

Module: Introduction**Page: Introduction****CC0.1****Introduction**

Please give a general description and introduction to your organization.

Sustainability is an integral part of Fortum's strategy. The tight link between business operations and corporate responsibility underscores the importance of sustainability as a competitive advantage. In its operations, Fortum gives balanced consideration to economic, social and environmental responsibility.

Global megatrends as well as low energy prices and the low overall economic development have created a need for energy sector transformation. Fortum aims to meet these global challenges with its strategy that targets growth and continued profitability with strong focus on clean energy, customers and shareholder value creation.

Fortum's vision "For a cleaner world" reflects our ambition to drive the transformation towards a low-emissions energy system and optimal resource efficiency. Fortum's mission is to engage customers and society to drive the change towards a cleaner world. Fortum's role is to accelerate this change by reshaping the energy system, improving resource efficiency and providing smart solutions. This way we deliver excellent shareholder value.

Fortum's strategy towards its vision has four cornerstones:

- (1) drive productivity and industry transformation
- (2) create solutions for sustainable cities
- (3) grow in solar and wind, and
- (4) build new energy ventures.

Fortum emphasises a circular economy, resource and energy efficiency, the use of waste and biomass, and climate change mitigation in environmental responsibility. Fortum's know-how in CO₂-free hydro and nuclear power production and in energy-efficient combined heat and power production, investments in solar and wind power, as well as solutions for sustainable cities play a key role in environmental responsibility. In 2016, Fortum's activities covered the generation and sales of electricity and heat as well as related expert services and energy solutions that improve present and future life.

Fortum is the 3rd largest power generator and the second largest electricity retailer in the Nordic countries. Globally, Fortum is one of the leading heat producers. As two thirds of the company's power production is hydro and nuclear, Fortum is also among the lowest-emitting generators in Europe. In 2016, in the EU area, 96% of

Fortum's power generation and close to 100% of the ongoing investment programme was CO2-free. Already 62% of Fortum's total electricity generation is CO2 free and Fortum's aim is to increase renewable energy generation considerably.

Fortum's main markets are the Nordic and the Baltic countries, Russia, Poland and India, and we employ altogether some 8,000 energy sector professionals. In the future, fast-growing and liberalising energy markets in Europe and Asia provide additional growth opportunities. In 2016, Fortum's sales were EUR 3.6 billion and the comparable operating profit totalled EUR 644 million. Fortum paid EUR 977 million in dividends to its shareholders and Fortum's total taxes borne amounted to EUR 365 million last year. Fortum's share is listed on NASDAQ OMX Helsinki and our market cap was around 13 billion on the last trading day of 2016.

Fortum believes that the future energy system will be based on emissions-free and inexhaustible energy sources and on overall efficiency of the energy system. Climate change mitigation has for years been a fundamental business driver for Fortum.

CC0.2

Reporting Year

Please state the start and end date of the year for which you are reporting data.

The current reporting year is the latest/most recent 12-month period for which data is reported. Enter the dates of this year first.

We request data for more than one reporting period for some emission accounting questions. Please provide data for the three years prior to the current reporting year if you have not provided this information before, or if this is the first time you have answered a CDP information request. (This does not apply if you have been offered and selected the option of answering the shorter questionnaire). If you are going to provide additional years of data, please give the dates of those reporting periods here. Work backwards from the most recent reporting year.

Please enter dates in following format: day(DD)/month(MM)/year(YYYY) (i.e. 31/01/2001).

Enter Periods that will be disclosed

Fri 01 Jan 2016 - Sat 31 Dec 2016

CC0.3

Country list configuration

Please select the countries for which you will be supplying data. If you are responding to the Electric Utilities module, this selection will be carried forward to assist

you in completing your response.

Select country
Finland
Russia

CC0.4

Currency selection

Please select the currency in which you would like to submit your response. All financial information contained in the response should be in this currency.

EUR(€)

CC0.6

Modules

As part of the request for information on behalf of investors, companies in the electric utility sector, companies in the automobile and auto component manufacturing sector, companies in the oil and gas sector, companies in the information and communications technology sector (ICT) and companies in the food, beverage and tobacco sector (FBT) should complete supplementary questions in addition to the core questionnaire.

If you are in these sector groupings, the corresponding sector modules will not appear among the options of question CC0.6 but will automatically appear in the ORS navigation bar when you save this page. If you want to query your classification, please email respond@cdp.net.

If you have not been presented with a sector module that you consider would be appropriate for your company to answer, please select the module below in CC0.6.

Further Information

Module: Management

Page: CC1. Governance

CC1.1

Where is the highest level of direct responsibility for climate change within your organization?

Board or individual/sub-set of the Board or other committee appointed by the Board

CC1.1a

Please identify the position of the individual or name of the committee with this responsibility

The Fortum Executive Management (FEM) decides on the sustainability approach and the Group-level sustainability targets that guide annual planning. The targets are ultimately approved by Fortum's Board of Directors. In 2016, FEM monitored the achievement of the targets in its monthly meetings and in quarterly performance reviews. The achievement of the targets were regularly reported to Fortum's Board of Directors. In 2016, by the CEO's designation, the Senior Vice President, Corporate Affairs and Communications segment, Mr Arto Rätty, was responsible of the lead in managing sustainability, including climate change issues. He was a member of FEM and reported to the Chief Operating Officer and all climate matters. In the Fortum Board of Directors, FEM is represented by the president and CEO and the CFO. Fortum has not nominated any individual board member as responsible for climate affairs.

CC1.2

Do you provide incentives for the management of climate change issues, including the attainment of targets?

Yes

CC1.2a

Please provide further details on the incentives provided for the management of climate change issues

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
Chief Executive Officer (CEO)	Monetary reward	Emissions reduction target Efficiency target	Incentive schemes applicable to Fortum's Executive management team (FEM) include long-term incentive scheme (LTI) and short-term incentive scheme (STI). The Board of Directors decides, based on the proposals made by the Nomination and Remuneration Committee, on remuneration

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
		Other: Behaviour change related indicator	principles and remuneration for senior management (President and CEO and the other members of Fortum Executive Management). Similarly, the Board of Directors approves all company-wide incentive arrangements for senior management and other key personnel. The criteria for annual incentives which were paid in 2016, were the Group's profitability and cash flow as well as success in reaching personal strategic targets. The performance criteria also included indicators related to sustainability targets. In 2016 the incentive scheme included an index measuring injury frequency for Fortum employees and for contractors, the number of serious injuries, the number of major environmental and health and safety incidents (EHS incidents). The criteria for annual incentives which were paid in 2017 based on 2016 results were the Group's profitability and cash flow, achievement of individual targets as well as targets based on injury frequency for Fortum employees and for contractors and the number of serious injuries. The LTI plan for years 2014-2016 included - besides financial measures - an index measuring Fortum's reputation among the general public and customers. The elements assessed as drivers behind Fortum's reputation included areas such as environmental and social responsibility (including climate change) and sustainable solutions provided by Fortum. The LTI targets as of the plan 2015-2017 are based on Earning per share (EPS) and Total shareholder value.
Corporate executive team	Monetary reward	Emissions reduction target Efficiency target	Incentive schemes applicable to Fortum's Executive management team (FEM) include long-term incentive scheme (LTI) and short-term incentive scheme (STI). The Board of Directors decides, based on the proposals made by the Nomination and Remuneration Committee, on remuneration principles and remuneration for senior management (President and CEO and the other members of Fortum Executive Management). Similarly, the Board of Directors approves all company-wide incentive arrangements for senior management and other key personnel. The criteria for annual incentives which were paid in 2016, were the Group's profitability and cash flow as well as success in reaching personal strategic targets. The performance criteria also included indicators related to sustainability targets. In 2016, the incentive scheme included an index measuring injury frequency for Fortum employees and for contractors, the number of serious injuries, the number of major environmental and health and safety incidents (EHS incidents). The criteria for annual incentives which were paid in 2017 based on 2016 results were the Group's profitability and cash flow, achievement of individual targets as well as targets based on injury frequency for Fortum employees and for contractors and the number of serious injuries. The LTI plan for years 2014-2016 included - besides financial measures - an index measuring Fortum's reputation among the general public and customers. The elements assessed as drivers behind Fortum's reputation included areas such as environmental and social responsibility (including climate change) and sustainable solutions provided by Fortum. The LTI targets as of the plan 2015-2017 are based on Earning per share (EPS) and Total shareholder value.

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
Business unit managers	Monetary reward	Emissions reduction target Efficiency target	Sustainability targets affect every Fortum employee and are part of Fortum's short-term incentive (STI) scheme. In addition, depending on the business division, the incentivised performance indicators include e.g. energy efficiency that indirectly reduces CO2 emissions. These type of incentive targets are set either as unit or individual level target depending on role. Weight of unit level targets is typically 30-40% and weight of all individual targets in the incentive scheme is 30%.
Other: Environment / sustainability manager	Monetary reward	Emissions reduction target Efficiency target	Fortum's Annual Bonus system (STI) is based on company's financial result and sustainability performance and on the individual/team performance result. The individual/team bonus targets for each individual are agreed upon with each employee. For environment/ sustainability managers bonus targets include climate change issues, when appropriate, depending on the responsibilities and tasks of the manager.

Further Information

Page: CC2. Strategy

CC2.1

Please select the option that best describes your risk management procedures with regard to climate change risks and opportunities

Integrated into multi-disciplinary company wide risk management processes

CC2.1a

Please provide further details on your risk management procedures with regard to climate change risks and opportunities

Frequency of monitoring	To whom are results reported?	Geographical areas considered	How far into the future are risks considered?	Comment
Annually	Board or individual/sub-set of the Board or committee appointed by the Board	All existing operating countries and geographical areas under consideration as growth areas.	> 6 years	The risk management process consists of identification of risks, risk assessment, risk response and risk control. Risks are primarily identified and assessed by divisions and corporate units. There are risk owners defined who are responsible for responding to risks by taking appropriate actions. Risk responses can be one of, or a combination of, mitigating, transferring or absorbing the risk. The risk assessment process covers financial risks, operational risks and strategic risks. Climate change risks may exist in several risk categories. For example operational climate risks are the negative effects of extreme temperatures and floods whereas changes in average temperatures are part of financial risks as it affects the future market prices of power prices. During 2014-2016 a Climate Change Risks Assessment Tool has been developed by Climate Leadership Council (CLC) in Finland as a project together with Fortum and Sitra.

CC2.1b

Please describe how your risk and opportunity identification processes are applied at both company and asset level

i) At company level: The Audit and Risk Committee (ARC) is responsible for monitoring the efficiency of risk management systems within the Group including reviewing risk exposures. Corporate Risk Management (CRM), a function headed by the Chief Risk Officer (CRO) reporting to the CFO, is responsible for assessing and reporting the Group's consolidated risk exposure to the Board of Directors, ARC and Group Management. Risks are identified and assessed by Divisions, Development Units and Functions according to models approved by the CRO, and are responsible for reporting risks to CRM. ii) At asset level: Depending on the business, the risk and opportunity identification process is done on power plant or asset level, business area or Division level. For example, risks/opportunities for hydro power production can be assessed at asset level if the production plants are located in the same region whereas for large CHP plants in a single location, the assessment is on power plant level. The risks are consolidated on both business area level and at division level and reported to CRM.

CC2.1c

How do you prioritize the risks and opportunities identified?

Prioritizing and classifying risks and opportunities into relevant categories is part of the risk assessment process. Priorities are defined by impact-likelihood analysis. Likelihood is a measure of how often we expect an event to occur in a specified period of time, and is measured in percentage terms (e.g. 1- 10% = Once in 10

years). Impact is a measure of the effect if the risk event realizes. The impact is assessed on the following scales: monetary, health & safety, environment and reputation. Each scale has a specifically defined level for what is considered to be low, medium or high impact. The combination of likelihood and impact determines the prioritization of the risk. For monetary effects, the impact is the financial impact compared to agreed targets (e.g. EBIT) given that the event occurs. For example, climate policy, regulation and fluctuations in temperature and precipitation all can have a direct effect on market variables and produced and consumed energy which can result in both positive and negative monetary impacts. In the same way, the risks in other dimension, such as health & safety and environmental impact is assessed, e.g. flooding or extreme temperatures may lead to hazardous workplaces or increase likelihood of leakage of oil or chemicals to the environment. The impact scale for health & safety and environmental impact is designed to ensure that these risks are given high priority.

CC2.1d

Please explain why you do not have a process in place for assessing and managing risks and opportunities from climate change, and whether you plan to introduce such a process in future

Main reason for not having a process	Do you plan to introduce a process?	Comment
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CC2.2

Is climate change integrated into your business strategy?

Yes

CC2.2a

Please describe the process of how climate change is integrated into your business strategy and any outcomes of this process

Fortum's strategy is anchored in megatrends (e.g. climate change) shaping the energy sector. Fortum believes in an efficient future energy system based on CO₂-free and renewable energy sources. The Paris Agreement (PA) has further strengthened the role of climate action in Fortum's business strategy: Fortum believes that ratcheting of the national contributions (INDCs) of PA will accelerate low-carbon transition and create new business opportunities. Fortum also foresees that the PA can improve the competitiveness of EU industry, increase worldwide markets for low-carbon technologies and bring major economies closer to the EU in terms of carbon costs on industry.

i) How the business strategy has been influenced: Fortum's strategy is based on a comprehensive operating environment analysis. Climate change mitigation has been one of the fundamental megatrends and drivers for the strategy revision in 2016. This is directly reflected in Fortum's vision "For a cleaner world". Fortum's

ambition is to drive the transformation towards a low-emissions energy system and optimal resource efficiency. Fortum's mission is to engage our customers and society to drive the change towards a cleaner world. Fortum's role is to accelerate this change by reshaping the energy system, improving resource efficiency and providing smart solutions. Sustainability targets including climate targets guide Fortum's business operations towards the mission. Fortum's Executive Management (FEM) decides on the sustainability targets that guide annual planning and which are ultimately approved by BoD. FEM monitors the achievement in its monthly meetings and in quarterly performance reviews and reports regularly to Fortum's Board.

ii) At least one example given of how the business strategy has been influenced: In Fortum's revised strategy 2016, increased investments in solar and wind power and sustainable solutions for cities have been highlighted. Fortum targets a GW-scale solar and wind portfolio. Fortum aims to help cities solve sustainability challenges and to support building a circular economy. In 2016, Fortum acquired Ekokem, a Nordic circular economy company. In 2016, Fortum announced the purchase of three wind farm projects in Norway.

iii) What climate change aspects have influenced the strategy: The need to significantly decrease greenhouse gas emissions, pricing of CO₂ and adaptation to climate change are key drivers of Fortum's strategy. Fortum believes that the future energy system will be based on CO₂-free and inexhaustible energy sources and on high efficiency of the energy system. Fortum's focus is on decarbonised electricity and heat generation and sustainable solutions for growing cities and urban areas.

iv) How the short term strategy has been influenced by climate change

Almost 100% of Fortum's current investments in Europe is CO₂-free. In 2016, total value of Fortum's RES investments was EUR 223 million.

In Russia, Fortum uses mainly natural gas as an energy source. Since a significant reduction in CO₂ emissions is not possible with Fortum's current Russian production portfolio, Fortum aims to reduce emissions by improving energy efficiency. Fortum's EUR 2.5 billion investment programme in Russia was finalised in March 2016. All Fortum's new plants in Russia are mainly based on combined-cycle gas turbine (CCGT) technology, which represents best available techniques in natural gas combustion (efficiency in CHP production 80-85%). Fortum's production fleet is ranking among the best in Russia regarding efficiency and emissions. The specific CO₂ emissions from Fortum's Russian energy production has decreased from about 380 g/kWh in 2010 to about 335 g/kWh in 2016.

v) How the long term strategy has been influenced by climate change

The energy sector transition is ongoing, but it will take years. Traditional production technologies will be further developed and used alongside the renewable production. Production technologies that are able to balance the increasing intermittency of the energy system, such as hydropower, will be even more important during the transition. Fortum will continue its investments in emissions-free, market-driven energy production, in line with its strategy.

Fortum's research and development activities which aim at building a platform for future growth include e.g. the following: solar energy, wave power, smart grids, pyrolysis, torrefication and the potential integration of bioethanol production with CHP plants.

vi) How this is gaining you strategic advantage over your competitors

Fortum is among the best companies in Europe regarding the carbon exposure (specific CO₂ emission of energy production). High share of CO₂-free production (96% of Fortum's power generation in the EU is CO₂ free, and in total 62%) and a flexible and versatile production portfolio is a competitive advantage for Fortum. As Fortum's CO₂ emissions are low, the cost of acquiring emissions allowances remains lower over Fortum's competitors. At the same time, Fortum however can benefit from increased electricity price as most of the carbon cost is passed through into the power price.

vii) The most substantial business decisions made during the reporting year that have been influenced by the climate change driven aspects of the strategy:

- sizable refurbishments at hydro power plants in Sweden and Finland

- fuel switching from heavy fuel oil to biofuel at Kivenlahti heat only boiler. The change decreased the CO₂ emissions by 15,300 tonnes in 2016.

- improvements to energy efficiency in 2016 resulted in annual energy savings of 245 GWh. These energy efficiency improvements save fuel and reduce emissions about 50,000 tonnes CO₂ annually.

viii) How the Paris Agreement has influenced the business strategy: Fortum believes that the PA creates a stable and long-term political framework for the energy sector steering investments to low-carbon production technologies. Fortum expects the PA to accelerate low-carbon transition and to create new business opportunities. The global commitment to climate change mitigation has strengthened Fortum's core belief in decarbonisation of the energy sector and given our strategy a more solid basis. The agreement has given evidence that Fortum's strategic choices have been right ones.

ix) Do you use forward-looking scenario analyses, including a 2oC scenario, to inform your organization's businesses, strategy, and/or financial planning? No, Fortum has not applied scenario analyses based on 2oC target, but considers setting science based climate targets during the next two years. However, Fortum's production portfolio is already low-carbon and over the past decades Fortum has significantly increased its annual CO₂-free power generation: from around 15 TWh

in 1990 to 46 TWh in 2016.

CC2.2b

Please explain why climate change is not integrated into your business strategy

CC2.2c

Does your company use an internal price on carbon?

