Module: Introduction

Page: W0. Introduction

W0.1

Introduction

Please give a general description and introduction to your organization

- The Novartis Mission:

Our mission is to discover new ways to improve and extend people's lives. We use science-based innovation to address some of society's most challenging healthcare issues. We discover and develop breakthrough treatments and find new ways to deliver them to as many people as possible. We also aim to provide a shareholder return that rewards those who invest their money, time and ideas in our company.

- The Novartis Strategy:

Our strategy is to use science-based innovation to deliver better patient outcomes in growing areas of healthcare. We maintain strong investment in research and development to address unmet medical needs. Our product pipeline is fed by a research and development approach that uses the latest science to advance the most promising projects. In drug development, we pursue promising therapies where we can leverage the scale and expertise of Novartis to bring important treatments to patients globally. We seek to develop medicines and products that can produce positive real-world outcomes for patients and healthcare providers.

We aim to develop innovative products in growing areas of healthcare where we can make a real difference. We focus on patented medicines, generic medicines and eye care – segments where we have the innovation power and global scale necessary to compete effectively. At the same time, we are expanding our presence in the emerging markets of Asia, Africa and Latin America, where populations are growing fastest and where demand for access to high-quality medicines and healthcare is also likely to continue to increase.

- Novartis People:

Talented, committed and responsible people from diverse backgrounds are essential for successfully implementing our strategy. We foster a company culture that supports the success of the enterprise through clear values to guide our people in their work. About 123 000 people of 142 nationalities work at Novartis around the world. Novartis products are available in more than 155 countries around the world.
We continue to reinforce a company culture that supports our people as they face new challenges in a rapidly evolving healthcare environment. Our values define our culture and help us execute the Novartis strategy in line with our mission and vision. They describe the professional behavior we expect from our employees and highlight the need for collaboration, as well as innovation, quality, performance, courage and integrity. We use these six values to inform our recruitment activities,

shape employee development programs, and help guide individual performance assessments and decisions about bonuses and other rewards. Comprehensive training programs ensure our people are familiar with these values and know how to apply them in their jobs.

- Environmental and Social Sustainability:

As a global leader in healthcare, we take our responsibility to protect the environment seriously and strive to minimize our environmental footprint. While the pharmaceutical industry is not an energy- or carbon-intensive sector, energy efficiency and greenhouse gas (GHG) emissions reduction are important for the long-term success of Novartis. We expect both our business and our operations to be impacted by the growing effects of climate change and the shifting weather patterns in many regions. With energy, GHG emissions and water resources becoming greater cost factors, efficiency improvements and alternate sources will be more important. In the long term, the increasingly severe effects of rising sea levels, extreme weather, changing precipitation patterns, and water scarcity could also influence the way Novartis selects new locations and how these would be protected against the effects of climate change. Environmental sustainability is an integral part of our strategy. We strive to make efficient use of natural resources and to minimize the environmental impact of our activities and products. Our 2030 vision on environmental sustainability is underpinned by targets spanning four areas: energy and climate, water and micropollutants, materials and waste, and environmental sustainability management.

W0.2

Reporting year

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

Period for which data is reported
Fri 01 Jan 2016 - Sat 31 Dec 2016

W0.3

Reporting boundary

Please indicate the category that describes the reporting boundary for companies, entities, or groups for which water-related impacts are reported

Companies, entities or groups over which operational control is exercised

W0.4

Exclusions

Are there any geographies, facilities or types of water inputs/outputs within this boundary which are not included in your disclosure?

No

W0.4a

Exclusions

Please report the exclusions in the following table

Exclusion	Please explain why you have made the exclusion

Further Information

Module: Current State

Page: W1. Context

W1.1

Please rate the importance (current and future) of water quality and water quantity to the success of your organization

Water quality and quantity	Direct use importance rating	Indirect use importance rating	Please explain
Sufficient amounts of good quality freshwater available for use	Vital for operations	Important	While pharmaceutical manufacturing is not very water intensive, access to good quality freshwater is vital for production processes. It is used e.g. in chemical synthesis, production of pharmaceuticals and excipients, cleaning of equipment and products. Where not sufficient, water is additionally purified depending on the required use in the process or in products. Several Novartis sites use large quantities of water to cool production processes, data centers or for comfort cooling. In these cases, water quantity and water temperature is more important than quality of freshwater for production processes. In our supply chain availability of freshwater is equally important as in our own operations. According to an assessment performed with 2016 data, we have the highest water footprint in our supply chain for the purchased pharmaceutical ingredients and chemicals (about 35% of our total water consumption in the supply chain).
Sufficient amounts of recycled, brackish and/or produced water available for use	Neutral	Neutral	Recycled/reclaimed water is used at several Novartis sites located in areas of water scarcity. Overall water recycling is 24.9% compared to total water used. Rain water is collected and used e.g. for filter scrubbing (e.g. in case of disruption, the use of recycled water can be substituted by using freshwater in order not to affect the specific processes). An assessment of the direct materials supply chain has been conducted on water footprint annually in the last three years to determine the importance of water on the materials supply chain. The results show that the access to sufficient amounts of water is more important than the quality of water as the most water is used for the production of energy than for direct use in pharmaceutical manufacturing. Suppliers in water scare areas (e.g. India/China) are more dependent on the availability of water than Novartis operations. As here, recycled water can be used.

W1.2

For your total operations, please detail which of the following water aspects are regularly measured and monitored and provide an explanation as to why or why not

Water aspect	% of sites/facilities/operations	Please explain

Water aspect	% of sites/facilities/operations	Please explain
Water withdrawals- total volumes	76-100	Novartis actively manages its water consumption by monitoring amounts of water input, water use and water output throughout the organization. Percentage coverage is 100%. Total water input volumes and volumes by sources are reported on a quarterly basis by all production, research & development and major administration facilities under Novartis operational control.
Water withdrawals- volume by sources	76-100	Water Input (Withdrawals) is the sum of all fresh water amounts entering a site from all types of water sources (Where from). Percentage coverage is 100%. The following water input by source indicators (where relevant) are reported quarterly, together with the total volumes as stated above: - Water purchased from external suppliers - Water drawn from aquatic environment - Water collected from rain - Water input as ingredient of raw materials - Water input from other sources.
Water discharges- total volumes	76-100	Novartis actively manages its water consumption by monitoring amounts of water input, water use and water output throughout the organization. Percentage coverage is 100%. Total water output (Discharge) volumes and volumes by destination are reported on a quarterly basis by all production, research & development and major administration facilities under Novartis operational control.
Water discharges- volume by destination	76-100	Water Output (Discharges) is the sum of all water amounts sent to any destination off site (to where). Percentage coverage is 100%. The following water output by source indicators (where relevant) are reported quarterly, together with the total volumes as stated above: - Water returned, released directly to aquatic environment - Water returned, discharged via treatment - Water lost, evaporated from cooling / heating systems - Water output as product ingredient - Water output to other destination.
Water discharges- volume by treatment method	76-100	Water returned, discharged via on-site or off-site treatment, is a mandatory indicator for all sites. Percentage coverage is 100%. It covers water that goes through treatment either in an on-site or off-site waste water treatment plant (WWTP) or both, on which at least one or several effluent load parameters are reduced to conditions in line with the local legal requirement for effluent to surface fresh water bodies. Information on treatment method are considered at local level but are not reported on a global level.
Water discharge quality data- quality by standard effluent parameters	76-100	Water quality data is reported on a yearly basis by all production and research & development facilities under Novartis operational control. Percentage coverage is 100% (water quality data is not collected from administration sites as this data is considered not relevant compared to the data from our manufacturing and R&D sites.) The following water quality indicators are reported (where relevant): - Total Suspended Solids (TSS) Load - Chemical Oxygen Demand (COD) Load - Nitrogen Load - Phosphate Load. All manufacturing facilities also assess effluent load of active pharmaceutical ingredients (APIs) in their water streams, using a risk-based approach based primarily on mass balance methods (or where necessary include analytical methods) and respective eco-toxicity parameters of individual drug substances.
Water consumption- total volume	76-100	Novartis actively manages its water consumption by monitoring amounts of water input, water use and water output throughout the organization. Percentage coverage is 100%. Total volume of water use (Consumption) is reported on a quarterly basis by all production, research & development and major

Water aspect	% of sites/facilities/operations	Please explain
		administration facilities under Novartis operational control. The following water use indicators are reported (where relevant): - Water used for cooling (Cooling Water) - Water used for other non-contact purposes - Water used in processes and for washing - Water used for sanitary purpose (Sanitary Water) - Water used in boilers - Water used for other purposes - Water re-used / recycled
Facilities providing fully-functioning WASH services for all workers	76-100	Due to the nature of our operations, where cleanliness and sterile working conditions are extremely important, we ensure that fresh water is available for cleaning, washing, and sanitary services and for drinking purposes at all facilities under Novartis operational control. We do not explicitly expect facilities to confirm this within our reporting systems as it is a prerequisite for quality operation. Percentage coverage is 100%.

