Social impacts from Wind power

Appendix to Vattenfall AB Certified Environmental Product Declaration EPD® of Electricity from Vattenfall's Nordic wind power

Confidentiality class – C1

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Content

Summary

This Social lifecycle assessment has been carried out to objectively describe social impacts related to wind power production from Vattenfall's Nordic wind power from a lifecycle perspective, including both impacts related to development and operation of the plants and supply chain impacts. The intention is to complete the environmental lifecycle assessments that are already a part of the Environmental Product Declaration (EPD®) with the other pillars of sustainability to allow for an integrated approach.

In the General Programme Instruction for EPDs (GPI ver 2.5), there is an invite for companies to declare also social and economic aspects in their declarations. The aim of this assessment has been to develop the methodology around S-LCA and to see how it can be used to measure and track impacts from energy production.

The study includes areas such as working conditions and health and safety impacts for people along the value chain of the product, and impacts on society and local communities.

The assessment is based on the *Guidelines for Social Life Cycle Assessment of Products* (UNEP/SETAC, 2009), and the *Handbook for Product Social Impact Assessment* (Roundtable for Product Social Metrics 2014). The indicators used are based on the GRI indicators for sustainability reporting. The report has been third-part verified by Elisabeth Ekener, researcher in Social sustainability at KTH – Royal institute of Technology (see Appendix 2).

The scope of the study is electricity generated in Vattenfall's Nordic wind farms and the functional unit is number/employee, which will give the best possibility for comparison with other S-LCA studies made as the method is still under development. The processes in focus are the Core processes of wind power production, including both the development and the operation of the wind farms. The manufacturing of wind turbines is also included. The other processes of the lifecycle (upstream and downstream, i.e. production of oils for maintenance of the wind farms, and distribution of electricity) will probably have relatively smaller impacts. Stakeholder groups included in the study are *Workers, Local Communities* and *Society*, and include both impacts from Vattenfall's own operations as well as impacts in the supply chain.

Sources of information have been internal experts, first tier suppliers and generic data. Internal data has been collected via interviews, official reports and internal systems for data management. Data from suppliers were collected via a questionnaire. Generic data for the supply chain has been gathered from the global risk analytics Verisk Maplecroft (www.maplecroft.com).

The results are presented in Chapter 4, containing quantitative results in a so called "Socioprofile" combined with qualitative descriptions. The results are discussed further in chapter 5.

Vattenfall believes that S-LCA could be a useful way to drive improvements in the life cycle in the sense that it allows for prioritisations and identification of areas of urgency, and also provides a method for tracking improvements. However, more work is still needed to make the method robust and finding indicators that are both focusing on actual impacts but also easy to quantify throughout the whole value chain. Testing is needed to allow for development both within Vattenfall and within other companies, and the availability of generic data needs to be investigated further as the reliability of the results is dependent of available data for especially the supply chain.

1. Goal and scope

1.1. Background

Lifecycle thinking has traditionally been limited to environmental impacts. But as the focus has moved more and more towards sustainability, the need for applying a holistic view including also social and economic aspects has increased. In the recent years, methodologies for social lifecycle assessments, or S-LCA, have been developed to assess for example working conditions and health and safety impacts for people along the value chain of the product, and impacts on society and local communities. Expanding the scope to include all three pillars of sustainability allows for a more integrated approach to drive improvements in the value chain.

Guidelines for conducting an S-LCA have been developed by UNEP and SETAC (*Guidelines for Social Life Cycle Assessment of Products,* UNEP/SETAC 2009). These guidelines are based on the ISO-standards for lifecycle assessments. The application has so far mostly been in the academic world, but recently also companies have started to show interest in S-LCA. In 2014, the Handbook for product social impact assessment (Roundtable for Product Social Metrics, 2014) was released aiming to guide companies in assessing social impacts on product level.

The General Programme Instruction for the International EPD® system (ver 2.5), section 4.6 describes additional information that can be disclosed by companies in the EPD. Additional information can include "information about social and socio-economic impacts related to the product". In section A10 Declaration of social and economic aspects this is further elaborated:

"Even if the International EPD® System is fully devoted to the environmental declarations and the first aim is to fulfil the standard ISO 14025, it is possible for the EPD also to include other relevant sustainability indicators as additional and voluntary information. Environment is just one of the dimensions of sustainability considered in a wide concept; also social and economic aspects should be considered for a complete evaluation of a product or a service. Sometimes work on minimizing the environmental impact can be in conflict with other sustainability issues./…/ Another example could be information resulting from so-called social-LCA, giving information about a products life cycle impact on different social indicators as working conditions, child labour, etc."

1.2. Objectives of the study

The aim of this social lifecycle assessment (S-LCA) is to measure social impacts from the generation of electricity. Developing the method further, to be both easier to apply and to be better suited for identifying hotspot areas in the supply chain to be used for internal prioritisations, will eventually improve opportunities to use the method for driving improvements throughout the whole value chain.

Another aim is to refine S-LCA and find ways for applying it to a product declared according to the EPD® system, to move in the direction of an integrated approach and to see how S-LCA can be applied to energy production.

1.3. Scope and System Boundaries

The scope of this study is electricity generated in Vattenfall's wind farms in the Nordic countries (Sweden and Denmark), with 2014 as the reference year. The functional unit is number/employee, which will give the best possibility for comparison. The unit is also easier to relate to compared to

number per kWh generated as is the functional unit in the rest of the EPD, and will be more useful in this period of development of the method.

The system boundaries and indicators have been based on interviews with internal key functions and learnings from last year's pilot for electricity from Vattenfall's Nordic hydropower (Social Impacts from Vattenfall's Hydropower, 2014). The focus is on Core processes of the value chain, i.e. the construction of wind farms (Core-infrastructure) as well as operation of wind farms (Core process), see Figure 1.

In 2014, operations were managed under Vattenfall Nordic's Business Unit Wind[1] (referred to as BU Wind in the document). The stakeholder group *Workers* comprises workers in management- and non-management positions, as well as part time employees and temporary workers, in both Core and Core - Infrastructure processes.

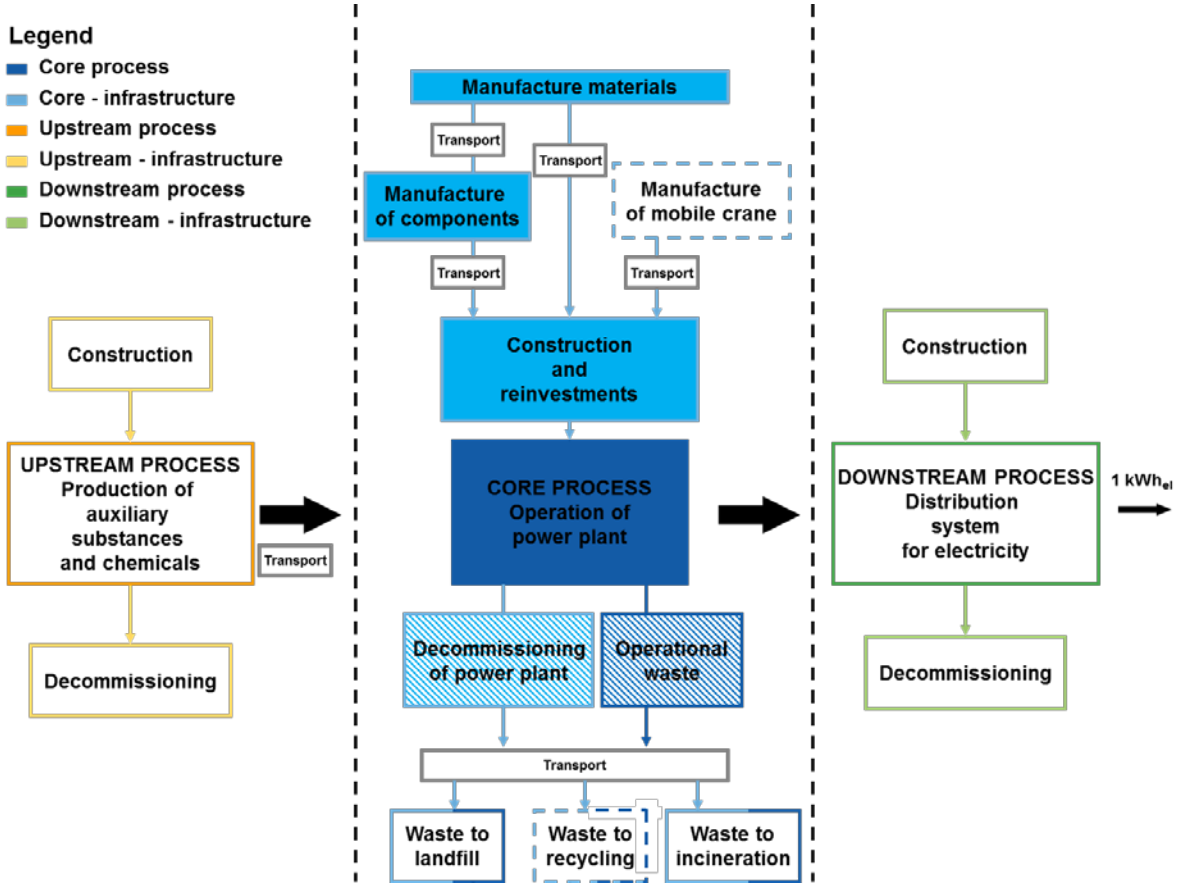

Figure 1 Process chart. The filled boxes are included in this study. White boxes are excluded, and multi-coloured boxes are partly included. Boxes with dotted lines are excluded also from the E-LCA while boxes with solid lines are included in the E-LCA.

[1] When this assessment was carried out a reorganisation was being conducted and the wind related operations in those countries was being handled together with operations in United Kingdom, Germany and the Netherlands within Business Area Wind.

1.3.1. Core

Included:

- Impacts on workers: Vattenfall BU Wind employees involved in the operation of the wind farms; service contractors working on the sites
- Local impacts on communities from wind farms in operation
- Impacts on society from wind farms in operation

Partly included:

- Treatment of waste[2]

Excluded:

- Consultants used (very few employees and few hours are used)
- Environmental impacts such as biodiversity and/or leakages from wind farms in operation (see the full EPD for environmental impacts)

1.3.2. Core-infrastructure

Included:

- Impacts on workers: Vattenfall BU Wind employees involved in the project development phase and civil work contractors involved in the construction of the wind farms; suppliers of wind turbines; sub suppliers delivering construction parts (turbine including tower, blades, machinery etc.); sub suppliers involved in raw material extraction
- Local impacts on communities from wind power development and construction
- Impacts on society from wind power development and construction and related to suppliers and sub suppliers

Partly included:

- Treatment of waste[3]
- Aspects related to local communities in the supply chain
- Decommissioning of turbines – site work (mainly done in Sweden and Denmark)

Excluded:

- Consultants involved in the project development phase
- Electrical works connected to the construction phase
- Workers in offshore construction, e.g. those working on vessels, with piling, and cable work
- Further use of decommissioned parts
- Further processing of scrapped material transported to recycling plant.
- Construction of roads to the wind farms (except for roads in the site area).
- Environmental impacts such as biodiversity and/or leakages from farms in operation (see the full EPD for environmental impacts)

[2] See section 3.3
[3] See section 3.3

1.3.3. Upstream

Upstream processes, i.e. production of oils and auxiliary substances for the power plant, have not been included.