Yes

CC2.2d

Please provide details and examples of how your company uses an internal price on carbon

- i) Scope that the emissions pertain to: scope 1 emissions in the EU countries, internal price on carbon is used in assessing the sensitivity of investments in our capital investment decisions. All investment proposals are subject to internal investment evaluation and approval process where use of the internal price is checked.
- ii) rationale for employing a price: in addition to other commodity prices, the price of carbon is among the factors affecting the profitability of the investments.
- iii) actual price used: we do not disclose the price
- iv) variances in prices over time and across geographies: the carbon price in the EU emissions trading scheme has varied significantly (from almost zero up to 30 euros) during the years 2005-2016. At the end of 2016, price was around EUR 5. Consequently, the internal price on carbon based on the EU carbon price has also varied. The key challenge of determining an internal price on carbon is the unpredictability of international and EU climate policy and targets. Fortum CEO is a member of the Carbon Pricing Corridors Panel where industry heavyweights establish a joint view on carbon price needed to meet the goals of the Paris Agreement. This collaboration gives insight information for our internal view on carbon pricing.
- v) who is responsible for determining the price: parameters (incl. carbon price) for investment calculations are determined twice annually by Corporate Business Control. The carbon price is defined by Trading and Asset Optimisation and approved by the Fortum Executive Management.
- vi) examples of how carbon pricing affects investment decisions: carbon free and low-carbon electricity production investments benefit from carbon pricing. Emissions pricing and emissions trading are cost-efficient, fair and technology-neutral ways to reduce emissions, accelerate investments and promote the development of products and services that are more climate friendly.

CC2.3

Do you engage in activities that could either directly or indirectly influence public policy on climate change through any of the following? (tick all that apply)

- Direct engagement with policy makers
- Trade associations
- Funding research organizations

CC2.3a

On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
Cap and trade	Support with minor exceptions	<p>In 2016, Fortum actively promoted a market-based energy and climate policy regarding the future EU target setting, the emissions trading scheme and the functioning of the internal energy market. Fortum strongly advocated for the reform of the EU ETS using a market stability reserve mechanism that was approved in 2015 and will be operational in 2019. Fortum also highlighted the need to strengthen the ETS by increasing the linear reduction factor (LRF) up to 2.6%, improving the coherence between the EU ETS and parallel policies, and minimizing market distortions from the Innovation Fund and the New Entrants' Reserve (NER). During the EU legislative process Fortum had extensive dialogue with several governmental organisations and politicians in the EU, the European Commission and the Parliament in particular, and member states. Fortum was actively involved in the preparations of the Marrakech COP22 and participated in the conference as part of the Climate Leadership Council (CLC) delegation. During the year Fortum participated in several international business initiatives promoting the role of business in climate change mitigation: Caring For Climate Initiative under the UN Global Compact and Carbon Pricing Leadership Coalition by the World Bank. Fortum has also been active in the Union of the Electricity Industry – Eurelectric, which</p>	<p>Fortum is strongly committed to climate change mitigation and supports cap & trade-based emissions trading as the main climate policy instrument in Europe. The European Emissions Trading System (EU ETS) should not be seen in isolation, but in a context of other climate and energy policy targets and measures set and implemented both on the EU and national levels. In that background, Fortum considers the following measures necessary to strengthen the incentives generated by the EU ETS: - Short-term (2013-2020): starting the Market Stability Reserve in 2019 and transfer of backloaded and unallocated allowances into the reserve. - Long-term (after 2020): Emissions reduction target as a headline target and the EU ETS as the key instrument to steer the EU climate policy. Other targets that have overlapping effects on the EU ETS – targets like those on renewable energy sources, energy efficiency and taxation – must be supportive of the EU ETS, if needed at all. This applies to the targets themselves as well as to the measures by which they are implemented in order to avoid a situation in which they water down the incentives of each other. CO2 reduction targets based on the EU Climate Roadmap should be set for 2040 and 2050. The cap of the ETS should be adjusted in accordance with these targets by increasing the linear emissions reduction factor latest from 2020 onwards. In</p>

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
		<p>represents the common interests of the whole European electricity industry, and has participated in discussions with national authorities and other stakeholders.</p>	<p>addition, extension of the ETS to new sectors should be carefully analysed.</p>
Carbon tax	Oppose	<p>Fortum has opposed carbon taxes in general and so called windfall tax in particular. Fortum has engaged in close collaboration with the European Commission in particular. Fortum has also been active in the Union of the Electricity Industry – Eurelectric, which represents the common interests of the whole European electricity industry, and has participated in discussions with national authorities and other stakeholders.</p>	<p>When designing energy and climate policy targets and measures to reach them, the EU must rely on the core source of its competitiveness i.e. well-functioning internal energy markets. EU cannot afford policy measures that do not exploit the internal market or which are non-market based and/or predominantly national. If the functioning of the emission trading is not addressed, the risk for national measures like CO2-taxes increases. This development must be reversed. Fortum supported an ambitious revision of the EU ETS. For the energy sector, where investments are capital intensive and with long lead times, it is crucial that the future energy and climate policy framework is predictable. In Fortum's view: - Well-functioning and efficient internal energy market is essential for reaching the de-carbonisation target in the most cost-efficient way, lowering the overall social costs of de-carbonisation. - The focus should be placed on carbon emission reduction. The 2030 framework should be based on a single binding headline target for CO2. - The level of target should be in line with the 2050 decarbonisation aspiration (80-95% CO2 reduction from 1990 level) which in our view would be in the range of at least 40% for 2030. The present trajectory will lead only to about 60% CO2 reduction by 2050.</p>
Energy efficiency	Support with minor exceptions	<p>In November 2016, the EU Commission made proposals for a revised energy efficiency Directive and for a revised energy performance of buildings Directive. Fortum has engaged in close collaboration with the European Commission, Parliament and Council. Fortum has also been active in the Union of the Electricity Industry – Eurelectric, which represents the common interests of the whole European electricity industry, and has participated in discussions with national authorities and other stakeholders.</p>	<p>Fortum supports energy efficiency and believes that more efficient use of energy sources is of great importance. However, in a modern and low-emitting energy system where an increasing share of power production is characterised by intermittency, it is more important when energy is consumed than how much energy is consumed. Energy efficiency policies and legislation should be designed to reflect this paradigm and focus more on measures to accommodate the ever more flexible power markets rather than imposing static savings obligations like the Commission is proposing in the Energy Efficiency Directive. Fortum has asked for a common heating and cooling strategy for the EU, but sees the Energy Efficiency Directive as an important step forward within the heating and cooling plans drafted by the Member States. Fortum welcomed the Directive,</p>

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
			<p>as district heating and cooling (DHC) is acknowledged as an important technology in achieving a more energy-efficient society. Fortum is, however, against an EU obligation to introduce mandatory savings targets allocated to distributors or electricity retailers through energy-savings obligation schemes. It is the energy users who must be directly motivated to create their own energy savings. The energy provider, of course, must be involved in offering tools and information to get consumers to make conscious decisions regarding their energy consumption. Furthermore, whenever considering such targets, early actions in each Member State must be taken into account.</p>
Clean energy generation	Support with major exceptions	<p>Fortum has engaged in close collaboration with the European Commission in particular. Fortum has also been active in the Union of the Electricity Industry – Eurelectric, which represents the common interests of the whole European electricity industry, and has participated in discussions with national authorities and other stakeholders.</p>	<p>In Fortum's view: - Well-functioning and efficient internal energy market is essential for reaching the de-carbonisation target in the most cost-efficient way, lowering the overall social costs of de-carbonisation. - The focus should be placed on carbon emission reduction. We welcome that the EU 2030 framework sets the emissions reduction target as the headline target. - The EU ETS is the most efficient tool to be used to meet this target. Additional targets for renewable energy or energy efficiency should focus on non-ETS sectors. Measures promoting these targets should not water down the CO2-price incentive or undermine the functioning of the internal energy market, and they should be harmonized to the extent possible. - European policy needs European implementation measures. Complementary national policies (CO2 taxes etc.) must be avoided in order to secure a level playing field in the common market as these would lead to unnecessarily high costs.</p>

CC2.3b

Are you on the Board of any trade associations or provide funding beyond membership?

Yes

CC2.3c

Please enter the details of those trade associations that are likely to take a position on climate change legislation

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you, or are you attempting to, influence the position?
Eurelectric	Consistent	Eurelectric is strongly committed to reducing carbon emissions and meeting the EU's climate targets for 2020-2030 and its 2050 climate vision. Delivering these targets and vision depends on an appropriate policy framework that enables cost-effective investments in low-carbon technologies. Eurelectric has consistently adopted a proactive approach in developing market-oriented policies and measures that will help to mitigate climate change.	Fortum is through the national associations represented in the Working Group Climate Change and several other groups at Eurelectric and has been actively contributing to the development of positions at Eurelectric. Fortum has a continuous dialogue with the association almost on a daily basis.
IETA	Consistent	The International Emissions Trading Association (IETA) is a non-profit business organisation founded in June 1999 to establish a functional international framework for trading in greenhouse gas emission reductions. IETA members seek to develop an emissions trading regime that results in real and verifiable greenhouse gas emission reductions, while balancing economic efficiency with environmental integrity and social equity. IETA supports the ETS as the cornerstone of the EU's climate policy. According to IETA, ETS has achieved emissions reductions at a low cost, given its flexibility and links to the Kyoto mechanisms. IETA believes that structural reforms to the EU ETS thus need to be discussed as part of the wider future policy framework post-2020. The EU ETS cap - and its annual linear reduction factor - should be the main tool to reach the EU 2030 target.	Fortum is represented in several climate related working groups at IETA and has been actively contributing to the development of positions at IETA. Fortum has a continuous dialogue with the association.
Finnish Energy	Mixed	Finnish Energy (FE) is the voice of over 260 member companies that produce, acquire, transmit and sell electricity, district heat and district cooling and offer related services. FE is committed to a vision of carbon neutral electricity and district heat in Finland in 2050, supporting the EU-wide 80-95% emission reduction goal. FE sees a market-based EU ETS as the key instrument to a low carbon future in the covered sectors. FEI welcomes the effort of strengthening the ETS, because alternative development would likely result in a fragmented climate policy, disintegrated internal energy market and high cost of transformation towards a low-carbon society. The changes to the ETS should be coordinated with regard to a broader energy and climate policy framework post-2020.	Fortum is represented in the Climate Change Committee, in the Board (Fortum CEO as chairman) and Energy Production Committee at FE and has been actively contributing to the development of positions at FE. Fortum has a continuous dialogue with the association almost on a daily basis.

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you, or are you attempting to, influence the position?
Swedenergy	Consistent	<p>Swedenergy is the united voice of Swedish power industry. Swedenergy is representing companies involved in the production, distribution and trading of electricity in Sweden – with a total of 171 member groups. Swedenergy believes that the EU ETS should become the main driver for cutting GHG emissions in line with the EU’s commonly agreed long-term climate objectives. EU ETS assures that emissions are reduced in a cost-efficient manner within the sectors covered by the system in the EU. The 2030 target for emission reduction together with a revised annual reduction factor in EU ETS, would help to increase the credibility of the EU Climate Change Policy and to provide the business society with visibility on the ambition levels aimed for beyond 2020 and thereby create incentives for long term investments in low carbon technology. Short term measures may however also be necessary to increase the credibility of EU ETS and to avoid introduction other, less cost-efficient measures, to rule out the role of EU ETS.</p>	<p>Fortum is represented in the Working Group Climate (with focus on EU ETS and other climate issues) at Swedenergy and has been actively contributing to the development of positions at Swedenergy. Fortum has a continuous dialogue with the association almost on a daily basis.</p>
Euroheat & Power	Consistent	<p>Euroheat and Power is an industry association, with members coming from over thirty countries and including national district heating and cooling associations, utilities operating district energy systems, industrial associations and companies, manufacturers, universities, research institutes and consultancies active in the sector. EHP shares EC ambition to enhance the effectiveness of the EU ETS as an instrument for reducing CO2 emissions in Europe. Therefore it sees it critically important to ensure that the revised EU ETS enables the development of district heating and, more generally, the evolution of the heating sector in line with the EU’s overall climate and energy ambitions. The revenues generated from the auctioning of allowances, which are reserved for climate initiatives, should be increased and not contribute to Member State budgets. The benchmark values should be based upon a comprehensive technical assessment and not utilise arbitrary figures which suggest unrealistic technological progression. It is unreasonable for the free allocation of allowances to CHP heat to have both the linear reduction factor and cross-sectoral correction factor applied in the calculation. Member States that are eligible to provide free allowances for the modernisation of the energy sector should be able to include heat,</p>	<p>Fortum is represented in the Energy Policy Committee and in the Board of Directors and has been actively contributing to the development of association’s positions. Fortum has a continuous dialogue with the association almost on a daily basis.</p>

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you, or are you attempting to, influence the position?
		as opposed to purely electricity. The modernisation fund investment board and management committee should only include beneficiary Member States and must not impose investment strategies.	
COGEN Europe	Consistent	COGEN Europe aligns with the importance of mitigating climate change. COGEN Europe's primary focus is on promoting the further utilization of high-efficiency co-generation for both industrial heat and district heating production. Key justification is the energy efficiency benefit of co-generation compared to separate production of required heat with heat-only boilers and separate production of electricity in a condensing power plant.	Fortum has delivered related own views and positions to COGEN Europe.

CC2.3d

Do you publicly disclose a list of all the research organizations that you fund?

Yes

CC2.3e

Please provide details of the other engagement activities that you undertake

CC2.3f

What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?

This process is mainly governed and coordinated by Public Affairs function in the company. The main task of Fortum's Public Affairs is to be aware of current and upcoming energy-related policy and legislation in the EU and in all countries where Fortum operates. This information is brought into the company's strategic and business decisions. Fortum's positions are prepared in close collaboration with business divisions, corporate relations, communication and sustainability experts. Positions to influence policy are approved by relevant business divisions and/or corporate functions. The positions take into consideration our company strategy, our approach to climate change and our preferences in climate policy and policy instruments. The activities influencing policy are based on the established positions. The activities and key messages are coordinated and aligned throughout our operating countries. Fortum offers expert advice to decision makers and non-governmental organisations in energy-related issues. Fortum also takes part in consultations and provides authorities with constructive suggestions forming the basis of legislative proposals. Fortum engages in an active dialogue with authorities and decision-makers about key climate issues in the energy sector.

CC2.3g

Please explain why you do not engage with policy makers

Further Information

Fortum's key Public Affairs Policy Messages can be found in the attached file.

Attachments

<https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/ClimateChange2017/CC2.Strategy/Public Affairs Policy April 2017.pdf>

Page: CC3. Targets and Initiatives

CC3.1

Did you have an emissions reduction or renewable energy consumption or production target that was active (ongoing or reached completion) in the reporting year?

Intensity target

CC3.1a

Please provide details of your absolute target

ID	Scope	% of emissions in scope	% reduction from base year	Base year	Base year emissions covered by target (metric tonnes CO2e)	Target year	Is this a science-based target?	Comment

CC3.1b

Please provide details of your intensity target

ID	Scope	% of emissions in scope	% reduction from base year	Metric	Base year	Normalized base year emissions covered by target	Target year	Is this a science-based target?	Comment
Int1	Scope 1	100%	7%	Metric tonnes CO2e per megawatt hour (MWh)*	2010	215	2020	No, but we anticipate setting one in the next 2 years	Our target is that in total energy production the 5-year average specific CO2 emission does not exceed 200 gCO2/kWh. Fortum is currently actively looking for consolidation of the generation business in Europe. This will include at least one sizable acquisition in the next few years. We will reconsider our targetsetting after these changes in the company.

CC3.1c

Please also indicate what change in absolute emissions this intensity target reflects

ID	Direction of change anticipated in absolute Scope 1+2 emissions at target completion?	% change anticipated in absolute Scope 1+2 emissions	Direction of change anticipated in absolute Scope 3 emissions at target completion?	% change anticipated in absolute Scope 3 emissions	Comment
Int1	Decrease	2	No change	0	The CO2 emissions of electricity production (target ID Int1) in the EU have decreased mainly because of reduced volume of coal condensing power production in Finland. Scope 3 emissions have remained at the same level, or slightly decreased.

CC3.1d

Please provide details of your renewable energy consumption and/or production target

ID	Energy types covered by target	Base year	Base year energy for energy type covered (MWh)	% renewable energy in base year	Target year	% renewable energy in target year	Comment
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CC3.1e

For all of your targets, please provide details on the progress made in the reporting year

ID	% complete (time)	% complete (emissions or renewable energy)	Comment
Int1	20%	100%	

CC3.1f

Please explain (i) why you do not have a target; and (ii) forecast how your emissions will change over the next five years

CC3.2

Do you classify any of your existing goods and/or services as low carbon products or do they enable a third party to avoid GHG emissions?

Yes

CC3.2a

Please provide details of your products and/or services that you classify as low carbon products or that enable a third party to avoid GHG emissions

Level of aggregation	Description of product/Group of products	Are you reporting low carbon product/s or avoided emissions?	Taxonomy, project or methodology used to classify product/s as low carbon or to calculate avoided emissions	% revenue from low carbon product/s in the reporting year	% R&D in low carbon product/s in the reporting year	Comment
Group of products	Fortum's energy products - electricity and heat - replace in certain cases the customer's alternative and more carbon intensive energy production and consequently reduce GHG emissions. Especially this concerns our environmentally labelled products that are CO2 free.	Low carbon product and avoided emissions	Other: European guarantees of origin of eco-labels on national nature conservation associations. Also nuclear power classified as low carbon.			In 2016, Fortum's electricity sales to private and commercial customers was 11.7 TWh in Nordic countries and also in Poland. 77% of this was from renewable energy sources, mainly hydropower. The share of nuclear power was 12%. The extent of impact mitigation can be assessed by assuming that carbon-free electricity sold by Fortum in Finland and Sweden would have had the specific CO2 emission of the Nordic residual electricity mix (336 g/kWh in 2015). The avoided CO2 emissions would have been about 3 million tonnes in 2016. These avoided emissions represent our customers' (third party) scope 2 emissions. Fortum's sales of CO2-free electricity resulted in no greenhouse gas emissions.
Product	As part of waste treatment services Fortum destroys customers' ODS (ozone depleting substances) and F-gases at its waste incineration plants.	Low carbon product and avoided emissions	Other: GWPs from IPCC Assessment reports used to calculate avoided emissions of ODS and F gases.			At Kumla Waste-to-energy plant in Sweden Fortum destroyed 99,2 tonnes of customers' ODS and F-gases in 2016. The avoided GHG emissions were about 530,000 tonnes.