W1.2a

Water withdrawals: for the reporting year, please provide total water withdrawal data by source, across your operations

Source	Quantity (megaliters/year)	How does total water withdrawals for this source compare to the last reporting year?	Comment
Fresh surface water	0	Not applicable	Novartis reports the quantities of water abstracted from the aquatic environment, but does not distinguish between surface water and groundwater. Most water abstracted from the environment is from groundwater sources or from river side-beds.
Brackish surface water/seawater	0	Not applicable	Novartis does not collect data for this specific source.
Rainwater	82	Higher	Rainwater is collected and stored for e.g. irrigation or use of lower requirements such as sanitary flushing.
Groundwater - renewable	64836	About the same	Novartis reports the quantities of water abstracted from the aquatic environment, but does not distinguish between surface water and groundwater. Most water abstracted from the environment is from groundwater sources or from river side-beds. Novartis does not

Source	Quantity (megaliters/year)	How does total water withdrawals for this source compare to the last reporting year?	Comment
			differentiate between renewable and non-renewable groundwater sources.
Groundwater - non-renewable	0	Not applicable	Novartis reports the quantities of water abstracted from the aquatic environment, but does not distinguish between surface water and groundwater. Most water abstracted from the environment is from groundwater sources or from river side-beds. Novartis does not differentiate between renewable and non-renewable groundwater sources.
Produced/process water	51	About the same	Includes purchased process water and water from "other sources"
Municipal supply	17186	Lower	At many places, in particular at all small administrational sites, Novartis does not operate own wells, but uses water from municipal supply.
Wastewater from another organization	0	Not applicable	Novartis does not collect data for this specific source.
Total	82155	Lower	Cooling water (primarily freshwater from groundwater sources or river-beds) can be withdrawn in large quantities and is returned in similar volumes to its original source nearby with negligible losses or variation in quality.

W1.2b

Water discharges: for the reporting year, please provide total water discharge data by destination, across your operations

Destination	Quantity (megaliters/year)	How does total water discharged to this destination compare to the last reporting year?	Comment
Fresh surface water	65885	Lower	Novartis reports the quantities of water discharged to the aquatic environment, but not the exact destination. While some quantities may be discharged back to groundwater

Destination	Quantity (megaliters/year)	How does total water discharged to this destination compare to the last reporting year?	Comment
			sources, it is assumed that the majority of non-contaminated cooling water is discharged to fresh surface water bodies.
Brackish surface water/seawater	0	Not applicable	Novartis does not collect data for this specific destination.
Groundwater	0	Not applicable	Novartis reports the quantities of water discharged to the aquatic environment, but not the exact destination. While some quantities may be discharged back to groundwater sources, it is assumed that the majority of non-contaminated cooling water is discharged to fresh surface water bodies.
Municipal/industrial wastewater treatment plant	13750	Lower	At many places, in particular at all small administrational sites, Novartis does not operate own treatment plants, but uses municipal plants for waste water treatment.
Wastewater for another organization	0	Not applicable	We do not collect data for this specific source.
Total	79635	Lower	The total quantity of water discharges does not include additional water losses from Novartis facilities due to evaporation from heating and cooling systems (1812ML), water in products (79ML) and irrigation (725ML).

W1.2c

Water consumption: for the reporting year, please provide total water consumption data, across your operations

Consumption (megaliters/year)	How does this consumption figure compare to the last reporting year?	Comment
16366	Lower	Most water used at Novartis is for cooling purposes (65885ML) and is returned unpolluted back to the aquatic

Consumption (megaliters/year)	How does this consumption figure compare to the last reporting year?	Comment
		environment. The quantity reported here includes the total volume of water sent to treatment (13750ML) and additional water losses from Novartis facilities due to evaporation from heating and cooling systems (1812ML), water in products (79ML) and irrigation (725ML).

W1.3

Do you request your suppliers to report on their water use, risks and/or management?

Yes

W1.3a

Please provide the proportion of suppliers you request to report on their water use, risks and/or management and the proportion of your procurement spend this represents

Proportion of suppliers %	Total procurement spend %	Rationale for this coverage
Less than 1%	1-25	Water-related risks (scarcity, water treatment/effluent risks) are a regular part of HSE audits at supplier sites. The supplier survey and audit concept is part of our Responsible Procurement program. The selection process considers country risks like efficacy of the regulatory systems (HSE), sector specific risks, any known or possible HSE problem, and in selected procurement categories the value of the contract. All suppliers are screened against these criteria and depending on the results site visits are conducted, with focus on high risk countries (i.e. India, China, Latin America) and high risk sectors (i.e. suppliers of chemicals, active

Proportion of suppliers %	Total procurement spend %	Rationale for this coverage
		ingredients, packaging materials). Suppliers are required to provide information on water consumption, water treatment practices and effluent parameters. Their incentive to report this information is better HSE performance and leads to positive business relationships. Even though proportion of suppliers and procurement spend covered by the system are small, risks are captured by a much higher degree, as we focus on categories and countries with potentially higher risks. Overall impact assessment: In parallel since 2014 we annually conduct an input/output study to determine the carbon footprint and water consumption of the entire material supply chain. This enables us to better identify impact hotspots and continue actions on these to reduce impacts and risks. The highest risk for water is confirmed for chemical suppliers is in Asia.

W1.3b

Please choose the option that best explains why you do not request your suppliers to report on their water use, risks and/or management

Primary reason	Please explain

W1.4

Has your organization experienced any detrimental impacts related to water in the reporting year?

No

W1.4a

Please describe the detrimental impacts experienced by your organization related to water in the reporting year

Country	River basin	Impact driver	Impact	Description of impact	Length of impact	Overall financial impact	Response strategy	Description of response strategy

W1.4b

Please choose the option below that best explains why you do not know if your organization experienced any detrimental impacts related to water in the reporting year and any plans you have to investigate this in the future

Primary reason	Future plans

Further Information

Module: Risk Assessment

Page: W2. Procedures and Requirements

W2.1

Does your organization undertake a water-related risk assessment?

Water risks are assessed

W2.2

Please select the options that best describe your procedures with regard to assessing water risks

Risk assessment procedure	Coverage	Scale	Please explain
Comprehensive company-wide risk assessment	Direct operations and supply chain	All facilities and suppliers	Environmental stewardship is part our business and essential to our long-term success. We take steps to use natural resources efficiently and minimize environmental impact of our activities and products. Direct Operations: We evaluated water usage at all sites using the WBCSD Global Water Tool. The focus of our evaluation is primarily on water availability rather than water quality, as the majority of our manufacturing sites have water purification equipment to address water quality issues. The top-ten sites located in areas of future potential water scarcity by water usage were required in 2013 to undertake a water audit, determine their water flows, evaluate water saving opportunities, and issue a water reduction target. In addition, access to water must be incorporated into the sites' Novartis risk portfolio if relevant. Since then, the top water scarce sites have reported water savings of 20%. Additionally, since 2015, all manufacturing facilities perform an effluent assessment and determine the local risk of pharmaceuticals in the receiving surface waters. Suppliers: An Input/Output analysis has been conducted since 2014 on the entire materials supply chain, covering carbon and water consumption. In the last three years, the supply chain was assessed twice on water scarcity risks. Results show that highest impacts are in the chemical sector and in the energy supply chain and that water scarcity in our supply chain is highest in Asia (e.g., India, China).

