

Module: Introduction**Page: Introduction**

CC0.1**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 a 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.

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
United States of America
Germany
Switzerland
India
Italy
Slovenia
Austria
Ireland
United Kingdom
Turkey
Spain
China
Singapore
Rest of world

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.

USD(\$)

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

- Group level governance:

The Health, Safety, Environment Steering Committee is chaired by the Novartis CEO, Joseph Jimenez, which is responsible for authorizing and sponsoring the environmental strategy. In the reporting year 2016, this role was delegated to the Head of Corporate Responsibility, Jürgen Brokatzky-Geiger, who reports directly to the CEO. The HSE Steering Committee included the global heads of manufacturing of all Novartis Divisions, the Head Real Estate and Facility Services of the shared services unit, and the Head of Health Safety Environment and Business Continuity Management (HSE&BCM). 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, Andre Wyss, member of the Executive Committee Novartis (ECN) and reporting directly to the CEO, is the ECN Executive Sponsor of the HSE&BCM Governance Board, which authorizes and sponsors the environmental strategy, including climate and water aspects. A new network of environmental sustainability professionals is in development to support the new corporate structure and more actively incorporate climate mitigation and climate adaptation considerations into daily business. During 2016, Novartis invested in four new global positions to in the domains of climate, water resources, materials and waste,

and environmental supply chain issues in an integrated, holistic approach as a team reporting directly to the Global Head of Environment.

- Undivided Line Management Responsibility:

All aspects of HSE&BCM at Novartis, including energy and climate, are the undivided responsibility of line management at the various organizational levels (site, country, Division, Group), who are supported by functional units with respective technical expertise.

- Functional Units on Energy and Climate:

At Divisional level, Novartis has previously assigned global energy managers to manage the divisional energy and greenhouse gas (GHG) emission reduction programs. Decisions on divisional energy and climate strategies were included in the annual HSE Group-level Management Reviews with all Divisions, and have been a regular agenda item of the HSE&BCM Steering Committee. At country and site levels, local energy manager functions and committees (depending on the size of the site) have been assigned to manage local energy efficiency programs. Energy use and GHG emissions are part of the HSE management system, managed by a network of corporate, divisional and site HSE functions. Targets on energy efficiency improvements and climate strategies are included in the individual targets assigned to Health, Safety and Environment Officers (HSEOs), divisional and site-based energy managers and line managers at various levels of the organization. HSE Officers, energy managers, and line managers who have been assigned energy targets receive cash bonuses when these are achieved or exceeded.

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
Corporate executive team	Monetary reward	Emissions reduction target	Divisional managers, who are members of the Novartis Executive Committee, are rewarded for meeting division specific absolute emission reduction targets on total Scope1 and Scope2 GHG (in tons CO2e) and CO2 emissions from vehicles fleet (in tons CO2).

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
Corporate executive team	Monetary reward	Emissions reduction project Emissions reduction target Energy reduction project Energy reduction target Efficiency project Efficiency target Other: Behaviour change related indicator	The Global Head Corporate Responsibility is rewarded for the corporate absolute emission reduction targets on total Scope1 and Scope2 GHG (in tons CO2e), CO2 emissions from vehicles fleet (in tons CO2) energy efficiency and energy savings targets (savings from energy projects in USD, GJ and tCO2e). His targets also include other environmental, HSE and sustainability targets.
Other: Environment/sustainability managers	Monetary reward	Emissions reduction project Emissions reduction target Energy reduction project Efficiency project Efficiency target Supply chain engagement Other: Behaviour change related indicator	Environmental managers (on group and divisional levels) are rewarded for meeting group or division specific absolute emission reduction targets on total Scope1 and Scope2 GHG (in tons CO2e), CO2 emissions from vehicles fleet (in tons CO2) and energy savings targets (savings from energy projects in USD, GJ and tCO2e). On Group level, targets also include emission reduction and energy efficiency projects, as well as behaviour change related projects and related indicators.
Energy managers	Monetary reward	Emissions reduction project Emissions reduction target Energy reduction project Efficiency project Efficiency target	Energy managers are rewarded for meeting site specific absolute emission reduction targets on total Scope1 and Scope2 GHG (in tons CO2e), CO2 emissions from vehicles fleet (in tons CO2) and energy savings targets (savings from energy projects in USD, GJ and tCO2e).

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
All employees	Recognition (non-monetary)	Emissions reduction project Energy reduction project Efficiency project Efficiency target Other: Behaviour change related indicator	Environmental Sustainability in CR Awards programs rewards associates who develop energy saving projects or environmental projects such as water footprint, sustainable packaging or waste and emission reduction.
Other: Country Managers	Monetary reward	Emissions reduction target Efficiency target	Country managers are rewarded for reducing CO2 emissions from the vehicles fleet and for energy efficiency of their commercial buildings.

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 geographical areas in which we operate are considered. These, among others, include: USA, Germany, Switzerland, India, Italy, Slovenia, Austria, Ireland, UK, Turkey, Spain, China, Singapore (in the order of size of GHG emissions in these countries)	> 6 years	Novartis manages risks proactively by implementing appropriate preventive and contingency measures. Risks include all climate change and environment-related potential risks and opportunities including natural disasters such as floods, drought, storms and earthquakes; health risks to people e.g., pandemic; safety such as fire and explosions; environmental risks such as sea level rise, water scarcity, spillage, soil contamination, water pollution; and climate risks related to business continuity e.g., because of above listed risks related to climate change and others.

CC2.1b

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

Risk/opportunity assessment at company level:

Novartis risk management process is designed to reduce the residual risk of an event – in terms of its likelihood of occurrence and severity of its consequences – to an acceptable level for the company overall and for individual facilities. The two most important tools at Novartis for HSE risk management, including climate change and other environmental impacts, are 1) HSE&BCM risk portfolios, developed at all sites and consolidated at group level; and 2) HSE inspections. In addition, for business-related risks, Business Continuity Management (BCM) processes and Novartis Emergency Management (NEM) processes are implemented as integral parts of the Group risk management framework.

Novartis develops risk portfolios covering all aspects of HSE&BCM annually. HSE&BCM inspections also cover issues related to climate change and are conducted according to an annual audit plan. Selection of sites to be audited depends on the respective risks expressed in the risk portfolio, as well as operational changes, regulatory changes and/or newly identified emerging risks. All major sites are audited on a three to five-year cycle, based upon the criteria for preparation of the audit plan in consideration of the foregoing criteria mentioned.

Planning started in 2016 for the first integrated global climate risk and resilience assessment. This assessment will span multiple years and focus on informing targeted investments to make Novartis operations more resilient in the face of increasing vulnerabilities associated with climate change.

Risk/opportunity assessment at an asset level:

Individual risk, defined in terms of likelihood of occurrence and severity of its consequences, are evaluated and described by each site by local experts and included in the risk portfolio. A formalized follow-up procedure on the results of HSE inspections is in place according to which corrective actions are implemented by the individual facility.

CC2.1c**How do you prioritize the risks and opportunities identified?**

Criteria to determine materiality/priorities:

HSE&BCM risk portfolios are based on a bottom-up approach, developed at each site and consolidated on divisional and group levels. Risks are expressed in terms of severity and probability of occurrence, and the risk evaluation and management process includes necessary steps to evaluate measures for reducing both severity and probability of occurrence and for increasing control levels to the defined acceptance level.

The consolidated Corporate Risk Portfolio is presented to and discussed with the Risk Committee of the Board of Directors (BoD). Action plans for the risks above risk acceptance levels have been developed and are being implemented. Audit results are reported to HSE Steering Committee at each meeting and to the BoD Risk Committee.

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**

Novartis' strategy is to use science-based innovation to deliver better patient outcomes in growing areas of healthcare. 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' environmental strategy has four priority areas: energy and climate, water and micro-pollutants, material & waste, and supply chain. We committed to two major milestones on our long-term pathway to carbon neutrality. We established GHG targets on Scope 1+2 of -30% by 2020 and of -50% by 2030, versus 2010. Novartis has made sustained progress in those areas and is examining how to achieve more rapid progress in alignment with the UN Sustainable Development Goals. The newly created positions of Head of Climate and Head of Environmental Supply Chain in the Global Environment function, work in tandem to create new global operating procedures across the company that align with new corporate organizational structures.

We have a dual strategy for GHG reduction, primarily from energy and fuel usage, i.e., to improve energy efficiency and to adopt renewable energy sources. Efficiency serves as the foundation for all other efforts, making implementation of distributed generation, distributed storage and demand response management more effective in reducing GHG emissions and building climate resilience in support of business continuity.

I) How business strategy is influenced:

Research has shown that companies who focus on sustainability achieve more positive financial returns because of the long-term focus on the resilience of the company. Novartis management is also guided by input from a variety of stakeholders in developing climate change requirements. The influence of activist investors, non-profit organizations and shareholders is increasingly impacting how policy is crafted. Organizations like the UN and WBCSD have had lasting impact on policy through convening efforts, framework development and constant access to new technical and benchmarking data. Internally, we ensure progress by target setting, performance reporting and an annual process of management review.

(ii) What were most substantial business decisions in 2016:

- Creation of four new positions to fully staff the Global Environment office with a holistic vision across environmental sustainability issues.
- Novartis piloted two projects in non-financial impact valuation for our environmental and sustainability efforts.

iii) What aspects of climate change have influenced strategy:

Business and operations may 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 become 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.

iv) Most important components of short-term strategy:

We take aspects of climate change into account when implementing strategies across our operations. - High carbon intensity in India and China is leading us to focus on these markets to reduce our carbon footprint by increasing efficiency through a combination of technology adoption, behaviour change and business process innovation. Projects like the Trigen on our Shanghai campus and the LEED Platinum certified building on our Hyderabad campus are examples of best practices that will be replicated across our global enterprise.

- Development of a coherent renewables strategy will allow us to take a portfolio approach to GHG emission reduction through a mixture of power purchase agreements, onsite generation, renewable energy attributes and other developing renewable energy or low carbon technology. Current planning efforts include wind projects that provide additionality in the US and Belgium as well as the creation of a project selection process that will lead to a consistent pipeline of renewables projects globally.

- Novartis is also focused on process innovation across the new organizational structure. Barrier identification and removal are a focus area, and more streamlined processes will be incorporated into new global operating procedures.

v) Most important components of long-term strategy:

Climate risk assessments: systematic, multi-phase assessments of the impact of sea level rise, urban flooding events, heat events and other destructive impacts from climate change will become the basis for long term facilities and resiliency investments and capability development. This should be done in partnership with academia and non-profit organizations such as WBCSD in order to ensure a holistic world view in our assessments across the 110 countries in which Novartis operates in today, as well as where we may be operating in the future.