Did you have emissions reduction initiatives that were active within the reporting year (this can include those in the planning and/or implementation phases)

Yes

CC3.3a

Please identify the total number of projects at each stage of development, and for those in the implementation stages, the estimated CO2e savings

Stage of development	Number of projects	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation		
To be implemented*	1	720
Implementation commenced*	6	594000
Implemented*	8	48000
Not to be implemented		

CC3.3b

For those initiatives implemented in the reporting year, please provide details in the table below

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
Energy efficiency: Processes	Turbine refurbishment at Chelyabinsk CHP3	11200	Scope 1	Voluntary				21-30 years	In 2016, Fortum invested EUR 186 million in the power and heat capacity in Russia.
Energy efficiency: Processes	Turbine renewal at Loviisa NPP	10000	Scope 1	Voluntary				11-15 years	In 2016, Fortum invested EUR 90 million in the Loviisa nuclear power plant.
Energy efficiency: Processes	Hydropower plant refurbishments in Sweden	200	Scope 1	Voluntary	2000000	14000000	4-10 years	>30 years	In 2016, Fortum invested in total EUR 74 million in hydropower production in Sweden, mainly maintenance and productivity investments, including also Järpströmmen refurbishment EUR 6 million.
Energy efficiency: Processes	Hydropower plant refurbishments in Finland	1400	Scope 1	Voluntary	2000000	15000000	4-10 years	>30 years	In 2016, Fortum invested in total EUR 29 million in hydropower production in Finland, mainly maintenance and productivity investments.
Energy efficiency: Processes	Heat accumulator at Suomenoja CHP	9200	Scope 1	Voluntary	900000	6000000	4-10 years	21-30 years	In 2016, Fortum invested EUR 7 million in the heat capacity in Finland.
Low carbon energy installation	Kivenlahti boiler pellet fuel conversion	25000	Scope 1	Voluntary	4000000	16500000	4-10 years	21-30 years	In 2016, Fortum invested EUR 8 million in the biofuels capacity in Finland.
Low carbon energy installation	District cooling network in Tartu, phase 1	1500	Scope 1	Voluntary				>30 years	In 2016, Fortum invested EUR 10 million in the heat network and cooling in Estonia.

Activity type	Description of activity	Estimated annual CO2e savings (metric tonnes CO2e)	Scope	Voluntary/ Mandatory	Annual monetary savings (unit currency - as specified in CC0.4)	Investment required (unit currency - as specified in CC0.4)	Payback period	Estimated lifetime of the initiative	Comment
Low carbon energy installation	New wind turbines at Blaiken wind park	100	Scope 1	Voluntary	70000	11000000	16-20 years	16-20 years	In 2016, Fortum invested EUR 11 million in wind power capacity in Sweden.

CC3.3c

What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Dedicated budget for energy efficiency	In 2014 we set an internal target to invest in energy efficiency projects to achieve annual energy savings of 1,400 GWh/a by 2020. At the end of 2016 we had already achieved 1,372 GWh/a. Power plant modernisation programmes and the investments in new technology and capacity have improved energy efficiency in Russia. For example, the new CHP plant under construction in Zabrze Poland will improve energy efficiency when replacing the existing very old power plant units
Internal price on carbon	Since 2005 Fortum has had a compliance obligation in the European emissions trading scheme (EU ETS) setting a price for carbon emissions. Almost all of company's emissions in the EU region are in the scope of the EU ETS. Price of carbon is among the key factors impacting the Nordic electricity price and fully integrated into company's investment decisions.
Internal incentives/recognition programs	Fortum's Technology and New Ventures team has organised the internal Accelerator (innovation activator) programme to inspire all employees to find new innovations. New ventures, such as Fortum HorsePower, created during this programme in 2015. The Fortum HorsePower is a service concept in which Fortum delivers bedding to horse stables and picks up the bedding-manure mixture for combustion. In 2016, bedding-manure mixture was collected from about 80 horse stables in southern Finland. In 2016, Fortum launched Must-win battle development programmes to increase customer-centricity, speed and agility.
Dedicated budget for low carbon product R&D	Research and development (R&D) activities help Fortum to develop a sustainable, carbon dioxide-free future. Its focus areas are continuous improvement of current operations, enabling of growth opportunities and development of an emissions-free energy

Method	Comment
	<p>system in the long-term. Each new development activity is assessed against the criteria of emission reduction and resource- and energy-efficiency. Sustainability is at the core of Fortum's strategy and, alongside Fortum's current businesses, the company is carefully exploring and developing new sources of growth within renewable energy production. Fortum is particularly interested in developing environmentally-benign energy solutions (CO2-free) and new CHP concepts, such as pyrolysis fuel and the HorsePower concept. The company is also researching and developing its solar energy competences and is involved in wave power pilot projects. In addition, Fortum is developing new customer solutions in electricity and heat to improve user experiences and demand-response services. In 2016, Fortum's R&D expenditure was EUR 52 million or 1.4% of sales.</p>
<p>Dedicated budget for low carbon product R&D</p>	<p>In 2016, Fortum initiated development of a virtual power plant for balancing electricity demand in a power grid. Fortum turn customers reserve assets into a virtual battery, with balance the power grid and share the revenues with customers. The virtual power plant will match consumption with the increasing renewable energy production without anyone having to give up on any comfort or security. The virtual power plant solutions include in the excess energy storage capacity in data center UPS-systems and telco base stations to get significant revenue stream from them, connecting customers' water heaters, home batteries or other assets through smart meters or directly, and building the next generation of grid aware charging for electric vehicles. In 2016, Fortum's R&D expenditure was EUR 52 million or 1.4% of sales.</p>
<p>Employee engagement</p>	<p>Along with emissions reduction measures implemented at production facilities, Fortum has taken various actions to reduce the carbon dioxide emissions, i.e. the carbon footprint, generated by the company's personnel and facilities. Actions include reduction of travelling, CO2 limits for company cars and education on climate issues. These measures are important in increasing the environmental awareness and motivation of employees.</p>
<p>Other</p>	<p>Fortum's sustainability targets include targets for company's specific CO2 emissions (g CO2/kWh produced energy). Progress in performance is followed-up quarterly and reported to the Fortum Executive Management and Fortum Board of Directors.</p>

CC3.3d

If you do not have any emissions reduction initiatives, please explain why not

Further Information

Page: CC4. Communication

CC4.1

Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s)

Publication	Status	Page/Section reference	Attach the document	Comment
In voluntary communications	Complete	2-8, 9-10, 16-18, 25, 26	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC4.1/Sustainability at Fortum.pdf	Presentation: Sustainability at Fortum 2016
In other regulatory filings	Complete	5-9, 17, 27-30, 31-33, 34-35	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC4.1/Fortum_Sustainability_2016.pdf	Fortum Sustainability Report 2016
In mainstream reports (including an integrated report) in accordance with the CDSB Framework	Complete	CEO Letter, Environmental efficiency, Regulatory environment, Value-creating strategy, Fortum transformation		Fortum Online Annual Review 2016: http://annualreport2016.fortum.com/en/
In mainstream reports (including an integrated report) in accordance with the CDSB Framework	Complete	1, 16-18, 22, 74-75	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC4.1/Fortum_Financials_2016.pdf	Fortum Financial Statements 2016. Other parts of Fortum's reporting entity include the Online Annual Review, CEO Letter, Corporate Governance Statement, Remuneration Statement, Tax Footprint as well as the Sustainability Report.
In voluntary communications	Complete	all	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC4.1/160919 Climate Risk Tool.pdf	Presentation: Climate change risk assessment framework (tool), updated in September 2016. Joint project with Fortum and Sitra. Helps to identify and analyse climate related risks (both negative and positive) in different countries and regions.

Publication	Status	Page/Section reference	Attach the document	Comment
In voluntary communications	Complete	2, 12-14, 18-19	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC4.1/Nordic_power_market_12_2016.pdf	The Fortum Energy Review, published in November 2016, focuses on the Nordic power market, presents current challenges and provides some solutions for fixing the identified problems. The energy sector is in the middle of a transition. Megatrends, such as climate change, emerging new technologies, changes in consumer behaviour and questions regarding resource efficiency, have a major impact on the energy sector globally. Fortum's intention is to actively participate in the market transition and to be part of the solutions. In this Energy Review, Fortum emphasises the need for cross-border coordination and collaboration of policy decisions in developing the Nordic power market.
In voluntary communications	Complete	all	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC4.1/151231 Fortum adaptation and resiliency report.pdf	Fortum's adaptation and resilience to climate change. Status report of preparedness and actions, December 2016.

Further Information

Fortum responds to several investor and other stakeholder questionnaires. Information about the risks and opportunities related to climate change, our climate targets and actions to reduce emissions, statistics on the emissions and measures to adapt to climate change are widely communicated through different company communication media (e.g. Sustainability Report and Financial Statements 2016), internet, customer and personnel magazines, investor relations presentations etc.). Fortum Sustainability's web page is: <http://www.fortum.com/en/sustainability/> Releases regarding Fortum's mitigation on climate change: <http://www.fortum.com/en/mediaroom/Pages/fortums-new-vision-and-strategic-cornerstones-updated-financial-targets.aspx> <http://www.fortum.com/en/mediaroom/in-focus/comments-and-position-papers/Pages/Fortums-position-on-the-development-of-the-EU-climate-policy.aspx> <http://www.fortum.com/en/mediaroom/Pages/three-nordic-utilities-call-for-action-to-strengthen-the-eu-carbon-market.aspx> <http://www.fortum.com/en/mediaroom/Pages/european-energy-companies-urge-eu-policymakers-to-take-action-for-a-robust-carbon-price-signal-on-the-european.aspx>

Module: Risks and Opportunities

Page: CC5. Climate Change Risks

CC5.1

Have you identified any inherent climate change risks that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Risks driven by changes in regulation

Risks driven by changes in physical climate parameters

Risks driven by changes in other climate-related developments

CC5.1a

Please describe your inherent risks that are driven by changes in regulation

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
International agreements	Despite the international Paris climate agreement made in 2015, the international climate policy framework including future greenhouse gas emission reduction	Other: wrong investment decisions due to uncertain regulation	1 to 3 years	Direct	About as likely as not	Medium-high	With low CO2 emissions, Fortum is a relative winner, if the international agreement tightens emission requirements and increases carbon and energy prices. Without it Fortum can't take	During 2016, Fortum was involved in the climate policy discussion and development and in promoting market driven energy and climate policy both at the EU level and in countries	Fortum's lobbying costs totalled EUR 2.1 million in 2016, out of which some EUR 0.6 million was allocated to EU area specific lobbying.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>obligations and economic value of greenhouse gas emissions remain still uncertain. This poses a risk to Fortum in its 9 operating countries. Recently this risk has increased as the new US administration led by president Trump has a low priority for climate action and the US is expected to remain passive in the global climate cooperation. According to the Paris Agreement, all countries are obligated to prepare national contributions (INDC, NDC), including mitigation, adaptation and financing, to be reviewed every five years. The Paris Agreement</p>						<p>full advantage of its low-carbon production portfolio (62% of electricity production CO2-free in 2016). If CO2 price would increase e.g. EUR 1, the electricity price increases approx. EUR 0.7-0.8/MWh in the Nordic power market. This will result in an increase of Fortum's EBITDA by EUR 30-40 million in unhedged situation. On the other hand, if this forecast is not realised, the profitability of Fortum's CO2-free investments may be reduced.</p>	<p>where Fortum operates. For example, Fortum was actively supporting the revision of the EU emissions trading system. In 2016, Fortum established a coalition with two other Nordic utilities Statkraft and Vattenfall in order to lobby for a strong revision of the EU ETS. This coalition developed a joint position and a number of amendments to the EU Parliament for the ETS Directive. The key asks by the coalition have been included in the existing draft Directive. Fortum participated in several initiatives promoting the role of carbon pricing and market as part of the global</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>is expected to increase long-term stability and predictability, encourage market-driven actions and reduce the risk of carbon leakage. Potentially, it can result in an accelerated low-carbon energy transition and new business opportunities. However, there will be no direct impact on the EU CO2 price unless the EU decides to increase its future greenhouse gas reduction targets. The EU Heads of States discussed the results of Paris in March 2016, but there was no decision on changing the 2030 targets. In Fortum's opinion, the EU's climate ambition has to be increased and</p>							<p>climate agreement. Fortum is a member of the World Bank's Carbon Pricing Leadership Coalition and the UN Caring for Climate Initiative. Fortum has also been recognised as one of the Carbon Pricing Champions by the UN Caring for Climate Initiative.</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	market-driven policies and measures must be trusted. This risk is related to Fortum's direct greenhouse gas emissions (scope 1) that represent 80% of Fortum's total emissions.								
Cap and trade schemes	Most of the climate regulation concerning Fortum is originating from the EU, as 7 out of 9 countries where Fortum is operating, are members of the EU. Fortum prefers emissions trading as the key climate instrument. Currently the EU ETS is faced with oversupply of allowances and consequently low allowance prices. This uncertainty entails a risk for investments.	Increased operational cost	1 to 3 years	Direct	Likely	High	CO2 allowance price is among the most decisive factors affecting the electricity price in the Nordic power market and hence a financial risk for Fortum. In the short-term it affects the electricity prices in Europe where almost all of Fortum's CO2-emissions are subject to the EU ETS. If CO2 price would increase e.g. EUR 1, the electricity price increases approx.	Risks are managed by using CO2 forwards and taking the costs of allowances into account in production planning. Uncertainty of the regulatory regime and CO2 allowance pricing are taken into account in the investment calculations. In the EU area most of the allowance cost is passed through to the electricity price and in heat market to the heat price to a large extent. Fortum is	In 2016, Fortum invested into wind power EUR 11 million in Sweden and EUR 15 million in Russia. Fortum's solar power investments in India were EUR 43 million in 2016. Fortum invested additionally EUR 103 million into hydropower production in Sweden and Finland. In 2016, Fortum's total investments, excluding acquisitions, were EUR 591 million, of which EUR 271 million targeted

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>Revision of the ETS is likely to be finalized during 2017 and this consequently reduces the uncertainty related to the rules for the period 2021-2030. Also the volumes of free allocation for existing and new heat production installations during the period 2013-2020 in all EU countries is one example of the risks. In 2016, close to 100% of Fortum's new investments in EU area were CO2-free and 96% of Fortum's current European power generation is CO2-free.</p>						<p>EUR 0.7-0.8/MWh in the Nordic power market. This will result in an increase of Fortum's EBITDA by EUR 30-40 million. In 2013–2020, most of the allowances will be auctioned. The value of Fortum's free allowances in 2016 (1.0 Mt) was about EUR 7 million using a CO2 price of EUR 7/t. Decreasing amount of free allowances of CO2 would lead to increasing production costs of fossil fuelled power plants. Based on the 2016 figures, the maximum financial implication of decreasing amount of free allowances of</p>	<p>also engaged in the development of the future climate policy framework, related legislation and in the development of the emissions trading schemes. Fortum manages the risk by expanding CO2-free production capacity, too. Fortum's investments in Europe target mainly CO2-free production. In 2016, Fortum invested into wind power in the Blaiken and Solberg wind farms in Sweden, and the Ulyanovsk wind farm in Russia. Fortum's ongoing solar power projects are Bhadla solar plant in Rajasthan, with a capacity of 70 MW, and Pavagada solar plant in Karnataka,</p>	<p>CO2-free production.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
							CO2 for Fortum could be EUR 7 million.	with a capacity of 100 MW, both in India. In 2016, Fortum finalised refurbishments of hydro power plants in Sweden and Finland, resulting in additional hydropower production of 30 GWh with about 10 MW capacity increase, commissioned a new heat accumulator at Suomenoja CHP plant and converted heavy fuel oil to wood pellets at Kivenlahti heat plant in Finland. In addition, Fortum planned and prepared the permanent demolition of Inkoo coal-fired power plant during year 2016. The demolition project started at the	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								beginning of the April 2017.	
Lack of regulation	Russia's legislative and political operating environment related to the climate issues differs significantly from that of Europe. In general, the regulatory framework is uncertain, and regulatory risks can evolve in the future in Fortum's Russian business. It is difficult to foresee how the regulation concerning e.g. timelines, reduction goals, form of regulation and other variables will develop in the future. At the moment there are no carbon constraints or price for carbon	Increased operational cost	3 to 6 years	Direct	More likely than not	Medium-high	Fortum's energy production in Russia is based on fossil fuels, mainly gas. Any cost of CO2 would increase our production costs. If this couldn't be passed to energy price, profitability of our operations would decrease. Our CO2 emissions in Russia totalled 15.5 Mt in 2016, and we estimate them to be 15-20 Mt per year in the future. With emissions of 15 Mt and CO2 price of EUR 5 the financial value of emissions would correspond EUR 75 million. Uncertainty of legislation can lead to losses in	In Russia, Fortum's new production capacity increases annual absolute CO2 emissions. However, Fortum's Russian investments will improve the efficiency of power production and reduce the specific CO2 emission with relation to produced energy and other flue gas emissions into the environment. Fortum is a member of the following organizations in Russia: Market Council for organizing efficient system of trading at wholesale and retail electricity and capacity market, Council of Power Producers, The Russian	In 2016, Fortum's total capital expenditure in Russia was EUR 201 million including mainly productivity investments, modernisations and energy efficiency improvements. This includes in the EUR 15 million investment into new wind power in Russia. During 2016, Fortum's investments in Russia totalled EUR 96 million.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>dioxide in Russia. Carbon price doesn't seem likely in the near future either. Russia has for example indicated that it will not ratify the Paris Agreement until 2020. Uncertainty of regulation can be seen as a risk also in 7 European countries, where Fortum has energy production. If future regulation can be anticipated only in a short term or legislation is limited to individual countries, it is difficult to do the right decisions concerning e.g. location of plants, fuel choices or technologies used. Inability to take long-term</p>						<p>other countries, too.</p>	<p>Union of Industrialists and Entrepreneurs, Association of the European Businesses in the Russian Federation. In 2016, Fortum completed in Russia its extensive investment programme (started on 2009). This programme doubled Fortum's Russian power capacity with 2,300 MW. Fortum completed the second new Chelyabinsk GRES power plant unit, with power capacity is 248 MW and heat capacity 174 MW. Also the modernisations of the Nyagan GRES power plant's second unit completed, that increased production</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	regulatory prospects into consideration when planning investments can lead to wrong investment decisions.							capacity by about 30 MW. In addition, Fortum invested into the new Ulyanovsk wind farm, with a total capacity of 35 MW. The Russian wind farm is expected to start production in year 2017.	
Other regulatory drivers	Renewable energy targets and support systems are considered a risk especially in the EU countries. Fortum has energy production in six EU countries. Renewable energy support is an overlapping steering instrument with the EU ETS leading to significant inefficiencies and sub-optimisation of production. For example national	Increased capital cost	>6 years	Direct	More likely than not	Medium-high	National subsidy schemes may lead to distortions of competition and to distorted renewable energy price. Share of Fortum's renewable sources in electricity generation was 30% in 2016. For heat production the corresponding figure was 7%. The feed-in tariff of renewable energy for Fortum's biofuelled CHP-plants in Finland	During 2016, Fortum was engaged in the development of the future climate policy framework, related legislation and the development of the emissions trading schemes. Fortum promotes transparent and predictable market driven regulation. For example, Fortum published several position papers on issues related to climate change during 2016.	Fortum's lobbying costs totalled EUR 2.1 million in 2016, out of which some EUR 0.6 million was allocated to EU area specific lobbying. Climate policy related issues were one of the major areas of lobbying. Fortum invested into renewable energy production: wind, solar and hydropower in 2016. Fortum invested EUR 11 million in the wind farms in Sweden, and EUR 15 million in the wind