1.3.4. Downstream

Downstream processes, i.e. distribution of electricity, have not been included. See also 2.3.2 Completeness/gaps.

2. Method

2.1. Methodology

In the EPD® system General Programme Instruction GPI (ver 2.5) there is an invitation for companies to also declare social and economic aspects, for example from S-LCA. In the PCR 171 (ver 3.0) for electricity, no instructions are provided on how to assess and present economic and social impacts. Hence this can be seen as a test of a method that could be used for this purpose.

The method in this study is based on the *Guidelines for Social Life Cycle Assessment of Products* (UNEP/SETAC 2009), here referred to as the "Guidelines", and the *Handbook for Product Social Impact Assessment* (Roundtable for Product Social Metrics 2014), referred to as the "Handbook".

Data is presented in Socioprofiles (*Assessing the Social Performance of Products,* Welling, 2013).

2.1.1. Stakeholder groups

The Guidelines suggest the following stakeholder groups: *Workers*, *Local community*, *Society*, *Consumers* and *Value chain actors*. The Handbook suggests that *Society*, *Consumers*, *and Workers* are taken into account.

In this assessment the stakeholder groups included are *Workers, Local Communities,* and *Society*. *Value chain actors* are integrated in the other groups. Stakeholder group *Consumers* has been excluded, in line with the PCR for electricity (ver 3.0).

2.1.2. Set of indicators

The indicators are chosen from the sources listed below. In addition, some own indicators have been added to complete the picture.

- GRI (Global Reporting Initiative, version G4), which is the main standard for sustainability reporting
- *Assessing the social performance of products – Developing a set of indicators for Vattenfall AB connected to the International EPD system* (Welling, 2013)
- *Handbook for Product Social Impact Assessment* (Roundtable, 2014)
- Methodological sheet for the *Guidelines* (UNEP/ SETAC 2009)

Indicators for working conditions in the supply chain have been chosen to cover at least the ILO Declaration's four Fundamental Principles and Rights at work[4];

[4] http://www.ilo.org/declaration/lang--en/index.htm

- Freedom of association and the effective recognition of the right to collective bargaining,
- Elimination of all forms of forced or compulsory labour
- Effective abolition of child labour
- Elimination of discrimination in respect of employment and occupation

Table 1 Stakeholder categories and impact categories included

Stakeholder category	Impact category (GRI)	Indicator sources
Workers	Discrimination and equal opportunities	GRI G4, Verisk Maplecroft, own indicators
	Child labour	Verisk Maplecroft
	Forced labour	Verisk Maplecroft
	Freedom of association and collective bargaining	Verisk Maplecroft
	Health and safety	UNEP/SETAC, Verisk Maplecroft, own indicators
	Working conditions	Verisk Maplecroft, Handbook
	Training and education	Handbook
	Employee satisfaction	Handbook
Local community	Local Community	GRI G4, Handbook, own indicators
	Local employment	GRI G4
	Respect for Indigenous rights	Verisk Maplecroft, GRI G4
Society	Contribution to economic development	Own indicators
	Promoting Social Responsibility	UNEP/SETAC, GRI G4
	Corruption	Verisk Maplecroft, own indicators
	Compliance	Verisk Maplecroft, GRI G4

For a complete list of indicators and for detailed information about them, see Appendix 1. In the appendix indicators that were deselected due to lack of data are also shown.

2.1.3. Collection method

The assessment is based on a combination of primary and secondary data.

Own operations

Internal data is mostly primary and has been collected via interviews with internal experts. The interviews were based on open questions to gain an understanding of processes and circumstances around the topics, allowing for flexibility regarding the indicators to assure alignment with existing data collection methods. Data was supplemented with official information in annual reports and publications on the intranet. Data was also taken from internal systems for data management.

Direct suppliers

Most first tier suppliers of goods and services are based in Northern Europe which means they fall under European legislation. Supplier data from first tier suppliers, with whom Vattenfall has a business relationship, has been collected via questionnaires. The suppliers chosen for data collection are all based in Denmark and have employees and factories in the northern part of Europe.

Suppliers further down the supply chain

To get information concerning sub suppliers delivering components and raw materials to first tier suppliers, the amounts of materials used in the wind turbine components have been used. The amounts of material was collected for the environmental LCA from one main supplier, and tracked using external references, together with supplementary information from the primary supplier, to

identify the possible country of origin. The information about countries has been used together with Verisk Maplecroft country risk indices and statistics from ILO databases to obtain a figure for potential social impacts.

2.1.4. Time period covered

The reference year used is 2014 but where possible the average for the years 2012-2014 has been used to cover up for annual variations. See also section 2.3 on data quality.

2.1.5. Aggregation

Characterisation of the supply chain has been simplified by concentrating on one of the main wind turbine suppliers where supply chain data for manufacturing and assembly countries was quite detailed and believed to be representative for the suppliers of wind turbines to Vattenfall. The country-specific risk indices have been weighted based on masses of material flows from each country and thereafter aggregated to form one index for the supply chain.

For own operations allocations have been made between employees working with generation (core) and project development (core-infrastructure), using an estimated share of one third of employees in generation and two thirds in project development. Indices for Vattenfall's own operations have been weighted using Sweden and Denmark and based on number of employees in each country.

To be able to aggregate data from different lifecycle stages, numbers have been recalculated to represent number per employee, for all stakeholder groups. See 5.3 for a discussion about limitations related to this.

2.2. Methodological decisions made

2.2.1. Choices regarding indicators

The selection of indicators has been based on their relevance for Vattenfall and BU Wind, and discussed with internal experts within Vattenfall. For discussions about limitations, see 5.1.

Due to the involvement of people with deep knowledge of the core operations, the indicators are considered to give a good overview of impacts related to the wind power production.

2.2.2. Stakeholder involvement

Setting up the system boundaries and selecting indicators was made based on internal discussions and together with external actors in the S-LCA field.

The inventory was made by interviews with internal experts and key functions and involvement of first tier suppliers.

The supply chain assessment has been limited to procurement of wind turbine generators (WTG) for a wind farm. Contacts have been taken with one of the main WTG suppliers which provided input material for the first tier assessment. Based on information from the supplier, an assessment of selected indicators have been made for suppliers for second tier and backwards, based mainly on Verisk Maplecroft country risk indices. The rationale is that WTG represent the largest investment cost in a wind farm. For contractors performing of civil works for construction of a wind farm and service suppliers for maintenance during operations, focus has been on the working conditions for

the suppliers' own employees as other impacts (supply chain impacts and impacts on local communities) would fall under the responsibility of Vattenfall and the turbine supplier.

2.2.3. Assumptions made

The turnover rate for Vattenfall has been calculated using number of employees at the end of 2013 and 2014. This is a rough approximation but since there has been a freeze on hiring in large parts of the organisation during the period this is probably not very far from the truth.

Assumptions for the supply chain:

- Concrete is assumed to be produced in Denmark as this study is based on a Danish project and concrete is normally bought locally to keep down transport costs.
- Plastics are assumed to be produced in Europe (20% of world supply compared to world leader China 24%)
- Copper is assumed to be manufactured in Chile
- Steel is assumed to be manufactured in China (50% of world supply of steel)

In the calculations for Core, service and maintenance work has been represented by one contractor. In reality, the work is carried out by several external and internal operators – in Denmark, three contractor companies are mainly used and in Sweden, personnel from Vattenfall's Service company is used together with BU Wind's own personnel. One of the contractor companies in Denmark has been used for this study.

2.3. Data quality

2.3.1. Site specific vs generic data

Data regarding Vattenfall's internal operations and the first tier suppliers is specific. The exceptions are the Verisk Maplecroft indices used which are generic. For other tiers in the supply chain, data is generic.

Table 2 Data quality matrix

	Own operations	**1st tier suppliers**	**Sub suppliers (below 1st tier)**
Accuracy, integrity and validity	Verified data, or non-verified internal data with documentation, or assumptions	Verified data, or non-verified internal data with documentation, or assumptions	Data obtained from generic sources
Timeliness	Data from current reporting period (2014) except for indicators describing incident and fatality rates, taxes paid and community spendings where the three year average was used	Data from current reporting period (2014)	Data from current reporting period (2014) or latest available year
Correlation	Data from normal operations during reference period, not related to specific site	Data from normal operations (not only related to delivery for the studied wind farms)	Average sector or country data from public or third party database provider

2.3.2. Completeness/gaps

Only a few numbers of suppliers have been selected to represent the whole lifecycle of wind power, both for delivery of wind turbines and for service work.

Upstream process, i.e. production of oils and fuels for maintenance of the farms, has been excluded. These processes are considered to be minor in the context.

Consumers have been excluded because the use of electricity is very broad and difficult to foresee. This is in line with the scope of the rest of the EPD as determined by the PCR for electricity (CPC 171, ver 3.0). Downstream processes, distribution of electricity, has also been excluded as the impacts are assumed not to be very different for the ones in the core processes.

Workers internally at Vattenfall has been limited to the employees at BU Wind. In reality, employees within several staff functions also work for the business unit. On the other hand, in some cases the number for the whole company has been used as representing the BU wind figure.

Indicators chosen have been based on assumptions on what data would be able to access both internally and from other sources. This means that there is probably a gap between the overview provided by the socioprofiles below and the actual situation. This is especially the case for the supply chain, where there is limited information available. To broaden the picture, overall impacts and obstacles are also described qualitatively under each section. Since data is difficult to find further down in the supply chain, there is also a lack of information about the actual social impacts, especially those on local community. See also section 5.1 for discussion around limitations regarding excluded processes and availability of data.