Incorporation of new technologies: Not only operations factors related to energy efficiency, carbon intensity and pricing will be more relevant for Novartis and require the application of new technology in buildings, clean room air conditioning and application of renewable resources such as wind, solar and geo-thermal energy.

(vi) How this is gaining Novartis strategic advantage:

We have been working towards a 2-degree scenario to support targets established in the Paris Agreement, and are considering more ambitious scenarios. A data based analysis of climate risks will allow us to accurately assess where we can reduce our risk through adaptation, as well as disclose those risks that may have a direct impact on business continuity and risk management. Our efforts will parallel and augment INDCs agreed to at Paris. This ability to identify long-term requirements will allow us to proactively respond to changing ecosystems and maintain competitive advantage. Additionally, an ambitious sustainability agenda may provide reputational benefit that will allow us to position favourably with ESG investors, creating value for shareholders. With the leading position on tropical diseases such as malaria, Novartis is better prepared than competitors for these diseases related to climate change effects, as these will become more important or even critical to health care systems in a growing number of affected countries. This position gives Novartis an advantage in market such as in Africa, where malaria and other vector diseases are spreading further.

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

Novartis leadership has endorsed a carbon price of USD 100 per ton (t) of carbon dioxide equivalents, in line with the cost of climate change to society as calculated by the World Bank. Building a carbon price into investment decisions is important as it helps identify projects that will most cost-effectively reduce GHG emissions.

This shadow price of carbon informed decisions on several refurbishment and maintenance projects, leading to more efficient equipment that was installed because of routine upgrades as well as guiding discussion on planning for future capital projects.

New HSE&BCM global operating procedures will assign roles and responsibilities across Novartis as organizations have been merged and efficiencies in staffing gained. The new procedures will take advantage of leadership structures that have combined responsibility for energy supply and demand in a single global office, allowing for new opportunities to make targeted investments in efficiency and resilience that make sense for the global enterprise.

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

Other

CC2.3a

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

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
Climate finance	Support	We support the efforts of the Task Force on Climate-related Financial Disclosures through participation in meetings as well as review and comment on proposed reporting requirements.	Climate risk financial disclosures are a feasible tool to help focus on monetary valuation of climate impacts that may be material to a company.
Cap and trade	Support	We report GHG emissions from totally 6 sites in the European Union as part of the EU-Emission Trading System (EU-ETS). We consider carbon emission trading an effective tool for supporting targets achievement of emission reductions.	We support the development of the EU-ETS to make it more effective and more practical. We also support the spreading of emission trading in other countries outside the EU.
Mandatory carbon reporting	Support	We participate and contribute to initiatives conducted by the World Business Council for Sustainable Development (WBCSD), Global Reporting Initiative (GRI) and corporate sustainability reporting such as The GHG Protocol, Natural Capital / True Value Reporting	We consider standardized Corporate Reporting and carbon reporting an effective tool for disclosure to and engagement with stakeholders as well as internal decision making. If practical and in line with existing globally accepted approaches legislative systems on mandatory corporate reporting could be additionally beneficial to further increase the best practice corporate reporting to additional companies.
Carbon tax	Support	We have voluntarily set an internal carbon price of USD100 per ton CO2e as a shadow price for more effective and better aligned decision making on GHG emission reduction. We work with organizations such as the WBCSD, UN-Global Compact, Ceres, C2ES and others to support spreading the concept of carbon pricing.	We support the position of e.g. the WBCSD that allocating a true price to carbon will be effective in mitigating climate change. We have set and implement our own shadow price on carbon of 100USD/tCO2e, sufficiently high to represent the true cost of climate change and to have a relevant influence on energy costs. A price of carbon in national markets will also increase the adoption of efficiency and renewables, scaling those assets in the local markets and making it more affordable to implement while also providing benefit through lower carbon intensity in the grid.
Energy efficiency	Support	We have implemented a comprehensive energy management and energy efficiency program, including energy audits, energy reporting and challenging energy use in capital projects. With that we were successfully anticipating emerging legal requirements such as by the EU-Energy Efficiency Directive.	We consider energy efficiency and effective management measures on energy efficiency as a feasible tool for decision making and improvements. Legislative systems on energy efficiency may additionally help to spread such best practice
Clean energy generation	Support	We continue to increase our portion of purchasing carbon-free or non-fossil based renewable electricity as a measure to further reduce our GHG emissions. Thereby, we give renewable based electricity a better market acceptance and higher chance to penetrate the electricity market. We are engaged with Ceres to support carbon pricing in the Massachusetts market.	Renewables based electricity can only gain broader acceptance if accepted by consumers. Increased renewable portfolio standards will allow us to more rapidly achieve our carbon reduction goals in bounded markets.

CC2.3b

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

No

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?
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CC2.3d

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

CC2.3e

Please provide details of the other engagement activities that you undertake

1) World Business Council for Sustainable Development (WBCSD):

- i. Method of engagement: Novartis primary method of engagement is being an active member of the WBCSD since its foundation in 1997, contributing to the work-streams of the WBCSD's focus areas and projects.
- ii. Topics of engagement: Novartis actively contributes to work-streams on PPAs, country deep dives for Power Purchase Agreements in India and China, Energy and Climate, Energy Efficient Buildings, Water and Ecosystems Services and Development. Novartis experts regularly participate in WBCSD meetings and working group activities. Novartis has also shared results of its sustainability impact evaluation projects in Kenya and China with fellow WBCSD members.
- iii. Nature of engagement: Novartis experts provide case studies and example to strengthen WBCSD's work towards international negotiations on Climate Policy with feedback on proposals and own contributions. Recently we provided a case study on the challenges that a corporate customer faces in negotiating virtual offsite power purchase agreements. Engagements at WBCSD allow us to provide information to our peers as well as benchmarking against companies that have made more progress than Novartis in sustainability efforts. This dialogue continues to provide motivation as well as new strategies to move forward with more ambitious sustainability goals.
- iv. Actions advocating: Novartis will continue to work with WBCSD to promote the use of power purchase agreements as a large portion of corporate portfolios for greenhouse gas emissions reductions.

2) United Nations Global Compact (UN-GC):

- i. Method of engagement: Novartis is a founding member of UN-Global Compact. Klaus Leisinger, former head of the Novartis Foundation for Sustainable Development, was an advisor to the UN Secretary General Kofi Annan for the scoping of actions and implementation of the UN Global Compact for many years; supporting the Secretary General both on substance and process of the compact.
- ii. Topic of engagement: Novartis is actively participating in working groups and reports to UN-GC on all aspects required, including on Energy and Climate. Representatives of Novartis are regularly participating in meetings of UN-GC.
- iii. Nature of engagement: Novartis continues to develop Science Based Targets as part of our pledge to UN-GC in 2015.
- iv. Actions advocated: Novartis continues to align its sustainability efforts to UN Sustainable Development Goals, and is crafting new engagement strategies that will support future revisions in our sustainability vision that more holistically incorporate these elements.

3) Pharmaceutical Supply Chain Initiative (PSCI)

- i. Method of Engagement: Novartis attends meetings and participates in work stream efforts as a partner with leading pharmaceutical companies seeking to improve sustainability across all levels of the extended supply chain.
- ii. Topic of engagement: Pharma companies engaged in benchmarking and coordination to share best practices across wide range of sustainability and third party risk management issues.
- iii. Nature of engagement: Novartis supports benchmarking with responses to questionnaires, participation in discussions, input to case studies and sharing best practices.
- iv. Actions advocated: Development of go/no-go vendor selection criteria on a range of sustainability issues will allow for more consistent engagement with reputable firms that share our focus on values based behavior that supports the communities that we work in.

4) Cambridge Compact

- i. Method of Engagement: Novartis, as a founding member of the Cambridge Compact, was the first private corporation to join and has been active in a leadership role for many years as well as contributing to specific working groups.
- ii. Topic of engagement: Cambridge Compact is focused on developing more sustainable business practices and a more resilient community in Cambridge, Massachusetts. This is done in partnership with industry, academia and non-profits. Novartis has led the local effort to explore ways to achieve a Net Zero laboratory environment, which would have significant benefit to Cambridge given the large number of labs in the Cambridge area due to a high concentration of academic research labs and commercial industry labs in the city.
- iii. Nature of engagement: Novartis has hosted multiple meetings on campus, organized sessions to focus on design of Net Zero labs through adoption of technology and changes in behavior, and has spoken on panels and in meetings to advocate for adoption of technology and behaviors to reduce consumption and increase climate resilience across Cambridge.
- iv. Actions advocated: Novartis works with other Cambridge Compact members to advocate for a price of carbon in Massachusetts, integrated climate risk assessments in the city, and targeted investment in climate resilience to reduce sea level rise impacts, urban flooding and heat events on local citizens.

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?

Active members and participants in the WBCSD and UN-GC activities are members of either top management or corporate functional managers of the Company: World Business Council for Sustainable Development (WBCSD):
The CEO is a Council member and the Global Head HSE&BCM and the Global Head of Environment are liaison delegates to the WBCSD. The Global Head Corporate Responsibility and the Global Head HSE&BCM participates in Council meetings representing the CEO when not available. The Global Head of Environment, Head of Climate, and other experts in the global function participate in dedicated meetings and actively contribute to projects and work-group activities. Novartis signed the manifesto for Energy Efficient Buildings of the WBCSD; we are applying our GHG reporting to the GHG Protocol, developed by WBCSD and WRI, and we use the Global Water Tool for setting water efficiency targets and tailoring our water efficiency program.

United Nations Global Compact (UN-GC): The CEO is active members of the UN-GC organization and functional managers of our groups in HSE&BCM and Corporate Responsibility are actively involved in UN-GC related activities. We signed the pledge Caring for Climate

Novartis reporting and disclosure on sustainability and energy and climate are included in our corporate responsibility reporting, which is aligned with GHG Protocol, GRI and UN-GC requirements. The 2016 Corporate Responsibility Report is structured in accordance with the GRI and UN-GC requirements.

CC2.3g

Please explain why you do not engage with policy makers

Further Information

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?