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	renewable energy obligations may lead to significant regional price fluctuations in the market. This is a risk in all other countries we have operations, except in Russia. The share of Fortum's renewable sources in electricity generation was 30% in 2016. For heat production the corresponding figure was 7%.						was approximately EUR 5 million in 2016. In Sweden, Fortum was a net buyer of electricity certificates with approximately of EUR 6.9 million in 2016.		farm in Russia. Fortum invested also EUR 43 million in two solar power plants in India. Fortum seeks to allocate its planned growth capital in the range of EUR 200–400 million in solar projects in India.
Fuel/energy taxes and regulations	Uncertainty regarding fuel and energy taxes in the EU member states remains a risk, as taxation remains under the scrutiny of the member states. Changes in taxation result in changes in fuel prices, and change the merit	Increased operational cost	1 to 3 years	Direct	Likely	Medium	Heavier taxation of fuels affects fuel prices and increases operational costs. Higher fuel price could affect the market price for electricity and our sales. Fuel price is normally indexed to heat and steam prices in bilateral	Versatile production portfolio and use of different fuels is a way to manage the risk. Fuels, goods and services are purchased from local and global suppliers, and fuels are used efficiently. These methods also	In 2016, Fortum's purchases of fuels totalled EUR 531 million, of which the share of fossil fuels was about EUR 454 million, biomass fuels about EUR 39 million, and nuclear fuels about EUR 38 million.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>order of energy production plants. For example in Finland, the taxation for fossil fuels used in heating has been heavily tightened during the past few years and in Sweden taxation on nuclear and hydro power has been raised. This process may affect to some extent in profitability of Fortum's electricity production in Nordic countries. In 2016, Fortum generated 24.1 terawatt-hours (TWh) of nuclear power, 20.7 TWh of hydropower in Nordic countries. Fortum generated also power based on fossil-fuels about 1.2 TWh in the Nordic countries and about 0.5 TWh in</p>						<p>contracts. Changes of the district heating price are case-specific and made according to the present market conditions. If Fortum's CO2-free power e.g. in the Nordic countries was taxed an additional tax of EUR 1–10/MWh, the annual tax would be approximately EUR 50-500 million.</p>	<p>reduce the risk. CHP production is a sustainable and energy-efficient way to produce energy as almost 90% of the fuel's primary energy can be utilised in the process. Combined generation reduces environmental emissions between 25-40% compared to separate production of electricity and heat. In 2016, a construction of Fortum's new CHP plant started in Zabrze, Poland. The plant is planned to start commercial operations by the end of 2018, with a capacity of 75 MW electricity and 145 MW heat. It will replace two old coal-fired plant units from the</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	Poland. However, in 2016, Sweden made decisions to significantly decrease taxes for nuclear and hydro power.							1950s. The investment is expected to improve the energy efficiency and to reduce carbon dioxide and other emissions. Fortum has also produced pyrolysis fuel in Joensuu, Finland. Biofuel is one of efficient routes for meeting the EU's greenhouse gas emission reduction targets.	

CC5.1b

Please describe your inherent risks that are driven by changes in physical climate parameters

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in precipitation pattern	a) Decreasing or increasing of precipitation	Reduction/disruption in production capacity	3 to 6 years	Direct	Unlikely	Low-medium	a) Decreasing hydropower production due	a) Climate change (incl. change in	Related costs regarding the development of

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>may result in fluctuation and affect timing of inflow and discharge, and consequently impact on hydropower production. b) Droughts might also increase the probability of forest fires which in turn could have an impact on our production facilities in the affected area. This is a risk in all 9 countries where Fortum has operations.</p>						<p>to decreasing or increasing of precipitation may lead to unstable hydropower production and decreased revenues. In 2016, about 44% of Fortum's European power generation was hydropower. Our Nordic power price typically depends on factors such as hedge ratios, hedge prices, spot prices, powerplants' availability and utilisation of Fortum's flexible production portfolio ie. hydro power plants, and currency fluctuations. Excluding the potential effects from changes</p>	<p>temperature, precipitation and run-off) is taken into account in production planning of hydropower. Production planning is based on inflow modelling which includes the observed and modelled climate change. Some changes for regulation permits have been applied to better take into account seasonal changes due to climate change. Extreme event scenarios are given more weight in production planning than earlier. In 2016, we continued preparing for extreme hydrological conditions in</p>	<p>production planning in hydropower are some EUR 10,000 annually. In 2016, Fortum invested in total EUR 103 million into hydro production in Sweden and Finland, mainly refurbishments and productivity investments.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
							<p>in the power generation mix, 1 EUR/MWh change in our power sales (achieved) price will result in approximately EUR 45 million change in Fortum's annual comparable operating profit. In addition, Fortum's results will be affected by the possible thermal power generation volumes and its profits. b) Forest fires can damage plants. Losses of energy production and increased maintenance costs can result in lower revenues.</p>	<p>production planning. b) For example in Russia, the Ministry of Civil Defence has defined fire safety assurance levels. In 2016, we issued following measures: walks nearby the plant by security staff extra times a day; extra fire extinguishers outside the plant; transporting dry grass etc. away from the plant; Fire brigade standby organised with the municipality; daily reporting to the State Technical Inspection and weekly/daily to the Ministry of Civil Defence and the Ministry of Energy c) In</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								2016, electricity volume risks were hedged by entering into electricity derivatives contracts, primarily on the Nordic power exchange, Nasdaq Commodities (Nord Pool). Hedging strategies are continuously evaluated as the hydrological balance and other relevant parameters change.	
Change in temperature extremes	Increasing temperature results in increasing cooling water temperature for Fortum's condensing power plants in Finland: the Meri-Pori power plant and the Loviisa nuclear power plant,	Reduction/disruption in production capacity	>6 years	Direct	Unlikely	Low-medium	Water temperature rise can affect nuclear power plants since back-flow condensation water isn't allowed to exceed 32 degrees e.g. at the Loviisa nuclear power plant in	Right now there's no need to take colder cooling water far from the sea at Fortum's condensing power plants in Finland. If the amount of measurable constrains on the availability of nuclear	During years 2015-2016, Fortum has invested about EUR 165 million into the Loviisa nuclear power plant in Finland. In 2016, Fortum invested EUR 90 million into the Loviisa nuclear power plant in Finland.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>and this could require additional pumping capacity of cooling water and construction of longer pipelines in order to take the water from further away in the sea. Increase in the back-flow condensation water temperature on the other hand, affects the availability of the plants. Increase in water temperatures also affects the cleanliness of the systems (e.g. algae, mussels) and hence the system's reliability.</p>						<p>Finland. Seawater temperature rise could also affect the water intake in case of excessive algae growth. In Loviisa nuclear power plant, energy loss of production interruption is about 1,000 MW/hour. With electricity price of EUR 45/MWh, loss is about EUR 45,000/hour.</p>	<p>power production became common due to water temperature, investments in a new water intake place could be considered. Loviisa nuclear power plant's new cooling system, including also the cooling towers, was commissioned in 2015. The investment enhanced safety in the improbable extreme situation, when seawater wouldn't be available to cool the plant's reactors. A reason for that could be e.g. an accident of oil tanker ship or a similar incident. In 2016,</p>	<p>The most important investment was the replacement of the Loviisa nuclear power plant's two high-pressure turbines.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								accident management was made easier by new diesel fuel distribution piping, which is used for fuel tanks of diesel powered-cooling system.	
Sea level rise	A couple of Fortum's thermal power plants are situated on seaside and consequently exposed to the rise of the sea level. Sea level rise is a long-term climate change impact and thus more likely to affect the next generation of our plants. The elevation of Fortum's Loviisa (Finland) nuclear power plant yard area is +3.00 meters.	Increased capital cost	>6 years	Direct	Very unlikely	Low-medium	The sea level rise can increase costs for constructions of wide flood control and water intake systems. Major sea level rise could even lead to shutdowns of power plants. For example, the energy loss of a production interruption of Loviisa nuclear power plant is about 1,000 MWh/hour. With electricity price of EUR 45/MWh the loss is about	Sea level rise is important to take into account, when planning the location of our new plants. Fortum's Loviisa nuclear power plant has anticipatory sea-level measuring and operating instructions and action plans for high sea levels. The authorities will provide Loviisa power plant's control room with a separate warning of a high sea level.	During years 2015-2016, Fortum has invested about EUR 165 million into the Loviisa nuclear power plant in Finland. In 2016, Fortum's investment into the Loviisa plant was EUR 90 million.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>Studies show that the threat of a high sea level will not occur suddenly, and it will be predictable. It will also last limited time frame, only some hours. The probability of a sea level rise of more than 3 meters is very small. The occurrence of a high sea level at Loviisa requires heavy storms to rage in the North Sea for a long period of time – typically a couple of weeks – resulting in an exceptionally large volume of water flowing through the Strait of Denmark into the Baltic Sea. Strong south-western and western winds</p>						EUR 45,000/hour.	<p>Even if the sea level might rise over +3.00 meters, and thus might cover some parts of the Hästholmen island, where the power plant is located, the reactor can be cooled using diesel-powered (no electricity) cooling system. Long-term accident management improved by new diesel fuel distribution piping completed in 2016. This piping enables filling the fuel tanks of diesel powered-cooling system as well as emergency response center diesel by gravitation from tank located in</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>over the Baltic Sea, lasting several days, will have to push water from the central areas of the sea into the Gulf of Finland. If additionally there is high pressure over the Baltic Sea and low pressure over the Loviisa area, the pressure difference will raise the sea level at Loviisa. Spillover (the bathtub effect) of the water level in the Gulf of Finland can also raise the water level locally. The tidewater effect caused by the moon also has a small impact. The Finnish Institute of Marine Research has</p>							higher elevation.	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	estimated that, as a result of the above-mentioned phenomena, the maximum explainable water level at Loviisa is +213 cm. (For example, the Gudrun storm on 9 January 2005 raised the sea level at Loviisa to +177 cm, according to the Finnish Institute of Marine Research.)								
Other physical climate drivers	Baltic Sea is a low sea which together with temperature raise and eutrophication creates good growth circumstances for algae. Fortum has several power plants on the coasts of the Baltic Sea. For	Reduction/disruption in production capacity	>6 years	Direct	Very unlikely	Low-medium	Algae cleaning can cause business interruptions. In Loviisa, the energy loss of interruption of production is 1,000 MWh/hour. With electricity price EUR 45/MWh loss is about EUR 45,000/hour.	There is the algae cleaning at the Loviisa nuclear power plant. Additionally, the new cooling towers, which are independent of seawater cooling, were constructed during 2015. The system	During years 2015-2016, Fortum has invested about EUR 165 million into the Loviisa nuclear power plant in Finland. In 2016, Fortum's investment into the Loviisa plant was EUR 90 million.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>smaller energy production plants, algae doesn't pose a risk but for bigger production plants, such as Fortum's Loviisa nuclear power plant in Finland, masses of algae could be a problem, if they drifted close to the cooling water intake place due to e.g. storms or sea level rise. In such situations algae could cause business interruptions.</p>							<p>improves the plant's preparedness for extreme conditions when seawater for some reason becomes unavailable for its normal cooling function. The plant is already equipped with back-up systems, but the new cooling towers reinforce its safety even further. Safety improvement continued also in 2016, because of new diesel fuel distribution piping used for fuel tanks of diesel powered-cooling system.</p>	
Change in mean (average) temperature	<p>Long term increase in temperature may result in decreased demand for</p>	<p>Reduced demand for goods/services</p>	<p>>6 years</p>	<p>Indirect (Client)</p>	<p>Likely</p>	<p>Low-medium</p>	<p>Increased temperature can lower the demand of heat and affect our sales. 1%</p>	<p>Fortum produces district heating mainly in Fortum's CHP plants where</p>	<p>In 2016, Fortum's capital expenditure was EUR 58 million in Poland and EUR 11 million</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	heat, but on the other hand increasing demand for cooling in all areas where Fortum operates.						decrease in heat sales would correspond approximately EUR 6.5 million (Fortum's total heating sales in 2016 was EUR 648 million).	heat and electricity are produced in the same process. In 2016, the construction of Fortum's new CHP plant started in Zabrze, Poland. The plant is planned to start commercial operations by the end of 2018. The plant will be fuelled by refuse-derived fuel (RDF) and coal, but it can also use a mixture of fuels and, with a small additional investment, biomass. The amount of RDF can be up to 40% of the total fuel usage. The investment will improve the efficiency of electricity and heat production and reduce	in Estonia. In European countries, Fortum's total growth investments in thermal plants totalled EUR 69 million in year 2016. Productivity, maintenance and legislation-based investments totalled EUR 42 million. This amount consists mainly of investments in heat plants and district heating and cooling networks as well as the maintenance of existing CHP plants and other defined actions based on legal requirements.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								carbon dioxide and other emissions into environment. In 2016, Fortum also started the new 13-MW district cooling project in Tartu, Estonia.	

CC5.1c

Please describe your inherent risks that are driven by changes in other climate-related developments

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Changing consumer behavior	The main driver behind the behavioral change of consumers is their worry about climate change impacts. The actual impacts of climate change (decreasing need for heating and increasing need	Reduced demand for goods/services	1 to 3 years	Indirect (Client)	Likely	Medium	Financial implications include e.g. potential loss of income due to decreasing demand for power and heat. In 2016, City Solutions division's sales made 39% of Fortum's total	As Fortum's production is CO2-free to a large extent. In 2016, 62% of power production was CO2-free. Fortum is well positioned in the market and able to meet the increasing demand. Fortum	In practice no additional costs (0 euros). Most of the labelled electricity is sold without an extra fee to customers. In the future, price differentiation may result in increased income from these products and also the volume of

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>for cooling) are not very relevant changes from the energy retail business perspective in short term (1-3 years). The energy volume delivered to the consumers has a continuously decreasing importance to the financial performance of Fortum's energy retail business (energy margin erosion due to intensifying retail competition) and at the same time the importance of service fees related to efficient use of energy and other relevant services are increasing. The worry related to the climate change has already a clear positive impact on the demand of energy from</p>						<p>sales. If the demand for heat decreased e.g by 1%, this would mean approximately EUR 14 million decrease in sales (City Solutions' sales in 2016 was EUR 1,424 million).</p>	<p>has developed several products to meet the customer demand: in 2009 Fortum began selling only electricity that is originated by CO2-free production to its private and business customers in the Nordic countries. Fortum also has extensive development activities ongoing related to sustainable cities, e.g. smart grid, distributed energy production, electricity as energy source for transport and eco-efficient heating solutions. In 2016, Fortum initiated development of a virtual power plant for balancing</p>	<p>them will increase. Fortum's R&D costs which cover also e.g. activities related to the electric car infrastructure and smart grids, were EUR 52 million in 2016 which corresponds 1.4% of sales.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>renewable sources and based on customer surveys the source of energy has had an increasing weighting in the set of consumers' decision making criteria. Fortum expects this development to continue. The most valued source of electricity is currently solar power. Worries related to the climate change together with political subsidies drive the increasing demand for decentralized photovoltaic solutions, power storage solutions, demand response solutions and energy usage optimization services. Fortum is in central role in offering all the</p>							electricity demand.	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>above-mentioned solutions and the financial returns are increasingly based on service fees. Fortum supports customers to use energy in a smarter way, and this is better business for Fortum than selling just bulk energy and competing with the lowest margins.</p> <p>Worries related to the climate change together with political subsidies steer also the migration from fossil fuel (oil based heating systems) to electricity based heating systems (heat pumps), which increases the demand for electricity. In longer term electric transportation will also have an</p>								

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	increasing impact on the demand for electricity that will at least partly compensate the decreasing need for heating. Fossil fuel based electricity production, especially coal, may become an increasing risk. These are risks in all 9 countries Fortum operates in, but especially in Fortum's 7 operating countries in Europe.								
Reputation	Fortum believes that the future energy system will be based on emissions-free and inexhaustible energy sources and on overall efficiency of the energy system. However, Fortum's emissions may increase in the near future. This	Reduced stock price (market valuation)	1 to 3 years	Direct	Unlikely	Medium-high	Failing to gain customer recognition as an enabler of a low-carbon society could have an impact on our market share and thus revenue. For example, a one percentage decrease in electricity sales would	In Russia, the CO2 challenge is managed through energy efficiency improvements in existing power plants and networks and construction of new energy efficient capacity in CHP plants. There is a big improvement	In 2016, Fortum's total capital expenditure in Russia was EUR 201 million including mainly productivity investments, modernisations and energy efficiency improvements. This included also in the investment of EUR 15 million

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>is because Fortum has recently finalised its 2,300 megawatt (MW) investments in producing electricity and 660 megawatt (MW) investments in producing heat in Russia. These capacity increases are mainly based on natural gas. After the finalisation of the Russian investment programme, Fortum has doubled its electricity production capacity. Fortum's CO2 emissions will increase by several million tonnes. However, the specific emissions per produced energy unit will not significantly change because</p>						<p>correspond approximately EUR 26 million (Fortum's total power sales in 2016 was EUR 2,587 million). Also Fortum's ability to influence governments in developing future climate policy framework, related legislation could weaken. This in turn, could result in unfavourable operating environment and impact our profitability.</p>	<p>potential in energy efficiency as well as in reduction of heat and water losses in district heating networks. To diversify our production fleet in Russia, there is ongoing the construction of new wind power. In 2016, Fortum invested into the Ulyanovsk wind farm is the first ever in Russia. This wind farms is expected to start production during 2017.</p>	<p>into the wind power. The total investment of wind power will be approximately EUR 65 million in Russia.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>the new units are the most modern based on most recent technology and more energy efficient than the old plants. Fortum's target in Russia is to bring environmental, occupational health and safety performance closer to the level of the plants in Europe. Failing in this work would be a reputational risk for the good track record that Fortum has as a power and heat production company with low carbon dioxide emissions.</p>								