W2.3

Please state how frequently you undertake water risk assessments, at what geographical scale and how far into the future you consider risks for each assessment

Frequency	Geographic scale	How far into the future are risks considered?	Comment
Every two	River basin	>6 years	Using the water WRI scarcity indicator on "water availability per capita in 2025" to assess each

Frequency	Geographic scale	How far into the future are risks considered?	Comment
years			facilities level of water scarcity considers future developments for the water shed in which these facilities are located.
Every two years	River basin	>6 years	Access to water is included in the annually updated risk portfolios of sites located in water scarce or extreme scarce areas.
Annually	River basin	1 to 3 years	Effluent risk assessments for pharmaceuticals in local surface water are performed annually according to internal guidelines.

W2.4

Have you evaluated how water risks could affect the success (viability, constraints) of your organization's growth strategy?

Yes, evaluated over the next 5 years

W2.4a

Please explain how your organization evaluated the effects of water risks on the success (viability, constraints) of your organization's growth strategy?

Water risks are evaluated in the HSE&BCM risk assessment and if relevant, included in the Novartis Risk Portfolio. Water risks from water scarce sites were not considered a material risk on the success of Novartis' growth strategy. This is due to the fact that respective consequences are limited to few individual sites located in water scare areas. The currently still very low financial implications related to water risks and the possibilities to avoid/mitigate these risks by alternative ways (e.g. cooling by mechanical chilling instead of water cooling), did not change our strategies for growth.

Following case example of successful water management may demonstrate this:
Comfort Cooling with ambient water at the Novartis Campus in Basel:
Situation: Water from nearby readily available surface of groundwater sources is used to condition indoor air. This practice helps to reduce electricity consumption, which otherwise would be necessary for mechanical chilling. As long as such water sources are sufficiently cold and temperatures are not overly increased, the impact on the natural source is very limited.
Task: At its headquarters in Basel (Switzerland) Novartis uses water from the nearby river Rhine for comfort cooling of office and research buildings. In recently more frequent hot summer periods, the temperature of the river exceeds 25°C, which limits the use of water from the river for cooling. In order to be able to continue

with its growth strategy at the headquarters location in Basel, and avoiding energy intensive mechanical chilling, Novartis decided to use seasonal heat storage technology for new buildings at the site.
Action: With a pilot application of a heat storage system for the new top management building inaugurated in 2014, seasonal heat storage was tested and proven effective.
Result: Since 2016, 3 buildings are equipped and are using this thermal storage technology. The wider application of this technology allow Novartis to keep the dependence on the cold water source low, help develop and further spread new heating/cooling techniques and continue its excellent electricity savings performance.

Effluent risks are not considered a material risk to organizations' growth strategy. In case of an identified effluent risk, mitigation measures, e.g. advanced treatment technology will be implemented to reduce and control the risk.

W2.4b

What is the main reason for not having evaluated how water risks could affect the success (viability, constraints) of your organization's growth strategy, and are there any plans in place to do so in the future?

Main reason	Current plans	Timeframe until evaluation	Comment

W2.5

Please state the methods used to assess water risks

Method	Please explain how these methods are used in your risk assessment
WBCSD Global Water Tool WRI water stress definition Other: Natural Capital Protocol; Input/Output Tool; Novartis Risk Portfolio; Novartis HSE	WBCSD Global Water tool and WRI Scarcity Indicators: To assess its risks related to water scarcity Novartis is using the WBCSD Global Water Tool. Using the water WRI scarcity indicator on "water availability per capita in 2025" to assess water risks at individual sites allows to consider future developments. Input/Output Tool: Since 2014, Novartis annually conducts a study on the carbon and water footprint of the direct Material Supply Chain.

Method	Please explain how these methods are used in your risk assessment
guideline and guidance notes; Novartis Risk Database	With this, carbon and water consumption footprint can be specifically assessed per business, per supply category and per country. The water footprint is specific for levels of water scarcity. The results are analyzed to identify impact hot spots in the supply chain and to address groups of suppliers or individual suppliers to determine follow-up actions. Natural Capital Protocol: Novartis began using the Natural Capital Protocol (NPC) in 2015 in a pilot application (guided by The Natural Capital Coalition, Cambridge University and WBCSD) to monetize environmental profit & loss for Novartis, using environmental impact prices for a variety of levels of water scarcity. We continue to update the analysis and have further refined the approach. Novartis Risk Portfolio: Access to water is additionally included in the annually updated risk portfolios of sites located in water scarce or extreme scarce locations. Novartis HSE guidelines and guidance notes: Effluent risks on pharmaceuticals in the environment are assessed by using internal guideline (HSE GL15) and guidance notes. Novartis Data Management System: Novartis maintains an accounting system on water withdrawal, consumption and discharge.

W2.6

Which of the following contextual issues are always factored into your organization's water risk assessments?

Issues	Choose option	Please explain
Current water availability and quality parameters at a local level	Relevant, included	Availability of water is included in the Novartis risk portfolio of sites located in a water-scarce or extremely-scarce location, based on the WRI water stress definition. The Novartis risk portfolio is regularly updated. Quality of water is not as important as water availability as the majority of our manufacturing sites have water purification equipment to address water quality issues. At our manufacturing site in Tuzla, Turkey, they have assessed alternative water sources in case of any water supply interruption (e.g. extraction from deep well or external supply via truck).
Current water regulatory frameworks and tariffs at a local level	Not relevant, included	Regulatory frameworks are considered and assessed in the Novartis Risk Portfolio for sites which are located in water-scarce or extremely-scarce locations, according WBCSD and WRI, as well as at additional sites where water intake is high or where water resources are managed with due care. For example, the regulatory limitation of using water from the river Rhine in Basel for comfort cooling if temperatures exceed 25°C was considered for expanding the site's concept of cooling alternatives with seasonal heat/cold storage in the bedrock underneath buildings. Other examples also demonstrate that regulatory frameworks or water tariffs have a limited effect, despite water scarcity

Issues	Choose option	Please explain
		where may be critical. Water costs at our production facility in e.g., Beijing, China, due to very low tariffs, are not a relevant factor to influence decisions for water savings. No regulatory framework exists currently for pharmaceuticals in the environment, however Novartis is a signatory participant to the Industry Roadmap for Antimicrobial Resistance. Lastly, Novartis assesses and monitors its effluent risk by using Novartis HSE guidelines and guidance notes considered industry best practice.
Current stakeholder conflicts concerning water resources at a local level	Not relevant, included	Stakeholder conflicts, if any, are considered and assessed in the Novartis Risk Portfolio of sites located in water-scarce or extremely-scarce locations, according WBCSD and WRI protocols.
Current implications of water on your key commodities/raw materials	Relevant, included	A supply chain analysis on water footprint has been conducted annually since 2014 to assess key areas of relevance. Social cost of water, in particularly if resources are scarce, are a decisive factor on the total impact of our material supply chain. Application of the Natural Capital Protocol in quantifying our own and supply chain environmental footprints in monetary terms show that water is among the most relevant parts of the entire impact. Social costs of the water footprint relate to our direct materials supply chain (including tier 1 to tier 6 suppliers) refers to about 20% of the total supply chain footprint.
Current status of ecosystems and habitats at a local level	Not relevant, included	Aspects of ecosystems and habitats are considered if relevant in the Novartis Risk Portfolio. Our production site in San Carlos, USA, has received a government approval to dredge the creek to prevent flooding of Novartis buildings during heavy rains. A part of the permit approval was to determine if there were any endangered species and to report out our mitigation measures to the government. Our engagement includes bringing the creek back to 80% of native vegetation (as opposed to non-native vegetation).
Current river basin management plans	Relevant, included	Current river basin management plans are considered at those Novartis locations where water is scarce or highly scarce. Such scarcity information is obtained from our application of the WBCSD global water tool, in selecting the top water scarcity locations that should implement a water savings program. Additionally, all manufacturing sites perform an effluent assessment using HSE guidelines and guidance notes, to assess the local risk for pharmaceuticals in the receiving surface waters.
Current access to fully-functioning WASH services for all employees	Not relevant, explanation provided	Cleanliness and sterile working conditions are extremely important for the pharmaceutical business. We ensure that fresh water is available for cleaning, washing, sanitary and drinking purposes at all facilities under Novartis operational control. Due to the importance and requisite for our business, we expect facilities to confirm this as a basic requirement.
Estimates of future changes in water availability at a local level	Relevant, included	By using the WRI water scarcity indicator on "water availability per capita in 2025" we consider future developments. We include access to water on the risk portfolios of all sites, which are located in water-scarce or extremely scarce locations.
Estimates of future potential regulatory changes at a local level	Relevant, included	By using the WRI water scarcity indicator on "water availability per capita in 2025" we consider future developments. Access to water is included on the risk portfolios of sites located in water-scarce or extremely-scarce locations. Novartis considers future regulatory changes for micro-pollutants in the environment through the effluent assessments by using Novartis HSE guidelines and guidance