Absolute 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
Abs1	Scope 1+2 (market-based)	100%	30%	2010	1580000	2020	No, but we are reporting another target which is science-based	The target is to reduce combined Scope1 and Scope2 GHG emissions by 30% by 2020 and 50% by 2030 based on 2010 emissions. This target is split into annual reduction targets and specific targets for several different types of GHG reduction opportunities. The baseline of 1580kt is slightly corrected with respect to the actual 2010 emissions to include acquisitions after 2010 in the baseline and will be further adapted for future acquisitions and/or divestments. The status achieved in 2016 is 14.2% reduction of emission from our industrial operations plus 4.2% carbon sinks of additional GHG reductions achieved at our own forestry projects.
Abs2	Other: Scope1 GHG emissions from vehicles	100%	50%	2010	206100	2020	No, but we are reporting another target which is science-based	The original target for scope 1 GHG emissions from vehicles (-30% by 2015 based on 2010 emissions) was increased in 2015 to -50% by 2020. Reductions were achieved by using more fuel-efficient vehicles through the introduction of hybrid gasoline-electric cars, increased use of diesel engines fitted with particulate filters, and other emission reduction options such as liquid natural gas or bio-fuels or also electric cars, as well as conservative driving styles. Ongoing measures will allow us to further reduce these emissions in the coming years.
Abs3	Scope 1+2 (market-based)	100%	50%	2010	1580000	2030	Yes, but this target has not been approved as science-based by the Science Based Targets initiative	The Novartis long-term GHG target is to reduce combined Scope1 and Scope2 GHG emissions by 50% by 2030 based on 2010 emissions. The baseline of 1580kt is slightly corrected with respect to the actual 2010 emissions to include acquisitions after 2010 in the baseline and will be further adapted for future acquisitions and/or divestments. The status achieved in 2016 is 14.2% reduction of emission

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
								from our industrial operations plus 4.2% carbon sinks of additional GHG reductions achieved at our own forestry projects. The -30% by 2020 and -50% by 2030 Scope1+2 targets have been confirmed to be science based by response from the SBT initiative, being two major milestones to carbon neutrality in the second half of the 21st century, as expected by UN-FCCC.

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
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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
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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
Abs1	60%	61.3%	Novartis reduced total scope 1+2 GHG emissions by 14.2% for Novartis industrial operations and 18.4% when Novartis forestry carbon sink projects are additionally considered. This represents almost two third of the 30% reduction target for 2020 achieved.
Abs2	60%	69.2%	Novartis has reduced GHG emissions from vehicles by 34.6% in 2016 based on the 2010 baseline, which represents 69% of the 50% reduction target for 2020.

ID	% complete (time)	% complete (emissions or renewable energy)	Comment
Abs3	30%	36.8%	The 2030 target was formulated as a long-term supplement to the 2020 target on total Scope1+2 GHG emissions. The 18.4% reduction achieved after 6 years of the total 20 years' target period (30%) represents a reduction of already 36.8% of the 50% reduction target.

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	<p>Sandoz, the generic products business unit of Novartis, is a leading producer of anti-infective Active Pharmaceutical Ingredients (AI APIs). Our manufacturing portfolio of AI APIs is predominantly located in Europe (Austria, Germany, Italy, Slovenia and Spain). Sandoz/Novartis is one of the few pharma companies that produces AI APIs outside China and India. We put high efforts in the energy efficiency of our manufacturing processes for AI APIs and achieved up to 30% energy efficiency improvement of these processes over the last 10 years. Furthermore, the carbon intensity of the energy used at our locations in Europe is by far lower compared the carbon intensities in China and India. Carbon Footprint LCA assessments of our AI API products have demonstrated that the per ton carbon impact of our products is in the order of magnitude of 16kgCO2e/kg API compared to 35 to 48 kgCO2e/kgAPI when produced in China or India. They have a 2 to 3 times lower carbon footprint compared to most other AI APIs. Therefore, we consider the Sandoz AI APIs as low-carbon products.</p>	Low carbon product	Other: Carbon footprint LCA study	4%	Less than or equal to 10%	Carbon Footprint LCA assessments of our AI API products have demonstrated that the per ton carbon impact of our products is in the order of magnitude of 16kgCO2e/kg API compared to 35 to 48 kgCO2e/kg API when produced in China or India.

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 CO ₂ e savings in metric tonnes CO ₂ e (only for rows marked *)
Under investigation	8	271500
To be implemented*	5	1800
Implementation commenced*	1	350
Implemented*	6	217200
Not to be implemented	0	0

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
Low carbon energy purchase	Off-site Wind PPA in USA (under investigation): Novartis started the process to receive bid for entering a major wind virtual off-site power purchase agreement (PPA) Texas, USA to offset carbon across the US. The size considered is 100MW and represents additionality into the market. This has the potential to offset as much as 70% of our US carbon footprint while generating revenue to fund sustainability efforts in other markets.	220000	Scope 2 (location-based) Scope 2 (market-based)	Voluntary	2000000	200000	1-3 years	11-15 years	Initiative under investigation: Savings represent value of anticipated revenue generated by sale of electricity in the market. Third party financing is being used, and our investment up front is the administrative cost to select the contract and put the contract in place.
Low carbon energy installation	On-site solar PPA in USA, Europe and Asia (under investigation): Novartis investigated expanding its on-site solar energy capacity from 1.5MW to over 15MW with solar PV and solar thermal opportunities at 8 sites in the USA (California, New Jersey and Colorado), projects in Europe (UK,	20000	Scope 2 (location-based) Scope 2 (market-based)	Voluntary	7500000	33800000	4-10 years	16-20 years	Initiative under investigation.

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
	Ireland, Belgium) and Asia (India and Singapore). Novartis will structure these projects as on-site Power Purchase Agreement (PPA) contracts.								
Energy efficiency: Building services	Energy Management Program with regional Facility Services providers (to be implemented): Novartis currently investigates possibilities to actively engaging facility management service providers at its sites into energy management programs. Part of the energy efficiency programs as conducted in the past by Novartis-own engineering and facility management groups will be transferred to third party service providers. Estimated savings range between 0.8 and 1.2% of energy use/cost and equal amount of related carbon	20000	Scope 1 Scope 2 (location-based) Scope 2 (market-based)	Voluntary	1000000	5000000	4-10 years	11-15 years	Initiatives under investigation.
Other	Forestry carbon-sink projects (implemented):	67000	Scope 1	Voluntary	0	5800000	16-20 years	>30 years	Initiatives implemented: The total

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
	<p>The four Novartis-owned carbon-sink forestry projects in Argentina, Colombia, Sichuan, China and Mali are becoming highly valid contributors on our total GHG balance. In the reporting year 2016, the most advanced projects in Argentina and Mali contributed 67.0ktCO2e GHG savings. Projects in Sichuan, China and Colombia do not contribute carbon-sink yet, as the China project shows a lower growth rate and the Colombia project was commenced 2 years ago. At these 2 locations, careful selection and planting of tree species continued in 2016: climate-adapted seedlings and optimized planting methods helped increase the survival rate with the local climatic conditions of the plantations. Cost savings from these projects will only occur in the future and from the</p>								<p>cost for the four projects in the calendar year 2016 remained comparable to 2015 (USD 5.8mio). It covers investment costs for the installations of plantations, the maintenance of plantations and additional cost for carbon management (monitoring, verification etc.).</p>

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
	projects in Argentina and Colombia only as these are considered a forest operation business case. Additional environmental and social benefits from these forestry projects have been quantified during our work on Natural Capital Assessment.								
Low carbon energy installation	Trigen (implemented): Optimization of trigen technology in 2016 on site in Shanghai lead to additional energy and CO2 savings. Possibilities for the implementation of this technology were assessed for the site in Italy, and Cambridge trigen was installed in 2016 to come online in 2017.	19000	Scope 1	Voluntary	1000000	4000000	4-10 years	16-20 years	Initiative implemented: Novartis will evaluate the economic and environmental feasibility to implement this technology across the network of sites.
Energy efficiency: Processes	Energy efficiency program results 2016 (implemented): Our multi-year energy management / energy efficiency program resulted in the reporting year 2016 in a 19.8kt GHG savings. Related cost and energy savings amounted	19800	Scope 1	Voluntary	5000000	17300000	4-10 years	6-10 years	Initiative implemented: The energy management program includes a detailed energy project accounting system with annual reporting of completed energy projects at all sites

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
	to USD 5mio and 523TJ in 2016. The investment for these projects amounts to USD 17.3 mio, i.e. an average payback of 3.5 years. Energy saving projects in 2016 included the chiller optimizations, waste heat recovery and steam condensate reuse. Over a period of 5 years the total savings amount to more than USD 70 mio and 220kt GHG savings.								globally.
Transportation: fleet	Program on fuel efficient vehicles (implemented): Since 2010 Novartis implements a program to increase the fuel efficiency of its vehicles fleet and reduce related CO2 emissions. A separate global target had been set on this aspect of Scope1 GHG emissions to support the program. In the reporting year 2016, we extended the scope of the program and bought or leased more vehicles under these guidelines,	8200	Scope 1	Voluntary	1500000	0	1-3 years	Ongoing	Initiative implemented: Investments are considered zero, as the vehicles are leased (typically 3 years' lease terms) and lease costs on average are not higher for more fuel efficient than for standard cars. Savings in fuel costs are estimated.

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
	achieving an absolute reduction of 8.2 kt CO2e in 2016 compared to 2015. GHG savings achieved over 6 years since 2010 are at 34.6% or 70kt CO2e compared to a business as usual scenario.								

CC3.3c

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

Method	Comment
Lower return on investment (ROI) specification	Novartis allows a relaxed payback scheme (over the full lifetime of the asset) for energy projects and require that all relevant investment projects include an energy challenge.
Internal incentives/recognition programs	Since 2004, Novartis has sponsored regular Energy Excellence Awards for innovative energy saving and emission reduction projects and achievements at its operations worldwide. The awards recognize outstanding performance in energy management. More recently the scope of the award scheme had been broadened to cover also HSE and CR topics.
Other	Compliance with own group-wide requirements/standards: In 2008, Novartis has issued internal energy and climate procedural requirements and standards for buildings and building/process equipment. The implementation of these standards are controlled by an audit program, with energy and GHG targets, a comprehensive reporting program and with a tight "Energy Challenge" process for all new investments. Two energy challenges were completed in 2016, at Fougera and Lendava.

Method	Comment
Internal price on carbon	Novartis leadership has endorsed a carbon price of USD 100 per ton (t) of carbon dioxide equivalents, in line with the cost of climate change to society as calculated by the World Bank. Building a carbon price into investment decisions is important as it helps identify projects that will most cost-effectively reduce GHG emissions. Starting in 2016, we used this shadow price of carbon to influence analysis of alternatives for future capital projects and to influence decisions on other projects to deliver major GHG reduction projects and measures based on the cost savings they generate, as determined by our internal carbon price of USD 100/tCO ₂ e. A cross-functional team consisting of climate, energy, facility, and procurement global experts prioritize major projects and actions necessary to achieve our 2020 GHG reduction target. Projects are submitted to top management for approval.