CC5.1d

Please explain why you do not consider your company to be exposed to inherent risks driven by changes in regulation that have the potential to generate a substantive change in your business operations, revenue or expenditure

CC5.1e

Please explain why you do not consider your company to be exposed to inherent risks driven by changes in physical climate parameters that have the potential to generate a substantive change in your business operations, revenue or expenditure

CC5.1f

Please explain why you do not consider your company to be exposed to inherent risks driven by changes in other climate-related developments that have the potential to generate a substantive change in your business operations, revenue or expenditure

Further Information

Page: CC6. Climate Change Opportunities

CC6.1

Have you identified any inherent climate change opportunities that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Opportunities driven by changes in regulation

Opportunities driven by changes in physical climate parameters

Opportunities driven by changes in other climate-related developments

CC6.1a

Please describe your inherent opportunities that are driven by changes in regulation

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Voluntary agreements	Fortum has been actively involved in the development of market based climate instruments. All Fortum's power plants in Finland are within the scope of the energy efficiency agreement between the Confederation of Finnish Industries and the Ministry of Employment and the Economy based on the EU Energy Services Directive (Directive on the Promotion of End-use Efficiency and Energy Services, 2006/32/EC). The voluntary agreement covers e.g. the annual planning and drafting of	Reduced operational costs	Up to 1 year	Direct	Very likely	Medium-high	Efficiency in our operations results in cost savings of raw material and CO2 allowances. For example, improving fuel efficiency by 0.5 percentage increases savings up to 0.5 million euros in a 150-megawatt power plant.	Fortum Power Division's energy-efficiency programme in 2008-2016 covered the power plants subject to the Finnish energy-efficiency agreement and Swedish hydropower plants. Other divisions have own energy-efficiency projects. In Finland and Sweden, Fortum's target is 606,000 MWh/a energy-efficiency improvements during 2008-2016. In 2016, Fortum accomplished refurbishments of hydropower plants in Sweden and Finland,	Power Division's energy-efficiency programme costs approx. EUR 80 million and City Solution Divisions's EUR 5.3 million during 2008-2016 in Finland and Sweden. Growth investments in new Russian energy efficient power generation capacity are approximately EUR 200 million from year 2015 onwards. In 2016, Fortum invested EUR 90 million into the Loviisa nuclear power plant in Finland. Fortum

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>the energy efficiency programme, follow-up monitoring and annual reporting to Motiva (an expert company promoting efficient and sustainable use of energy and materials in Finland, operates as an affiliated Government agency), and training of the entire plant personnel. Participating in this programme helps us in focusing in our energy-efficiency and strengthens our position as an energy efficiency expert. In the framework of the voluntary agreement, Fortum has e.g. modernized the high-pressure</p>							<p>resulting in additional hydropower production of 30 gigawatt-hours (GWh) annually. In the framework of the voluntary agreement, Fortum has also e.g. modernized the high pressure turbines at the Loviisa nuclear power plant in 2016. It increases plant's electricity production by about 100 gigawatt-hours (GWh) annually. Fortum's target is to achieve over 1,400 GWh of annual energy savings by the year 2020 as compared to 2012. By the end of 2016, about 1,372</p>	<p>invested in total EUR 271 million in CO2-free energy production in 2016.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	turbines at the Loviisa nuclear power plant in 2016. In 2016, Fortum also accomplished refurbishments of hydropower plants in Sweden and Finland, resulting in additional hydropower production of 30 gigawatt-hours (GWh) annually.							GWh or 98% of the target set for 2020, had been reached.	
Cap and trade schemes	Fortum strongly believes that the only way forward in climate change mitigation will be carbon pricing and use of market mechanisms that remunerate private investments. We therefore have consistently advocated for market-based, technology-neutral solutions	Other: increasing product price	1 to 3 years	Direct	Very likely	Medium-high	The higher CO2 price and the auctioning of CO2 allowances from 2013 are likely to increase Nordic power prices and Fortum's profitability. In electricity production, the key financial impact and future opportunity	Fortum's investments in Europe target mainly CO2-free production. The ongoing renewable investments will add about 580 MW of electricity production capacity and about 300 MW of heat production capacity. In 2016, Fortum	In 2016, Fortum's total investments without acquisitions were EUR 591 million, of which EUR 271 million targeted CO2-free production. Fortum invested in total EUR 29 million into hydropower production in Finland and

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>and efficient carbon pricing (like cap and trade) as tools for decarbonization. Basically our opportunities increase as far as the greenhouse gas emission reduction requirements become stricter, because we are better positioned than our competitors to meet those regulations. If the cost of emitting CO2 increased in the future, also the value of carbon free energy production would increase. The associated countries/regions are basically the EU countries and especially the countries of the Nordic power market.</p>						<p>stems from higher achievable power sales price in the Nordic region. Basically, one euro in the sales price increases our annual operating profit by approximately 45 million euros, assuming stable generation mix, and excluding Russian operations.</p>	<p>invested into hydropower in Sweden and Finland, mainly refurbishments and productivity investments. Refurbishments of hydropower plants increased production capacity about 10 MW and production of 30 GWh annually. The biggest projects were Järpströmmen refurbishment and Långströmmen dam safety project, both in Sweden. In 2016, Fortum invested also in the Blaiken wind farm, with a capacity of 247.5 MW and share of ownership 15%, and</p>	<p>EUR 74 million in Sweden. The Järpströmmen project was EUR 6 million and Långströmmen project EUR 11 million, in Sweden. Fortum invested into wind power EUR 11 million in Blaiken and Solberg in Sweden. Fortum's solar power investments in India were EUR 43 million.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>Almost all of Fortum's CO2 emissions in the European Union were included in the EU emissions trading system in 2016. On the period 2013-2020 the rules are more harmonised and the allocation of emission allowances is increasingly based on auctioning. This offers us opportunities, because 96% of Fortum's electricity production in the EU is CO2-free, and Fortum does not need to buy allowances for that production.</p>							<p>Solberg wind farm, with a capacity of 75 MW and share of ownership 50 %, both in Sweden. Fortum started also new 100-MW and 70-MW solar power park projects in India.</p>	
International agreements	<p>Basically our opportunities increase as far as the greenhouse gas</p>	<p>Reduced operational costs</p>	<p>1 to 3 years</p>	<p>Direct</p>	<p>Likely</p>	<p>Medium</p>	<p>The value of our carbon free energy production increases, if</p>	<p>Fortum believes that the future energy system will be based</p>	<p>In 2016, Fortum invested a total of EUR 271 million in</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>emission reduction requirements become stricter, because we are better positioned than our competitors to meet those regulations. The value of carbon free energy production increases, if the cost of emitting CO2 increases in the future. As a power and heat production company with low carbon dioxide emissions (62% of total electricity production CO2-free), Fortum will be a relative winner if the international agreement on a global market and carbon price is achieved. Clean Development Mechanism (CDM) can be</p>						<p>the cost of CO2 emissions increases in the future. If we produce for example 1 TWh of electricity without CO2 emissions instead of producing it with natural gas, the avoided costs would be total EUR 4 million. If market mechanisms (like CDM) are to be continued in the future, Fortum can continue acquiring emissions units also through international carbon funds.</p>	<p>on emissions-free and inexhaustible energy sources and on overall efficiency of the energy system. The investments in Europe target mainly renewable and CO2-free production. The Nordic electricity market functions as an example for the integration of Europe's electricity markets. Therefore, Fortum is very qualified to be a frontrunner in understanding, analysing and anticipating the markets, in terms of investment choices or anticipating price development</p>	<p>CO2-free production. Fortum has invested a total of EUR 10 million in the World Bank's Prototype Carbon Fund (PCF). The total amount of ERUs/CERs we will receive is estimated to be about 1 million tonnes CO2 which approximates EUR 10 million if CO2 price is assumed to be EUR 10.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	used to supplement national emissions reduction measures continues also on the post-2012 period and the Paris Agreement includes several other market mechanisms as well. Fortum is a participant in a carbon fund that has implemented CDM and JI projects.							also on an international market. Fortum has invested in the World Bank's Prototype Carbon Fund (PCF). Fortum is also actively involved in the global discussion on carbon pricing and market mechanisms.	
Fuel/energy taxes and regulations	According to the EU Directive on Renewable Energy Finland has a target to increase the share of RES in final consumption to 38% by 2020. The Swedish RES target is set at 49% by 2020. As the climate change	Increased demand for existing products/services	1 to 3 years	Indirect (Client)	Likely	Low-medium	Developing infrastructure for electric cars in a large-scale offers Fortum new business opportunities. At the same time we create circumstances in which electricity can replace other	We investigate and create infrastructure for the large-scale introduction of electric cars. This includes e.g. the planning and development of recharging systems and recharging points. Two	In 2016, Fortum invested in Charge and Drive EUR 12 million, mainly charging poles in Norway.

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>mitigation requires reduction of fossil fuels e.g. in transportation there is a possibility to increase electricity consumption e.g. through electrification of transportation. Fortum has already taken an active role in this development work. Fortum actively promotes the adoption of electric vehicles by developing solutions that enable quick and safe charging of electric vehicles. Fortum Charge & Drive is the Nordic countries' largest electric vehicle charging network, which operates in Norway, Iceland, Sweden and</p>						<p>energy forms. Therefore the demand for the electricity produced by us can increase. E.g. 1 % increase in our power sales would approximate EUR 26 million (Power sales in 2016 was EUR 2,587 million and 84.7 TWh).</p>	<p>pilot projects has been in Sweden and Finland. An electric car can save about 60-70% of the energy used by a gasoline- or diesel-fuelled car. In 2016, Fortum Charge & Drive opened an innovative electric car charging facility at the Vulkan parking garage in central Oslo. It has over 100 charging stations available for customers. The charging facility was built in cooperation with the property owner and the city of Oslo. The facility is helping Oslo to reach its ambitious climate goals, which include</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>Finland. The network consists of 1,200 affiliated smart chargers in the Nordic countries. The Charge & Drive cloud-based business system is already used by about 50 partners in the Nordic countries and nearly 40,000 end customers. Fortum has about 50 charging stations in Finland, about 90 in Sweden and about 200 in Norway. More than 100 stations are fast chargers. Increased use of electric vehicles reduces emissions regardless of the source of electricity, because all electricity</p>							cutting greenhouse gas emissions by 50% by 2020 and 95% by 2030, compared to 1990 levels.	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	production is in the framework of the EU emissions trading scheme, unlike petrol and diesel fuels.								
Other regulatory drivers	Fortum is one of the leading suppliers for operation and maintenance services. We operate in the Nordic countries, the Baltics, Russia, Continental Europe and UK as well as in selected international markets such as Middle East and Asia. Fortum's services in energy efficiency improvements and other energy services for the industrial customers will benefit from further energy efficiency initiatives and	Reduced capital costs	Up to 1 year	Indirect (Client)	Likely	Medium	Increased demand for energy efficiency services and building sustainable cities may increase demand for our operation, maintenance and expert services for power plants, industrial facilities and also in large-scale business opportunities related to the infrastructure for sustainable cities. The energy-efficiency directive in EU	Fortum has core operations in 9 countries, with over 8,000 energy sector professionals, focus on diversity. Fortum's portfolio covers structural modifications, preventive maintenance and training of personnel in optimal operation and in improving the plant's operational economy. Fortum TOPi® system has been delivered to dozens of locations around the world. Thus	The annual costs of Ecotuning® projects may be EUR 100,000-250,000.

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>carbon constraints. Energy efficiency solutions market is predicted to grow strongly at least for the coming two decades. The EU energy strategy emphasises tapping into the biggest energy-saving potential – buildings and transport. This is an opportunity for Fortum, since we have extensive development activities related to sustainable cities, e.g. smart grid, distributed energy production, electricity as energy source for transport and eco-efficient heating solutions. Fortum also improves the</p>						<p>brings additional possibilities to sell even more this kind of services. For example in Finland, energy audits for large energy companies at the minimum four years interval will increase annual turnover roughly by EUR 500,000.</p>	<p>Fortum has comprehensive experience of various types and sizes of power plants. With the TOPi® system a customer is able to achieve savings in every aspect of daily operations and maximize the efficiency of plant, and also emission monitoring is improved continuously. Fortum Ecotuning® service optimises the energy efficiency of customer's plant, finds process bottlenecks, calculates impacts and proposes the cure to reach an excellence in power plant</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>energy efficiency of its own operations which is an opportunity since it brings both financial gain and environmental benefits. A large share of Fortum's production, 19 plants, is based on combined heat and power production (CHP) with high overall efficiency. There is potential to increase the use of CHP in our market area, so this is a commercial opportunity for Fortum.</p>							<p>performance. Ecotuning® project includes delivery promise for the customer, typically 1% decrease in annual fuel consumption. For example in medium size CHP-plant in Finland this means EUR 250,000 annual energy savings. Fortum offers also remote monitoring services and studies, which support customers to improve energy efficiency. In year 2016, Fortum made advancements to the energy efficiency services, such as instead of an individual power plant, it</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								can be examined the development of a broader area, like power and heat plants of a city or a company. There have been made several studies in 2016, e.g. Järvenpää and Joensuu area in Finland.	
Other regulatory drivers	Climate change, urbanisation, population growth, and limited natural resources are examples of megatrends shaping the world. These megatrends are pushing us to maximise the efficient use of resources, such as waste and biomass. In 2016, Fortum acquired Ekokem Corporation and	Increased demand for existing products/services	1 to 3 years	Indirect (Client)	Very likely	Medium	In 2016, Fortum acquired Ekokem Corporation, which leading Nordic circular economy company specialised in material and waste recycling, final disposal solutions, soil remediation and environmental . In 2015, Ekokem group's net	Fortum expects the concern about climate change to increase the demand for low-carbon and energy-efficient energy products and solutions. Fortum's developing circular economy services also meet this demand, as the use of hazardous and non-recyclable	The debt and cash-free purchase price for 100% of the Ekokem company was approximately EUR 700 million. Based on Fortum's estimate for 2016, the purchase price corresponds to approximately 11 times EBITDA. In 2016, Fortum invested also into new

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>started offering sustainable city solutions, like waste and circular economy services to customers. As a part of Fortum's new strategy, Fortum has expanded business portfolio to include also circular economy services for our customers. For us, the circular economy means that materials are recycled as much as possible and hazardous substances are removed from circulation. Efficient and reliable waste management is important in a society based on sustainability. Fortum's aim is to promote the</p>						<p>sales was EUR 258 million and reported EBITDA EUR 55 million.</p>	<p>waste in energy production replaces fossil fuel and reduces the formation of GHG gases at landfills. The circular economy business is specialised in waste and material treatment, recycling and combustion, final disposal solutions, soil remediation and environmental construction services. Fortum's new circular economy business operates hazardous waste treatment and combustion facilities in Finland, Sweden and</p>	<p>waste-derived production EUR 9 million in Finland.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>transition towards a more extensive circular economy. Fortum offers waste treatment services for customers in the Nordic and Baltic countries.</p>							<p>Denmark. The waste-to-energy capacity for hazardous waste incineration is located in Riihimäki (electricity capacity of 18 MW and heat capacity 90 MW), in Finland; in Kumla (9 MW and 35 MW, respectively), in Sweden; and in Nyborg (16 MW and 19 MW), in Denmark. Fortum has also waste-to-energy CHP plant in Klaipeda, Lithuania. The Klaipeda CHP plant, with electricity capacity of 20 MW and heat capacity of 60 MW, uses non-hazardous</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								municipal and industrial waste as fuel.	

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Please describe your inherent opportunities that are driven by changes in physical climate parameters

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in mean (average) temperature	Due to increasing temperature the demand of cooling energy will increase in the future. District cooling is more climate benign than individual house cooling. According its strategy, Fortum offers sustainable solutions for growing cities. We offer district cooling	Increased demand for existing products/services	>6 years	Indirect (Client)	Likely	Low-medium	Increased demand in district cooling can increase revenues. In 2016, City Solutions division's sales made 39% of Fortum's total sales. If the demand for cooling increased e.g by 1%, this would mean approximately EUR 14 million increase in sales (City	Fortum can produce district heating in combined heat and power (CHP) plants where heat and electricity are produced in the same process. District cooling is mostly produced by free cooling from sea or cooling from heat pumps. Fortum contributes to developing regulatory and political environment for	In European countries, Fortum's total growth investments in thermal power totalled EUR 69 million in year 2016. Productivity, maintenance and legislation-based investments totalled EUR 42 million. This amount consists mainly of investments in heat plants and

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>in Sweden, Finland and Estonia. The increased demand for cooling offers new business opportunities for Fortum. Advanced district cooling is an ideal solution for densely built and populated urban areas where district cooling and heating networks serve a large number of consumers. Fortum has opportunities to provide district cooling in the Nordic countries, Baltic countries, Russia and Poland. This means 8 out of 9 countries where Fortum is operating at the present.</p>						<p>Solutions' sales in 2016 was EUR 1,424 million). However, nowadays the implication of district cooling is quite marginal.</p>	<p>the district cooling business in its operating countries (8 out of 9). As heating and cooling are local businesses, they are primarily subject to local legislation and regulations and treated very differently in different countries. One method to manage this is to have an active dialogue with the local authorities and decisionmakers. In 2016, Fortum started the new 13-MW district cooling plant and network project in Tartu, Estonia. The project will decrease the need of electricity yearly by 70% compared to local cooling solutions and also CO2 emissions by 71%. At the</p>	<p>district heating and cooling networks as well as the maintenance of existing CHP plants and other defined actions based on legal requirements. The total cost of the investment in Tartu district cooling project will be EUR 5.7 million including a new cooling plant with the capacity of 13 MW. In 2016, Fortum's capital expenditure for thermal power was EUR 11 million in Estonia.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								moment Tartu district cooling network is 1.6 kilometres long. Citycenter Ainoa is one of the first users of Fortum's district cooling solution in Espoo, Finland. More than 90% of the thermal energy removed from the building complex is utilised in the area's district heating. Fortum is also developing district cooling solutions by e.g. cooperating with researchers. In Poland, Fortum is collaborating with the Wroclaw University of Technology on district cooling solutions.	
Change in precipitation pattern	Changing temperature and rainfall change the prerequisites for energy production and	Increased production capacity	>6 years	Direct	About as likely as not	Low-medium	Hydropower, which has a 30% stake of Fortum's power production portfolio, is a very	Climate change is taken into account in production planning. Especially the methods for regulation and	Fortum's R&D costs totalled EUR 52 million in 2016 which corresponds to 1.4% of sales. Fortum invested