Issues	Choose option	Please explain
		notes.
Estimates of future potential stakeholder conflicts at a local level	Relevant, included	By using the water WRI scarcity indicator on "water availability per capita in 2025" we consider future developments. Access to water is included on the Novartis Risk Portfolios of sites located in water-scarce or extremely-scarce locations.
Estimates of future implications of water on your key commodities/raw materials	Relevant, included	The Input/Output Tool to analyse the water footprint of the supply chain was conducted to assess key areas of relevance. The analysis provided an overview of water risks and hot spots related to water-scarce locations in our supply chain. The risk analysis is shared with the business and supports the business with environmental criteria around future supply chain decisions.
Estimates of future potential changes in the status of ecosystems and habitats at a local level	Relevant, included	Aspects of ecosystems and habitats (e.g. for our Grimsby manufacturing site located next to the Humber sanctuary) are considered if relevant on a local level in the Novartis Risk Portfolio. For such sites, this provides valid information on change in conditions, regulatory requirements, trends and future developments.
Scenario analysis of availability of sufficient quantity and quality of water relevant for your operations at a local level	Not relevant, included	Local water availability assessments are undertaken at Novartis facilities using WRI water scarcity indicator. Such assessments are particularly important at anti-infective manufacturing facilities where vast quantities of cooling water are used for process cooling, instead of mechanical chilling, in order to save energy. High quality water for our manufacturing processes will be ensured by water purification equipment as already done today. For water supply scarcity due to climate change resulting in water shortage, reduced snowpack melt, etc., there are to date no trends visible for reduction of surface water availability due to those causes. As these trends are currently slowly developing and longer term, those specific risks are not considered material at this point in time, however the potential for such risk will continue to be monitored.
Scenario analysis of regulatory and/or tariff changes at a local level	Relevant, included	Local water cost assessments are undertaken at several Novartis facilities and included in the Novartis Risk Portfolio, if relevant. Such assessments are particularly important at anti-infective manufacturing facilities where vast quantities of cooling water are used in order to save energy. Due to the quantities of water involved, any increases in water charges could affect the economic viability of the facilities in the future. Typically, sites have licenses to pump water from the river side beds and discharge the water back to the river, as the temperature is only slightly increased and environmental impacts on the river biotope are not considered material. Regulatory changes for micro-pollutants in the environment are monitored and included in the Novartis Risk Portfolio, if relevant.
Scenario analysis of stakeholder conflicts concerning water resources at a local level	Relevant, included	Stakeholder conflicts concerning water resources are assessed at a local level at some facilities within the Novartis Risk Portfolio; particularly in the anti-infective manufacturing facilities which need water for cooling purposes. For example at our site in Kundl; Austria, if not sufficiently water for cooling is available, mechanical chilling be used instead. However, this has the potential to increase energy costs and GHG emissions each by about 20%.
Scenario analysis of implications of water on your key commodities/raw	Relevant, not yet included	An input/output supply chain analysis (Input/Output Tool) on water footprint was conducted to assess key areas of relevance. Only limited information was able to be extracted but future refinement is

Issues	Choose option	Please explain
materials		planned.
Scenario analysis of potential changes in the status of ecosystems and habitats at a local level	Relevant, included	Aspects of ecosystems and habitats (e.g. the Humber sanctuary adjacent to our Grimsby manufacturing site in the UK) are considered at a local level and if relevant are included in the Novartis Risk Portfolio.
Other	Not evaluated	

W2.7

Which of the following stakeholders are always factored into your organization's water risk assessments?

Stakeholder	Choose option	Please explain
Customers	Relevant, included	Novartis informs stakeholders on its water saving activities and related water risks in its annual non-financial reporting (Corporate Responsibility Report) and in local environmental reports. With some selected customers, such as the National Health Service (NHS) in England and hospital pharmacists, we build direct contacts on environmental topics. For Walmart Stores in the US and in Mexico and for Abbott in India, we provide climate information with the CDP supplier survey.
Employees	Relevant, included	Associates can contribute to water efficiency through their own daily habits (e.g. on the use of sanitary water). Based on our Water Savings program at the top water scarce sites we have developed programs that allow associates to engage in water savings activities by e.g. posters, awareness signage. Such programs are implemented e.g. at our sites in Batam, Indonesia; Hyderabad, India and La Jolla, California.
Investors	Relevant, included	Novartis informs investors on its water saving activities and related water risks in its annual non-financial reporting (Corporate Responsibility Report) and in local environmental reports. We also respond proactively to information requests of investors. In 2016 Novartis had provided comprehensive feedback on (among others) water risk of chemical suppliers in India.
Local communities	Relevant, included	Besides CR Reporting on corporate level, Novartis informs local stakeholders on its water saving activities and related water risks in local environmental or sustainability reports. Such local reports are (among others) issued in Slovenia (for our Sandoz subsidiary Lek, covering all Novartis operations in Slovenia), for the Sandoz facilities in Kundl/Schaftenau in Tyrol, Austria and for the Basel Operations in Switzerland. Additionally, regular contacts are maintained with the Basel authorities and with community groups of the surrounding communities in Huningue, France. For example, Novartis in Basel conducts a voluntary 200 million dollar remediation project in the commune