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 mainstream reports (including an integrated report) but have not used the CDSB Framework	Complete	p. 7, 30-31, 60, 70-73	https://www.cdp.net/sites/2017/24/13524/Climate Change 2017/Shared Documents/Attachments/CC4.1/novartis-annual-report-2016-en-low-res.pdf	Novartis Annual Report 2016.
In voluntary communications	Complete	p.25-27; 58-74	https://www.cdp.net/sites/2017/24/13524/Climate Change	Novartis Corporate

Publication	Status	Page/Section reference	Attach the document	Comment
			2017/Shared Documents/Attachments/CC4.1/novartis-cr-performance-report-2016.pdf	Responsibility Performance Report 2016

Further Information

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
Cap and trade schemes	<p>EU-ETS: Novartis has 6 sites in the European Union that are part of the European Emissions Trading Scheme (EU-ETS). The total amount of allowances for 2016 is 122,443 tons. With an average price of currently Euro 6 this represents a value of app. Euro 735,000. In 2016, these 6 Novartis sites could keep their GHG emissions managed under EU-ETS at 144442 tonnes (approximately the same level as in 2015), but 18% above the amount of allowances received. The gap was compensated in 2016 with surplus from Phase II, purchase of additional EUAs (in Slovenia and the UK). Allowances will be further reduced during Phase III between 2017 and 2020, while our ongoing energy and GHG reduction program will also allow for further emission reductions over coming years. Most recent experience showed that we were not able to stay</p>	Increased operational cost	3 to 6 years	Direct	Very likely	Low-medium	<p>The 2016 shortage of 18% is valued to Euro 132000 (USD 148000), which so far could be compensated with surplus from previous years, small amounts of EUA purchase and EUA-CER swaps. Over the entire Phase III total cost is not expected to grow over USD 0.5 million per year.</p>	<p>Ongoing strong energy and GHG reduction programs across the organization are in place to work towards the global energy efficiency and GHG reduction targets. The largest sites included in the scheme is the Anti-Infectives manufacturing plant of Sandoz Division in Kundl, Austria. Kundl continued implementation in 2016 of a comprehensive energy management program (being the first site in Austria with ISO 50,000 Energy Management System certification). Major projects of energy efficiency</p>	<p>The EU-ETS sites and Corporate HSE have very little if any additional management cost to comply with EU-ETS. These are limited to some additional monitoring and the verification costs, which are estimated to below USD 0.1 million p.a.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>below the allowances received and will have to compensate the shortage. Additional regulatory risks identified that will increase the financial implications for Novartis are an expected re-increase in the allowance price and the potential introduction of emission trading schemes in other regions or countries (e.g. USA, Canada, Japan, Australia, China).</p>							<p>improvement and related GHG emission reduction are electricity and heat energy savings of the fermentation processes, waste heat recovery from processes and from waste water treatment. The Sandoz site in Rovereto, Italy implemented a project for heat recovery and the generation and internal use of biogas, generated from their high-load waste water and from waste water sludge. In 2016, Novartis implemented a comprehensive energy monitoring system on the Slovenian sites, which allows</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								comprehensive benchmarking and further optimization of the steam boilers, which are in EU-ETS.	
International agreements	With respect to regulatory schemes (such as the continued Kyoto protocol and future national and supra-national legal requirements following the Paris Agreement), Novartis has taken a proactive approach towards existing and forthcoming legal schemes on greenhouse gas (GHG) emissions as set forth in its Corporate Energy and Climate Strategy (adopted by the Executive Committee of Novartis in June 2015 with GHG targets for 2020 and 2030 and reviewed in 2016). Novartis will also be impacted in more general terms, when prices of carbon will become more fully integrated into prices of goods and services, in particularly energy and	Increased operational cost	>6 years	Direct	Likely	Medium	Total energy costs were USD 280 million in 2016 and existing carbon costs were marginal. Energy prices did not increase in recent years. Since the introduction of our energy program in 2008 we have reduced annual energy costs by USD 76 million through projects compared to a business as usual scenario. Future increases in energy prices and the implementation of carbon costs	Ongoing strong energy and GHG reduction programs across the organization are in place to work towards the global energy efficiency and GHG reduction targets. Novartis has put in place an energy project accounting process for all divisions and sites. The mandatory reporting includes investment, energy cost savings, energy savings and GHG emission reduction by	Energy projects over last 5 years had an average payback of 2.6 years. Management costs for the energy management programs at Divisions and sites of app. USD 4-5 million per year were largely over-compensated by the savings of so far USD 71 million p.a. in energy costs achieved by the program over last 7 years; i.e. no

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>water. In view of such integration Novartis has also endorsed by top management to use an internal carbon price of USD100/tCO₂e as shadow price, anticipating the most recent UN-GC call for a company voluntary carbon price of USD100/ton CO₂e at minimum.</p>						<p>may have a stronger impact of estimated 20-30% of energy cost in the long-term, i.e. USD 67-101 million per year.</p>	<p>each implemented project. Novartis has set an energy saving target of 17% energy and related GHG emission saving by 2015 (baseline 2008) and divisions implemented this target specifically at their sites. This internal target was overachieved in 2015 by 17.9% savings, which led to planning in 2016 to engage stakeholders to discuss increasing the level of ambition in the corporate goals. That review, planning and subsequent action resulted in scheduled workshop in 2017 to take</p>	<p>additional costs but rather attractive cost reductions overall.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								further action on revising the goals.	
Emission reporting obligations	<p>Novartis could potentially be exposed to regulatory risks due to the growing importance of these schemes, even though climate change currently has limited direct impact on our industry sector (pharmaceuticals, eye care products and generics), and does not represent a major commercial risk.</p> <p>Expanding requirements on GHG reporting is expected on Scope3, specifically in supply chain impacts, as well as a more complex reporting of Scope2, covering location- and market-based reporting.</p>	Increased operational cost	3 to 6 years	Direct	About as likely as not	Low	<p>Additional costs related to regulatory actions are not expected to be introduced soon or be implemented broadly. In the coming years, it is expected that such costs may be limited to a few countries and thus stay below USD 1 million per year.</p>	<p>The 2016 CR Report is the fourth issue of reports following this new structure based on full GRI and UN-GC reporting requirements and the second with an updated reporting process. Environmental Sustainability forms a major part of the CR Report and reporting on energy and GHG emission reduction performance and targets is a central part. We are constantly challenging our reporting practice and mirror it with</p>	<p>Little additional management costs for the expansion of reporting are expected because of this risk. Group functions on CR Reporting are in place and further challenging and adaptation of reporting practice is not seen to be higher than USD 0.5 million.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								requirements formulated by SRI groups such as DJSI, and business organizations such as GRI and the WBCSD.	
Lack of regulation	We believe that a lack of clear international agreements and national legislation on climate change and respective targets may have a negative impact on our ability to plan measures to reduce climate change impact. Novartis has invested in long-term carbon sink afforestation/reforestation projects, has certified them with formal schemes such as CDM or VCS, and compensates part of its emissions with the carbon sinks gained from these projects. Uncertainty in the application and use of these schemes creates disadvantages for our forestry carbon sink projects and the value of credits developed.	Other: Loss of value of carbon offsets	>6 years	Direct	About as likely as not	Low	As Novartis developed its own forestry carbon sink projects and designed them as a business case, the actual price of credits is not a key parameter in our approach. Additional economic, social and environmental values are created with these projects. We also do not intend to sell the credits. The registration under CDM and VCS are solely made for quality	Novartis will continue its forestry carbon sink projects, and add additional sustainability values (social, environmental, economic) into the projects. We are working towards making the forestry carbon sink projects a business case with an economically positive outcome, which also will secure their long-term continuation and durability of the carbon	Management costs related to these projects are a marginal part of the total costs required to run the four forestry carbon sink projects, which overall is <USD 0.3 million per year.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
							reasons. The effect of low credit prices is rather immaterial, related to the credibility and acceptance of the forestry projects. Any financial implication is not expected to exceed USD 1 million per year.	stocks. An internal 2016 pilot project in impact valuation seeks to create a framework for valuation while a lack of consistency exists externally.	

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
Induced changes in natural resources	Availability of water and energy: Situation: Supply chain assessments of	Reduction/disruption in production capacity	3 to 6 years	Indirect (Supply chain)	Very likely	Medium	Increase in energy and water costs in water scarce areas due to further	The management method applied to this risk is a proactive facility and resource procurement and	Costs associated with running the water savings program are

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>Novartis' direct suppliers conducted annually for the last three years, have shown that several types of material and resource supplies are highly sensitive to water availability and quality. The supply of electricity, almost any type (hydro-electric or thermal) highly depend on the availability of sufficient water. The availability of good quality fresh water is vital for production processes e.g. in chemical synthesis, production of pharmaceuticals and excipients, cleaning of equipment and product.</p>						<p>increased water stress could amount to 20-30% of the site costs. For the top-10 water scarce sites, total energy costs in 2016 were USD 39 million and total water costs were USD 7 million. An increase as estimated above would result in an addition USD8-12million per year.</p>	<p>energy/water management approach that continued in 2016. 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. In case of disruption, substitution measures are in place: recycled water can be substituted by using freshwater and water cooling can be substituted by electric energy. Novartis includes monitoring of water as a priority element in its environmental strategy, monitors water flows and asks sites to actively manage water efficiency where relevant.</p>	<p>marginal, below USD 0.2 million per year for the entire global program.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in precipitation extremes and droughts	<p>Flooding of operations: Situation: Novartis manufacturing operations located in critical areas, e.g. Elbe river plains in Barleben-Magdeburg, Germany and Illinois in the USA Mid-West, the Mumbai area in India and in the Shanghai area in China, could be flooded during severe weather events with respective damages and production interruptions. Flooding risks were even found in California, where local situations could unexpectedly create a flooding risk at severe weather</p>	Reduction/disruption in production capacity	3 to 6 years	Direct	Likely	Medium	<p>Sites must invest in the reinforcement of site infrastructure (larger storm water run-off, dykes, specific building protection, etc.), which is estimated to USD 2-5 million per site or USD 20 to 25 million overall. The total cost for the flood protection project implemented in San Carlos, California amounted to 0.25 million in correction measures on the local creek and protection equipment for the building.</p>	<p>Actions related to flood protection are aspects of site engineering and facility management. Risks are assessed in the annual risk evaluation process, where natural disasters are a regular part of and are prepared site by site. Task: To avoid such events, specific risk assessment and consequently necessary protection measures might become necessary. This will lead to higher costs to keep such risks within acceptable limits. Action: Through 2016, our production site in San Carlos in Central California has implemented a flood protection project, in cooperation with local authorities and neighbouring</p>	<p>Site engineering might use 5-10% more resources over several years when such flood protection projects must be implemented. These additional engineering costs are assessed to 0.4-0.5 million in total over next 5 years.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	events.							firms. Result: With the measures taken the site successfully controlled the risk of flooding and minimized the related consequences for the operation even with record levels of rain in California starting in late 2016. Preparations started in 2016 to advertise and award initial contracts for our first global climate risk assessment that will inform development of global operating procedures and adaptation investments focused on protecting business continuity for critical assets.	
Sea level rise	Flooding of Novartis manufacturing operations at coastal locations:	Increased capital cost	>6 years	Direct	Likely	Low-medium	Sites will need to invest in the reinforcement of site infrastructure	Actions related to flood protection are normal aspects of site engineering and facility management.	Site engineering might use 5-10% more resources over several years