2.3.3. Uncertainty

The largest uncertainty is related to the supply chain, as the information on what countries are represented is very limited and the information on actual social impacts is even more so. The countries of manufacture have been assumed and generic risk indices have been used in this study. Since these assumptions are only approximations they may not accurately reflect reality. Suppliers to Vattenfall are subjected to internal sustainability risk management processes, including auditing, based on the Vattenfall Code of Conduct for Suppliers. However, these are currently still limited in scope and mainly focus on first tier suppliers and on suppliers in high risk countries. Many suppliers are not covered by these processes and little is known about suppliers further down in the supply chain. The processes are under development and, as they are developed, control, transparency and availability of information are expected to increase.

There are also uncertainties related to the choice of indicators and their ability to reflect actual impacts. This is especially the case for local communities. See also section 5.2 for a discussion concerning the limitations of the study.

2.3.4. Representativeness of data (population + time)

Since HR data used is aggregated at BU Wind level, this data is assumed to be representative for both employees in wind power development and in generation. However, this is perhaps not the case for all categories.

The data used mainly originates from 2014, and where possible, the average for the years 2012-2014 has been used to cover up for annual fluctuations. Due to organisational changes some data from

different years might be difficult to compare. In those cases the 2014 value alone was used. In some cases the 2013 value was used instead due to the unavailability of more recent data, or 2015 up to the date when the data was collected.

3. Background information – Wind power

The number of employees in BU Wind by the end of 2014 was 139 (full-time employees, FTE). The annual production, with 2014 as reference, was 2.0 TWh. The technical service lifetime for wind turbines is 20 years.

3.1. Impacts from wind power on society and local communities

In general, wind power production can have both positive and negative impacts. Development of new wind power is an important step in moving the society towards a renewable energy system and this is seen positively by the society at large and at a global scale. At a local level, this is also seen positively by large groups but there are also local circumstances that have to be considered.

In terms of positive impacts, wind power leads to job creation, and creates value for the society. In the next step, electricity generation is a required and valuable resource for society at large in its development and also for the community, today and in the future. In particular, wind power, when applied to phase out other production such as fossil power, can have positive health effects for the whole society in terms of reduction of emissions with negative impacts for human health.

Impacts that are perceived as negative from groups in the local communities can be visual impact, noise, and shadows. A Canadian report “Understanding the evidence: Wind Turbine Noise” concludes that the evidence is sufficient to establish that there is a causal relationship between exposure to wind turbine noise and annoyance but there is limited evidence to establish such a relationship between exposure to wind turbine noise and sleep disturbances. For other health effects such as stress, tinnitus, cardiovascular diseases etc., the evidence was inconsistent and inadequate. Further studies are needed.

Other negative impacts are connected to the interference with reindeer herding in northern Sweden. The impacts can be different depending on where the wind farm is situated and how e.g. roads are planned. The planning requires a good stakeholder dialogue with the concerned Sami villages to minimise the negative impacts. There is so far little research on the topic of how the operations of wind farms affect the reindeers but the studies that have been conducted so far shows that the reindeers generally avoid areas close to infrastructure, including e.g. power lines, and access roads (to e.g. wind farms). As a consequence grazing areas can be restricted or sequestered. (Naturvårdsverket, 2012). Other effects that ongoing studies look at are the cumulative effects of many wind farms or the combination of wind farms, mining, and other activities. During the construction phase the animals can be disturbed by noise and increased traffic, which means that they leave the area during a period but studies indicate that they come back when the disturbances have disappeared.

One positive local impact can be that land owners, either it is forest or agricultural land, have a new income source. The economic situation for those groups is not always easy but with leasing the land, which is the normal case if a private land owner, they can afford to continue with forestry or agriculture and stay in the area.

3.2. Obstacles in the supply chain of wind power

For environmental impacts from wind power production, a large part is allocated to the supply chain and the manufacturing of the turbines. This is probably true also for social impacts; since the construction of parts used is to some extent located in countries where there is a risk that basic human rights are not as respected as in the western European countries where the wind power production takes part. As we haven't been able to access information on what countries are represented beyond second tier, this study has been based on statistics (see section 2.2.2).

The supply chain includes construction of parts for the turbines, mainly industrial electronics and steel products. In a business-to business context, the electronic sector is not as exposed to risks related to working conditions as the consumer products industry, due to the strict quality requirements of high-tech technology products. This means that the risk for child and/or young workers is limited. Risks may arise within the area of working conditions related to freedom of association, wages and working hours as well as breach of women's rights (KPMG, CSR Sector Risk Assessment, 2014)

Further down in the supply chain, the turbine manufacturing is also dependent on mining of minerals, mainly steel and copper but also other minerals. In the metal sector, problems are found within most areas of human rights, especially working conditions such as freedom of association and involuntary labour – linked to e.g. wages and unpaid overtime. There is also a risk of child labour. Healthy and safe working conditions for mine workers and in the processing of metals are also on the list of material risks, as are impacts on local communities and protection of material and immaterial resources for the people living near the mines (KPMG, CSR Sector Risk Assessment, 2014).

3.2.1. Supply chain management

Vattenfall's suppliers are expected to comply with the Vattenfall Code of Conduct for Suppliers, based on the UN Global Compact's ten principles[5]. Since 2009 the aim is for the Code of Conduct to be a part of all contracts with suppliers exceeding SEK 100 000 in value. The Vattenfall Code of Conduct for suppliers includes a commitment for suppliers to monitor the aspects in the code at their suppliers.

Vattenfall aims at auditing[6] new first tier suppliers of goods and services from high risk countries[7] before signing contracts. Work is currently underway to develop this process to include existing suppliers, suppliers further down the supply chain, as well as suppliers in medium and low risk countries.

[5] Vattenfall's Code of Conduct for Suppliers is based on international conventions and guidelines including the Universal Declaration of Human Rights, International Labour Organization (ILO) Conventions and Recommendations relevant to improving working conditions in the supply chain, the UN Global Compact, the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles for Human Rights and Business. See http://corporate.vattenfall.com/Global/corporate/about_vattenfall/suppliers/code_of_conduct-for_suppliers.pdf

[6] A formal or documented process that applies a set of performance criteria as one of the factors in determining whether to proceed with a relationship with a supplier. (G4 Implementation Manual, https://www.globalreporting.org/resourcelibrary/GRIG4-Part2-Implementation-Manual.pdf)

[7] The high risk countries are defined by a combination of different indices, see http://corporate.vattenfall.com/Global/corporate/about_vattenfall/suppliers/CSR_Country_risk_classification_July_2013.pdf

3.3. Waste management

The main waste from wind farm operations is oil residues from old oil filters and from cleaning cloths. This is classified as hazardous waste and is taken care of according to legislation. See the full EPD for information on waste streams. Waste from core-infrastructure is dominated by scrapped material when reinvestments are made and material from decommissioning, which largely comprises different types of metals. Up to date decommissioned wind turbines from Vattenfall's repowered wind farms, where old and often inappropriately located wind turbines are replaced by bigger, more efficient ones, have been sold and used in wind farms in other countries since they have been decommissioned before their technical lifetime.

Waste treatment is almost exclusively taken care of in Sweden and Denmark. Operational waste and scrapped reinvested material have not been assessed specifically but since the Verisk Maplecroft indices are generic at the country level the indices for Sweden and Denmark can be assumed to also be representative for the waste management processes.

4. Results

The results are divided according to the stakeholder groups included in the assessment. For impacts on *Workers*, see section 4.1. For stakeholder groups *Local Communities* and *Society* see section 4.2 and 4.3 respectively.

The results are presented for the following life cycle processes:

- Core: including the operation of wind farms, and impacts on local stakeholders as well as the service and maintenance work of the wind farms
- Core-infrastructure: comprising work related to the construction of the wind farms, from the supply chain of materials and components to construction at the site.

Core operations are carried out in Sweden and Denmark. First tier suppliers in Core-infrastructure are located mainly in Western-European countries whereas sub suppliers are located all over the world. For assumptions regarding countries representing sub suppliers, see 2.2.2.

4.1. Workers

The stakeholder group *Workers* includes both employees at BU Wind and workers in the supply chain. See Table 3 below for the summary of all quantitative indicators assessed. For qualitative descriptions and explanations of the numbers in the table, see sections 4.1.1-4.1.6.

Table 3 Socioprofile for stakeholder group *Workers*

Workers	Unit	Core		Core-infrastructure		
		Vattenfall generation (SE + DK)	Service supplier (DK)	Vattenfall development (SE + DK)	1st tier suppliers (DE + DK)	Sub suppliers (below 1st tier)
Discrimination and equal opportunities						
Discrimination in the workplace index	Index[1]	8.4	9.0	8.4	8.7	4.7
Ratio women/men	Ratio	0.29	0.16	0.29	0.32	NA
Median age of workforce	Years	42	40	42	41	NA
Ratio women/men in managerial position	Ratio	0.25	0	0.25	0.18	NA
Child labour						
Child labour index	Index[1]	9.4	10.0	9.4	9.5	4.8
Forced labour						
Forced or involuntary labour index	Index[1]	7.7	9.0	7.7	7.7	3.8
Freedom of association and collective bargaining						
Freedom of association and collective bargaining index	Index[1]	9.4	10.0	9.4	9.5	4.8
Health and safety						
Existence of safety officers and/or work environment committees	Y=1/N=0	1	1	1	1	NA
Occupational Health and Safety Index	Index[1]	8.7	9.0	8.7	8.7	4.8
Number of incidents (more than one day lost) per employee	Number/ employee	0.014	0.037	0.014	0.007	0.018
Number of fatalities per employee	Number/ employee	0.0024	NA	0.0024	0	0.0001
Working Conditions						
Working Conditions index	Index[1]	9.0	10.0	9.0	9.2	5.4
Percentage of workers whose wages meet at least legal or industry minimum standards and their provision complies with all applicable laws.	%	100 %	100 %	100 %	NA	NA
Percentage of employees that work more than 48 hours / week on an average?	%	NA	NA	NA	NA	NA
Training and education						
Numbers of hours of training per employee during the reporting period.	Number/ employee	2.5	NA	2.5	NA	NA
Employee satisfaction						
Percentage of workers who participated in a job satisfaction and engagement survey during the reporting period.	%	72 %	NA	72 %	77 %	NA
Worker turnover rate during the reporting period.	%	5 %	12 %	5 %	9 %	NA

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

4.1.1. Discrimination and Equal Opportunities

The Verisk Maplecroft index "Discrimination in the workplace" investigates the extent to which individuals are treated less favourably than others in a comparable position and situation, without reasonable and objective justification, when accessing employment and during employment,

especially in relation to working conditions, such as compensation, working hours and health, safety and security, training and promotion opportunities.

The index is based on e.g. coverage of protection in law, and core countries have relatively robust regulations and enforcement in this area which contributes to the higher score for this index. See also the “Legal and regulatory environment risk index” described in 4.3.4 below.