Stakeholder	Choose option	Please explain
		of Huningue, near Basel to protect local groundwater sources from pesticide pollutants, originating from former owners of the site.
NGOs	Relevant, included	A study in 2016 valuated the social and environmental benefit of the four Novartis forestry projects. An analysis of Social Return on Investment (SROI) was included. In the carbon sink forestry project in Sichuan, China, we cooperate with The Nature Conservancy (TNC). It is a voluntary carbon sink forestry project on 4100ha degraded land on mountain sides. The afforestation of these lands will in the long term protect water sources, by reducing soil erosion and the tendency to landslides. 455ha of the land are located in Nature Reserves and the remaining area is located adjacent to these reserves.
Other water users at a local level	Not relevant, explanation provided	At some of its water-scarce locations Novartis provides water from the factory to the local community. This is practiced at some of our production sites in South Asia, e.g. at the Pharmaceutical Operations site of our OTC Joint Venture Company with GSK in Pakistan. However, we do not consider them as relevant, because we have limited potential to influence.
Regulators	Relevant, included	Regulators are included in water risk assessments undertaken at some Novartis manufacturing facilities, where we operate facility owned waste water treatment operations and/or discharge waste water to public sewer treatment facilities. Summary reports including key water parameters are shared if requested with the regulators on a regular basis.
River basin management authorities	Relevant, included	River basin management authorities are factored into water risk assessments undertaken at some Novartis manufacturing facilities. Water specialists at our manufacturing sites in Stein (CH), Wehr (Germany), Schweizerhalle (CH) and Basel (CH) work closely with the Rhine River Watershed authority and local public waste water treatment plants to monitor and control water effluent and pollutant parameters of the river. Values of key parameters are regularly reported. This is partly supported by the internal HSE guideline 15, which assess the risk for pharmaceuticals in the receiving surface water.
Statutory special interest groups at a local level	Relevant, included	Novartis informs stakeholders on its water savings activities in its annual non-financial reporting (Corporate responsibility Report) and its local environmental reports (e.g. EMAS Reports). In certain matters we collaborate directly with local authority and the community. For example in Wehr, Germany, where the pharmaceutical operation installed in 2016 a state-of-the-art pre-treatment production facility for effluent in agreement with the local authority and community.
Suppliers	Relevant, included	An assessment of the materials supply chain is regularly conducted by Novartis based on an Input/Output tool to determine the relevance of the water footprint of the materials supply chain. For the first time. Novartis is participating in the CDP Supply Chain Program and including 23 selected key suppliers to provide feedback on climate and water. This includes suppliers in water-scarce regions.
Water utilities at a local level	Relevant, included	Novartis informs stakeholders on its water savings activities in its annual non-financial reporting (Corporate Responsibility Report) and its local environmental reports (e.g. EMAS Reports). Water utilities for our research facility in La Jolla, California cooperated with Novartis in conducting a water audit and developing water savings opportunities.
Other	Not evaluated	

W2.8

Please choose the option that best explains why your organisation does not undertake a water-related risk assessment

Primary reason	Please explain

Further Information

Module: Implications

Page: W3. Water Risks

W3.1

Is your organization exposed to water risks, either current and/or future, that could generate a substantive change in your business, operations, revenue or expenditure?

Yes, direct operations and supply chain

W3.2

Please provide details as to how your organization defines substantive change in your business, operations, revenue or expenditure from water risk

Direct operations:
Large quantities of water are used at several Novartis sites to cool production processes and/or buildings. Novartis encourages the use of water for cooling at sites where water is abundant. This saves significant quantities of energy and associated GHG emissions. In the unlikely event of a longer-term future when plants could no longer abstract cooling water from the aquatic environment due to e.g. climate change resulting in water shortage, the use of mechanical chillers would be required to cool the production processes. This would result in significantly higher operating costs (estimated 10-20%) through increased energy usage and

significantly higher GHG emissions (estimated 10-20%). The higher costs and higher GHG emissions would be considered a substantive change to the organization. Other criteria we use measure substantive change, e.g. damages to Novartis brand and reputation, or legal impacts on our own operations as well as our value chain. Thresholds are provided in our Enterprise Risk Management system. As impacts are in many cases not straight forward and a combination of impacts, we do not use a single threshold value.

Supply Chain:
A substantive change in the organization is measured as described above for our own operations, as well as for the value chain. Water risks in the supply chain are primarily related to two areas: 1) Water consumption in the supply chain (primarily at tier 2 or tier 3 suppliers), where water intensive processes are included in the preparation of natural (pulp, fiber, agricultural products) or fossil raw materials (chemicals) and which may generate water risks, in particular when these suppliers are located in water scarce regions such as e.g. in India; and 2) Water consumption in the supply chain for Tier 1 suppliers of chemicals in India or water-scarce regions in China.

The water consumption related risks and environmental footprint of the supply chain is being assessed by Novartis with an Input/Output tool on an annual basis. The various environmental footprints, including water risks, had been quantified and monetized in the course of an assessment of Environmental P&L. Water-related impacts of the supply chain constitute about 18% of the total environmental externalities. The 2016 assessment confirms the 2015 results.

W3.2a

Please provide the number of facilities* per river basin exposed to water risks that could generate a substantive change in your business, operations, revenue or expenditure; and the proportion of company-widefacilities this represents

Country	River basin	Number of facilities exposed to water risk	Proportion of company-wide facilities that this represents (%)	Comment
Switzerland	Rhine	1	Less than 1%	Water of the river Rhine is used for comfort cooling of office and research buildings at our headquarters site in Basel. It is a non-contact one-time-through use of the water, given back to the river with very small temperature increase. There is a limitation to use the river water, at times when the water exceeds a temperature of 25°C, which so far once happened in summer 2003. Novartis took measures to reduce dependency on the river water for cooling in installing systems for new buildings that allow seasonal heat storage in the bedrock underneath the building.

Country	River basin	Number of facilities exposed to water risk	Proportion of company-wide facilities that this represents (%)	Comment
Austria	Danube	1	1-5	Fermentation processes at our Sandoz facility in Kundl, Austria use water for cooling from the riverbed of the river Inn, a side river to the Danube river. The water is given back to the river after a non-contact, one-time-through application of water for process cooling. Water shortage in the river Inn that would limit the availability of water for cooling is not expected within the coming 50 years.

W3.2b

For each river basin mentioned in W3.2a, please provide the proportion of the company's total financial value that could be affected by water risks

Country	River basin	Financial reporting metric	Proportion of chosen metric that could be affected	Comment
Switzerland	Rhine	% cost of goods sold	Less than 1%	Operating costs for some buildings at the site will very little increase due to higher electricity consumption for mechanical chilling, when river water for comfort cooling would not be available anymore at certain time periods of the year.
Austria	Danube	% cost of goods sold	Less than 1%	Operating costs for fermentation processes at the site will somewhat increase due to higher electricity consumption for mechanical chilling, when river water for process cooling would not be available anymore at certain time periods of the year.

W3.2c

Please list the inherent water risks that could generate a substantive change in your business, operations, revenue or expenditure, the potential impact to your direct operations and the strategies to mitigate them

Country	River basin	Risk driver	Potential impact	Description of potential impact	Timeframe	Likelihood	Magnitude of potential financial impact	Response strategy	Costs of response strategy	Details of strategy and costs
Switzerland	Rhine	Physical-Climate change Physical-Rationing of municipal water supply Physical-Seasonal supply variability/Inter annual variability Regulatory-Increased difficulty in obtaining withdrawals/operations permit	Higher operating costs	The impact to the site is considered relatively small. If less ambient water is available for comfort cooling, mechanical chillers would be required to cool the buildings in summer months, which would result in somewhat higher operating costs (estimated less than 1%) through increased energy usage and higher GHG emissions.	4-6 years	Probable	Low	Alignment of public policy positions with water stewardship goals Engagement with public policy makers Infrastructure investment Increased capital expenditure Increased investment in new technology Promote best practice and awareness	The heat storage technology was implemented to make the site less dependent on cooling water. The cost to develop the response strategy is marginal. The total costs of USD 5-6 mio for 3 buildings include the project costs.	Projects for seasonal heat storage of new buildings were implemented in 2014-2016. Costs of such projects are in the range of USD 1.5-2 mio each.
Austria	Danube	Physical-Ecosystem vulnerability Physical-Projected water stress Physical-Seasonal supply variability/Inter annual variability	Higher operating costs	In the rather unlikely event in a longer term future when the fermentation plant in Austria could no longer	>6 years	Unlikely	Medium	Engagement with community Infrastructure investment Increased investment	Cooling technology would need to be changed from water cooling to mechanical	Mechanical chilling would increase the site's energy consumptio

Country	River basin	Risk driver	Potential impact	Description of potential impact	Timeframe	Likelihood	Magnitude of potential financial impact	Response strategy	Costs of response strategy	Details of strategy and costs
		Regulatory-Increased difficulty in obtaining withdrawals/operations permit		abstract cooling water from the aquatic environment due to climate change resulting in water shortage, the use of mechanical chillers would be required to cool the production processes, which would result in significantly higher operating costs (estimated between 10 and 20%) through increased energy usage and significantly higher GHG emissions (also between 10 and 20%). This would be considered a substantive change to the organization.				in new technology	chilling. Costs for the implementation of such strategy will include new equipment for mechanical chilling, estimated to USD 10 mio over 5-10 years plus the annual increase in energy costs of USD 1.5 - 2.5 mio p.a.	n by estimated 10-20%, i.e. USD 1.5 - 2.5 mio p.a.