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>Novartis manufacturing operations in coastal locations, e.g. in Batam Island, Indonesia; Tuas, Singapore; Dhaka, Bangladesh; Navi Mumbai, India; Shanghai area, China or Long Island, New York State, USA are potentially at risk to flooding and/or extreme weather events due to sea level rise. We expect higher costs of operation in such areas due to higher demand for protection of areas with high asset values from more frequent and repeated flooding events in such areas, resulting in</p>						<p>(dykes or storm protection) or contribute to larger protection measures undertaken by local governments. This is estimated to USD 2-5 million per site, or 10-15 million for a potential site relocation.</p>	<p>Risks related to natural disasters or climate change induced risks such as seas level rise will be evaluated as part of the annual risk portfolio process. Sites might also be closed as part of overall capacity reassessments. Preparations started in 2016 to advertise and award initial contracts for our first global climate risk assessment that will inform development of global operating procedures and adaptation investments focused on protecting business continuity for critical assets.</p>	<p>when such reinforcements will be implemented. Additional engineering costs are assessed to 0.2-0.3 million, but not within next 5 years. Site closure and/or relocation are expected to be 10 times that amount, i.e. at least 1 million for one site.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	higher capital and operational costs. Operations with smaller asset values or in poorer areas such as in Dhaka, Bangladesh will potentially be required to move to other locations.								
Tropical cyclones (hurricanes and typhoons)	Damage to operations in critical areas: Tropical cyclones or tornadoes are extreme weather events that can cause significant damage and loss of assets at Novartis manufacturing and research operations. Such locations in East- and South-East USA (e.g., Duluth, Georgia; Fort Worth, Texas)	Increased capital cost	1 to 3 years	Direct	Likely	Low	Sites will be required to reinforce the infrastructure of their buildings and provide additional protection (shelter) for their employees. This could amount to estimated USD 2-5 million per site, depending on the size of site and number of	Actions related to typhoon, hurricane and tornado protection are normal aspects of site engineering and facility management in areas where such severe event could happen. Local engineering and HSE groups are aware of increasing risks related to change of weather patterns are include such changes in their risk evaluation. Preparations started in 2016 to	Site engineering at these sites might use 5-10% more resources over several years when measures for building reinforcement and employee protection will need to be implemented. This may result in extra costs of estimated 0.2-0.3 million overall for major sites

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	will need higher protection to cope with such increased risk or will be required to move to other locations.						associates working at these sites.	advertise and award initial contracts for our first global climate risk assessment that will inform development of global operating procedures and adaptation investments focused on protecting business continuity for critical assets.	such as Fort Worth and Johns Creek.
Induced changes in natural resources	Availability of agro-materials for fermentation processes supplied for Novartis fermentation operations as global commodities represents a risk as the price for such commodities is expected to rise with increasing effects of climate change, due to various climate factors.	Reduction/disruption in production capacity	>6 years	Indirect (Supply chain)	Likely	Low-medium	Prices for agricultural commodities may increase by 20-30% over the next 10 years. This may drive cost of goods sold up in that sector of our business for the portion of our \$42B annual sales that are dependent on agricultural commodities.	Novartis has an active procurement program in place to constantly optimize procurement situation for all key process materials. They, along with researchers, are constantly looking for alternate ingredients and suitable substitutions as well as working on developing alternate supply chain options and have worked hand in hand with third-party risk	Additional management costs for this aspect to be minor, i.e. less than USD 0.1 million.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								management efforts in 2016.	

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
Other drivers	Biodiversity: A temperature rise of 1.5 to 2.5°C above pre-industrial levels, which are expected by 2050 as a minimum, will lead to the extinction of 20-30% of known plant and animal species (IPCC 2007). Potential reduction in biodiversity caused by climate change may have long term impacts on Novartis' pharmaceutical business. With over 60% of all new anti-	Inability to do business	>6 years	Direct	More likely than not	Medium	Current Novartis products based on natural compounds include top-selling brands like Miracalcin, Neoral and Sandostatin, which together bring more than USD 2 billion in net sales. Disruption of this supply chain could eliminate that USD 2 billion in sales.	Novartis operates a Natural Products Unit (of app. 50 researchers) within Novartis Institutes for Biomedical Research, our R&D unit, including bio-prospecting programs in Asia and Latin America.	The issue is covered within the Natural Products Unit. A decrease of biodiversity will make bioprospecting programs more difficult, more time consuming and less effective. Cost for such studies may easily be doubled compared to today, i.e. reach USD 5-10mio.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	cancer and anti-infective agents (both important parts of Novartis drug portfolio) being derived from natural products or their derivatives, Novartis could suffer severely from the reduction of biodiversity over the next 30 to 50 years. Current Novartis products based on natural compounds include brands like Miracalcin, Neoral and Sandostatin. The Novartis products Sennoside and Coartem are herbal medical products or contain natural compounds that are extracted from plants.								
Increasing humanitarian demands	Increased need and higher expectations to fight tropical diseases: Climate change will affect the spread of tropical diseases like malaria and dengue fever due to	Increased capital cost	3 to 6 years	Direct	About as likely as not	Medium	The increased spread may result in an estimated 10% higher demand. If the malaria treatment is given on production costs with no profit,	Novartis is very active in supporting the fight against malaria with its innovative combination medicine Coartem and new malaria	Management costs would equally increase by 10%.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>changing climate patterns to areas which are today sub-tropical or temperate (e.g. Mediterranean, northern parts of the USA, China and areas of higher altitude in India and Africa).</p>						<p>such spread will result in a higher demand and thus higher costs to Novartis. If malaria spreads out into higher income areas outside Africa (e.g. Southern Europe or North America), Novartis will have a business benefit from selling the malaria treatment to such developed markets.</p>	<p>drugs under development. In a unique collaboration with international organizations (e.g. WHO), Novartis has provided more than 750million Coartem treatment courses to the public sector in Africa (e.g. Kenya and Tanzania) without profit since 2001. These treatments have helped to save approximately 550000 lives. If malaria potentially spreads into additional tempered areas because of climate change, Novartis will experience higher demand for medication and will continue help fighting malaria also outside Africa. Novartis main management method on this aspect is research for new</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								applications and alternative treatment methods for malaria. New malaria drugs are under development at Novartis. These include other combination of ingredients to overcome growing resistance to substances included in Coartem and alternative ways of treatment.	

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
International agreements	<p>Clear regulation resulting in high value of carbon offsets: The recently signed Paris Agreement is seen by Novartis as a significant step forward towards a more harmonized international agreement on climate change. After the Paris Accord was signed and the Marrakesh Agreement formed, we pushed in 2016 to move forward in alignment with legal and societal expectations. The intended Nationally Determined (IND) commitments on reduction targets help Novartis in setting its own GHG emission reduction targets related to such agreements. Novartis has already developed CDM projects in Argentina and China and is developing another one in Colombia. Novartis also conducts a carbon offset project in Mali, based on voluntary schemes (VCS and ISO). The Novartis projects will further gain credibility and acceptance with updated international agreements, and the carbon offset</p>	Reduced operational costs	>6 years	Indirect (Supply chain)	About as likely as not	Medium-high	<p>Following the Paris Agreement, the carbon offset credits generated will achieve higher prices. The four Novartis forestry carbon sink projects will generate about 6 million tons in 30 years. With a proposed carbon price of USD 50-100 (i.e. 10 times higher than current credit prices for offset projects with additional sustainability benefits) the projects have a total long-term value of USD 300-600 million for the carbon sinks alone. Assuming an increase of the</p>	<p>The four Novartis forestry carbon sink projects are conducted and managed locally and steered with a Novartis global committee. In the respective countries Argentina, Colombia, Mali and China Novartis subsidiaries manage the projects together with forestry organizations (specialized forestry operators in Argentina and Colombia, an agroforestry company in Mali and governmental forest bureaux in China). Additionally, Novartis</p>	<p>The management costs for the four offset projects overall are approximately USD 0.5 million per year.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>credits generated would achieve higher values. Novartis has also set an internal carbon price of USD100/tCO₂e as shadow price for better decision making, in agreement with latest requirements of international organizations.</p>						<p>price to USD 200 in the very long term, the total value could increase to USD 1.2 billion.</p>	<p>engages with mediators (NGOs, academia and specialized carbon consultants), to ensure the projects are following best practice and most advanced methodologies . Planting continued in multiple sites during 2016. The targets set by Novartis in 2015 of 30% GHG emissions reduction by 2020 and 50% reduction by 2030 are directly linked to INDs of leading countries such as Switzerland or the EU. Without ratification and more</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								ambitions commitments in 2017 and forward, tools for carbon offsetting and carbon trading will also remain unclear or existing systems might even further deteriorate. This could reduce the value of established credits based on the current existing official or voluntary carbon offsetting schemes.	
Cap and trade schemes	EU-ETS: Possibility to sell surplus allowances related to increased energy efficiency and GHG emission reduction performance: Novartis might be able to reduce its GHG emissions at the sites included in the EU-ETS to levels that it will have surplus allowances	Reduced operational costs	3 to 6 years	Direct	Unlikely	Low	Since EU-ETS allowances have been reduced by 33% when moving from phase II to Phase III, the potential surplus is expected to be	Ongoing strong energy and GHG reduction programs across the organization are in place to work towards the global energy	The EU-ETS and Corporate have very little if any additional management cost to comply with EU-ETS. These are

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	and will be able to sell these to other companies.						USD <0.1 million by 2020.	efficiency and GHG reduction targets. A combination of efficiency, renewable attributes, distributed generation, distributed storage and demand response management will be applied in a portfolio approach to achieve our goals.	limited to some additional monitoring and the verification costs, which are estimated to below USD 0.1 million per year.
Voluntary agreements	Voluntary use of Carbon Offset schemes: Novartis has initiated its own forestry carbon sink projects in Argentina (CDM project: Reforestation of Grazing Lands in Santo Domingo, Argentina, registered by UN-FCCC by February 10, 2011), Mali (Mali Jatropha Initiative; a validated VCS/ISO project), China (Afforestation/Reforestation of Degraded land in	Wider social benefits	>6 years	Direct	Likely	Medium	The forestry carbon sink projects in Argentina and Colombia are designed as business cases and will create economic returns at a later stage (estimated 20 years after start). The benefits will be	The projects are conducted and managed locally by forestry organizations and controlled by Novartis locally and centrally. Management ensures that the land is maintained in a way that preserves	The management costs for the four offset projects overall are approximately USD 0.5 million per year.