Although the figure for Sweden is slightly lower, the figures are quite similar for Sweden (7.98) and Denmark (8.97). However, in Eastern European countries the numbers are significantly lower (approx. 4-5) and the same is true for South American countries, which account for the greater part of the copper supply. China represents the lowest index.

Table 4 Discrimination in the workplace index scores for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Index[1]	8,0	9,0	8,5	4,7	5,3	5,2	0,62

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

The energy industry is still predominantly male, especially among the service technicians. The median age and share of women is about the same at Vattenfall as at the large suppliers but the difference between office workers and service technicians can be seen at both companies where the share of women is slightly lower among service technicians.

By the end of 2014, 22 % of the BU Wind workforce were women. Of those in managerial positions, 20 % were women. As a comparison approximately 24 % of the workforce of the Vattenfall group are female and 18 % in a managerial position. The goal for Vattenfall is that the share of female managers should correspond to the share of female employees.

Looking at the countries in the supply chain, the ratio between women and men in work, at a country level, is close to 0,9 in Sweden, Denmark and Germany, a little lower in the eastern European countries (about 0,8) and about 0,6 in both China and Chile. These ratios are still higher than the company-specific numbers provided by the companies in the the study, due to the fact that these are on a country-level, regardless of sector. The energy sector is traditionally a largely male dominant sector.

The indicators in this area focus to a large extent on gender equality. However, there are many other types of discrimination thatmight be a problem in the western European countries. For example, structural racism leading to difficulties for persons with foreign background to get a job or same career advancements as others. Age discrimination might be another problem.

The number of incidents of discrimination reported in the organisation is thought to reflect the situation. In this study, it hasn’t been possible to find a number for incidents reportedand hence this indicator is not presented in Table 3. Whether this means that the actual number is zero or not is not certain, and also if a zero would really mean that no incidents occur. Rather, it might also indicate that should an incident occur it would perhaps not be reported.

4.1.2. Child Labour

The Verisk Maplecroft Child Labour Index indicates the risk of child labour to business including perceived complicity and direct employment of children due to deficiencies in the establishment and implementation of mechanisms to prevent child labour.

This index reflects the situation at the country level with no regard for the type of industry. However, in the heavy manufacturing industry where most components for energy production are manufactured, the risk for child labour is lower due to the need for qualified workers. Further down in the supply chain where raw material is extracted up or less skilled work is performed the risk is bigger. Even though all countries screened in this supply chain do have legislation on child labour the enforcement of legislation is considered to be weaker in certain countries (Romania, China) which would account for the low index scores.

Table 5 Child Labour index scores for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Index[1]	9,0	10,0	9,0	3,7	5,3	3,7	0,6

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

In Vattenfall the employee´s age is automatically checked prior to employment and included in the employment contract. Hazardous work is been restricted to persons above the age of 18 in all countries screened in this report. Hazardous work includes e.g. working underground in mines and certain work where chemicals are involved. No cases of child labour have been revealed in own operations.

4.1.1. Forced Labour

The Forced and Involuntary Labour Index indicates the risk of forced labour to business and global supply chains. Forced labour can be described as a continuum with slavery at one extreme and hidden forms of involuntary labour at another. The latter may well be a significant problem for which there is little data available and includes regular overtime work where workers are pressurised in different ways to work overtime. Illegal and systematic overtime can result in workers being denied their right to rest, a higher risk of occupational injury, and deficient product quality. In addition, compensation for overtime work may not be in line with legally stipulated levels for such work.

Table 6 Forced or Involuntary Labour index scores for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Index[1]	7,0	9,0	6,5	4,7	5,3	5,2	0,6

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

The index includes the parameter of risk for trafficking. The most widely used definition of trafficking can be found in the UN Protocol to Prevent, Supress and Punish trafficking in Persons[8]. Trafficking in our scope comprises labour trafficking and trafficked persons are very often already belonging to vulnerable groups. Those persons are not only performing some form of forced labour but very often are legal rights not observed, which in turn means higher risks to a range of occupational health risks.

[8] "The recruitment, transportation, transfer, harbouring, or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation."

The score for Sweden as a medium risk country is much affected by the risks for trafficking, which as mentioned, is one part of the index. This is not relevant for BU Wind and no cases of forced labour have been revealed in Vattenfall's own operations.

4.1.2. Freedom of Association and Collective Bargaining

In the Verisk Maplecroft "Freedom of association and collective bargaining index" Core's weighted score is 9.6 and Core-infrastructure's is 7.2 out of 10, where 10 is associated with the lowest risk. The index measures the level of risk posed to business by allegations of complicity or direct involvement in violations of the rights to freedom of association and collective bargaining. Reasons for this difference in the score are that in the Core countries the implementation of freedom of association is very strong and that is e.g. shown in the membership in trade unions, which is very high and the fact that different independent unions occur in a workplace. In the supply chain though, the situation is not the same. In first and second tier with suppliers based in Europe the score is still high or medium but in some countries further down in the supply chain freedom of association is forbidden by law (China). When freedom of association and collective bargaining functions properly, it provides the foundation for solving many other labour issues, including health and safety in the workplace.

Table 7 Freedom of Association and Collective Bargaining index scores for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Index[1]	9,0	10,0	9,0	5,7	5,3	4,7	0,1

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

The trade union is the most common formal channel that employees use to exercise their labour rights and negotiate salaries. The trade union is also a grievance mechanism since it provides a formal and structured channel for workers to complain about labour related situations. Employees that are not associated with any specific trade union may also be covered by collective bargaining agreements. The trade union tradition is robust in the Core countries and this is the main route used to influence employees' working conditions

During the time period studied, no grievances were filed and addressed in BA Wind. This does not necessarily mean that no incidents or conflicts occur, rather that cases, if any, were not registered in the formal way.

4.1.3. Health & Safety

Sweden and Denmark have strong legislation and governance within the health and safety area. This is seen in the Verisk Maplecroft "Occupational health and safety index" where Sweden scores 8.5 and Denmark scores 9.0 on a scale where 10 indicates the lowest risk. The Occupational Health and Safety Index 2015 assesses the risk to business through possible association with, and exposure to poor occupational health and safety standards at a country level. The BU Wind organisation is also certified in accordance with OHSAS 18001:2007, which means they have a systematic way of working with health and safety according to a plan-do-check-act cycle, and are audited annually on their work.

In the supply chain the risk is higher, see Table 8 below. Normally the legislation is in place in these countries but enforcement is lacking. There is also a connection to the "Corruption risk index" and the "Legal and regulatory environment risk index" as a low score for the latter index indicates that enforcement of legislation is weak. When no official body conduct compliance checks at the

companies many of them have no incentives to follow existing laws. A low score in the corruption index can imply that even if compliance checks are conducted they have no effects due to possible bribes. Read more in 4.3.2 and 4.3.3 in the Promoting social responsibility and Compliance parts.

Table 8 Occupational Health and Safety index scores for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Index[1]	8,5	9,0	8,5	4,2	4,8	5,7	1,1

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

When comparing incident and fatality rates over the different life cycle stages, one gets the impression that the risks are instead much higher in the core processes of the wind power production. Interpretation of the data shall however be made bearing in mind that the statistical base for these numbers are much lower, where single incidents affect overall results much more. The numbers representing supply chain are also on a country level and from official ILO databases, and in some cases only insurance compensated incidents. Risk related work in wind is related to the categories heights, road transport and boat transport. Around 25 % of employees are involved in high risk work on a daily basis, and 35 % of employees are exposed to high risk occasionally. To perform work in these categories you (according to GWO, Global Wind Organisation) have to pass a health check and certain trainings:

- health/fitness check
- work at heights
- first aid
- fire awareness
- sea survival (if offshore)
- manual handling (ergonomics)

At BU Wind there are safety officers located in each country. Formal occupational health and safety (joint management-worker) committee exists at Vattenfall BU Wind. Even though not all employees are members of trade unions, this committee still represents all employees. The committee is represented on an overall level of the organisation but health and safety is a standing agenda point on all department and team meetings. There has been one fatal accident during the last three years. This accident occurred while the employee was travelling to work.

In Table 3is seen both the number of incidents per employee and the risk index “Occupational Health and Safety”. One could think that the lower risk (high score in the Verisk Maplecroft risk index) the lower number of incidents per employee. That relation is not seen and one strong reason for that is most probably the quality of incident reporting. In countries with low enforcement of especially health and safety legislation there is a large number of unreported cases.

4.1.4. Working conditions

The Working Conditions Index highlights the level of risk posed to business through possible association with practices by state and non-state actors that limit the right of a person to just and favourable working conditions. This risk arises from the potential existence of poor working conditions in companies’ global value chains (i.e. in their own operations, or in those of their suppliers, subcontractors, distribution networks or business partners).

Table 9 Working Conditions index scores for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Index[1]	8,5	10,0	8,5	4,7	5,3	6,2	2,1

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

Just and favourable working conditions include several aspects, and there is an overlap with several other aspects in this chapter, which are described above and below this section.

In this assessment, working conditions was chosen to be described by indicators for wages and working hours. According to the CSR Risk Assessment (KPMG, CSR Sector Risk Assessment, 2014), those would be material risks for both the electronics and the metal sectors.

Violations of working conditions' rights include wages below the level of a living wage, which means that the worker cannot support himself/herself and his/her family; discriminatory pay gaps; unreasonably long working hours; workplace conditions below health and safety standards, including the failure to provide effective protective equipment where necessary or equipment that is safe to use and the failure to provide adequate occupational health and safety training to prevent injuries.

There is normally a difference between the legal or industry minimum wages and a living wage and it is difficult to estimate a living wage. The first step is to meet the minimum legal or industry wage (whichever is higher).

The percentage of workers whose wages meet at least legal or industry minimum standards, and whose wages comply with all applicable laws, is estimated at 100 % in Core process. In the core countries, where the right to freedom of association and collective bargaining is relatively well respected, collective bargaining agreements are expected to meet not only the legal minimum wages but also provide a living wage. The first tier suppliers in core-infrastructure have reported that 100 % of their employees' wages comply with all applicable laws. Suppliers in Western European countries can be assumed to be on the same level as the Core, but for countries in Eastern Europe and China the wage situation is less favourable. This number is therefore probably not representative for the whole supply chain.

The percentage of employees that work more than 48 hours a week on an average is an indicator that is not monitored on company level in the companies asked in the survey. Those companies are situated in Sweden and Denmark and the reason for not monitoring on company level can be that there is legislation regulating working hours and other indicators, and monitoring from the closest manager, are used to keep track of compliance.

