our sustainability performance is an important determinant of our relationship with stakeholders. We proactively engage with stakeholders to understand their needs and concerns, and in return we address these in our decision making process.

Transparency is a fundamental concept in our engagement strategy and this underpins our different engagement efforts. We publicly disclose key sustainability information in our annual report and on Vestas.com whilst also entering into more detailed dialogues with key stakeholders.

We actively collaborate with stakeholders to positively influence not only our own sustainability performance but also that of the wider communities we operate in. For example, Vestas took a leading role in the Global Wind Organisation, developing a standard for Basic Safety Training within the framework of the organisation. We also co-founded [WindMade](#), an initiative leading to the first global consumer label identifying products and companies made with wind energy. This was done together with other global players like [WWF](#) and [Bloomberg](#).

Vestas, at the Group level, has both categorised and prioritised stakeholders in an effort to

rationalise and focus engagement efforts.

Initially stakeholders are categorised based on their relationship with Vestas, for example, customers, NGOs and policy makers.

Subsequently, each stakeholder is considered in the context of a number of criteria to determine how relevant Vestas' sustainability performance is to them and conversely how important they are to Vestas' sustainability performance.

Engagement can range from forming active partnerships to address common sustainability issues to a more passive engagement through, for example, the publication of the annual report. The priority given to a stakeholder is used to determine the most appropriate approach to engagement.

Our ambition to build closer partnerships and support our stakeholders is reflected in Vestas' materiality analysis.

### Contact us!

[Sustainability](#)

## Main stakeholders

Our main stakeholder groups

Here at Vestas, we have many different stakeholder groups with whom we interact. These include customers, shareholders, employees, politicians, suppliers and sub-suppliers, non-governmental organisations, communities and the media.

### 1. Customers

We prioritise customers as our number one stakeholder group, and to ensure an open and honest dialogue we have implemented a [Customer Loyalty survey](#). Vestas is working with customers on an on-going basis to address sustainability issues.

### 2. Shareholders

Transparency is at the heart of our outreach to the investment community. The stock market experts look at Social, Economic, Environmental and Health & Safety initiatives to rate listed industrial companies.

### 3. Employees

Employees are Vestas' most important asset and we have a range of offerings aimed at them to ensure continuous learning and development as well as competitive benefits.

We reach out to employees through different channels to ensure that they are engaged and committed to Sustainability issues. One channel is Vestas' Safety Walks. A Safety Walk is an opportunity for managers in production, service or administration to discuss safe behavior and ways of improving safety with employees in their actual job function. We also use our Employee Survey to measure the employees' perception of their working environment. The survey is

To ensure that employees can report malpractice or ask questions they may need an answer to if faced with ethical dilemmas at work; a Whistle-blower system, named EthicsLine is available. Except where specifically prohibited by local law anyone filing a report may remain anonymous.

### 4. Policy makers

At Vestas, we work closely with political stakeholders to [drive the market](#) for wind energy. As our industry is a regulated industry, we are naturally in dialogue with governments, political leaders, civil servants, interest groups and non-governmental organizations all over the world. We offer advice and information about the benefits and potential of wind power and during 2014 Vestas was engaged with policy makers in the regions and countries where we operate advocating reforms and providing best practice experience.

### 5. Local communities

Social license to operate is important to Vestas.

Vestas's first learning has shown that there is not one unique formula to gain and maintain social license. It requires timely and effective communication, meaningful dialogue, to be sensitive to local cultural norms, create realistic expectations, and develop fair grievance mechanisms. Diverse guidelines and a toolbox have been developed to support regional business unit's better face the challenges. As Vestas gains more knowledge and experience we will develop our ability to continue to gain and maintain social license to operate.

Vestas is supporting educational activities in

followed up by the drafting of action plans in all departments in order to act on the feedback we receive.

India and South Africa, and enable access to energy to rural areas through the Wind for Prosperity programme.

## Material issues

Understanding our stakeholders' opinions and priorities enables us to make better decisions and ensure that we are both a successful company and a responsible member of the community. We have therefore engaged with internal and external stakeholders to define what matters most to them and in doing so have identified what the material sustainability issues are for Vestas.

A materiality analysis is mapping topics and indicators that reflect the organization's significant economic, environmental, and social impacts. By identifying material issues we can focus our sustainability-related programs on the areas that are most important to Vestas and our stakeholders. The materiality analysis also influences how we report on sustainability issues. For example, we comment on the most material issues in the annual report and provide additional information and updates on [Vestas.com](http://Vestas.com).