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	Southwest Sichuan, China) and Colombia (Reforestation of grazing lands in Hacienda El Manantial, Puerto Lopez, Colombia). These projects will not only produce carbon sinks, that Novartis uses for compensating part of its GHG emissions, but also generate wider social (economic development and community development) and environmental (watershed management, biodiversity, agro-forestation) benefits. In addition, the projects in Argentina, Colombia and Mali are designed as a business case and are therefore intended to generate long-term economic benefits to Novartis, with a reasonable return of investments and establishment costs.						shared with the operating partners and can grow to USD 2-5 million per year for Novartis locally.	habitat, captures carbon and creates sustainable jobs for members of the local community.	
Emission reporting obligations	Novartis reporting practices: Novartis is following a proactive reporting and disclosure style, including comprehensive and timely reporting of energy and	Investment opportunities	1 to 3 years	Direct	Very likely	Low	Positive financial outcome from proactive reporting and disclosure is difficult to	In Novartis disclosure and reporting of non-financial information, including environmental	Overall cost of Corporate Responsibility reporting and disclosure is roughly

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>climate aspects in its annual business report, on the website and in accordance to UN-Global Compact and GRI reporting requirements.</p>						<p>estimate. However, a growing number of investors are carefully looking on companies' corporate responsibility performance for their investment decisions. In some countries, e.g., Sweden corporate responsibility performance aspects become decisive for market access. Sales in these countries will therefore be positively influenced with our comprehensive corporate responsibility disclosure and reporting.</p>	<p>data, are part of Corporate Responsibility (CR) management at Group Level.</p>	<p>assessed to be USD 2-5 million per year., including all internal resources needed to collect all the requested performance information from the global organization.</p>

CC6.1b

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 higher global temperature and increase of expected precipitation level changes, Novartis expects that tropical vector diseases such as malaria, dengue fever and others will spread into more temperate zones. Thereby, larger percentage of the global population will be affected and will need treatment against these diseases. Novartis has malaria drugs in its portfolio and is working on the development of more effective malaria drugs	Increased demand for existing products/services	>6 years	Direct	About as likely as not	Low-medium	In a unique collaboration with international organizations (e.g. WHO), Novartis has provided more than 750 million Coartem treatment courses to the public sector in Africa (e.g. Kenya and Tanzania) without profit since 2001. Profits from a gradual spread into more-developing areas will initially be zero or marginal (when continued to be distributed during Corporate Responsibility programs), but could become more relevant in the longer term. Even if demand	Novartis is very active in supporting the fight against malaria with its innovative combination medicine Coartem and new malaria drugs under development. Should malaria and other vector diseases spread more broadly outside less-developed tropical countries, the business of providing medication for such diseases will be included in normal business processes. Novartis is working as part of the Access to Medicine	Management costs are estimated to grow to the same extent as markets and required product volumes will grow.

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	and on drugs for dengue fever and other neglected diseases. Businesses selling these drugs may benefit especially if these diseases spread to more developed countries.						may grow to considerable amounts, such products will continue to be generic with relatively low margins. Financial impact can be both positive and negative, since sale of these drugs into developed countries would generate revenue while we are also subsidizing the medicine that is being provided to developing nations.	Initiative (ATMI) to serve patients that may not have the ability to get medicine on their own.	

CC6.1c

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
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Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Reputation	Among-the-leader profile in climate change management: The Novartis energy and climate management, and broader Health, Safety and Environmental (HSE) management objective is to be at the forefront together with leading peers. Novartis has set ambitious targets on absolute GHG emissions reductions and is the only pharmaceutical company that has developed and implemented its own forestry carbon sink projects.	Reduced operational costs	3 to 6 years	Direct	Very likely	Medium	Positive financial outcome from proactive energy and climate programs are expected, for example savings on energy. Our energy and climate program has achieved USD 74 mio over last 7 years, which is more than 20% of the total company energy costs.	Novartis global Corporate Responsibility and HSE&BCM programs are based on a network of experts on local and group level, including about 450 HSE&BCM experts worldwide. Efforts started in 2016 to eliminate existing guidelines and guidance notes that were based on the former corporate structure, and develop new global operating procedures that maximize the advantage that can be gained in the new organization.	The energy and climate management program and energy efficiency program is managed by local and corporate HSE and engineering groups. Overall, approximately 100 associates worldwide spend part of their time on this topic, focusing on a variety of saving opportunities and improvements. Few examples have shown that management costs for a proactive energy management were much less than the savings achieved. Extra costs for the higher engagement to run an "among the leaders" program have not been assessed.
Increasing humanitarian	Increased need and higher	Increased demand for	>6 years	Direct	More likely than not	Medium	The increased spread of	Novartis' primary	Management costs will equally

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
demands	<p>expectations to fight tropical diseases: Climate change will affect the spread of tropical diseases like malaria and dengue fever due to changing climate patterns to areas which are today sub-tropical or temperate (e.g. Mediterranean, northern parts of the USA, China and areas of higher altitude in India and Africa). Novartis is very active in supporting the fight against malaria with its innovative combination medicine Coartem and new malaria drugs under development. In a unique collaboration with international organizations</p>	existing products/services					<p>disease may result in an estimated 10-20% higher demand. As long as the malaria treatment is given on production costs with no profit, such spread will result in a higher demand and thus higher costs to Novartis. In case malaria spreads out into higher income areas outside Africa (e.g., Southern Europe or North America), Novartis will have a business benefit from selling the malaria treatment also to such developed</p>	<p>management method on this aspect is research for new applications and alternative treatment methods for malaria. New malaria drugs are under development at Novartis. These include other combination of ingredients to overcome growing resistance to substances included in Coartem and alternative ways of treatment.</p>	increase by 10-20%.

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>(e.g. WHO), Novartis has provided more than 750million Coartem treatment courses to the public sector in Africa (e.g. Kenya and Tanzania) without profit since 2001. These treatments have helped to save approximately 550000 lives. When malaria potentially spreads into additional tempered areas because of climate change, Novartis will experience higher demand for medication and will continue help fighting malaria also outside Africa.</p>						<p>markets. 1 in 7 people in the world are already impacted by a Novartis drug or medical device, and our work providing increased access to medicines will increase those numbers.</p>		

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	617909
Scope 2 (location-based)	Fri 01 Jan 2010 - Fri 31 Dec 2010	1062041
Scope 2 (market-based)	Fri 01 Jan 2010 - Fri 31 Dec 2010	962836

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 Fourth Assessment Report (AR4 - 100 year)
Other: CFC-11	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: CFC-12	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: CFC-13	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Halon-1211	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Halon-1301	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Halon-2402	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: HCFC-123	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: HCFC-22	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: HFC-134	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: HFC-143a	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Methane	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Nitrous oxide	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Sulphur hexafluoride	IPCC Fourth Assessment Report (AR4 - 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
Natural gas	0.055	metric tonnes CO2e per GJ	International Energy Agency

Fuel/Material/Energy	Emission Factor	Unit	Reference
Methane	0.056	metric tonnes CO2e per GJ	International Energy Agency
Propane	0.06	metric tonnes CO2e per GJ	International Energy Agency
Distillate fuel oil No 2	0.0737	metric tonnes CO2e per GJ	International Energy Agency
Distillate fuel oil No 5	0.077	metric tonnes CO2e per GJ	International Energy Agency
Diesel/Gas oil	0.0736	metric tonnes CO2e per GJ	International Energy Agency
Motor gasoline	0.0739	metric tonnes CO2e per GJ	International Energy Agency
Jet gasoline	0.0732	metric tonnes CO2e per GJ	International Energy Agency

Further Information

Page: CC8. Emissions Data - (1 Jan 2016 - 31 Dec 2016)

CC8.1

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

Operational control

CC8.2

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

534832

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	According to the GHG Protocol Scope 2 Guidance

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
1042502	798117	

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
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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	Less than or equal to 2%	Metering/ Measurement Constraints	In 2006 Novartis implemented a comprehensive and sophisticated data reporting process and data management application that reduces uncertainty in our data to the bare minimum. In 2016, GHG emissions data was collected from 256 reporting units covering practically all Novartis operations worldwide. The data reporting process involves one dedicated person to enter data and a separate person to verify data at the site level. Automatic data plausibility checks are carried out by the Data Management System during data entry. Additional checks are undertaken at the Org. Unit levels. The final data is then review by an independent assurance expert (PwC) before publication in the Novartis Annual Report and in the Corporate Responsibility Performance Report. Please note that the data reported in this section of the CDP may differ slightly from the data presented in the Novartis Reports. The data presented in these publications is based on so-called 9+3 forecasts derived from 9 months of actual data and 3 months of estimated data. The data presented in the CDP is the actual data from the full 12 months of 2016. Potential minor inaccuracies could result from imprecise energy meter readings.
Scope 2 (location-based)	Less than or equal to 2%	Metering/ Measurement Constraints	In 2006 Novartis implemented a comprehensive and sophisticated data reporting process and data management application that reduces uncertainty in our data to the bare minimum. In 2016, GHG emissions data was collected from 256 reporting units covering practically all Novartis operations worldwide. The data reporting process involves one dedicated person to enter data and a separate person to verify data at the site level. Automatic data plausibility checks are carried out by the Data Management

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
			<p>System during data entry. Additional checks are undertaken at the Org. Unit levels. The final data is then review by an independent assurance expert (PwC) before publication in the Novartis Annual Report and in the Corporate Responsibility Performance Report. Please note that the data reported in this section of the CDP may differ slightly from the data presented in the Novartis Reports. The data presented in these publications is based on so-called 9+3 forecasts derived from 9 months of actual data and 3 months of estimated data. The data presented in the CDP is the actual data from the full 12 months of 2016. Potential minor inaccuracies could result from imprecise energy meter readings.</p>
Scope 2 (market-based)	Less than or equal to 2%	Metering/ Measurement Constraints	<p>In 2006 Novartis implemented a comprehensive and sophisticated data reporting process and data management application that reduces uncertainty in our data to the bare minimum. In 2016, GHG emissions data was collected from 256 reporting units covering practically all Novartis operations worldwide. The data reporting process involves one dedicated person to enter data and a separate person to verify data at the site level. Automatic data plausibility checks are carried out by the Data Management System during data entry. Additional checks are undertaken at the Org. Unit levels. The final data is then review by an independent assurance expert (PwC) before publication in the Novartis Annual Report and in the Corporate Responsibility Performance Report. Please note that the data reported in this section of the CDP may differ slightly from the data presented in the Novartis Reports. The data presented in these publications is based on so-called 9+3 forecasts derived from 9 months of actual data and 3 months of estimated data. The data presented in the CDP is the actual data from the full 12 months of 2016. Potential minor inaccuracies could result from imprecise energy meter readings.</p>