In China, migrant workers are especially vulnerable to risks of poor working conditions. It can be forms of involuntary labour, overtime excess, and incorrect payment of overtime. According to a report by KPMG (id), a workweek can in some Asian countries, China included, be up to 84 hours long. According to this report, audits show that 50-75 % of Asian suppliers in the electronics sector were responsible for breaching working time regulations.

There is a significant correlation between overtime and low wages. If the minimum wages are low, and hence likely to keep workers in poverty, they will be more willing to work excessively long hours. There is also interference between working hours and for example health and safety, as the risk of accidents increases when employees are forced to work long shifts without sufficient time to rest.

For migrant workers decent dormitories are part of their working conditions as well, where access to drinking water and adequate fire protection are among the most critical aspects.

4.1.5. Training and Education

The indicator with training hours for the employees is one part in describing what availabilities employees have to develop within their work. These trainings can be to become better in one's area of expertise or to broaden one's area of work to other tasks. In these trainings the leadership trainings are included as well.

In the indicator is included training outside of what is required to perform their work (certificates needed), for mandatory trainings see under 4.1.3 Health & Safety. Excluded from these trainings is also the so called Integrity Programme, which is a part of the anti-corruption work. See 4.3.3 Corruption for more information.

4.1.6. Employee satisfaction

Many companies perform employee satisfaction surveys in some form, but not all of them. It may be more common in larger companies where communication paths are longer. For that reason the figures given below are not fully representative, which is also commented. Surveys are constructed in different ways and the most reliable figure to measure is then the response rate in such a survey. The response rate doesn't give any information about how satisfied employees are but a high response rate may indicate the willingness to improve if the employee is not satisfied and also the openness in the organisation.

For Core, comprising operations and service, the overall response rate is 72 %. For Core – Infrastructure (own organisation and 1st tier supplier) it is 75 %. Data has not been collected for sub suppliers.

In Vattenfall's internal tool for measuring employee satisfaction the response rate for group was 72 % in 2013, which was the latest survey. The category "Engagement" is used to describe if employees feel committed to the company and are willing to put in discretionary effort to go the extra mile. The category is a summary of seven different indicators. For 2013, the engagement index for BU Wind was 78.5 – which is higher than the group average of 63 and the Nordic average which was 71.The result is mirroring the percentage of positive and very positive answers and consequently the index 100 indicates that all employees are positive or very positive to the seven statements in the engagement category.

4.2. Local Community

This chapter includes impacts on the stakeholder group local community. For local communities, the focus is mainly on Vattenfall's own activities. See Community below for a summary of the quantitative indicators assessed. For qualitative descriptions and explanations of the numbers in the table, see sections 4.2.1-4.2.4.

Table 10 Socioprofile for the stakeholder group Local Community

Local Community	Unit	Core		Core-infrastructure		
		Vattenfall generation (SE + DK)	Service supplier (DK)	Vattenfall development (SE + DK)	1st tier suppliers (DE + DK)	Sub suppliers (below 1st tier)
Local community						
Number of grievances about impacts on society filed, addressed, and resolved through formal grievance mechanisms	Number/ employee	0.074	NA	0	NA	NA
Number of programmes or events targeting community engagement during the reporting period.	Number/ employee	0.1	NA	3.9	NA	NA
Community spending and charitable contributions	tEUR/ employee	0.010	NA	0.020	0.077	NA
Local employment						
Proportion of spending on local suppliers at significant locations of operation	%	90 %	NA	20 %	NA	NA
Respect of indigenous rights						
Indigenous peoples' rights	Index[1]	9.2	9.5	9.0	NA	NA
Ratification of the ILO 169	Y=1/N=0	0.4	1.0	0.4	0.5	0.0
Number of grievances related to human rights (including indigenous people) impacts filed, addressed, and resolved through formal grievance mechanisms	Number/ employee	0	NA	0	NA	NA

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

4.2.1. Local Communities

In the process of developing a new wind farm, the stakeholder communication is a crucial part of the project. A large number of meetings are held with many different stakeholders from an early stage. This is important to get the external views on planned activities, and allows for adaption of the project according to the needs of the stakeholders. These meetings amount to a few hundred per year.

For Vattenfall's wind power, stakeholders cover municipality, authorities, land owners, neighbours, ornithology association and other nature organisations, native district association etc. In northern Sweden the Sami villages and hunters are very important stakeholders. Constructing offshore may also include fishermen. During this reporting period one offshore project has started development activities. The communication with stakeholders is an important part of the project development to gain knowledge about concerns and sometimes about local nature, and is also a good way to inform about the project.

Normally, opinion polls are performed before the project starts, during the project development and after it has been finished. Here we can normally see that opinions move more to the positive over time.

Grievances that are reported are registered in the internal management system. The complaints can come from private persons or the municipality and to register them is a way of being able to follow-up on each matter.

Normally, most of the events occur during the project development phase in form of meetings with stakeholders. Sometimes the existing wind farms arrange events where people can visit the wind farm and learn more about it. It can also be a school class visiting when learning about energy in school.

What is becoming more common in wind farm projects is support to local development where an agreement between the developer and a local development association, started for this aim and detached from the municipality, is settled. Normally the agreement includes a framework for what the financial support can be used, not to take over expenses where the municipality has an obligation. It can for example be used for development of local business, and restoration or creation of recreation areas.

In Denmark, the Renewable law obliges wind farm developers to offer neighbours to become shareholders in the wind farm. There is also a fixed way of compensating real estate value losses in certain situations.

4.2.2. Local employment

Service suppliers are to a large extent local, and service contractor companies hire almost all of their employees on a local basis. The figures in the table above are only covering data from procurement in Vattenfall. The figures are estimated and the reason why they are different is that they represent different parts of the lifecycle: for core-infrastructure the share of suppliers (turbine, ground work etc.) that are locally based corresponds to approximately 20 % of the total spend. For Core, 90 % represent the share of spendings covering local suppliers for service and maintenance.

In some areas the wind farm can contribute positively by being a new employer in the area.

4.2.3. Delocalization and Migration

The numbers 0 (zero) in the table represents number of involuntary resettlements to land rights. During the reporting period a number of real estates have been bought by Vattenfall. This is done to find the best placement of the turbines so that the wind can be utilised at its most. The agreement of selling your real estate is always voluntary and if there are no agreements the layout of the windfarm has to be adapted to that situation.

In Denmark, most of the persons selling their real estates move to a new house in the vicinity. In Sweden, most real estates sold are old crofts or country houses. This concerns a few real estates per year in Denmark and even less in Sweden.

4.2.4. Respect for Indigenous Rights

Indigenous peoples are defined by the UN as "having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing in those territories, or parts of them." Respect for indigenous people's rights is a part of the human rights to self-determination and Free Prior and Informed Consent (FPIC) as provided for in the UN declaration on the Rights of Indigenous Peoples.

Indigenous people often have customary rights to land which means that they have the right to use the land for livelihood, religious purposes etc. even though they don't legally own the land. This might make them more vulnerable to physical changes and resettlements. The rights of indigenous people for wind power can be translated to the relationship with the Sami villages in northern

Sweden. On average there is one project a year with interference with reindeer breeding areas, where there might be a potential conflict with Sami villages.

Recently a new cooperation was initiated at Vattenfall to coordinate the meetings between all business units with operations in the area, and the Sami villages, to provide an opportunity to manage potential conflicts or problems before they arise. This collaboration includes electricity distribution, hydropower and wind power, and allows for better coordination of stakeholder management.

The Verisk Maplecroft index "Indigenous peoples' rights" highlights obstacles that indigenous communities within a country may face in exercising a variety of rights. Obstacles can be for example that indigenous people are not afforded the same rights as other groups, including property rights and cultural rights, or lack of access to basic services or legal assistance and remedies for human rights violations. Indigenous peoples and activists are also vulnerable to attack by groups with competing interests. For the core countries (Sweden and Denmark), this index is 9.2. For core-infrastructure it has not been possible to calculate a number as no data is available for many countries in the supply chain. But especially when it comes to mining the risk of breaching indigenous people's rights is high (ref: KPMG report)

Table 11 Indicators for indigenous people's rights for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Indigenous people's rights index[1]	9.0	8.5	NA	NA	NA	1.7	NA
Favoured the adoption of UN's Declaration on the Rights of Indigenous Peoples	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ratification of the ILO 169	No	Yes	No	No	No	Yes	No

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

The UN Declaration on the Rights of Indigenous Peoples is a comprehensive statement addressing the rights of indigenous peoples. UN declarations are generally not binding and hence this declaration was adopted by 144 states in 2007, compare with the ILO convention below. All countries in our Core and selected Core-infrastructure countries did vote in favour for this declaration.

The ILO Convention No. 169 deals with the rights of indigenous and tribal people. This convention is legally binding. So far, only 22 countries have ratified the convention, including Denmark and Chile. Countries like Sweden, Germany, Romania, Poland and China have not ratified it. The fact that a state has not ratified the Convention does not indicate that there are no minority groups in the country that could fall under the definition of indigenous rights, or that the rights of those peoples are not at risk in this country. It is likely that there are other reasons why so many countries have hesitated to ratify the convention. One reason might be the "Right to decide priorities for development", where it in Article 7 of the convention says that indigenous and tribal people have the right to "decide their own priorities for the process of development as it affects their lives, beliefs, institutions and spiritual well-being and the lands they occupy or otherwise use", which might stand in conflict with other land rights.

For Vattenfall's wind power, no significant grievances regarding violation of land claims or indigenous rights have been registered, neither any incident. Here it is referred to the complaints related to breaches to human rights for people living in the vicinity of power plants. Complaints related to for example noise are described under 4.2.1.

4.3. Society

This chapter includes impacts on the stakeholder group society, including for example prevention of corruption, contribution to economic development, social responsibility for the supply chain and legal compliance. Public commitments can for example indicate how engaged a company is to reduce its negative impacts, not only within its own organisation but also in its relation with their community and the society. In this study, the subcategories Contribution to economic development, Social responsibility, Corruption and Compliance were selected. See Table 12 Socioprofile for stakeholder group Society below for a summary of the quantitative indicators assessed. For qualitative descriptions and explanations of the numbers in the table, se sections 4.3.1-4.3.4.