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>distribution. Changes in temperature would affect snow amount, seasonal river flow patterns and thus Fortum's hydro power production (20.7 TWh in 2016), which has a 28% stake in Fortum's power production portfolio. Changes in timing of river flow affect water regulation patterns and production planning. Fortum has studied the impact of climate change on hydrology in rivers with Fortum's hydropower in Sweden and Finland. Hydropower is</p>						<p>competitive production technology, because it is CO2-free and variable costs are low. With hydropower we can react quickly to changing markets and operate competitively in the electricity markets. Sometimes temperature increase may shift inflows to high demand season. Temperature changes also affect power demand, production and electricity prices. Excluding the potential effects from changes in the power generation mix, a 1 EUR/MWh change in our power sales</p>	<p>production planning need to be altered due to the changes in climate. Climate change impact can also be taken into account in hydro power refurbishment projects. Fortum's investment programme will increase hydropower capacity by about 100 MW by 2020. The goal of Fortum's investment programme is to increase CO2-free hydropower capacity and to improve hydropower plant safety and availability. Fortum's hydropower production capacity totals 4,650 megawatts (MW) at present. In 2016, Fortum invested into hydro production,</p>	<p>additionally EUR 103 million into hydro production in Finland and Sweden. The biggest of these were Järpströmmen project EUR 6 million and Långströmmen project EUR 11 million. This is a part of Fortum's long-term Nordic hydropower plant investment programme, with an annual investment value of about EUR 100 million. In addition, Fortum implemented environmental measures valued at EUR 3.2 million for hydropower in 2016.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>a very competitive form of production due to its CO2-free nature and in terms of variable costs. With hydropower, we can react quickly to different market conditions and operate competitively in the electricity markets.</p>						<p>(achieved) price will result in an approximately EUR 45 million change in Fortum's annual comparable operating profit.</p>	<p>mainly refurbishments and productivity investments. The biggest of these were Järpströmmen and Långströmmen projects, both in Sweden. The refurbishments completed in 2016 resulted in an annual hydropower production increase of about 30 GWh with a capacity of about 10 MW. In Sweden and Finland Fortum has also voluntarily worked with authorities and local interest groups to agree on and implement additional restrictions and other projects to improve the environment and the use of the water systems. Fortum finances</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								projects that reduce the adverse environmental impacts of hydropower production and support biodiversity in built-up water systems. Funds come from the sales of "Ekoenergia" eco-labelled electricity in Finland and "Bra Miljöval"-labelled electricity in Sweden.	
Induced changes in natural resources	Enhanced biomass growth due to higher average temperature may result in new bioenergy production opportunities. In 2016, biomass fuels accounted for 1% of Fortum's power generation and 7% of heat generation,	Reduced operational costs	>6 years	Indirect (Supply chain)	Likely	Low-medium	Enhanced biomass growth would increase the supply of biomass which could decrease fuel price and Fortum's costs. If the average price of biomass decreased by 10%, this could reduce Fortum's fuel costs by about EUR 5 million.	In 2016, Fortum used a total of 12.7 petajoules (PJ) of renewables and other biofuels (10.2 petajoules of biomass fuels). For example, there was a replacement of heavy fuel oil with wood pellets at the Kivenlahti heat plant in Espoo, Finland. In 2016, 62% of	Fortum's R&D costs which also include projects related to e.g. biomass use, totalled EUR 52 million in 2016 which corresponds to 1.4% of sales. In 2016, Fortum invested into new biomass fuel-derived production EUR 8 million and new waste-

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>and additionally waste accounted for 3% of heat generation. Nordic operating environment and the region's strong roots in the forest industry make biomass in particular a competitive alternative.</p>						<p>In 2016, of Fortum's purchases, fuels accounted for EUR 531 million, of which the share of fossil fuels was about EUR 454 million, biomass fuels about EUR 39 million, and nuclear fuels about EUR 38 million. Majority of biomass fuels consisted of wood pellets, wood chips and wood residues.</p>	<p>Fortum total electricity production was CO2-free, and 30% was produced from renewable energy sources. About 7% of heat production was produced from renewable, CO2-free energy sources. Fortum is also a leading user of hazardous waste and non-hazardous, municipal waste in the Nordic and Baltic countries. Utilising municipal waste is an essential part of sustainable waste management because it will reduce the amount of waste that would otherwise end up in landfills and increase the formation of GHG gases there.</p>	<p>derived production EUR 9 million, both in Finland.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Other physical climate opportunities	Due to higher temperatures during the winter, the Baltic Sea may be covered with ice for a shorter time during the year or not at all in the future. This can be an opportunity for offshore wind power production since operational and maintenance cost are lower in the sea areas due to milder winters. In the Nordic conditions sea-based wind power has better profitability than onshore wind power due to wind conditions. Currently Fortum has no offshore wind	Investment opportunities	>6 years	Direct	More likely than not	Low-medium	Building offshore windmills might be an opportunity for Fortum in meeting increasing demand for renewable energy. In Nordic countries, offshore wind power has better profitability than onshore wind power due to more windy conditions. In addition, better wind conditions enables more value from onshore wind power as well. Excluding the potential effects from changes in the power generation mix, a 1 EUR/MWh change in our power sales (achieved) price will result in an	The Blaiken wind farm, with a capacity of 247.5 MW, in Sweden, was completed in 2016. Fortum's share of ownership of the Blaiken wind farm is 15%. Fortum has also started construction of Solberg wind farm, with a capacity of 75 MW, in Sweden. Fortum's share of ownership of the Solberg wind farm is 50%. The Solberg wind farm is expected to be commissioned in 2018. Fortum has finalised the acquisition of three wind power projects in Norway in the beginning of 2017. The transaction consists of the 32 MW Nygårdsfjellet wind farm, which is already operational, as	In 2016, Fortum invested into wind power EUR 11 million in Blaiken and Solberg in Sweden, and additionally EUR 15 million in Ulyanovsk in Russia.

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	power production.						approximately EUR 45 million change in Fortum's annual comparable operating profit.	well as the fully-permitted Ånstadblåheia and Sørfjord projects. Fortum is preparing for the construction of the Ånstadblåheia and Sørfjord projects, expected to be commissioned in 2018 and 2019. When built the installed capacity of the three wind farms would total approximately 170 MW.	

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Please describe your inherent opportunities that are driven by changes in other climate-related developments

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Reputation	Fortum annually measures customer and	New products/business services	Up to 1 year	Direct	Very likely	Low-medium	Fotum has a good track record in the	Innovation is a tool to manage reputation.	Costs of building good reputation are

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>stakeholder satisfaction as well as development of the company's reputation and the factors that impact it through the One Fortum survey, the stakeholder sustainability survey and other stakeholder collaboration. Fortum conducted the One Fortum survey in 2016 in Finland, Sweden, Norway, Poland, the Baltic countries, Russia and India. Over 4,000 customers and nearly 3,300 other stakeholders were interviewed for the One Fortum survey. Fortum has a strong reputation among public administration representatives. Fortum's</p>						<p>electric utility sector. Good reputation can result in new business opportunities and increase our sales of energy products and expert services. E.g. 1% increase in power sales is approximately EUR 26 million (Power sales in 2016 was EUR 2,587 million). Reputation affects the employee commitment too. Talented and committed employees are the prerequisite for achieving climate change mitigation goals and being a profitable company. In 2016, Fortum's departure turnover was 13.0%, and</p>	<p>Fortum Innovation Challenge is a tool to inspire employees to initiate ideas and innovations that increase the efficiency of current operations, create growth, promote sustainability and secure business and technology opportunities. In 2016, Fortum organised for example the open innovation competition called "Hack the Solar" to develop solar energy solutions focusing on the customer solar panel purchasing process and customer experience. Fortum invited 12 teams (with 2-3</p>	<p>difficult to estimate since Fortum's reputation consist of all the actions we take and how we engage in dialogue with our stakeholders. Typical annual sum granted to the winner of Fortum Innovation Challenge is about EUR 100,000. In 2016, the winning team of the solar innovation competition received a prize of 10,000 euros, and the best teams had an opportunity to pilot their innovations with Fortum.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>reputation improved the most in this group, compared to the previous year. Our reputation improved also among non-governmental organisations, opinion makers, personnel, and customers and is now good in all of these groups. The employees' view on Fortum as a company is on a good level and has remained stable compared to last year. Also, the international and independent EPSI Rating annually surveys the level of satisfaction of electricity retail company customers in Finland, Sweden and Norway. Fortum believes that a good track</p>						<p>voluntary departure turnover was 5.6%.</p>	<p>persons/team) from service design and software development to innovate and develop new services for home-owners with solar energy production. The goal was to develop proof-of-concepts of digital living services for existing and new home-owners of solar panels.</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>record as a climate change mitigating company helps us to attract talented employees who are committed to the mitigation of climate change. Fortum's good reputation thus helps us to meet the current and future competence needs and to develop and retain employee competence. The effort of every Fortum employee is needed to be able to meet the company's long-term aspiration of being a CO2-free power and heat company. Fortum has also a good track record among other actors in the electric utility sector. This creates us new</p>								

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	business opportunities since we can use our expertise in other companies' projects not only in the countries where we have operations but also in other countries.								
Changing consumer behavior	The main driver behind the changing consumer behavior is their worry about climate change. Based on customer surveys, energy source seems to have an increasing weight in consumers' decision making criteria. This has already had a clear positive impact on the demand of energy from renewable sources. The most valued source of	Increased demand for existing products/services	1 to 3 years	Direct	More likely than not	Low-medium	Changing consumer behaviour can increase the demand for our low-carbon products which can increase sales. E.g. 1% increase in power sales is approximately EUR 26 million (Power sales in 2016 was EUR 2,587 million). Now the financial implications due to pricing of carbon-free electricity products are minor. Most of the labelled	Fortum's investments in the EU area are mainly CO2-free production. Fortum is one of the world's leading companies in CHP production-related know-how. CHP production is resource and energy efficient: almost all of the energy of the fuel can be utilised. Fortum also wants to reduce environmental impacts by increasing biofuels and	In 2016, Fortum's total investments without acquisitions were EUR 591 million, of which EUR 271 million targeted CO2-free production. In addition, Fortum supports projects that reduce environmental impacts of hydropower production and support biodiversity in built-up water systems.

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>electricity is currently solar power. The changing consumer behavior concerns especially the three Nordic countries (Finland, Sweden and Norway), where Fortum has the largest customer base. Changing consumer behavior drives the increasing demand for decentralized photovoltaic solutions, power storage solutions, demand response solutions and energy usage optimization services. Fortum is in a central role in offering all the above-mentioned solutions and the financial returns are increasingly based on service</p>						<p>electricity is sold without an extra fee. Price differentiation may result in increased income and volume of these products. The demand for our energy efficiency services can increase, too.</p>	<p>waste-to-energy production. Fortum sells only electricity produced without CO2 emissions to its customers in the Nordic countries. In 2016, Fortum continued to give Guarantee of Origin (GoO) to its electricity, meaning that a given share of quantity of energy is produced from renewable energy sources. Fortum also sells electricity under Green labels, which have stricter environment criterias i.e. not just renewable. In 2016, Fortum's electricity sales was 11.7 TWh in Nordic countries and Poland. About</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>fees. Fortum helps its customers to use energy in a smarter way. Increasing service business is better business than selling just bulk energy and competing with the lowest margins.</p> <p>Worries related to climate change also steers the migration from fossil fuel (oil based heating systems) to electricity based heating systems (heat pumps), which increases the demand for electricity. In longer term, electric transportation will also have an increasing impact on the demand for electricity that will at least partly compensate the decreasing need for heating. An</p>							<p>9,000 GWh (77%) was produced from renewable sources, mainly hydropower. In addition, Fortum offers products for real-time control and optimisation of electricity consumption. By follow-up and reduction of energy consumption, when electricity price is high, customers can save appr. 5-10 % energy and the corresponding amount in their electricity bill. Fortum is also strongly involved in constructing a Nordic electric vehicle charging infrastructure. In 2016, we made contracts with several customers to</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	increasing number of household and business customers expect electricity retailers to provide information about the origin of the electricity they sell. As Fortum's power production is CO2-free to a large extent. In 2016, about 96% of Fortum's electricity production in the EU was CO2-free, and 62% of Fortum's total electricity production was CO2-free.							deliver Fortum's Charge & Drive system for operating their electric vehicle charging infrastructure in Nordic countries.	
Other drivers	Fortum's strength is the flexible, cost-efficient and climate-benign generation portfolio. That will be our main asset also in the future. Use of a diverse range of energy sources in the	Increased stock price (market valuation)	Up to 1 year	Direct	Likely	Medium-high	We believe that having a versatile production portfolio affects Fortum's share value. Nuclear power (24.1 TWh/33% of power generation) and	Fortum's investments in Europe target to CO2-free production. The ongoing investments will add 580 MW of electricity production capacity and	In 2016, Fortum's total investments without acquisitions were EUR 591 million, of which EUR 271 million targeted CO2-free production

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>production guarantees that for example changes in water reservoirs or prices of fuels don't affect us as much as if we produced energy using only one energy source. In 2016, the sources of power generation were: nuclear 33%, natural gas 33%, hydro 28%, coal 4% and biomass 1%. In heat production the sources were: natural gas 71%, coal 17%, biomass 7%, waste 3%, heat pumps (electricity) 1% and peat 1%. In 2016, CHP plants accounted for 26% of Fortum's total electricity production and 88% of heat production. The role of new, renewable energy</p>						<p>hydropower (20.7 TWh/28% of power generation) are competitive forms of production due to their CO2-free nature and in terms of variable costs. With hydropower we can react quickly to market conditions and operate competitively in the electricity markets. In 2016, sales of Fortum's Power Generation segment was EUR 1,657 million. CHP production is also resource- and energy-efficient way to produce electricity.</p>	<p>300 MW of heat production capacity. OAO Fortum's investments until 2016 have added about 2,300 MW of electricity production capacity in Russia. The investment programme finalised in Russia is based mainly on the use of natural gas. Future growth opportunities can be foreseen in the liberalising energy markets in Europe and Asia. We also continue our hydropower refurbishment programme and modernisation, capacity upgrade and lifetime extension</p>	<p>including EUR 103 million into hydro production, EUR 26 million into wind power production, EUR 43 million into solar power production, and additionally EUR 90 million into Loviisa nuclear power plant.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>forms in production will still be minor in the near future: with the exception of hydropower, other pure solar-economy production forms are still in the development phase and will require significant support from society. Changes in the energy production system are slow, and the transition towards an emissions-free future will happen gradually. Fortum's generation portfolio is also geographically diversified (located in 9 countries) which helps in spreading the risk, too. We believe that being present in different countries</p>							<p>projects in nuclear power.</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	and having a versatile production portfolio make Fortum share an attractive investment.								
Other drivers	Diminishing natural resources, growing environmental problems and the rising prices of fuels are increasing electricity's relative share of total energy consumption. With electricity replacing other energy use, the total energy need and emissions are decreasing. A challenge for the energy sector is to boost the efficient use of energy while bringing electricity and modern energy systems to an increasing	Increased demand for existing products/services	1 to 3 years	Direct	Very likely	High	Increased demand of electricity may increase Fortum's electricity sales. E.g. 1% increase in power sales is approximately EUR 26 million (Power sales in 2016 was EUR 2,587 million). Also demand for sustainable solutions (living) are likely to increase. By the end of 2016, about 1,372 GWh or 98% of the target set for 2020, had been reached. The energy-efficiency	Fortum develops solutions to reduce the climate impacts of energy use in housing, transportation and electricity distribution. Nowadays smart meters are helping our customers monitor electricity consumption and conserve electricity. By follow-up and thus reduction of energy consumption, especially, when electricity price is high, customers can save appr. 5-10 % energy and	Fortum's R&D costs which cover e.g. activities related to the electric car infrastructure and smart grids were EUR 52 million in 2016. In 2016, Fortum's total investments without acquisitions were EUR 591 million, of which EUR 271 million targeted CO2-free production.

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	number of people. With energy-efficiency, the role of electricity is emphasised in the energy sector, a fact that offers opportunities for Fortum both in the markets we already operate in and in new markets. Fortum's target is to achieve over 1,400 GWh of annual energy savings by the year 2020 as compared to 2012.						improvement projects are calculated to yield an annual energy savings of about 245 GWh.	the corresponding amount in their electricity bill. Fortum invests mainly CO2-free electricity generation capacity in the EU area. Fortum also continued hydropower refurbishment programme and modernisation, capacity upgrade and lifetime extension projects in nuclear power.	

CC6.1d

Please explain why you do not consider your company to be exposed to inherent opportunities driven by changes in regulation that have the potential to generate a substantive change in your business operations, revenue or expenditure

CC6.1e

Please explain why you do not consider your company to be exposed to inherent opportunities driven by changes in physical climate parameters that have the potential to generate a substantive change in your business operations, revenue or expenditure

CC6.1f

Please explain why you do not consider your company to be exposed to inherent opportunities driven by changes in other climate-related developments that have the potential to generate a substantive change in your business operations, revenue or expenditure

Further Information

Module: GHG Emissions Accounting, Energy and Fuel Use, and Trading

Page: CC7. Emissions Methodology

CC7.1

Please provide your base year and base year emissions (Scopes 1 and 2)

Scope	Base year	Base year emissions (metric tonnes CO2e)
Scope 1	Fri 01 Jan 2010 - Fri 31 Dec 2010	19040000
Scope 2 (location-based)	Tue 01 Jan 2013 - Tue 31 Dec 2013	127700
Scope 2 (market-based)	Fri 01 Jan 2016 - Sat 31 Dec 2016	94700

CC7.2

Please give the name of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

Please select the published methodologies that you use

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

CC7.2a

If you have selected "Other" in CC7.2 please provide details of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

CC7.3

Please give the source for the global warming potentials you have used

Gas	Reference
CO2	IPCC Fifth Assessment Report (AR5 - 100 year)
CH4	IPCC Fifth Assessment Report (AR5 - 100 year)
Other: N20	IPCC Fifth Assessment Report (AR5 - 100 year)
HFCs	IPCC Fifth Assessment Report (AR5 - 100 year)
PFCs	IPCC Fifth Assessment Report (AR5 - 100 year)
SF6	IPCC Fifth Assessment Report (AR5 - 100 year)

CC7.4

Please give the emissions factors you have applied and their origin; alternatively, please attach an Excel spreadsheet with this data at the bottom of this page

Fuel/Material/Energy	Emission Factor	Unit	Reference
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Further Information

Statistics Finland, Fuel classification 2016

Attachments

[https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/ClimateChange2017/CC7.EmissionsMethodology/Fuel_classification_2016.xlsx](https://www.cdp.net/sites/2017/82/6582/Climate%20Change%202017/Shared%20Documents/Attachments/ClimateChange2017/CC7.EmissionsMethodology/Fuel_classification_2016.xlsx)

CC8.1

Please select the boundary you are using for your Scope 1 and 2 greenhouse gas inventory

Financial control

CC8.2

Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e

18755700

CC8.3

Please describe your approach to reporting Scope 2 emissions

Scope 2, location-based	Scope 2, market-based	Comment
We are reporting a Scope 2, location-based figure	We are reporting a Scope 2, market-based figure	For Fortum Scope 2 emissions are related to purchased electricity. In 2016 we were able to provide market-based data for 57% of our electricity procurement. The rest of purchased electricity was mainly in Russia, where market-based data is not yet available.