W3.2d

Please list the inherent water risks that could generate a substantive change in your business operations, revenue or expenditure, the potential impact to your supply chain and the strategies to mitigate them

Country	River basin	Risk driver	Potential impact	Description of potential impact	Timeframe	Likelihood	Magnitude of potential financial impact	Response strategy	Costs of response strategy	Details of strategy and costs
China	Huang He (Yellow River)	Physical-Climate change Physical-Drought Physical-Ecosystem vulnerability Physical-Increased water scarcity Physical-Projected water scarcity	Supply chain disruption	An assessment of the water consumption and risk footprint of the materials supply chain and monetization of environmental externalities show us that such impacts are highest in the material supply chain. Most relevant countries include China and India. With this study undertaken in 2015 and 2016 we quantified the water footprint of our materials	4-6 years	Highly probable	Medium-high	Engagement with suppliers	Costs of such a strategy would potentially be significant, however in the long-term, economic benefits would be bigger than costs. If all externalities were included, water costs would grow in the amount of the current externalities. However, water efficiency measures will allow reducing	The externalities in the supply chain are determined via a two-step approach. In the first step an environmentally extended input/output assessment for the supply chain is performed. The tool uses average emission intensities by industry sector and incorporates regional trade flows and interrelationships to calculate emissions from spend data. In the second step the emission data received from the

Country	River basin	Risk driver	Potential impact	Description of potential impact	Timeframe	Likelihood	Magnitude of potential financial impact	Response strategy	Costs of response strategy	Details of strategy and costs
				supply chain in China for 2016 to be 59 Mm3. This is more than 3.5 times the water consumption of the Novartis internal operations (16 Mm3) (Novartis Corporate Responsibility Performance Report 2016).					these by at least 30-40%.	input output assessment is linked with the damage cost method as described in the CE Delft Shadow Prices Handbook to calculate the externalities. Our response strategy in managing environmental externalities of the materials supply chain includes to actively manage the selection of suppliers and to influence their environmental footprint by closer cooperation. The dialogue with suppliers in China has just commenced, by direct engagement with selected suppliers to discuss possible actions to minimize environmental impacts and

Country	River basin	Risk driver	Potential impact	Description of potential impact	Timeframe	Likelihood	Magnitude of potential financial impact	Response strategy	Costs of response strategy	Details of strategy and costs
										related risks.
India	Ganges-Brahmaputra	Physical-Climate change Physical-Drought Physical-Ecosystem vulnerability Physical-Increased water scarcity Physical-Projected water scarcity	Supply chain disruption	An assessment of the water consumption and risk footprint of the materials supply chain and monetization of environmental externalities show us that such impacts are highest in the material supply chain. Most relevant countries include China and India. With this study undertaken in 2015 and 2016 we quantified the water footprint of our materials supply chain in India for 2016 to be 52 Mm3. This is more than 3 times the water	4-6 years	Highly probable	Medium-high	Engagement with suppliers	Costs of such a strategy would potentially be significant, however in the long-term, economic benefits would be bigger than costs. If all externalities were included, water costs would grow in the amount of the current externalities. However, water efficiency measures will allow reducing these by at least 30%.	The externalities in the supply chain are determined via a two-step approach. In the first step an environmentally extended input/output assessment for the supply chain is performed. The tool uses average emission intensities by industry sector and incorporates regional trade flows and interrelationships to calculate emissions from spend data. In the second step the emission data received from the input/output assessment is linked with the damage cost method as described in the

Country	River basin	Risk driver	Potential impact	Description of potential impact	Timeframe	Likelihood	Magnitude of potential financial impact	Response strategy	Costs of response strategy	Details of strategy and costs
				consumption of the Novartis internal operations (16 Mm3) (Novartis Corporate Responsibility Performance Report 2016).						CE Delft Shadow Prices Handbook to calculate the externalities. Our response strategy in managing environmental externalities of the materials supply chain includes to actively manage the selection of suppliers and to influence their environmental footprint by closer cooperation. The dialogue with suppliers in India has just commenced, by direct engagement with selected suppliers to discuss possible actions to minimize environmental impacts and related risks.

Please choose the option that best explains why you do not consider your organization to be exposed to water risks in your direct operations that could generate a substantive change in your business, operations, revenue or expenditure

Primary reason	Please explain

W3.2f

Please choose the option that best explains why you do not consider your organization to be exposed to water risks in your supply chain that could generate a substantive change in your business, operations, revenue or expenditure

Primary reason	Please explain

W3.2g

Please choose the option that best explains why you do not know if your organization is exposed to water risks that could generate a substantive change in your business operations, revenue or expenditure and discuss any future plans you have to assess this

Primary reason	Future plans

Further Information

Page: W4. Water Opportunities

W4.1

Does water present strategic, operational or market opportunities that substantively benefit/have the potential to benefit your organization?

Yes

W4.1a

Please describe the opportunities water presents to your organization and your strategies to realize them

Country or region	Opportunity	Strategy to realize opportunity	Estimated timeframe	Comment
Turkey	Cost savings Improved water efficiency Social licence to operate	Reduce water consumption and increase quality of effluent: In our manufacturing site in Kurtkoy, Turkey, the water consumption was reduced and quality of effluent was increase by the installation of reverse osmosis-ultrafiltration system. The project costs were approx. USD 600000.	1-3 years	65-70% of used water is reused in cooling systems. Remaining water is currently discharged, but can be used in future for additional applications.
Company-wide	Increased brand value Improved community relations Increased shareholder value Improved water efficiency	Potential business opportunities are reduced water and energy costs, improved risk management strategies for managing water usage, easier compliance with potentially stricter water legislation, increasing investments from environmentally conscious investors and increased appreciation from current and future Novartis personnel on environmental achievements at Novartis.	4-6 years	Novartis strives to be among the most admired companies in all aspects of our operations. The Novartis Annual Report and Corporate Responsibility Report are two means by which we inform internal and external stakeholders of our water strategy and performance. In addition, local sustainability reports containing details of local water management initiatives are also produced at many sites or organizational units. Novartis also provides additional data directly to the sustainable investment community via yearly surveys.

Country or region	Opportunity	Strategy to realize opportunity	Estimated timeframe	Comment
	Social licence to operate			
Ireland	Cost savings Improved water efficiency Innovation	Recovery and Recycling of water: At our technical operation site in Cork, Ireland, purified water, which was primarily used to rinse products, is recycled for sanitary purposes, like flushing of toilets. Additionally, drained water is collected, treated via a reverse osmosis treatment and fed back into the raw water tank and hold available for re-use. The water recovery saves about USD 15000 per year.	1-3 years	Approximately 70% of the reject water is recovered and reused.
India	Climate change adaptation Cost savings Improved community relations Improved water efficiency Staff retention	Reduce, reuse and recycling of water: At our service center in Hyderabad, India, a local project with the title "No water No life - every drop counts" was initiated: rain water harvesting pits were installed, onsite sewage treatment plan has been installed, purified water is recycled for cooling systems, sanitary and gardening use.	1-3 years	Use of rain water has local water saving of 6600m3, which is equivalent to USD 8000. Recycling of purified water has an additional saving of 40000m3 which is equivalent to USD 59000.