Table 12 Socioprofile for stakeholder group Society

Society	Unit	Core		Core-infrastructure		
		Vattenfall generation (SE + DK)	Service supplier (DK)	Vattenfall development (SE + DK)	1st tier suppliers (DE + DK)	Sub suppliers (below 1st tier)
Contribution to economic development						
Tax paid	tEUR/ employee	4.53	NA	0	NA	NA
Promoting Social Responsibility						
The organization has pledged to comply with the Global Compact principles and has engaged itself to present yearly Communication On Progress	Y=1/N=0	1	0	1	1	NA
Percentage of new suppliers in high risk countries that were screened using human rights criteria	%	100 %	NA	100 %	100 %	NA
Payments on time	%	NA	NA	NA	95 %	NA
Corruption						
Corruption index	Index[1]	8.5	9.5	8.5	9.0	5.5
Existence of anti-corruption policy	Y=1/N=0	1	0	1	1	0
Percentage of target group that has conducted anti-corruption training.	%	50 %	NA	50 %	90 %	NA
Compliance						
Legal and Regulatory Environment Risk Index	Index[1]	8.9	9.2	8.9	8.9	6.1
Total number of (significant) fines and non-monetary sanctions for non-compliance with laws and regulations.	Number/ employee	0	0	0	0	NA

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

4.3.1. Contribution to economic development

Companies contribute to society in different ways and one way is economic development. It can consist of construction of relevant infrastructure for the region and capacity building. A factory for

wind turbine generator parts gives job opportunities and contributes to that the local hotel and restaurants can survive. Another way to contribute to economic development is through taxes paid. The companies that were asked in the survey for this report did not give an answer about paid taxes so the figure in the above table is from Vattenfall AB's subsidiaries Vattenfall Vindkraft AB and Vattenfall Vindkraft A/S (the Swedish and Danish wind power companies respectively). Taxes included are company and property taxation. Neither the Swedish nor the Danish Wind Power company made any profit during the reporting period[9]. Property tax in Sweden is paid for all erected wind turbines and in Denmark when the company owns the property where the wind turbines are placed.

4.3.2. Promoting social responsibility

Vattenfall has pledged to comply with the Global Compact. The same for the main supplier. Beside this, Vattenfall also aims to comply with a number of international guidelines, including the UN Guiding Principles for Business and Human Rights and the OECD Guidelines for Multinational Enterprises, and to report sustainability data annually in accordance with Global Reporting Initiative (GRI). For smaller companies, such as the contractors performing maintenance work, this is not as common. However, in accepting the Vattenfall Code of Conduct for Suppliers, which is based on the above mentioned international instruments, suppliers to Vattenfall are also accepting to comply with these instruments (see also 3.2).

Vattenfall aims at auditing new first tier suppliers of goods and services from high risk countries before signing contracts. Work is currently underway to develop this process to include existing suppliers, suppliers further down the supply chain, as well as suppliers in medium and low risk countries.

4.3.3. Corruption

Global anti-corruption NGO Transparency International defines corruption as 'the abuse of entrusted power for private gain'. Verisk Maplecroft's Corruption Risk Index examines the prevalence and persistence of corruption in the public and private sectors in 198 countries, as well as the efficacy of government efforts to combat corruption. The weighted indices for Core and Core-infrastructure are 8.9 and 7.3 respectively. Generally, bribery is more prevalent in developing economies due to administrative institutions are often weak, legal and regulatory oversight poor and pay scales low, meaning that there is both a greater temptation to engage in corruption and it is more viable to do so with impunity. Nevertheless, recent scandals in Europe and the United States show that corruption is not confined to less developed economies. See also Legal and Regulatory Environment Risk Index in 4.3.4 below.

Table 13 Corruption risk index scores for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Index[1]	8,0	9,5	8.5	4.2	5.3	6.7	2.6

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

Vattenfall has developed an anti-corruption policy. All managers within the company on the three highest management levels together with all employees with significant contacts with our

[9] Company taxation for their parent company Vattenfall AB, see annual reports.

competitors have to participate in a training including issues related to corruption at least every third year. The training has so far not been performed by all concerned BU Wind personnel. One reason for this may be that the organisation has undergone several re-organisations during the past years, which can mean that there are several new persons with duties requiring the training that haven't done it yet. A push was made 2015 and with the new organisation valid from mid-2015 a new push is needed. All employees within Communication, Procurement and Sales with regular contacts with external parties as well as other employees dealing with specifications for Procurement have to participate in an anti-corruption e-learning programme at least every third year. Up till today approximately 50 % of the persons identified to take the training have done it. There is also an e-learning which can be done at any occasion by all employees.

The main supplier has an anticorruption Handbook. Employees are trained in anti-corruption behaviour in a programme where 89 % of the target group have participated in the web based training and 60 % of the target group have so far participated in the live training (DK numbers). They also conduct regular surveys to gauge how employees perceive the topic of compliance.

4.3.4. Compliance

The Legal and regulatory environment risk index identifies and monitors the strategic and operational business risks presented by an uneven playing field in terms of regulation and government policy, the costs associated with corruption and lack of respect for the rule of law. The index is a combination of several indices, Corruption risk index among others. These indices are therefore correlated; in countries with high risk for corruption the rule of law is also weaker. The weighted index for core-infrastructure is 7.6, whereas for core, building upon the Nordic countries 9.0 on a scale from 0 to 10 where 10 indicates the lowest risk.

Table 14 Legal and regulatory environment risk index scores for different countries in the value chain

Country	Sweden	Denmark	Germany	Romania	Poland	Chile	China
Index[1]	8.8	9.1	8.6	5.2	6.5	7.2	3.6

1 Risk index on the scale 0-10 where a low number indicates a high risk (indices taken from Verisk Maplecroft at www.maplecroft.com)

For Vattenfall there have been no significant fines or non-monetary sanctions in the reporting period. One smaller sanction has been obliged one of our contractors. There have been threats about injunctions if no further measures are implemented (e.g. noise metering's or control programs).

The large supplier regularly reports on important proceedings in ongoing court cases in their annual report as well as in the quarterly reports. A few processes are under investigation.

4.4. Summary of results

Social impacts from wind power in terms of worker's labour and human rights are in general good for employees where the wind farms are located (Sweden and Denmark), in comparison with many of the countries further down in the supply chain.

The core ILO Conventions are well implemented in Swedish and Danish law and the tradition of freedom of association and collective bargaining is robust. The situation is almost the same for workers in the first tier where European countries are well represented – with a shift towards less favourable working conditions in Eastern Europe.

Instead, the largest risks for workers are found in the supply chain. Especially in the mining sector, there are risks for breaches of most of the content in the core ILO conventions: the freedom of association and collective bargaining, breach of women's rights, low wages, child labour, excessively long working hours and forced labour.

Below is an attempt to illustrate performance within the subcategories for the stakeholder group workers. The scales for the different subcategories are different and this difference in scales means that the results in the different subcategories are not possible to compare with each other. The lower value for Discrimination is explained by the relatively lower ratio of women in managerial positions in the core operations compared to the share of female employees in the organisation. The employee satisfaction shows the response rate of the internal survey. The scores solely do not necessarily indicate that these areas are the lower performing compared to e.g. working conditions.

Figure 2 Subcategory scores for Workers[10]

Impacts on local communities related to wind power can be both negative and positive. To the negative, noise, shadowing and landscape impact can be mentioned. Positive impacts are related to job creation and support to regional development. The relationship with local stakeholders is crucial for acceptance for wind power hence the large number of engagement activities with local stakeholders is an important part of project development.

[10] The number for discrimination was based on the average of discrimination in the workplace index, and the difference between ratio women/men in managerial position and overall ratio women to men. Health and safety was based on average of health and safety index and existence of officers. Working conditions were based on average of percentage of workers whose wages meet applicable laws, and the working conditions index. Employee satisfaction using the participation in survey only.Values are presented so that a higher value corresponds to a more desired situation.

The risks in the supply chain also tend to be higher for indicators relating to impacts on the society, represented by indices on corruption and rule of law.

5. Discussion

5.1. Limitations and shortcomings

The possibility to perform a lifecycle assessment covering the full value chain is very much limited to the availability of data. As data is more difficult to find further down in the supply chain, the quality of data as well as coverage is much better for Vattenfall's own operations and the first tier suppliers than for the rest of the supply chain. This is a clear shortcoming as the further down in the supply chain the more work are in sectors and in countries that are assessed with higher risks for violations of fundamental human rights. The decision to select indicators from an outside-in perspective, based on availability of data internally, may also affect the outcome of the assessment and there is a risk that important issues that would otherwise be identified as material are missed. But since the generic indices have been selected to cover the Fundamental Principles of the ILO Declaration the most crucial parts are considered to be included.

The assumption that China is the only supplier of steel has large consequences for the overall results, as the amount of steel is much larger than all other material flows. However, this is a conservative choice as China represents the highest risks for most of the indices.

The exclusion of Upstream and Downstream processes will probably not affect the results very much. Upstream processes are considered to have a minor impact due to small material flows, and Downstream, e.g. distribution of electricity can be assumed to be quite similar to the impacts from core.

The risk indices used for this study are on country level. It is though important to keep in mind that different sectors are exposed to different sustainability risks. For example, in construction of high-tech electrical components, the risk for under-aged workers or health and safety are not as high as for other sectors where the product quality requirements are lower, while for example labour risks are more material (see e.g. KPMG CSR Sector Assessment 2014).

In general all indicators measuring number of grievances are difficult to find and draw conclusions from. The definition is often formulated as incidents of violations or impacts filed, addressed and resolved. This is of course a quality aspect to use official data but the risk is that no conclusions can be drawn since too few events are registered. Most certainly there are many unreported incidents and impacts, which means the conclusions drawn from official data can be misleading.

The lack of data regarding companies, and thus countries, that are involved further back in the supply chain means that there is also a lack of information about the actual social impacts they have on different stakeholders. Using the Verisk Maplecroft risk indices is a way of showing the country risks in different areas and to indicate where social impacts can be more severe. There can be areas where the selected risk indices have not been sufficient to describe the situation, especially on local community where the location of an industry largely can steer what the social impacts are. Examples of such impacts may be the access of material and immaterial rights.

5.2. Stakeholder groups and stakeholder involvement

This study has been based on primary data from own operations and from first tier suppliers. Involving the stakeholders more in the data collection phase could give another view of the impacts, and should be considered for future assessments. Involvement of suppliers is a clear step forward but data collection from external stakeholders in local communities would be interesting to include. To be able to do so, other indicators needs to be found to better describe impacts on local communities.

In general, the impacts on local communities are difficult to quantify. Also for the supply chain, the indicators used to measure impacts on local communities are insufficient and need to be developed further to be able to draw any conclusions. For future studies, more generic indicators for impacts on local communities should be considered, describing local stakeholders' access to material and immaterial rights.

Vattenfall employees outside BU Wind, for example staff functions on the regional and corporate levels, have been left out of this study. For several employee aspects, such as working conditions, the results would reasonably be the same for those employees and for aspects such as incident rates there may be differences as many of these employees are based in an office.