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	Limited assurance	https://www.cdp.net/sites/2017/24/13524/Climate Change 2017/Shared Documents/Attachments/CC8.6a/novartis-annual-report-assurance-2016.pdf	72 -73	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/2017/24/13524/Climate Change 2017/Shared Documents/Attachments/CC8.7a/novartis-annual-report-assurance-2016.pdf	72 -73	ISAE3000	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)	Our Annual Report 2016 includes total GHG emissions Scope 1 and Scope 2 data from the previous year, that is also verified during the assurance provision process. (2016 Annual Report, page 71)
Year on year change in emissions (Scope 1)	Our Annual Report 2016 includes GHG emissions Scope 1 data from the previous year (combustion and processes on site, and vehicles) that is also verified during the assurance provision process. (2016 Annual Report, page 71)
Year on year change in emissions (Scope 2)	Our Annual Report 2016 includes total GHG emissions Scope 2 data from the previous year (purchased energy), that is also verified during the assurance provision process. (2016 Annual Report, page 71)
Emissions reduction activities	The content of the "Driving environmental sustainability" section of the Annual Report on page 70 provides details on the progress of our initiatives and information on our environmental sustainability plan.
Emissions reduction activities	The data on halogenated and non-halogenated VOC emission reductions, displayed on page 71 of the 2016 Annual Report, are covered by the scope of the 2016 assurance engagement.
Other:	Performance data on contact water use and water discharge to treatment, as well as data on operational hazardous and non-

Additional data points verified	Comment
	hazardous waste, displayed on page 71 of the 2016 Annual Report, are covered by the scope of the 2016 assurance engagement.

CC8.9

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

No

CC8.9a

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

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
United States of America	140729
Austria	73785
United Kingdom	37548
Germany	37544
Slovenia	31168
Spain	26055
Italy	24436
Ireland	13774
France	11127
Belgium	10708
Switzerland	10287
China	10199
Japan	9399
Poland	9005
Turkey	13461
Rest of world	75607

CC9.2

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

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)
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CC9.2b

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

Facility	Scope 1 emissions (metric tonnes CO2e)	Latitude	Longitude
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CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CO2	522507
HFCs	12325
SF6	0
N2O	0
CH4	0

CC9.2d

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

Activity	Scope 1 emissions (metric tonnes CO2e)
Manufacturing (onsite combustion & processes)	336082
Administration (onsite combustion & processes)	54378
R&D (onsite combustion & processes)	18452
Sales (vehicle emissions)	125920

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)
United States of America	326122	303934	608003	57370
Switzerland	92135	99500	460294	3212
Slovenia	75901	26743	223846	31296
India	68817	65662	75557	0
Austria	62606	2050	334436	323487
China	60910	60910	100436	0
Italy	50033	40771	165635	24017
Singapore	42576	35977	85060	0
Germany	41633	1389	97791	88548
Malaysia	38282	32673	52643	0
Indonesia	23640	20984	33334	0
Turkey	22218	13421	48327	16361
Ireland	22005	4083	48721	39864
Spain	18117	0	48721	39864
Rest of world	97507	90020	288645	32262

CC10.2

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

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)
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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)
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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)
Manufacturing	823522	614001
Administration	101342	81803
R&D	117638	102313

Further Information

CC11.1

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

More than 0% but less than or equal to 5%

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	93871
Steam	381555
Cooling	0

CC11.3

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

1938804

CC11.3a

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

Fuels	MWh
Natural gas	1808318
Distillate fuel oil No 2	46475
Distillate fuel oil No 5	4616
Other: Waste - Fossil in nature	39722
Other: Bagasse	23186
Wood or wood waste	13278
Other: Waste - Biological in nature	3209

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
Contract with suppliers or utilities, supported by energy attribute certificates	616416	0	The figure reported here is the total amount of energy purchased that is generated from renewable energy sources (photovoltaic, solar-thermal, geothermal, wind, biomass or small-scale hydroelectricity below 300kW). Many of our sites, particularly in Europe and the US, have chosen to purchase "low carbon energy". To report energy purchased from renewable sources, our reporting guidance stipulates that sites should obtain a certificate issued by a third party guaranteeing the renewable energy content of the energy mix. Such certificates are provided by the energy suppliers.

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
2310746	2224683	86063	6339	6339	Total electricity consumed is calculated based on consumed electricity that is purchased from third parties, plus electricity generated on-site from renewable energy sources, plus electricity produced on-site from CHP (Combined Heat and Power) installations, minus electricity sold to third parties.

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	3.2	Decrease	Nominal total Scope 1 and Scope 2 GHG emissions have decreased between 2015 and 2016, from 1362.1kt in 2015 to 1332.9kt in 2016. The emissions reduction projects undertaken in 2016 achieved emission reductions of 43 kilotons CO ₂ e (kt) in 2016, equivalent to 3.2% reduction. Calculation: $(43\text{kt} / 1362\text{kt}) * 100 = 3.2\%$
Divestment	3.0	Decrease	40.2 kt less vs. 2015 (1362 kt Scope 1 and Scope 2 GHG emissions) due to the sale of a production site in Germany end of Q1 2016 (13.0 kt accounted in 2016 vs. 53.2 kt in 2015). Calculation: $(53.2 - 13.0) / 1362 * 100 = 3.0\%$
Acquisitions	0	No change	Novartis did not make any acquisitions in 2016
Mergers	0	No change	Novartis was not involved in any mergers in 2016
Change in output	0	No change	There were no major changes in output at Novartis facilities
Change in methodology	0	No change	There was no change in methodology
Change in boundary	1.5	Increase	During 2016 Novartis largely expanded its two Research Facilities in Shanghai (China) and Cambridge (USA), creating 95,381m ² of new operating area, and resulting in 20 kt more emitted in 2016 versus 2015 (1362 kt Scope 1 and Scope 2 GHG emissions). Calculation: $(20\text{ kt} / 1362\text{ kt}) * 100 = 1.5\%$
Change in physical operating conditions	0	Increase	Physical operation conditions at Novartis facilities did not change in 2016
Unidentified	0	No change	
Other	5.0	Decrease	68.3 kt or 5.1% of the 2015 emissions (1362kt Scope 1 and Scope 2 GHG emissions) could be achieved by additional tree growth at our forestry carbon-sink projects in Argentina and Mali. Calculation: $68.3\text{ kt} / 1362\text{ kt} * 100 = 5.0\%$

CC12.1b

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?

Market-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
0.00002747	metric tonnes CO2e	48518000000	Market-based	0.3	Decrease	Nominal total Scope 1 and Scope 2 GHG emissions have decreased between 2015 and 2016, from 1362.1kt in 2015 to 1332.9kt in 2016. This is mainly due to the implementation of energy saving projects in 2016 that have led to emission reductions of 43 kilotons CO2e (kt) in the calendar year, while sales have slightly decreased from 49.4 mio USD in 2015 to 48.5 mio USD in 2016.

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
11.41	metric tonnes CO2e	full time equivalent (FTE) employee	116867	Market-based	0.9	Decrease	Nominal total Scope 1 and Scope 2 GHG emissions have decreased between 2015 and 2016, from 1362.1kt in 2015 to 1332.9kt in 2016. This is mainly due to the implementation of energy saving projects in 2016

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
							that have led to emission reductions of 43 kilotons CO2e (kt) in the calendar year, while the number of FTE has slightly decreased from 118327 in 2015 to 116867 in 2016.
7.20	metric tonnes CO2e	metric tonne of product	185100	Market-based	2.2	Decrease	Nominal total Scope 1 and Scope 2 GHG emissions have decreased between 2015 and 2016, from 1362.1kt in 2015 to 1332.9kt in 2016. This is mainly due to the implementation of energy saving projects in 2016 that have led to emission reductions of 43 kilotons CO2e (kt) in the calendar year, while production has slightly increased from 184900 metric tons in 2015 to 185100 tons in 2016.

Further Information

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	122443	12956	144442	Facilities we own and operate

CC13.1b

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

Novartis might be able to reduce its GHG emissions at the sites included in the EU-ETS to levels that it will have compensated for current shortages or even achieved surplus allowances. As a result, purchase of allowances could be avoided. In Phase III Novartis will be able to reduce its shortage or again create a surplus, if the six sites are able to reduce their emissions by additional 15% over next 3 years.

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 purchase	Hydro	Title: Yunnan Gaohe River 4th level Hydropower: Project number CN3747 Yunnan Gaohe River 4th level Hydropower Project (hereafter referred to as the Project) lies in Kachang Town, Yingjiang County, Dehong Autonomous Prefecture, Yunnan Province, China. The Project is a hydropower station with 20MW (1*12MW+1*8MW) installed capacity and will achieve greenhouse gas (GHG) emission reductions by avoiding CO2 emissions from the business-as-usual scenario electricity generation of those fossil fuel-fired power plants connected into China Southern Power Grid. It is estimated the annual GHG reduction of the Project will achieve 68,241tCO2e.	Other:	68.2		Not relevant	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	4098000	The amount of Scope 3 GHG emissions for purchased goods and services reported here is the result of a study on 2016 spend data. The tool uses average emission intensities by industry sector and incorporates regional trade flows and interrelationships to calculate emissions from purchased goods spend data. The amount reported includes at least six tiers of suppliers in the materials value chain.	0.00%	This study based on an input/output assessment was undertaken in spring 2017 using 2016 purchasing data. The first year the study was conducted was 2015. Since then, Novartis has performed the assessment annually and refined the approach and the level of detail over time. In addition, Novartis is participating in the CDP Supply Chain program and obtaining data from suppliers shortly.
Capital goods	Relevant, calculated	690000	An environmentally extended input-output assessment was performed in spring 2017 with 2016 data which considered over 90% of our CapEx (capital goods) spend by matching these expenses to the most appropriate emission intensities of the relevant industry sectors. The remaining 10% were not considered as relevant.	0.00%	It was the first year that this approach was used to determine the GHG emissions for the Capital Goods category. The emission data referred to so far was based on a study undertaken in 2010. The new approach is a more accurate way to calculate the relevant emissions.
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Not relevant, explanation provided				Compared to the total Scope 1,2 & 3 emissions for Novartis, these emissions are not considered relevant. The emissions were calculated to be > 100kt CO2e but we see no significant reduction opportunities and very limited potential to influence. e.g., upstream emissions from fuels were already reduced as use of coal is avoided and other fossil fuels than gas are < 5%.
Upstream transportation and distribution	Relevant, calculated	710000	An environmentally extended input-output assessment was performed in spring 2017 with 2016 data. All spend in this category was considered accordingly.	0.00%	The GHG emissions of these categories were calculated based on a refined approach of the input/output assessment undertaken in spring 2017. In addition, Novartis is participating in the CDP Supply Chain program and obtaining