W4.1b

Please choose the option that best explains why water does not present your organization with any opportunities that have the potential to provide substantive benefit

Primary reason	Please explain

W4.1c

Please choose the option that best explains why you do not know if water presents your organization with any opportunities that have the potential to provide substantive benefit

Primary reason	Please explain

Further Information

Module: Accounting

Page: W5. Facility Level Water Accounting (I)

W5.1

Water withdrawals: for the reporting year, please complete the table below with water accounting data for all facilities included in your answer to W3.2a

Facility reference number	Country	River basin	Facility name	Total water withdrawals (megaliters/year) at this facility	How does the total water withdrawals at this facility compare to the last reporting year?	Please explain
Facility 1	Switzerland	Rhine	Basel	16402	About the same	Total water abstraction for the Basel headquarters site primarily used for comfort cooling, remained about the same

Facility reference number	Country	River basin	Facility name	Total water withdrawals (megaliters/year) at this facility	How does the total water withdrawals at this facility compare to the last reporting year?	Please explain
						(1%) between 2015 and 2016.
Facility 2	Austria	Danube	Kundl	36955	About the same	Total water abstraction for the Kundl/Schaftenau Anti-Infectives production site, primarily used for process cooling, remained about the same (0.2%) between 2015 and 2016.

Further Information

Page: W5. Facility Level Water Accounting (II)

W5.1a

Water withdrawals: for the reporting year, please provide withdrawal data, in megaliters per year, for the water sources used for all facilities reported in W5.1

Facility reference number	Fresh surface water	Brackish surface water/seawater	Rainwater	Groundwater (renewable)	Groundwater (non-renewable)	Produced/process water	Municipal water	Wastewater from another organization	Comment
Facility 1	15544	0	0	0	0	0	858	0	
Facility 2	36774	0	0	0	0	0	182	0	

W5.2

Water discharge: for the reporting year, please complete the table below with water accounting data for all facilities included in your answer to W3.2a

Facility reference number	Total water discharged (megaliters/year) at this facility	How does the total water discharged at this facility compare to the last reporting year?	Please explain
Facility 1	16383	About the same	Novartis collects information on water input, use and output broken down to subcategories from all its operations worldwide. Partly these flows are measured with flow meters, others are calculated or assessed with feasible assumptions. Water balance criteria of ± 10%need to be fulfilled for data quality and consistency.
Facility 2	36955	About the same	Novartis collects information on water input, use and output broken down to subcategories from all its operations worldwide. Partly these flows are measured with flow meters, others are calculated or assessed with feasible assumptions. Water balance criteria ± 10%need to be fulfilled for data quality and consistency.

W5.2a

Water discharge: for the reporting year, please provide water discharge data, in megaliters per year, by destination for all facilities reported in W5.2

Facility reference number	Fresh surface water	Municipal/industrial wastewater treatment plant	Seawater	Groundwater	Wastewater for another organization	Comment
Facility 1	15697	687	0	0	0	Over 95% of the water discharged from Basel facility is non-contact cooling water, discharged back to the River Rhine, without contact to any potential contaminants.
Facility 2	34400	2555	0	0	0	About 93% of the water discharged from Kundl facility is non-contact process cooling water, discharged back to the River Inn, without contact to any process components or other potential contaminants.

W5.3

Water consumption: for the reporting year, please provide water consumption data for all facilities reported in W3.2a

Facility reference number	Consumption (megaliters/year)	How does this compare to the last reporting year?	Please explain
Facility 1	687	Lower	Water consumption (i.e. water discharged via treatment plus water lost) in Basel is lower (11%) in 2016 compared to 2015. This change is due to improved water efficiency at the site.
Facility 2	2555	About the same	Water consumption (i.e. water discharged via treatment plus water lost) at Kundl is about the same (-1.1%) in 2016 compared to 2015.

W5.4

For all facilities reported in W3.2a what proportion of their water accounting data has been externally verified?

Water aspect	% verification	What standard and methodology was used?
Water withdrawals- total volumes	76-100	Standard: ISAE3000 Methodology: Limited Assurance
Water withdrawals- volume by sources	Not verified	
Water discharges- total volumes	76-100	Standard: ISAE3000 Methodology: Limited Assurance
Water discharges- volume by destination	76-100	Standard: ISAE3000 Methodology: Limited Assurance

Water aspect	% verification	What standard and methodology was used?
Water discharges- volume by treatment method	76-100	Standard: ISAE3000 Methodology: Limited Assurance
Water discharge quality data- quality by standard effluent parameters	Not verified	
Water consumption- total volume	76-100	Standard: ISAE3000 Methodology: Limited Assurance

Further Information

Module: Response

Page: W6. Governance and Strategy

W6.1

Who has the highest level of direct responsibility for water within your organization and how frequently are they briefed?

Highest level of direct responsibility for water issues	Frequency of briefings on water issues	Comment
Board of individuals/Sub-set of the Board or other committee appointed by the Board	Scheduled-quarterly	The HSE Steering Committee is chaired by the Novartis CEO, Joseph Jimenez, which is responsible for authorizing and sponsoring the environmental strategy. In reporting year 2016, this role was delegated to Head of Corporate Responsibility, Jürgen Brokatzky-Geiger, who reports directly to the CEO. The HSE Steering Committee included global heads of manufacturing, Head Real Estate and Facility Services of the shared services unit, and the Head of Health Safety, Environment and Business Continuity Management. The composition of the HSE Steering Committee has been reviewed in 2017 following organizational changes, including the establishment of a new global HSE&BCM organization. The President of Novartis Operations,

Highest level of direct responsibility for water issues	Frequency of briefings on water issues	Comment
		Andre Wyss, member of the Executive Committee Novartis (ECN) and reporting directly to the CEO, is the ECN Sponsor of the new HSE&BCM Governance Board, which authorizes and sponsors the environmental strategy, including climate and water aspects.

W6.2

Is water management integrated into your business strategy?

Yes

W6.2a

Please choose the option(s) below that best explains how water has positively influenced your business strategy

Influence of water on business strategy	Please explain
Establishment of sustainability goals	In 2015, Novartis endorsed its environmental sustainability targets for 4 areas: water/micropollutants; energy/climate; material/waste; sustainable management. With these targets, we created measurable indicators to guide the company to reach its vision to minimize the environmental impact of our activities and products over their life cycle.

W6.2b

Please choose the option(s) below that best explains how water has negatively influenced your business strategy

Influence of water on business strategy	Please explain
Increased capital expenditure	It is expected that the sustainability target on water/micropollutants will increase capital expenditure for manufacturing sites with potential risk for receiving surface water. Sites will have to, for example, upgrade the local wastewater treatment, either by internal measures, or in cooperation with external treatment providers.

W6.2c

Please choose the option that best explains why your organization does not integrate water management into its business strategy and discuss any future plans to do so

Primary reason	Please explain

W6.3

Does your organization have a water policy that sets out clear goals and guidelines for action?

Yes

W6.3a

Please select the content that best describes your water policy (tick all that apply)

Content	Please explain why this content is included
Publicly available Company-wide Performance standards for direct operations Acknowledges the human right to water, sanitation and hygiene Other: Incorporated within group environmental, sustainabililty or EHS policy	Publicly available: Efficient use and conservation of water, minimizing emissions to water, and 2020 targets on water and micro-pollutants are explicitly stated in the Novartis HSE Policy available to public: https://www.novartis.com/about-us/corporate-responsibility/resources/codes-policies-guidelines Company-wide: Novartis HSE Policy and water targets are valid for all operations, with a priority for water savings. The water quality requirements and drug substance effluent targets are valid for all manufacturing locations that process drug substances. We apply specific targets and program actions for sites in water-scarce areas. Performance standards for direct operations: Direct operations have to report comprehensive water data, and depending of water scarcity levels, must implement water savings programs. Drug substance effluent targets and effluent controls are implemented at all sites processing drug substances. Performance standards for suppliers: Responsible Procurement programs, including the Novartis Supplier Code, questionnaires, surveys and supplier audits cover water consumption and water effluent parameters. Incorporated within group policy: The efficient use and conservation of water, minimizing emissions to water, and 2020 target on water and micro-pollutants are explicitly mentioned in the Novartis HSE Policy. Acknowledgement for human rights to water: Our Corporate Responsibility Policy and programs implicitly include water/sanitation/hygiene.