5.3. Referencing and aggregation

The intention of this report is to give an objective view of the impacts, in line with the guidelines for EPD (GPI ver 2.5) that no value judgements shall be made. But for the interpretation of the results it would be valuable to put the impacts in a context, for example using reference values. In this study, a test was made trying to use reference values for the chosen indicators. The method for referencing quantitative indicators needs to be further developed, both within Vattenfall and within the S-LCA community.

An attempt to show the performance in spider diagrams has been made in the Summary section above (4.4), but the possibility to interpret the results is limited due to different scales for the different social topics. See below an alternative, showing only the Verisk Maplecroft Risk indices, which all have the same scale.

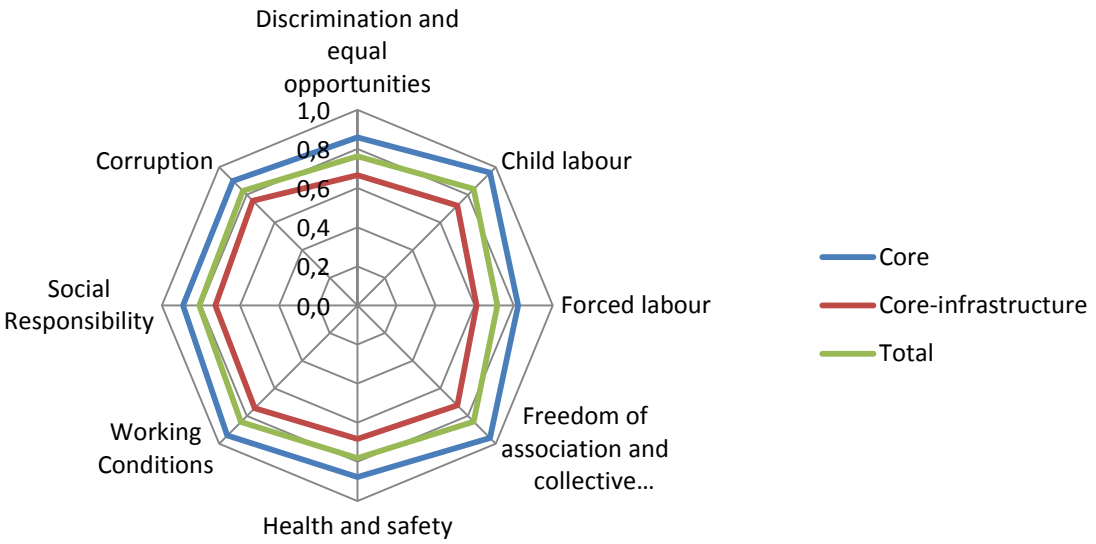

Figure 3 Performance within different subcategories (Verisk Maplecroft indices used only). Values are presented so that a higher value corresponds to a more desired situation.

Data for the supply chain was calculated by using masses of input materials as weighting. This is not optimal as the mass doesn't correspond to the involvement of people in the manufacturing and hence not how many employees are exposed to the impacts. A much better value would have been number of working hours per process, and second best would be to use costs, as this in some way might correspond to the amount of work required. Unfortunately mass was the best separation available. This may lead to a higher weighting was given to processes that in reality don't stand for a large part of the lifecycle activities. However, one may consider this to be conservative as large masses are connected to less advanced work, and less advanced work generally contains larger risks for breaches against human rights.

For impacts on local communities between the different lifecycle stages, number of employees was used to weight information from Vattenfall and our suppliers. Number of employees doesn't necessary reflect the severity of impacts on the local, but there is no guidance in the literature on how this weighting should be made, and number of workers was chosen as the best alternative that was available. One other option could have been to use the number of local stakeholders in the communities for each lifecycle stage.

5.4. Recommendations for future work

More use of the method is expected to provide greater knowledge on how to compare data from different assessments and contribute to the development of the methodology in general. One such task would be the development of reference values. When looking at the reference values suggested in the literature they are measured as actual numbers, which makes it difficult to put them into context of what is good and what is bad performance. More work is needed to find relevant reference values useful for more industries.

Since this is a new way of working it has been difficult to obtain relevant data for some of the indicators chosen for both the supply chain and for own operations. For the future, easier processes for social data management are needed. In particular, there is a need for internally available data regarding the supply chain and data related to sub-suppliers. The pressure on companies keeping track of such data will probably increase over time when social impacts are more and more observed. Another learning from this and to avoid data gaps until more standardised and accepted methods and indicators are developed, the indicators in the next study should take better into account the availability of generic data, to make sure that data can be found for all relevant life cycle stages. It would for example be valuable to explore existing databases to find indicators that can give relevant data regarding social impacts in the supply chain that can complement specific data from (sub-) suppliers. For example, indicators better reflecting availability of data for impacts on local communities are needed, as both number of programmes, number of grievances and indicators describing respect for indigenous people's rights were difficult to find data for.

The study was also limited by the availability of primary data for the indicators chosen, internally and from first tier suppliers. For workers, the indicator about working hours was difficult to find an answer to, as number of hours worked is normally not measured on top level within the organisation. Another example is number of incidents of discrimination, and percentage of employees that are paid a living wage.

A screening of impacts throughout the supply chain would be necessary to show hotspots to include in the S-LCA and to be able to understand how choices regarding for example system boundaries impact overall results. This screening would benefit from involving several stakeholder groups that could give their view on which impacts are most relevant.

6. Conclusions

This study was conducted to develop a reliable method for describing social impacts related to power production in a quantitative way. It hasn't been possible in this study to obtain data for some of the indicators chosen for the supply chain nor for own operations. In the part 5.4 above some ways are presented to manage this deficiency.

Social impacts from wind power in term of worker's labour and human rights are generally good for employees where the wind farms are located (Sweden and Denmark), in comparison with many of the countries further down in the supply chain. The core ILO Conventions are well implemented in Swedish and Danish law and the tradition of freedom of association and collective bargaining is robust. The situation is almost the same for workers in the first tier where European countries are well represented – with a shift towards less favourable working conditions in Eastern Europe.

Instead, the largest risks for workers are found in the supply chain. Especially in the mining sector, there are risks for breaches of most of the content in the core ILO conventions: the freedom of association and collective bargaining, breach of women's rights, low wages, child labour, excessively long working hours and forced labour. Even though the indices themselves are not sector-specific, this is in a way reflected by the fact that the assumption that China was set to represent the steel supply, including iron ore mining, is standing for a large part of the supply chain impact.

Impacts on local communities related to wind power can be both negative and positive. To the negative, noise, shadowing and landscape impacts can be mentioned. Positive impacts are related to job creation and support to regional development. The relationship with local stakeholders is crucial for acceptance for wind power. The large number of engagement activities with local stakeholders is an important part of preparing and eventually adapting parts of the project to wishes from the local community, informing about the project in different phases, and engage e.g. school children in the knowledge of energy production.

Even though the data availability for impacts on local communities in the supply chain is very low, some reflections can be made based on literature and general statistics. For example the metal/mining sectors are linked with high risks for deprivation of the rights to a clean, safe and healthy environment. Other common areas linked with high risks are land use issues and restrictions in the possibility to use customary rights. It's also common with poor involvement from the local community in planning of, and changes in the mining area and lack of planning when it comes to decommissioning of the plant.

For society, the positive impacts are assumed to be bigger than the negative ones, as wind power production is supposed to push out fossil energy production that have high health impacts. In terms of positive impacts the payments of taxes can be mentioned, contributing to the economic welfare of the society. Renewable energy production is also more wanted by the large mass according to a Swedish survey covering several years (SOM-institutet, 2012).

The risks in the supply chain also tend to be higher for indicators relating to impacts on the society, represented by indices on corruption and rule of law. Even here, China marks out as the country associated with the largest risks. According to the Guiding Principles on Business and Human Rights[11] companies have an obligation to comply with all applicable laws and to respect human rights in countries where they are active. When dealing with suppliers in countries where it is known that the risk for violations of fundamental human rights is high it must be a high priority to make sure that the operations are performed in way that does not infringe on the human rights. This includes having policies and processes in place to "identify, prevent, mitigate and account for how they address their impact on human rights" and should not being limited to first tier suppliers but including other tiers as well.

In general it's much more difficult to find data from stakeholders outside the own organisation, due to natural reasons. One conclusion is that it is very difficult to build the lifecycle assessment from top-down, since it is very difficult to penetrate the supply chain and find information about countries, processes and organisations. More progress would probably be reached by using a bottom-up approach, by using generic analysis of supply chains. Another conclusion is that, for doing that better generic data than the official indices used in this study are needed to better represent impacts in the supply chain in relation to our indicators.

[11] Guiding Principles on Business and Human Rights, United Nations, 2011

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APPENDIX 1 LIST OF INDICATORS FOR SOCIAL ASSESSMENT

Indicators shadowed with a grey colour have not been possible to obtain data for, or the data collected was deemed to be insufficient, and are hence not included in the report.

Indicators used	Source	Explanation
Workers		
Equal opportunities/discrimination		
Discrimination in the Workplace Index	Verisk Maplecroft	The Index investigates the extent to which individuals are treated less favourably than others in comparable position and situation, without reasonable and objective justification, when accessing employment and during employment, especially in relation to working conditions, such as compensation, working hours and health, safety and security, training and promotion opportunities. Additionally, it highlights the extent to which workers may be subjected to harassment and hostility in the workplace as a form of unjust or prejudicial differentiation of such workers from other employees in the workplace on grounds, such as their gender, age, ethnicity, religion or belief, disability, contraction of HIV/AIDS, migration status, nationality, sexual orientation or gender reassignment.
Total number of incidents of discrimination	GRI G4 HR3	Identify incidents of discrimination on grounds of race, colour, sex, religion, political opinion, national extraction, or social origin as defined by the ILO, or other relevant forms of discrimination involving internal and external stakeholders across operations in the reporting period. Identify the status of each incident, including whether or not an organizational review of the original incident has been undertaken, a remediation plan implemented and results reviewed through routine internal management review processes, and whether or not the incident is no longer subject to action (that is, resolved, case completed, or no further action required by the organization).
Ratio women/men	GRI G4 LA1	/…/ Identify the employee turnover during the reporting period, by age group: under 30 years old, 30-50 years old, over 50 years old, per gender and region. /…/ Rates are calculated using the total employee numbers at the end of the reporting period.
Median age of workforce	Own	
Ratio women/men in managerial position	GRI G4 LA12	Identify the governance bodies that exist within the organization, such as the board of directors, management committee, or similar body for non-corporate organizations. /…/
Child labour		
Child Labour Index	Verisk Maplecroft	The Child Labour Index indicates the risk of child labour to business and its global value chain. The risks include business complicity through possible association with business partners in the value chain employing children. The risk of direct employment of children may arise due to a state's substandard enforcement mechanisms to prevent child labour.
Forced labour		
Forced or Involuntary Labour Index	Verisk Maplecroft	The Forced and Involuntary Labour Index indicates the risk of forced labour to business and global supply chains partners that contribute to value chains. Risks include the perceived complicity of companies in forced labour through violations committed by business partners that contribute to value chains. Verisk Maplecroft calculates the index by analysing the frequency, duration, coverage and severity of reported forced labour violations in 173 countries, as well as structure and process indicators such as legal frameworks and the efficacy of their implementation.
Freedom of association and collective bargaining		