CC8.3a

Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
112700	94700	For Fortum Scope 2 emissions are related to purchased electricity. In 2016 we were able to provide market-based data for 57% of our electricity procurement. The rest of purchased electricity was mainly in Russia, where market-based data is not yet available.

CC8.4

Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

No

CC8.4a

Please provide details of the sources of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure

Source	Relevance of Scope 1 emissions from this source	Relevance of location-based Scope 2 emissions from this source	Relevance of market-based Scope 2 emissions from this source (if applicable)	Explain why the source is excluded

CC8.5

Please estimate the level of uncertainty of the total gross global Scope 1 and 2 emissions figures that you have supplied and specify the sources of uncertainty in your data gathering, handling and calculations

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 1	More than 2% but less than or equal to 5%	Metering/ Measurement Constraints	About 12% of our total scope 1 emissions are subject to the EU Emissions Trading and are accurately monitored and verified by a third party. These emissions have an uncertainty 0-2%. Major part of the remaining 88% of scope 1 emissions, which are generated in our Russian operations, are calculated with appropriate international emission factors and local volume measurements for gas and coal having an uncertainty 2-5%. The aggregated estimated total uncertainty is less than 5%.
Scope 2 (location-based)	More than 5% but less than or equal to 10%	Other: National emission factors	All of Fortum's scope 2 emissions are from purchased electricity. The emissions are calculated with national average emissions factors with an estimated uncertainty of less than 10%.
Scope 2 (market-based)	More than 2% but less than or equal to 5%	Other: National emission factors	We have been able to collect supplier specific emissions data for about 57% of our electricity procurement, and about 48% of this is labelled carbon-free electricity. We consider this data very accurate, because it is verified by a third party. About 32% of our electricity procurement takes place in Russia, where no supplier specific data is available. Accurate market-based data combined with less accurate national emission data is assessed to give an overall uncertainty of less than 5%.

CC8.6

Please indicate the verification/assurance status that applies to your reported Scope 1 emissions

Third party verification or assurance process in place

CC8.6a

Please provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/section reference	Relevant standard	Proportion of reported Scope 1 emissions verified (%)
Annual process	Complete	High assurance	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC8.6a/170529_Suomenoja_VerificationStatement_2016.pdf	1-5	European Union Emissions Trading System (EU ETS)	12
Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC8.6a/CDP-verification-template_Fortum.pdf	1-3	ISAE3000	100

CC8.6b

Please provide further details of the regulatory regime to which you are complying that specifies the use of Continuous Emission Monitoring Systems (CEMS)

Regulation	% of emissions covered by the system	Compliance period	Evidence of submission

CC8.7

Please indicate the verification/assurance status that applies to at least one of your reported Scope 2 emissions figures

Third party verification or assurance process in place

CC8.7a

Please provide further details of the verification/assurance undertaken for your location-based and/or market-based Scope 2 emissions, and attach the relevant statements

Location-based or market-based figure?	Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 2 emissions verified (%)
Market-based	Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC8.7a/CDP-verification-template_Fortum.pdf	1-3	ISAE3000	100
Location-based	Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC8.7a/CDP-verification-template_Fortum.pdf	1-3	ASAE3000	100

CC8.8

Please identify if any data points have been verified as part of the third party verification work undertaken, other than the verification of emissions figures reported in CC8.6, CC8.7 and CC14.2

Additional data points verified	Comment
Year on year change in emissions (Scope 1 and 2)	The verification referred to in 8.6a and 8.7a includes a comparison of annual emissions of 2016 and the previous year.
Year on year change in emissions (Scope 3)	The verification referred to in 8.6a and 8.7a includes a comparison of annual emissions of 2016 and the previous year.

CC8.9

Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?

Yes

CC8.9a

Please provide the emissions from biologically sequestered carbon relevant to your organization in metric tonnes CO2

1344000

Further Information

Page: [CC9. Scope 1 Emissions Breakdown - \(1 Jan 2016 - 31 Dec 2016\)](#)

CC9.1

Do you have Scope 1 emissions sources in more than one country?

Yes

CC9.1a

Please break down your total gross global Scope 1 emissions by country/region

Country/Region	Scope 1 metric tonnes CO2e
Russia	15627600

Country/Region	Scope 1 metric tonnes CO2e
Finland	1990500
Poland	797000
Lithuania	120500
Estonia	96900
Denmark	52900
Sweden	49300
Latvia	21000

CC9.2

Please indicate which other Scope 1 emissions breakdowns you are able to provide (tick all that apply)

- By business division
- By facility
- By GHG type
- By activity

CC9.2a

Please break down your total gross global Scope 1 emissions by business division

Business division	Scope 1 emissions (metric tonnes CO2e)
Russia	15627600
City Solutions	2281600

Business division	Scope 1 emissions (metric tonnes CO2e)
Generation	846500

CC9.2b

Please break down your total gross global Scope 1 emissions by facility

Facility	Scope 1 emissions (metric tonnes CO2e)	Latitude	Longitude
Nyagan GRES	3194300	62.12963	65.37489
Tyumen CHP2	2171200	57.16129	65.525
Tyumen CHP1	2072800	57.15221	65.52721
Chelyabinsk CHP3	2011600	55.235278	61.491111
Chelyabinsk CHP2	1812300	55.133889	61.469722
Chelyabinsk GRES	1535000	55.175547	61.390636
Argayash CHP	1446200	55.73331	60.71661
Meri-Pori	841600	61.63332	21.41666
Suomenoja	840200	60.21661	24.66661
Chelyabinsk CHP1	592700	55.133888	61.469722
Other sites	2237800		

CC9.2c

Please break down your total gross global Scope 1 emissions by GHG type

GHG type	Scope 1 emissions (metric tonnes CO2e)
CO2	18584400
N2O	163500
CH4	7800

CC9.2d

Please break down your total gross global Scope 1 emissions by activity

Activity	Scope 1 emissions (metric tonnes CO2e)
Power generation	12720400
Heat production	6035300

Further Information

Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2016 - 31 Dec 2016)

CC10.1

Do you have Scope 2 emissions sources in more than one country?

Yes

CC10.1a

Please break down your total gross global Scope 2 emissions and energy consumption by country/region

Country/Region	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
Russia	61200	61200	150600	0
Denmark	13700	15400	33000	0
Poland	11500	9800	12000	0
Finland	21600	4300	202700	165000
Estonia	3400	3200	2900	0
Lithuania	400	400	1100	0
Latvia	300	200	2600	0
Sweden	600	100	55200	55000

CC10.2

Please indicate which other Scope 2 emissions breakdowns you are able to provide (tick all that apply)

- By business division
- By facility
- By activity

CC10.2a

Please break down your total gross global Scope 2 emissions by business division

Business division	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)
Russia	61200	61200
City Solutions	45100	29700
Generation	6400	3800

CC10.2b

Please break down your total gross global Scope 2 emissions by facility

Facility	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)
Chelyabinsk heat only boilers	20000	20000
Chelyabinsk heat network	17700	17700
Tyumen CHP1	13800	13800
Nyborg	13500	15200
Tyumen heat network	8200	8200
Tartu heat only boilers	2500	2500
Meri-Pori	2500	2500
Czestochowa heat network	3100	2600
Zabrze heat only boilers	2700	2300
Tyumen CHP2	1500	1500
Other sites	27200	8300

CC10.2c

Please break down your total gross global Scope 2 emissions by activity

Activity	Scope 2, location-based (metric tonnes CO2e)	Scope 2, market-based (metric tonnes CO2e)
Power generation	35200	21200
Heat production	47300	44000
Heat distribution	29800	28800
Waste treatment	400	700

Further Information

Page: CC11. Energy

CC11.1

What percentage of your total operational spend in the reporting year was on energy?

More than 35% but less than or equal to 40%

CC11.2

Please state how much heat, steam, and cooling in MWh your organization has purchased and consumed during the reporting year

Energy type	MWh
Heat	0
Steam	0
Cooling	0

CC11.3

Please state how much fuel in MWh your organization has consumed (for energy purposes) during the reporting year

110580000

CC11.3a

Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

Fuels	MWh
Natural gas	68783000
Other: Nuclear fuel	25315000
Bituminous coal	11291000
Wood or wood waste	2518000
Municipal waste	1405000
Peat	496000
Other: Agrobiomass	303000
Other: Hazardous waste	284000
Landfill gas	13000
Other: Fuel oil	171000

CC11.4

Please provide details of the electricity, heat, steam or cooling amounts that were accounted at a low carbon emission factor in the market-based Scope 2 figure reported in CC8.3a

Basis for applying a low carbon emission factor	MWh consumed associated with low carbon electricity, heat, steam or cooling	Emissions factor (in units of metric tonnes CO2e per MWh)	Comment
Energy attribute certificates, Guarantees of Origin	220000	0	Purchased as carbon-free electricity certified with guarantees of origin

CC11.5

Please report how much electricity you produce in MWh, and how much electricity you consume in MWh

Total electricity consumed (MWh)	Consumed electricity that is purchased (MWh)	Total electricity produced (MWh)	Total renewable electricity produced (MWh)	Consumed renewable electricity that is produced by company (MWh)	Comment
2710000	460000	71311000	21048000	202000	

Further Information

Page: CC12. Emissions Performance

CC12.1

How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to the previous year?

Decreased

CC12.1a

Please identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined) and for each of them specify how your emissions compare to the previous year

Reason	Emissions value (percentage)	Direction of change	Please explain and include calculation
Emissions reduction activities	1.1	Decrease	Emissions reduction activities identified at three power plants reduced our emissions about 208,000 t CO ₂ e. Emission value calculated as = (actual emission (2016) - production (2016) * specific emission (2015)) / total emissions (2015). Emission value: (-22,000-152,000-34,000)/19,414,000 = -208,000/19,414,000 = -1.1%. See the site specific numerical calculations in the attachment.
Divestment	12.2	Decrease	Divestment of Tobolsk power plant in Russia and Swiebodzice power plant in Poland reduced our emissions about 2.4 Mt CO ₂ e. Emission value: (231,700-2,592,000)/19,414,000 = -2,360,300/19,414,000 = -12.2%
Acquisitions	1.2	Increase	Acquisition of Ekokem businesses in the Nordic countries and Duon in Poland increased our emissions about 231,000 t CO ₂ e. Emission value: 231,000/19,414,000 = 1.2%
Mergers			
Change in output	7.2	Increase	Emissions change caused by change in output. Emission value calculated as = (production (2016) * specific emission (2015) - actual emission (2015)) / total emissions (2015). Emission value: 1,388,400/19,414,000 = 7.2%. See the site specific calculations in the in the attachment.
Change in methodology			
Change in boundary			
Change in physical operating conditions			
Unidentified			
Other	2.2	Increase	Other causes for changes in emissions are changes in fuel mix and changes in the electricity and heat production ratio at CHP plants. Emission value calculated as = (actual emission (2016) - production (2016) * specific emission (2015)) / total emissions (2015). Emission value: 423,700/19,414,000. See the site specific numerical calculations in the attachment.

Is your emissions performance calculations in CC12.1 and CC12.1a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

CC12.2

Please describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per unit currency total revenue

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator: Unit total revenue	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.0052	metric tonnes CO2e	3632000000	Location-based	7	Decrease	Emissions decreased by 3% due to divestment of Tobolsk power plant and in some extent emissions reduction activities. At the same time, revenue increased by 5%, resulting in clear decrease in emissions per revenue.

CC12.3

Please provide any additional intensity (normalized) metrics that are appropriate to your business operations

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: Unit total	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.191	metric tonnes CO2e	megawatt hour (MWh)	99008000	Location-based	3.3	Increase	Emissions decreased by 3% due to to divestment of Tobolsk power plant and in some extent emissions reduction activities. Production decreased by 6% due to divestments and market conditions.

Further Information

The attached file includes site specific calculations for the changes shown above in 12.1a

Attachments

[https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/ClimateChange2017/CC12.EmissionsPerformance/CDP_12_change.xlsx](https://www.cdp.net/sites/2017/82/6582/Climate%20Change%202017/Shared%20Documents/Attachments/ClimateChange2017/CC12.EmissionsPerformance/CDP_12_change.xlsx)

Page: CC13. Emissions Trading

CC13.1

Do you participate in any emissions trading schemes?

Yes

CC13.1a

Please complete the following table for each of the emission trading schemes in which you participate

Scheme name	Period for which data is supplied	Allowances allocated	Allowances purchased	Verified emissions in metric tonnes CO2e	Details of ownership
European Union ETS	Fri 01 Jan 2016 - Sat 31 Dec 2016	1025500	1658900	2684400	Facilities we own and operate

CC13.1b

What is your strategy for complying with the schemes in which you participate or anticipate participating?

Fortum's strategy complying with the EU ETS comprises of three main elements: emission reduction measures including efficiency upgrades in our own installations (in-house abatement) and investment in low-carbon production, operation in the emissions trading scheme (purchase and selling of allowances) and the use of project based emission reduction credits (Kyoto mechanisms). The individual compliance and trading strategies are defined by the relevant business divisions.

CC13.2

Has your organization originated any project-based carbon credits or purchased any within the reporting period?

Yes

CC13.2a

Please provide details on the project-based carbon credits originated or purchased by your organization in the reporting period

Credit origination or credit purchase	Project type	Project identification	Verified to which standard	Number of credits (metric tonnes CO2e)	Number of credits (metric tonnes CO2e): Risk adjusted volume	Credits canceled	Purpose, e.g. compliance
Credit origination	Other: Several CDM project types in the Fund	Fortum is a participant in the World Bank's Prototype Carbon Fund (PCF). Credits originate from the project portfolio of PCF that has 18 CDM projects ongoing.	CDM (Clean Development Mechanism)	10000	10000	Yes	Compliance
Credit origination	Wind	Inner Mongolia North Long Yuan 100 MW Huitengxile Wind Farm project in China	CDM (Clean Development Mechanism)	4796	4796	Yes	Voluntary Offsetting

Further Information

Page: CC14. Scope 3 Emissions

CC14.1

Please account for your organization's Scope 3 emissions, disclosing and explaining any exclusions

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Purchased goods and services	Relevant, calculated	233700	<p>(i) The volumes and categories of purchased goods and services are based on Fortum's purchasing databases. We have assessed our Scope 3 emissions based on GHG Protocol's Corporate Value Chain Accounting and Reporting Standard. Emission data from DEFRA has been used in the calculation of emissions. The GWP values (100 years) are from updated UNFCCC reporting guidelines on annual inventories. (ii) We have assessed data quality based on criteria in Scope 3 standard on page 77 taking into account representativeness to the activity in terms of technology, time, geography, completeness and reliability. Based on this we have scored the quality of primary and secondary data as very good/good/fair/poor. The biggest source of uncertainty in the reported emissions is the emission factors (score: fair) for spending on different groups of goods and services. The data on spending of purchases is relatively accurate (score: good). (iii) As a part of our assessment, we have estimated our GHG emissions from purchased goods and services based on spend data from internal purchasing data management systems. We applied a financial spend analysis to prioritise our goods and services purchases in the reporting year before collecting data for this category. Our purchased goods and services (other than capital goods and energy and fuel related activities) consist mostly of maintenance</p>	100.00%	

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
			and construction and other business activities. Supply chain emissions factors for kgCO2e per £ spend for purchasing categories provided by DEFRA (2013 guidance) were used and currencies were converted to EUR.		
Capital goods	Relevant, calculated	142693	(i) The volumes and categories of capital goods are based on Fortum's purchasing databases. We have assessed our Scope 3 emissions based on GHG Protocol's Corporate Value Chain Accounting and Reporting Standard. Emission data from DEFRA has been used in the calculation of emissions. The GWP values (100 years) are from updated UNFCCC reporting guidelines on annual inventories. (ii) We have assessed data quality based on criteria in Scope 3 standard on page 77 taking into account representativeness to the activity in terms of technology, time, geography, completeness and reliability. Based on this we have scored the quality of primary and secondary data as very good/good/fair/poor. The biggest source of uncertainty in the reported emissions is the emission factors (score: fair) for spending on different groups of goods and services. The data on spending of purchases is relatively accurate (score: good). (iii) As a part of our assessment, we have estimated our GHG emissions from capital goods based on spend data from internal purchasing data management systems. We applied a financial spend analysis to prioritise our	100.00%	

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
			capital goods investments in the reporting year before collecting data for this category. Our capital goods consist mostly of heavy components in energy production process, like boilers, turbines, generators. Supply chain emissions factors for kgCO2e per £ spend for purchasing categories provided by DEFRA (2013 guidance) were used and currencies were converted to EUR.		
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Relevant, calculated	4347859	i) Fuel data (primary data) is from Fortum's database. Emissions factors (secondary data) are based on literature and publicly available information (IPCC, UNFCCC, VTT Finland). The GWP values (100 years) are from updated UNFCCC reporting guidelines on annual inventories. (ii) We have assessed data quality based on criteria in Scope 3 standard on page 77 taking into account representativeness to the activity in terms of technology, time, geography, completeness and reliability. Based on this we have scored the quality of primary and secondary data as very good/good/fair/poor. The biggest uncertainty is related to emission factors (score: fair) applied. They are general estimates from different sources and not specifically estimated for the fuel lots for Fortum. Fuel data (score: very good) from our own statistics is reliable and accurate. (iii) Emissions from fuel value chains include emissions from fuel production (e.g. mining, refining and processing), fuel	50.00%	