The formal identification of material issues was performed in 2011 through an internal stakeholder consultation involving many parts of the organization. To prioritise issues, we used internal knowledge of stakeholder expectations, Vestas surveys, external stakeholder sustainability reports, consultant input and global sustainability studies.

In 2012 we enhanced the materiality analysis by consulting directly with external stakeholders such as customers and investors. Doing so gave us additional insight into their priorities and provided a useful platform for meaningful dialogue.

The Vestas materiality analysis has identified a range of sustainability issues. Amongst these, Health & Safety, Business Performance, Climate Change, Quality & Reliability, Product Environmental Performance and Community Impact are understood to be some of the most important sustainability issues.

## Management systems

At Vestas, all employees must work according to Management System Standards for the Environment and Occupational Health and Safety.

To support this drive, Environmental Management is certified in accordance with the requirements of ISO 14001, Health & Safety Management in accordance to OHSAS 18001, and the Quality Management System in line with ISO 9001.

The Sustainability Management System, covering Health, Safety, Environment, Security and Business Ethics and Social Responsibility, serves to put all external and internal Vestas Sustainability requirements systematically, efficient and effectively into practice. It is Vestas' intent to make Sustainability an integral component of all business processes.

In order to ensure continual improvements for Sustainability performance in each area, our daily working practices are governed processes

and supported by various tools – including databases and IT systems.

For example, in order to enhance communication we insist on regular internal reporting on all significant Sustainability incidents through various channels. This helps us identify and investigate the most relevant issues to be addressed. The solutions implemented to these issues help to continuously improve the overall Vestas Sustainability performance throughout the organisation.

Vestas is currently in the process of updating and aligning our Vestas Management System towards a global approach ensuring that all processes are unified throughout the organisation.

### Certificates

Vestas is fully covered by an umbrella certificate for the management system standards OHSAS 18001, ISO 14001 and ISO 9001.

## Organising sustainability

Responsibility for Sustainability performance lies in the line organisation. To support the line organisation the following departments are responsible for global policies, procedures, and overall guidance related to sustainability: Health, Safety and the Environmental is managed by the Global Quality, Safety & Environment (QSE) department, CSR, Corporate Security and the EthicsLine whistleblower function are managed by the Compliance department.

### Board committees

Vestas board committees oversees Vestas' focus on sustainability. Two out of three committees discuss sustainability issues at their meetings.

The board committees that touch upon Sustainability issues are the Audit Committee and the Technology & Manufacturing Committee. In 2014, the Audit Committee held six meetings and the Technology & Manufacturing Committee held four meetings.

The Audit Committee evaluates the adequacy and effectiveness of Vestas' ethics and anti-corruption programme pursuant to Vestas' Code of Conduct and the World Economic Forum Partnering Against Corruption Initiative (PACI). The cases filed in Vestas whistle blower system, Vestas Ethics Line, are reported here.

## Safety standards

Customers and employees expect a unified approach to safety regardless of region or country. Vestas agrees. That's why we have developed a wide variety of global processes, such as:

### Incident management

A sustained effort to increase the flow of knowledge in regards to corrective and preventive actions against safety is a priority. Global knowledge sharing on a monthly basis enables proactive learning to establish best practices for reducing the number of injuries.

### Contractor safety

As Vestas' own safety performance has improved strongly over the years, the performance of contractors has become increasingly important to protect both Vestas' and its contractors' employees from potential harm as well as to live up to customer expectations of safe operations. Measures implemented so far to improve the performance of contractors include pre-qualifications, standardisation of safety requirements and intensified tracking of safety performance.

### Safety Induction programmes

A safety induction programme for managers and employees is part of the induction programme for new employees. We do this as employees must know what to expect - and what is expected of them - as soon as they arrive.

### Electrical safety

Global standards on "Electrical Safety" and "Control of Hazardous Energy" have been developed in order to eradicate electrical injuries. A range of Master Instructors cascade their knowledge into the business.

### Risk and opportunities

As part of Vestas' strive for continuous improvements, its process of assessing risks and opportunities has been enhanced to accommodate a growing demand for alignment across areas of Sustainability. The process will ensure that all sustainability-related risks and opportunities are systematically and effectively identified, quantified, mitigated and monitored in an aligned way throughout the organisation. The scope of the process is to include the identification and assessment of significant Environmental Aspects, Health and safety Hazards and Corporate Social Responsibility Impacts and Security Threats.