W6.4

How does your organization's water-related capital expenditure (CAPEX) and operating expenditure (OPEX) during the most recent reporting year compare to the previous reporting year?

Water CAPEX (+/- % change)	Water OPEX (+/- % change)	Motivation for these changes
0	-1.0	Operational costs for water supply and treatment decrease by 1.0% in 2016 compared to 2015. The reduction is a result of small changes at several locations and might be impacted by changes in water prices.

Further Information

Page: W7. Compliance

W7.1

Was your organization subject to any penalties, fines and/or enforcement orders for breaches of abstraction licenses, discharge consents or other water and wastewater related regulations in the reporting year?

Yes, not significant

W7.1a

Please describe the penalties, fines and/or enforcement orders for breaches of abstraction licenses, discharge consents or other water and wastewater related regulations and your plans for resolving them

Facility name	Incident	Incident description	Frequency of occurrence in reporting year	Financial impact	Currency	Incident resolution
East Hanover, USA	Fine	Incident date: 30 Jan 2014 Fine issued: 22 Apr 2016 Description: Fine issued due to Total Suspended Particulate (TSP) emissions above the established value, due to a baghouse unit not operating as designed during the stack testing period.	0	1000	USD($)	Operation of the unit was ceased and corrective measures were implemented immediately.
Rovereto, Italy	Fine	Incident date: 10 Jul 2015 Fine issued: 05 Oct 2016 Description: Fine issued due to WWTP emissions in the water, due to a valve malfunction during shut-down and cleaning operations at the waste water treatment plant.	0	183	EUR(€)	Corrective actions have been implemented to prevent recurrence including review of the design and installation of a second safety valve in cascade.

W7.1b

What proportion of your total facilities/operations are associated with the incidents listed in W7.1a?

1.8%

W7.1c

Please indicate the total financial impacts of all incidents reported in W7.1a as a proportion of total operating expenditure (OPEX) for the reporting year. Please also provide a comparison of this proportion compared to the previous reporting year

Impact as % of OPEX	Comparison to last year
0	No change

Further Information

Page: W8. Targets and Initiatives

W8.1

Do you have any company wide targets (quantitative) or goals (qualitative) related to water?

Yes, targets and goals

W8.1a

Please complete the following table with information on company wide quantitative targets (ongoing or reached completion during the reporting period) and an indication of progress made

Category of target	Motivation	Description of target	Quantitative unit of measurement	Base-line year	Target year	Proportion of target achieved, % value
Reduction in consumptive volumes	Water stewardship	Implement water saving programs at the top water scare sites with highest water footprint and water scarcity: achieve 25% savings compared to 2010.	Other: % Water savings relative to water footprint (water that needs cleaning and water lost)	2010	2020	16%
Water pollution prevention	Water stewardship	site effluents 10-fold below "no-effect" concentration at receiving surface water	Other: number of sites who were included in the target	2010	2020	50%

W8.1b

Please describe any company wide qualitative goals (ongoing or reached completion during the reporting period) and your progress in achieving these

Goal	Motivation	Description of goal	Progress
Other: Active water management program at water scarce sites	Water stewardship	Novartis is committed to managing water resources wisely and effectively and minimizing its water footprint through water recycling and savings, particularly at locations where water is scarce. Since 2010 Novartis has been implementing a water savings program assessing water scarcity and water footprint and aiming for water saving of 25% for top scarce sites. Water audits are conducted, local water flows are determined, water saving opportunities evaluated and implemented.	The top scare sites located in South and South-East Asia, the US and Europe has implemented water saving projects, achieving about 20% savings on their total water footprint since 2010.
Watershed remediation and habitat restoration, ecosystem preservation	Water stewardship	Creek bed project in San Carlos, to prevent flooding of the Novartis production building during heavy rain. This project encompasses dredging the creek and re-establishing the native vegetation. In 2016 maintenance work has been done to bring back 80% native vegetation. Additional to this Novartis complied a watershed study to see what else besides dredging could be done. The preferred proposal is an upsized bypass culvert which will be a joint effort between government, regulatory agencies and local	The strategy to prevent flooding by an upsized bypass culvert is currently validated by the agency. The time estimated to realize this project is 3 years with a total cost of USD 14.2 mio.

Goal	Motivation	Description of goal	Progress
		industries, including Novartis.	

W8.1c

Please explain why you do not have any water-related targets or goals and discuss any plans to develop these in the future

Further Information

Module: Linkages/Tradeoff

Page: W9. Managing trade-offs between water and other environmental issues

W9.1

Has your organization identified any linkages or trade-offs between water and other environmental issues in its value chain?

Yes

W9.1a

Please describe the linkages or trade-offs and the related management policy or action

Environmental issues	Linkage or trade-off	Policy or action
Greenhouse gas emissions	Trade-off	Cooling water usage: Several Novartis sites in Austria, Italy, Spain and Slovenia use large quantities of water from river side banks to cool their production processes and additional sites in e.g. Switzerland use cooling water from a nearby river for comfort cooling of offices and groundwater to cool data centers. At these sites the quantity and temperature of the water is important for the efficiency of cooling rather than the water quality. Mechanical chillers could provide cooling instead of using free cooling with water and thus reduce the use of cooling water; however, this would increase energy use, energy costs and energy-related GHG emissions significantly. We estimate that energy and related GHG emissions would increase be 20-30% at these sites, if water was not available anymore for cooling. With their approach to use water for cooling instead of electricity, these sites effectively contribute to the Novartis energy efficiency program and to the related GHG targets. The compromise on the water consumption is rated less important; due to the fact that such cooling methodology is applied in areas where fresh water sources are abundant and slight increase in temperature is marginal.
Energy and water treatment efficiency	Linkage	Water treatment technology: A wastewater treatment technology based on fine-bubble diffused aeration has been introduced in Ireland in 2014. This technology is more energy efficient and more effective in the decomposition of pollutants. This has led to significant reductions in the emissions of key pollutant parameters: Total Suspended Solids, Chemical and Biochemical Oxygen Demand and Total Nitrogen were reduced by 62 to 88%. The new technology can be readily retrofitted to other facilities that use an aerobic wastewater treatment process (incorporating activated sludge) and can be scaled in size for multiple plants and various capacities. Currently 2 sites have now installed this technology, which also offers the potential to reduce discharges of residual APIs to the environment. Many of these substances adsorb onto activated sludge – more of which is now retained in the wastewater treatment plant to be subsequently removed as a solid for incineration. The new technology helps Novartis to achieve both energy and related climate, as well as water footprint targets. Less water to be cleaned and more effective treatment reduces quantity of water for treatment, water effluent related costs, as well as amounts of pollutants remaining of the effluents of treated water.
GHG reduction by water reuse	Linkage	Water recycling: 2016 a site in Slovenia (Ljubljana) implemented a project to reuse steam condensate for sanitary utilities. The goal of the project was to optimize the energy consumption and thus saving energy and cost. The thermal energy consumption is reduced by 1'100 GJ/year, which results in a GHG reduction of 61tons CO2e/year. By this measure, the fresh water consumption of the site could be reduced by 240m3/year. Currently 6 Novartis sites in Europe implemented a similar project for reuse of steam condensate.

Further Information

Module: Sign Off

Page: Sign Off

W10.1

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

Name	Job title	Corresponding job category
Mr. André Wyss	President, Novartis Operations	President

W10.2

Please indicate that your organization agrees for CDP to transfer your publicly disclosed data regarding your response strategies to the CEO Water Mandate Water Action Hub.

Note: Only your responses to W1.4a (response to impacts) and W3.2c&d (response to risks) will be shared and then reviewed as a potential collective action project for inclusion on the WAH website.

By selecting Yes, you agree that CDP may also share the email address of your registered CDP user with the CEO Water Mandate. This will allow the Hub administrator to alert your company if its response data includes a project of potential interest to other parties using water resources in the geographies in which you operate. The Hub will publish the project with the associated contact details. Your company will be provided with a secure log-in allowing it to amend the project profile and contact details.

Yes

Further Information

CDP