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
					data from suppliers
Waste generated in operations	Not relevant, calculated	63000	This is a calculation based on the various types and amounts of waste (accurate primary data) and respective assumptions on GHG emission factors from each of these waste types determined from their composition and climate-related properties. Wastewater: Environmentally extended input output assessment was performed to consider the emissions of the wastewater accordingly.	83.00%	A procedure was established to calculate GHG emissions from reported waste data, based on emission factors determined for each waste category and disposal path and property and composition of each waste type. Compared to the total Scope 1,2 & 3 emissions for Novartis, these emissions are not considered relevant (< 100 kt CO2e). In 2017 a more sophisticated analysis was performed that is not limited to waste. Wastewater was considered accordingly as described in the GHG protocol. Even with the now increased number the emissions are not considered as relevant for the inventory.
Business travel	Relevant, calculated	136000	Data obtained from Hogg Robinson Group (HRG), the travel agency responsible for booking over 95% of Novartis business travel for 2015 worldwide. Data was calculated from miles travelled in different flight distances (intercontinental, international, domestic) and booking classes for each individual country, added to a total. It covers all flight travel for Novartis employees plus service providers on their trips for Novartis. Calculations are based on emissions factors determined by DEFRA. In the second half of 2016 a new provider was selected Carlson Wagonlit Travel (CWT) that provides now the data accordingly.	100.00%	The data is provided quarterly by Carlson Wagonlit Travel (CWT) and before the second half of 2016 by Hogg Robinson Group (HRG). This Scope 3 aspect and related performance number is included in the environmental performance summary table in the Novartis CR Report page 27, which is part of the assurance scope.
Employee	Relevant,	144000	Novartis calculated this data based on the	0.00%	This study was undertaken in 2010 and has

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
commuting	calculated		regional distribution of employees (accurate primary data) and respective assumptions for GHG emission factors for private and public transport in each major geographic region.		not been repeated as the focus was on the further and more detailed analysis of other Scope 3 GHG categories that are more significant in their scale.
Upstream leased assets	Not relevant, explanation provided				Operational control approach is used: Emissions of Novartis leased assets are already part of Scope 1&2. In addition, company leased cars are included in Scope 1&2 and for this reason not relevant in this category.
Downstream transportation and distribution	Not relevant, calculated	57000	This calculation is based on the following assumptions derived from regional production types and volumes (accurate primary data): 1) All products are transported over 500km by train or 40t lorry (50% each) 2) All products are transported by small lorries on the last 25km 3) Products delivered to internal and external destinations are treated equally 4) 10% of all products are transported by ship for 5000 km 5) 3% of all products are transported by airplane for 5000 km	0.00%	Compared to the total Scope 1,2 & 3 emissions for Novartis, these emissions are not considered relevant (< 100 kt CO2e).
Processing of sold products	Not relevant, explanation provided				Very few Novartis goods are processed further after they are sold. Related emissions are thus considered not relevant. To sell intermediate products is not our business model.
Use of sold products	Relevant, calculated	112000	The use of Novartis products does not generally result in GHG emissions, with the exception of an inhaler product that uses HFC R134a as a propellant. All quantities of HFC R134a used in the production of the inhaler product are	100.00%	The use of Novartis products does not generally result in GHG emissions, except for an inhaler product that uses HFC R134a as a propellant.

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
			measured. GHG emissions are calculated using the IPCC emissions factor for HFC 134a.		
End of life treatment of sold products	Not relevant, explanation provided				Novartis' pharmaceutical products (tablets, injectables, etc.) are consumed by patients and no GHG emissions associated with the end of life of sold Novartis products occur by that. Novartis has only few medical device products (e.g. inhalers, surgery tools and contact lenses). Therefore it was assumed that GHG emissions of these products are not relevant.
Downstream leased assets	Not relevant, calculated	6000	Novartis calculated this data based on the assets that are leased out by Novartis (accurate primary data). As proxy data for the emissions the Novartis internal data is used as reference.	0.00%	To prove the statement provided last year that this category is not relevant, a calculation was performed to underpin the statement made in the previous year. The emissions are < 100 ktCO2e and therefore not considered relevant.
Franchises	Not relevant, explanation provided				Any GHG emissions associated with franchises are not considered relevant. Novartis is not in the franchise business.
Investments	Not relevant, explanation provided				Any GHG emissions associated with investments are not considered relevant (Limited potential to influence and emissions are not relevant for the Novartis business goals).
Other (upstream)	Not relevant, explanation provided				In our screening of our relevant scope 3 activities no "other (upstream)" emissions were identified.
Other (downstream)	Not relevant, explanation provided				In our screening of our relevant scope 3 activities no "other (downstream)" emissions were identified.

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/2017/24/13524/Climate Change 2017/Shared Documents/Attachments/CC14.2a/novartis-cr-performance-report-2016.pdf	Novartis CR Performance Report 2016 pp. 97-98: Scope 3 GHG emissions from business travel are included in the verification scope (p.27).	ISAE3000	2

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	8	Increase	Scope 3 emissions from purchased goods and services increased from 3780 ktCO ₂ e to 4098 ktCO ₂ e in 2016 (+ 8%). For the first year we considered purchased services as relevant for the Scope 3 inventory after a screening of the emissions of all purchased services.
Waste generated in operations	Change in boundary	16	Increase	This category is not considered relevant. However, a more sophisticated analysis was performed that is not limited to waste. Wastewater was considered accordingly as described in the GHG protocol. Even with the now increased number the emissions are not considered as relevant for the inventory. They are below 100ktCO ₂ e.
Business travel	Emissions reduction activities	70	Decrease	The amount was largely reduced due to a strict travel regime implemented in 2016. The emissions were reduced from 231 ktCO ₂ e to 136 ktCO ₂ e
Use of sold products	Change in output	11	Decrease	The change of the emissions from 124 ktCO ₂ e from 2015 to 112 ktCO ₂ e 2016 are predominately due to a change in production volumes of the inhaler product that uses HFC R134a as propellant.
Capital goods	Change in methodology	74	Increase	It was the first year that an environmentally extended input-output assessment was used to determine the GHG emissions for the Capital Goods category based on our CapEx spend. The emission data referred to so far was based on a study undertaken in 2010. The new approach is seen as a more accurate way to calculate the relevant emissions. The emissions increased from 180 ktCO ₂ e to 690 ktCO ₂ e with the changed methodology.
Upstream transportation & distribution	Change in methodology	100	Increase	It was the first year that with an environmentally extended input-output assessment and a detailed mapping of our commodity codes to the upstream transportation and distribution was used to determine the GHG emissions for this category.
Downstream leased assets	Change in methodology	100	Increase	It was the first year that this category was calculated. However, the emissions from downstream leased assets are not considered as relevant for the inventory. They are with 6 ktCO ₂ e far below 100ktCO ₂ e which is our internal threshold for consideration.

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

Engagement with suppliers:

As part of our Responsible Procurement program, we systematically engage with our suppliers on corporate responsibility topics, including, human and labor rights, health, safety and environmental aspects.

- Method of engagement: Engagement with suppliers includes HSE audits and respective corrective action plans. Additional direct engagement with suppliers has started via the CDP Supply Chain program where Novartis is reaching out in 2017 for the first year to collect primary environmental data from selected key suppliers. Novartis and the CDP performed joint webinars for the suppliers.

- Strategy for prioritizing engagements: For the selection of suppliers to include in our Responsible Procurement program, country risks including e.g. the efficacy of the regulatory systems around HSE are considered. In addition, we consider sector specific risks, any known or possible HSE problems, and in selected procurement categories the value of the contract. All suppliers are screened regarding these criteria and depending on the risk level we conduct in addition to surveys on site visits. As result of this selection process our focus is on high risk countries (i.e. Novartis suppliers in India, China, Latin America) and high risk sectors (i.e. suppliers of chemicals, active ingredients, packaging materials).

- Results of engagements: Each Responsible Procurement Audit leads to a list of Corrective Action measures, to be conducted by the audited supplier company according to defined schedule. Visits to supplier companies results in better understanding and awareness on HSE and environmental topics, on our expectations and improvements, and on next steps of actions as specifically agreed.

- Engagement Example: Novartis is a member of the PSCI. The PSCI organizes supplier events including the Novartis suppliers webinars and conferences to get HSE experts together and share best practices including knowledge sharing. The last PSCI supplier workshop was hosted by Novartis in May 2017 in Hyderabad, India.

Engagement with customers:

For engagement with our customers we have a customer service available. We provide country specific customer support. Customers can reach out via phone or email. Sustainability related questions are distributed internally and answered accordingly. In addition, Novartis provides feedback to customers via the CDP supply chain program.

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
Collaboration/innovation	50	8%	In 2017, Novartis started to engage with selected key suppliers via the CDP Supply Chain Program. The program was initiated as a pilot for 2017. With the obtained information, the determined Scope 3 data will get more robust. Based on the primary data KPIs, further engagement will be developed. The data serves as input for the SBT setting and thus as a foundation for future GHG emission reductions initiatives in the Novartis supply chain. The success of this engagement will be measured based on the response rate and the quality of the response. About 50% of the selected suppliers are first time responders or no responders where a successful onboarding is part of the success of this engagement. To date, initial conversations have taken place with all selected key suppliers and dedicated internal specialists were nominated as support. In addition, Novartis is engaging with suppliers via the Pharmaceutical Supply Chain Initiative (PSCI). The PSCI is performing workshops and webinars around sustainability and enables further capability building for the suppliers.

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

Novartis signed the SBTi and is committed setting Scope 3 targets accordingly. A multi-day internal workshop with cross-functional leaders and external speakers and facilitators is scheduled for end of June to initiate setting ambitious environmental targets for the company. Novartis works in parallel and in preparation for the workshop with an external consultant company that supports us setting SBT targets around Scope 3.

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
Mr. André Wyss	President, Novartis Operations	President

Further Information

CDP