Freedom of association and collective bargaining	Verisk Maplecroft	The Freedom of Association and Collective Bargaining Index measures the level of risk posed to business by allegations of complicity or direct involvement in violations of the rights to freedom of association and collective bargaining.
Health and safety		
Existence of safety officers and/or work environment committees	Welling	Partly related to the GRI G4 LA5: Percentage of total workforce represented in formal joint management-worker health and safety committees that help monitor and advice on safety programs.
Occupational Health and Safety Index	Verisk Maplecroft	The Occupational Health and Safety Risk Index assesses the risk to business through possible association with, and exposure to poor occupational health and safety standards at a country level. In accordance with the Occupational Health Safety Convention 1981, for the purpose of this index, 'health', in relation to work, indicates not merely the absence of disease or infirmity, it also includes 'the physical and mental elements affecting health' which are directly related to safety and hygiene at work. (Indicators include: Deaths from occupational diseases, 2002; Government effectiveness index, 2011; Number of ILO conventions ratified, 2013; Occupational accidents causing 4+ days absence, 2003; Occupational deaths, 2003; Regulatory quality index, 2011).
Number of incidents (more than one day lost)	Own	
Number of fatalities	Own	
Sick-leave	Welling	
Working Conditions		
Working Conditions Index	Verisk Maplecroft	The Working Conditions Index measures the prevalence and gravity of sub-standard working conditions, particularly in relation to minimum wage, working hours, and health and safety in the workplace and highlights the level of risk posed to business through possible association with practices of state and non-state actors limiting the right of a person to just and favourable working conditions. Violations of the right to just and favourable working conditions include the payment of wages that are below living wage and thus do not support a worker and their family; discriminatory pay gaps; unreasonably long working hours; workplace conditions below health and safety standards, including the failure to provide effective protective equipment where necessary or the equipment that is safe to use and the failure to provide adequate OHS training to prevent injuries.
Percentage of workers whose wages meet at least legal or industry minimum standards and their provision complies with all applicable laws.	Handbook	Wages paid for a normal working week should meet at least the minimum wage, established either by law, collective bargaining agreement or an industry standard. Living wage means that wages received by a worker for a standard working week in a particular place should be sufficient to provide a decent standard of living for the worker and his or her family.
Percentage of employees that work more than 48 hours / week on an average?	Handbook	The number of working hours is defined by applicable laws and industry standards on working hours and public holidays. The normal working week, excluding overtime, should not exceed limits laid down by law or 48 hours for hourly workers. Workers should be provided with at least one day off following every six consecutive days of working. Overtime work is voluntary, compensated at a premium rate in accordance with either the law or applicable collective agreement, does not exceed 12 hours per week, and is not demanded on a regular basis.
Training and education		

Numbers of hours of training per employee during the reporting period.	Handbook	Training and education refers to workplace policy and initiatives to expand workers' capabilities and skills, thus increasing their capacity and employability. Capacity development is important as it contributes to the growth of human capital within the organisation.
Employee satisfaction		
Percentage of workers who participated in a job satisfaction and engagement survey during the reporting period.	Handbook	Job satisfaction and engagement is measured through a worker survey which includes all workers and measures worker satisfaction on the following minimum aspects: - Determination to accomplish goals and confidence in meeting their goals - How their work contributes to the business goals of the company - The relationship of workers with their direct colleagues and supervisors - The communication between workers and senior management - Opportunities to use their skills and abilities at work - Career progression opportunities and professional development - Wages, compensation and benefits
Worker turnover rate during the reporting period.	Handbook	Rate at which the employer loses workers in the reporting period.
Local Community		
Local community		
Number of grievances about impacts on society filed, addressed, and resolved through formal grievance mechanisms	GRI G4 SO11	Identify existing formal grievance mechanisms. Formal grievance mechanisms may be managed by the reporting organization or by an external party. Identify the total number of grievances about impacts on society filed through formal grievance mechanisms. Identify the total number of grievances addressed or resolved during the reporting period from both current year and prior year grievance filings. /.../
Number of programmes or events targeting community engagement during the reporting period.	Handbook	
Community spending and charitable contributions	Own	
Local employment		
Percentage of workforce hired locally	UNEP/SETAC	
Proportion of spending on local suppliers at significant locations of operation	GRI G4 EC9	Calculate the percentages based on invoices or commitments made during the reporting period (that is, using accruals accounting). Local purchases may be made either from a budget managed at the location of operation or at the organization's headquarters.
Delocalization and migration		
Number of individuals that had to resettle due to organizational activities.	UNEP/SETAC	Number of individuals who resettle (voluntarily and involuntarily) that can be attributed to organization
Total number of incidents of violations or conflicts related to land claims	Welling	Welling: Amount of (indigenous) land rights conflict / land claims brought to the court (by customary rights, legal rights)
Respect of indigenous rights		

Indigenous peoples' rights index	Verisk Maplecroft	The Indigenous Peoples' Rights Index highlights obstacles that indigenous communities within a country may face in exercising a variety of rights.
Ratification of the ILO 169	Own	Measures whether the country in question have ratified the ILO Convention No. 169 (Indigenous and Tribal Peoples Convention, 1989).
Number of grievances related to human rights (including indigenous people) impacts filed, addressed, and resolved through formal grievance mechanisms	GRI G4 HR12	Identify existing formal grievance mechanisms. Formal grievance mechanisms may be managed by the reporting organization or by an external party. Identify the total number of grievances about human rights impact filed through formal grievance mechanisms during the reporting period. Identify the total number of grievances addressed or resolved during the reporting period from both current year and prior year grievance filings.
Society		
Contribution to economic development		
Tax paid	Own	Economic development is a basic requirement in the struggle against poverty and hunger. Creation of sufficient wealth to satisfy basic material needs underlies human well- being. Organizations can compete in ways that exploit lower tier suppliers and employees, or they can invest to create more capable suppliers and productive workers that provide a foundation for sustained economic development.
Promoting social responsibility		
The organization has pledged to comply with the Global Compact principles and has engaged itself to present yearly Communication On Progress	UNEP/SETAC	
Percentage of new suppliers that were screened using human rights criteria[1]	GRI G4 HR10	Identify the total number of new suppliers that the organization considered selecting or contracting with. Identify the total number of new suppliers that were screened using human rights criteria. Definition of screening: A formal or documented process that applies a set of performance criteria as one of the factors in determining whether to proceed with a relationship with a supplier. (G4 Implementation Manual, https://www.globalreporting.org/resourcelibrary/GRIG4-Part2-Implementation-Manual.pdf)
Payments on time to suppliers	UNEP/SETAC	
Corruption		
Corruption index	Verisk Maplecroft	The Corruption Risk Index examines the prevalence and persistence of corruption in the public and private sectors in 198 countries, as well as the efficacy of government efforts to combat corruption.
Existence of anti-corruption policy		Partly related to the UNEP/SETAC: Formalised commitment of the organization to prevent corruption, referring to recognised standards.
Percentage of target group that has conducted anti-corruption training.		Partly related to GRI G4 SO4: Communication and training of anti-corruption policies and procedures
Compliance		

[1] This indicator was a little adjusted and includes only percentage of suppliers in *high risk countries* that were screened

Legal and Regulatory environment risk index	Verisk Maplecroft	The Legal and Regulatory Environment Risk Index identifies and monitors the strategic and operational business risks presented by an uneven playing field in terms of regulation and government policy, the costs associated with corruption and lack of respect for the rule of law. Indicators include Rule of Law Index, Corruption Risk Index, Corporate Governance Index, Regulatory Framework Index, Respect for Property Rights Index, Supply Chain Complicity Index
Total number of (significant) fines and non-monetary sanctions for non-compliance with laws and regulations.	GRI G4 SO8	Identify administrative or judicial sanctions levied against the organization for failure to comply with laws or regulations, including: □□- International declarations, conventions, and treaties; and national, sub-national, regional, and local regulations □□- Cases brought against the organization through the use of international dispute mechanisms or national dispute mechanisms supervised by government authorities

APPENDIX 2

Review of Social Life Cycle Assessment conducted by Vattenfall

The Social Life Cycle Assessment conducted by Vattenfall AB and reported on in the document "Social impacts from Wind power, Appendix to Vattenfall AB Certified Environmental Product Declaration EPD® of Electricity from Vattenfall's Nordic wind power ", has been third-party reviewed by me, Elisabeth Ekener, researcher in the area of Social sustainability at KTH – The Royale Institute of Technology . I find that the Report fulfils the intentions in the Social LCA Guidelines (UNEP/SETAC 2009).

My suggestions for improvements of future S-LCA work are the following:

- The process of defining the impact categories and the indicators used is not described sufficiently clearly. Please also discuss the implications for the results of the fact that indicators were deselected on the basis of insufficient data rather than materiality.
- For the generic hotspot assessments of the parts of the life cycle where no specific data is available (referred to in the current report as 'Supply Chain'), generic data on country level has been collected from Verisk Maplecroft's Risk Index. The use of this source raises questions on the risk perspective taken. The aim of this source appears be to supply businesses with risk information about corporate business risks. It should be considered whether this is in accordance with the intention of the Social LCA Guidelines (UNEP/SETAC 2009). The Guidelines' state aim is to address social impacts on stakeholders listed as Workers, Consumers, Local Communities, Society and Value chain actors, and to improve performance in terms of human well-being specifically. This might not in every case align with the aim to lessen the business risk. Consider using other sources, for example the Social Hotspots Database (SHDB), or the newly developed PSILCA database, specifically developed for supplying data to Social LCA assessments.
- It is valuable that the report recognizes the existence of positive as well as negative social impacts. However, it could be made more clear how these impacts, with rather different implications, are handled in the presentation of the results and in the interpretation.
- To improve legitimacy of the process and the findings, consider involving relevant external stakeholders in the selection of impact categories and/or indicators, as well as in the assessment process.

Elisabeth Ekener

Stockholm, 2016-01-22