## Chemical management

Being in control of the chemicals and hazardous substances used in development, manufacturing and service of the turbines is part of our management system and essential for a sustainable company.

Only when actively working on finding safer and more environmentally friendly products does Vestas ensure a healthy workplace for our employees and minimum impact to the environment.

Chemical management at Vestas includes global procedures for approval of new chemicals, local instructions for handling, transporting and storing chemicals and a global chemical database for sharing knowledge from suppliers.

Vestas has, in cooperation with a global provider of chemical, regulatory and compliance information services, implemented a global chemical management system. This includes an online system where all employees can enter and obtain essential information about the chemicals and hazardous substances used in Vestas. Some of the essential information which is available to the employees in the database includes Safety datasheets (SDS's), Safety Cards/Workplace assessments, correct use of personal protective equipment (PPE) and information about dangerous goods.

In order to adapt to continuously changing chemical legislation globally like GHS/CLP and REACH, Vestas has developed a [Material and Chemical Blacklist](#) which identify substances that are prohibited or restricted with the aim of

phasing out their use in our product and manufacturing and service processes.

The prohibition or restriction is based on legal requirements or decided by Vestas management.

Vestas requires our suppliers to fulfill the requirements on the Chemical and Material Blacklist for all products delivered to Vestas. Vestas cannot work with suppliers using substances that are prohibited. If the suppliers use chemicals or materials restricted according to the Chemical and Material Blacklist, an HSE evaluation must be performed by the supplier to ensure correct use of the chemicals and materials. Furthermore it is expected that the supplier creates an action plan for phasing out these restricted substances and finding alternatives.





## Employees

Employees are crucial to staying competitive and providing customers with the best service. The company's People Pipeline – employee lifecycle – ensures that the right people are in the right functions throughout the organisation. It enables Vestas to attract, employ, reward, develop and retain the best. The different elements of the pipeline are continuously being refined to ensure that Vestas stays competitive.

At Vestas we know the importance of understanding the culture and background of our customers in order to offer them the best service possible. Therefore, Vestas attempts to foster an inclusive and diverse environment to attract employees of different nationalities, while remaining true to core company values such as Safety First, Quality and the Vestas Code of Conduct. We are also dedicated to continuous improvement of competences. We do that through a variety of internal learning possibilities as well as [career development](#). Vestas has among other things developed three [leadership tracks](#) and attractive [benefits](#).

Being a global business entails [employing people](#) of different nationalities and cultures. The business must be 'in the region, for the region.'

### Recruiting

Vestas is active in over 70 countries and is constantly seeking opportunities to expand into new markets. We always seek to hire the best-suited candidates for vacant positions, based on background and merit. We do thorough assessments of both external and internal candidates, and value opportunities to promote qualified internal talents.

The People Review aims to create insight into the performance and potential of our employees, and to have a structured and proactive approach to performance, action planning, and succession planning. All employees at Manager level (IPE 54+) or above are mandatory to review, but many business units choose to review all employees.

The People Review creates the foundation for the PDD's, which take place after the People Review. The PDD's are discussions between managers and their staff. They ensure that all employees receive feedback on their performance and behaviour for the year and set goals for the coming 12 months – including competence development, such as training. The aim is for all Vestas' employees to have a yearly PDD that is followed up mid-year.

93 percent of Vestas' employees responded to the Employee Survey in 2014 and 81 percent of them confirmed that they conducted a Performance and Development Dialogue with their manager.

### Compensation & Reward

Vestas is a global company and, inevitably, this means pay practices and market rates may differ by region. However, the company aims to approach each location in the same manner and with the same guidelines. Thus Vestas seeks to ensure that compensation and reward levels remain fair when comparing, for instance, locations and gender, and remain competitive when comparing to industry standards.

### Exit

All employees leaving Vestas, regardless of the

## Training

In 2014, 281 courses were offered and 356,000 hours of training completed. 98 percent of the course participants participated in classroom training and 2 percent participated in online self-paced training. On average each employee received 20 hours of training in 2014 with a span from management levels receiving 5 hours of training to other employees receiving 22 hours of training.

## Development

The Performance and Development Dialogue (PDD) and People Review are two of our key tools within the area of employee development.

reason for their departure, are offered an interview as part of the exit process. This way, the company learns more about why the employee has chosen to leave Vestas, and can devise new methods for making the company more likely to attract and retain talent in the future.

When having to lay-off employees in large numbers, Vestas always ensures negotiations are conducted as quickly as possible and result in decent severance packages for all those affected. Vestas also offers laid-off employees support for further education and outplacements