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
			transportation and storing. Emission factors from international and national sources have been applied for each part of the value chain.		
Upstream transportation and distribution	Not relevant, calculated	142	i) Primary data for upstream transportation is from Fortum's database. Emissions factors (secondary data) are based on publicly available information (VTT Finland). (ii) We have assessed data quality based on criteria in Scope 3 standard on page 77 taking into account representativeness to the activity in terms of technology, time, geography, completeness and reliability. Based on this we have scored the quality of primary and secondary data as very good/good/fair/poor. The biggest uncertainty is related to emission factors (score: fair) applied. Horsepower data (score: very good) from our own statistics is reliable and accurate. (iii) Emissions from upstream transportation and distribution includes only Fortum's horsepower. Upstream transportation of fuels is included in category 3 (Fuel and energy related activities). Upstream emissions of purchased electricity are already accounted for in scope 2 emissions.	100.00%	
Waste generated in operations	Not relevant, calculated	3943	(i) Waste data has been collected from Fortum's own environmental data management systems and covers all operations of the company. Emission coefficient for waste from a Finnish "Ilmastolaskuri" (Climate Calculator) has been used. The GWP values (100 years) are from updated UNFCCC reporting guidelines on annual inventories. (ii) We	100.00%	

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
			<p>have assessed data quality based on criteria in Scope 3 standard on page 77 taking into account representativeness to the activity in terms of technology, time, geography, completeness and reliability. Based on this we have scored the quality of primary and secondary data as very good/good/fair/poor. Waste data (score: very good) is from our own company sources. The quality of data is passable, as there are uncertainties in the emission factors (score: fair). The calculation of greenhouse gases for all waste fractions is based on current information from the municipal waste management of Helsinki and therefore not specifically developed for the waste fractions from Fortum's operations. (iii) The Climate Calculator estimates the direct greenhouse gas emissions from the waste processing and transport related to the site's biowaste, paper, cardboard, carton, energy fraction and unsorted waste. The Calculator was developed by HSY Helsinki Region Environmental Services Authority, Finland and the greenhouse gas emission coefficients for each type of waste were provided by the Finnish Environment Institute.</p>		
Business travel	Not relevant, calculated	4839	(i) The data consists of air travel, which is the most important source of business travel emissions for Fortum as it operates in 10 countries. Train and ship travelling is used only to minor extent. The data does not include use of car as a mean of	100.00%	

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
			<p>transportation. The GWP values (100 years) are from updated UNFCCC reporting guidelines on annual inventories. (ii) We have assessed data quality based on criteria in Scope 3 standard on page 77 taking into account representativeness to the activity in terms of technology, time, geography, completeness and reliability. Based on this we have scored the quality of primary and secondary data as very good/good/fair/poor. Travel volume data (score: good) is based on the statistics from Fortum's Travel Agency and is reliable, but not fully representative as it does not cover all our operating countries. Emission factors from a Finnish LIPASTO database and IPCC are reliable (score: good). (iii) Air travel reports were provided by the travel agency. CO2 emission factors from calculation system for traffic exhaust emissions and energy consumption in Finland (LIPASTO). CH4 and N2O emissions calculated using IPCC 2006 emission factors, tie 1 default values.</p>		
Employee commuting	Not relevant, calculated	6554	<p>(i) The emissions have been estimated based on publicly available data and in-house calculations (assuming 50% of staff using own car and distance from home to work in average 20 km). Company benefit cars are included in scope 1 emissions and reported separately. The GWP values (100 years) are from updated UNFCCC reporting guidelines on annual inventories. (ii) We have assessed data</p>		

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
			<p>quality based on criteria in Scope 3 standard on page 77 taking into account representativeness to the activity in terms of technology, time, geography, completeness and reliability. Based on this we have scored the quality of primary and secondary data as very good/good/fair/poor. Primary data (score: poor) for employee commuting is not available. The employee commuting distance is an average estimate and not based on any statistical data regarding Fortum's personnel. The means of transport/vehicles has been assumed, not based on any statistics. Employee specific data is not available. Emission data for vehicles is reliable (score: good). (iii) The emissions have been estimated based on publicly available data and in-house calculations (assuming 50% of staff using own car and distance from home to work in average 20 km). Company benefit cars are included in scope 1 emissions and reported separately.</p>		
Upstream leased assets	Not relevant, explanation provided				<p>We have assessed our Scope 3 emissions based on GHG Protocol's Corporate Value Chain Accounting and Reporting Standard. Based on our Scope 3 assessment Fortum does not have relevant upstream leased assets that would be reported on Group level. When applicable, emissions from the</p>

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
					operation are accounted for in Scope 2 emissions (Purchased electricity).
Downstream transportation and distribution	Not relevant, explanation provided				We have assessed our Scope 3 emissions based on GHG Protocol's Corporate Value Chain Accounting and Reporting Standard. Based on a rough calculation the emissions from downstream transportation are, classified as not relevant.
Processing of sold products	Not relevant, calculated	2033	(i) The volume data of sold products (gypsum) has been collected from Fortum's own environmental data management systems. The GWP values (100 years) are from updated UNFCCC reporting guidelines on annual inventories. (ii) We have assessed data quality based on criteria in Scope 3 standard on page 77 taking into account representativeness to the activity in terms of technology, time, geography, completeness and reliability. Based on this we have scored the quality of primary and secondary data as very good/good/fair/poor. The emission factor (score: good) is an average of 10 data sources. The amount of sold products (gypsum) is relatively accurate (score: very good). (iii) Average emissions for producing a gypsum plate have been estimated based on the average of 10 literature sources. The utilized gypsum totalled approx 8521 tons in 2016.	0.00%	

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Use of sold products	Not relevant, explanation provided				We have assessed our Scope 3 emissions based on GHG Protocol's Corporate Value Chain Accounting and Reporting Standard. Based on our Scope 3 assessment, Fortum's does not manufacture products that would emit greenhouse gases during the use phase. The category does not apply to Fortum's operations.
End of life treatment of sold products	Not relevant, explanation provided				We have assessed our Scope 3 emissions based on GHG Protocol's Corporate Value Chain Accounting and Reporting Standard. Based on our Scope 3 assessment, Fortum's does not manufacture products that would require end-of-life treatment. Therefore, the category does not apply to Fortum's operations.
Downstream leased assets	Not relevant, explanation provided				We have assessed our Scope 3 emissions based on GHG Protocol's Corporate Value Chain Accounting and Reporting Standard. Based on our Scope 3 materiality assessment, Fortum does not have have relevant downstream leased assets that would be reported on Group level.
Franchises	Not relevant, explanation provided				We have assessed our Scope 3 emissions based on GHG Protocol's Corporate Value Chain Accounting and Reporting Standard. Based on our Scope 3 materiality assessment, Fortum has no franchising

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
					business and therefore the category does not apply to Fortum's operations.
Investments	Not relevant, explanation provided				Fortum is a shareholder in a Finnish hydropower company Kemijoki Oy and in a Finnish nuclear power company TVO. Production of hydro power (Kemijoki) and nuclear power (TVO) is CO2-free (scope 1 emissions), and companies do not disclose their scope 2+3 CO2 emission.
Other (upstream)					
Other (downstream)					

CC14.2

Please indicate the verification/assurance status that applies to your reported Scope 3 emissions

Third party verification or assurance process in place

CC14.2a

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 3 emissions verified (%)
Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2017/82/6582/Climate Change 2017/Shared Documents/Attachments/CC14.2a/CDP-verification-template_Fortum.pdf	1-3	ISAE3000	100

CC14.3

Are you able to compare your Scope 3 emissions for the reporting year with those for the previous year for any sources?

Yes

CC14.3a

Please identify the reasons for any change in your Scope 3 emissions and for each of them specify how your emissions compare to the previous year

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment
Purchased goods & services	Change in boundary	183	Increase	Part of Fortum's purchases (about 30% in year 2016) is reported in our purchasing database without information of any detailed category. These purchases can not be related to any specific DEFRA category for emissions calculation. In the previous years, such as year 2015, these purchases have been totally omitted from calculations. For year 2016, emissions from the undefined purchases were calculated using an average emissions

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment
				factor of the specified purchases. Therefore taking into consideration the increase of an overall purchasing volume by 105%, this leads to an increase of 183% in calculated emissions.
Capital goods	Change in boundary	187	Increase	Part of Fortum's purchases (about 40% in year 2016) is reported in our purchasing database without information of any detailed category. These purchases can not be related to any specific DEFRA category for emissions calculation. In the previous years, such as year 2015, these purchases have been totally omitted from calculations. For year 2016, emissions from the undefined capital goods were calculated using an average emissions factor of the specified categories of capital goods. Therefore taking into consideration the increase of an overall investment volume by 86%, this leads to an increase of 187% in calculated emissions.
Fuel- and energy-related activities (not included in Scopes 1 or 2)	Divestment	5	Decrease	Reduced gas consumption due to divestment of the Tobolsk power plant in Russia.

CC14.4

Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies? (Tick all that apply)

Yes, our suppliers
Yes, our customers

CC14.4a

Please give details of methods of engagement, your strategy for prioritizing engagements and measures of success

Fortum has carried out a comprehensive stakeholder analysis in 2010 and continuously assesses material issues for different stakeholders based on themes raised from the yearly One Fortum stakeholder survey and in the company's dialogue with stakeholders.

Suppliers:

- i) Method of engagement: Directive 2009/28/EC (Renewable Energy Directive) comprises a set of sustainability criteria for biofuels and bioliquids. In order to fulfill the criteria, Fortum gathers information from its suppliers as a form of Sustainability Declarations (written reports). Information regarding the amount of raw materials, distance between the location of raw material production and Fortum site, as well as transport method and volume of transport is gathered for each batch.
- ii) Strategy for prioritization: As fuels are an overwhelming majority of our raw materials, we have chosen this part of the value chain as well as the individual fuel suppliers to focus our engagement on. Based on the information above, Fortum calculates, whether the biofuels and bioliquids meet the requirements set for GHG savings.
- iii) Measure of success: we calculate the greenhouse gas savings as required in the directive. For example, in regards to Fortum's pyrolysis oil production at the Joensuu CHP plant in Finland, the use of 10 GWh of pyrolysis oil instead of heavy fuel oil can reduce CO2 emissions by about 5.000 tonnes.

Customers

- i) An increasing number of customers require a guarantee of origin for the electricity they buy, i.e. information about the way the electricity is produced. In 2016, all electricity sold to private customers in Finland was CO2-free and produced by hydropower and wind power. The origin of the hydropower and wind power was guaranteed with European Guarantees of Origin or with the EKOenergy label of the Finnish Association for Nature Conservation. In 2016, all electricity in Sweden was sold with an environmental value. Customers can actively choose between a mix of wind and hydro, which is also labelled with Good Environmental Choice, or they can choose to have their energy entirely from either wind or hydropower. The Good Environmental Choice eco-label was founded and is overseen by the Swedish Society for Nature Conservation. The electricity sold as entirely wind or hydropower is based on European guarantees of origin. Assigned deliveries (Fortum Enkel) have Good Environmental Choice eco-labelled wind and hydro power in their delivery. Customers are not making an active choice receive nuclear power, which is CO2-free in the production phase. In Finland and Sweden, Fortum's carbon-neutral heating product offers customers the opportunity to influence their CO2 emissions. Companies are able to offset their CO2 emissions resulting from their use of heat by purchasing international carbon offsets. Customer satisfaction is monitored regularly during the year. Monitoring is done by general customer satisfaction surveys. Surveys are standardized and executed in all countries where Fortum has customers enabling benchmarking between countries and business areas. Fortum also regularly tests development ideas by discussing them at customer advisory councils in Finland and at one-off customer meetings in other countries.
- ii) Strategy for prioritization: as electricity is our main product and all our customers receive carbon free electricity, this part of the value chain has naturally been included.
- iii) Measure of success: we calculate the volume of emissions avoided by our emissions free products. The extent of impact mitigation can be assessed by assuming that electricity sold by Fortum in Nordic countries and also in Poland (total 11.7 TWh in 2016) would have had the specific CO2 emission of the Nordic residual electricity mix. Fortum's sales of CO2-free electricity resulted in no greenhouse gas emissions. The consequent CO2 emissions would have been about three million tonnes.

CC14.4b

To give a sense of scale of this engagement, please give the number of suppliers with whom you are engaging and the proportion of your total spend that they represent

Type of engagement	Number of suppliers	% of total spend (direct and indirect)	Impact of engagement
Compliance	13	6.4%	Total 13 Fuel suppliers and Solar power suppliers were audited for sustainability related issues in 7 countries in 2016. Only 6 of them were also purchased and representing in total spend. Other 7 suppliers, which were mainly Solar module and EPC Contractors, were potential suppliers for procurements in future.

CC14.4c

Please explain why you do not engage with any elements of your value chain on GHG emissions and climate change strategies, and any plans you have to develop an engagement strategy in the future

Further Information

Module: Sign Off

Page: CC15. Sign Off

CC15.1

Please provide the following information for the person that has signed off (approved) your CDP climate change response

Name	Job title	Corresponding job category
Pekka Lundmark	President and CEO	Chief Executive Officer (CEO)

Further Information

Module: Electric utilities

Page: EU0. Reference Dates

EU0.1

Please enter the dates for the periods for which you will be providing data. The years given as column headings in subsequent tables correspond to the "year ending" dates selected below. It is requested that you report emissions for: (i) the current reporting year; (ii) one other year of historical data (i.e. before the current reporting year); and, (iii) one year of forecasted data (beyond 2021 if possible).

Year ending	Date range
2009	Thu 01 Jan 2009 - Thu 31 Dec 2009
2016	Fri 01 Jan 2016 - Sat 31 Dec 2016
2019	Tue 01 Jan 2019 - Tue 31 Dec 2019

Further Information

Page: EU1. Global Totals by Year

EU1.1

In each column, please give a total figure for all the countries for which you will be providing data for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emission intensity (metric tonnes CO2e/MWh)
2009	7627	39141	7899000	0.20
2016	8743	48178	11263000	0.23
2019	8755			

Further Information

Page: EU2. Individual Country Profiles - Finland

EU2.1

Please select the energy sources/fuels that you use to generate electricity in this country

- Coal - hard
- Oil & gas (excluding CCGT)
- CCGT
- Nuclear
- Waste
- Hydro
- Other renewables

EU2.1a

Coal - hard

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	1712	1690	1256000	0.74
2016	462	905	672000	0.74
2019	462			

EU2.1b

Lignite

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)

EU2.1c

Oil & gas (excluding CCGT)

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	45	231	82000	0.36
2016	45	88	33400	0.38
2019	45			

EU2.1d

CCGT

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	240	429	135400	0.32
2016	240	103	35000	0.34
2019	240			

EU2.1e

Nuclear

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)
2009	1433	11973
2016	1472	11739
2019	1872	

EU2.1f

Waste

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO ₂ e)	Emissions intensity (metric tonnes CO ₂ e/MWh)
2009	0	0	0	
2016	18	19	19700	1.0
2019	18			

EU2.1g

Hydro

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)
2009	1493	6498
2016	1535	7952
2019	1565	

EU2.1h

Other renewables

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)

EU2.1i

Other

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO ₂ e)	Emissions intensity (metric tonnes CO ₂ e/MWh)

EU2.1j**Solid biomass**

Please complete for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	299	776	211000	0.27
2016	69	266	48000	0.18
2019	69			

EU2.1k**Total thermal including solid biomass**

Please complete for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	2296	3123	1729000	0.55
2016	833	1382	808000	0.58
2019	833			

EU2.1l

Total figures for this country

Please enter total figures for this country for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO ₂ e)	Emissions intensity (metric tonnes CO ₂ e/MWh)
2009	5222	21594	1729000	0.08
2016	3840	21073	797500	0.04
2019	4270			

Further Information

Page: EU2. Individual Country Profiles - Russia

EU2.1

Please select the energy sources/fuels that you use to generate electricity in this country

Coal - hard
Oil & gas (excluding CCGT)
CCGT

EU2.1a

Coal - hard

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	256	2477	1525000	0.62
2016	256	2597	1842000	0.71
2019	256			

EU2.1b

Lignite

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)

EU2.1c

Oil & gas (excluding CCGT)

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	2529	13517	6435000	0.48
2016	2427	6634	3042000	0.46
2019	1975			

EU2.1d

CCGT

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2016	2220	16264	6048000	0.37
2019	2254			

EU2.1e

Nuclear

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)

EU2.1f**Waste**

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO ₂ e)	Emissions intensity (metric tonnes CO ₂ e/MWh)

EU2.1g**Hydro**

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)

EU2.1h**Other renewables**

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)
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EU2.1i

Other

Please complete the following table for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
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EU2.1j

Solid biomass

Please complete for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
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EU2.1k

Total thermal including solid biomass

Please complete for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	2785	15994	7961000	0.50
2016	4903	25495	10900000	0.43
2019	4485			

EU2.1I**Total figures for this country**

Please enter total figures for this country for the "year ending" periods that you selected in answer to EU0.1

Year ending	Nameplate capacity (MW)	Production (GWh)	Absolute emissions (metric tonnes CO2e)	Emissions intensity (metric tonnes CO2e/MWh)
2009	2785	15994	7910000	0.50
2016	4903	25495	10930000	0.43
2019	4485			

Further Information

EU3.1

In certain countries, e.g. Italy, the UK, the USA, electricity suppliers are required by regulation to incorporate a certain amount of renewable electricity in their energy mix. Is your organization subject to such regulatory requirements?

Yes

EU3.1a

Please provide the scheme name, the regulatory obligation in terms of the percentage of renewable electricity sourced (both current and future obligations) and give your position in relation to meeting the required percentages

Scheme name	Current % obligation	Future % obligation	Date of future obligation	Position in relation to meeting obligations
Other: Swedish and Norwegian Electricity Certificate Scheme	23.1%	28.8%	2020	In 2016, Fortum's obligation was around 1 343 241 certificates, of which 1 174 645 in Sweden and 168 596 in Norway.

Further Information

Page: EU4. Renewable Electricity Development

EU4.1

Please give the contribution of renewable electricity to your organization's EBITDA (Earnings Before Interest, Tax, Depreciation and Amortization) in the current reporting year in either monetary terms or as a percentage

Please give:	Monetary figure	%	Comment
Renewable electricity's contribution to EBITDA			

EU4.2

Please give the projected contribution of renewable electricity to your organization's EBITDA at a given point in the future in either monetary terms or as a percentage

Please give:	Monetary figure	%	Year ending	Comment
Renewable electricity's contribution to EBITDA				

EU4.3

Please give the capital expenditure (capex) planned for the development of renewable electricity capacity in monetary terms and as a percentage of total capex planned for power generation in the current capex plan

Please give:	Monetary figure	%	End year of capex plan	Comment
Capex planned for renewable electricity development				

Further Information

CDP