



## Climate Change 2017 Information Request Northrop Grumman Corp

### Module: Introduction

#### Page: Introduction

#### CC0.1

##### Introduction

**Please give a general description and introduction to your organization.**

Northrop Grumman Corporation is a publicly owned company whose common stock is listed on the New York Stock Exchange (NYSE: NOC). Northrop Grumman is a leading global security company providing innovative systems, products and solutions in autonomous systems, cyber, C4ISR, strike, and logistics and modernization to government and commercial customers worldwide. We offer a broad portfolio of capabilities and technologies that enable us to deliver innovative products, systems and solutions for applications that range from undersea to outer space and into cyberspace. We participate in many high-priority defense and government programs in the United States and abroad. We conduct most of our business with the U.S. Government, principally the Department of Defense (DoD) and intelligence community. We also conduct business with foreign, state and local governments and commercial customers.

Northrop Grumman established its environmental sustainability program, greeNG, in 2009 to reduce the company's environmental footprint by improving operational efficiency and integrating environmental sustainability practices into all our operations. Our greeNG Program strives to expand environmental sustainability awareness throughout our organization, supporting our corporate values and meeting the expectations of our diverse set of stakeholders. greeNG is a catalyst for environmentally sustainable performance that drives long-term affordability into our operations, benefiting our customers as well as our shareholders.

Northrop Grumman has committed to the following 2020 environmental sustainability goals: a 30% reduction in absolute GHG emissions from 2010 levels, a 20% reduction in water use from 2014, and a 70% solid waste diversion rate from landfill.

#### 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

Fri 01 Jan 2010 - Fri 31 Dec 2010

Thu 01 Jan 2015 - Thu 31 Dec 2015

Wed 01 Jan 2014 - Wed 31 Dec 2014

Tue 01 Jan 2013 - Tue 31 Dec 2013

Sun 01 Jan 2012 - Mon 31 Dec 2012

**Enter Periods that will be disclosed**

Sat 01 Jan 2011 - Sat 31 Dec 2011

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**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
Algeria
Australia
Belgium
Canada
China
Denmark
France
Germany
Italy
Japan
Netherlands
Norway
Saudi Arabia
Singapore
South Korea
Switzerland
Taiwan
United Arab Emirates
United Kingdom
United States of America

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**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(\$)

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**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](mailto:respond@cdp.net).

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

Further Information

## Module: Management

### Page: CC1. Governance

#### CC1.1

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

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

#### CC1.1a

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

The highest level of responsibility resides with Northrop Grumman's Policy Committee of the Board of Directors [BOD (sub-set of the Board)]. As noted on page 16 in the 2017 Proxy Statement, the Policy Committee is comprised of 7 committee members, all of which are independent directors, who assist the Board in overseeing policy, government relations and corporate responsibility including reviewing and providing oversight of the Company's environmental sustainability program.

#### 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 project Other: Potable water use conservation and improvement in solid waste diversion from landfill	As noted in the 2017 Proxy Statement, under our Annual Incentive Plan, we use a mix of financial and non-financial metrics to measure our performance for purposes of determining award payout to our Named Executive Officers (including the CEO, CFO, COO, and others), (or as CDP refers to it the Corporate Executive Team) annually. Environmental Sustainability is one of six non-financial metrics which is measured in terms of reductions in absolute greenhouse gas emissions,

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
			potable water use consumption, and improvement in solid waste diversion. Performance to these metrics is reported annually to the Board of Directors and factor into executive compensation.
All employees	Monetary reward	Emissions reduction project Other: Potable water use conservation and improvement in solid waste diversion from landfill	Non-financial metrics influence bonus payments to all eligible employees. Environmental Sustainability is one of six non-financial metrics which is measured in terms of reductions in absolute greenhouse gas emissions and potable water use consumption, and improvement in solid waste diversion. Performance against these metrics is reported annually to the Board of Directors and factor into employee bonus payments.

#### 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	Global	3 to 6 years	The Board of Directors and its Committees provide oversight of the Company's risk management processes, including the Enterprise Risk Management Council (ERMC). The Policy Committee is responsible for overseeing the company's environmental sustainability program . Annually, the Policy Committee is updated on the environmental sustainability program performance, risks and opportunities related to climate change, and initiatives in place to address environmental sustainability issues.

#### CC2.1b

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

At the company level, the Board of Directors and its Committees provide oversight of the Company's risk management processes, including the Enterprise Risk Management Council (ERMC). The ERMC is comprised of all members of the Corporate Policy Council, the Chief Accounting Officer, Chief Compliance Officer, Secretary, head of Internal Audit and Treasurer. The ERMC seeks to ensure that the Company has identified the most significant risks and implemented effective mitigation plans by leveraging the Business Continuity Program.

At the facility (asset) level, the Business Continuity Program leverages annual physical security surveys to evaluate risks and opportunities and their potential impacts to the company, personnel, and/or operations. The surveys include risk factors driven by changes in physical climate parameters such as hurricanes, adverse weather, and flooding. Risks are evaluated to determine if the risk is acceptable or if investment in controls is required.

In addition to business continuity planning at the asset level (individual facilities), risk and opportunities are addressed through facility specific greenhouse gas, energy, water, and solid waste assessments. These assessments provide more thorough understanding of site specific risks to environmental sustainability indicators (e.g. water availability) as well as opportunities to improve the efficiency, minimize emissions, and/or reduce the risks to facility operations (e.g. through water conservation initiatives).

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**CC2.1c**

**How do you prioritize the risks and opportunities identified?**

Business impact analyses is performed annually to prioritize recovery order of sites and business processes and to identify gaps in recoverability. Risks identified through the Business Continuity Program are assessed and prioritized based on probability, business impact, and acceptance or investment in controls.

In addition, facility specific opportunities related to meeting environmental sustainability program objectives and goals are evaluated using criteria such as the return on investment, environmental benefit (greenhouse gas emissions reductions or water conservation), and/or risk mitigation (e.g. minimizing exposure to drought conditions).

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**CC2.2**

**Is climate change integrated into your business strategy?**

Yes

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**CC2.2a**

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

i) Northrop Grumman's strategy is influenced through the environmental sustainability program, greeNG, that was established in 2009 to manage the company's environmental sustainability and climate change initiatives. To ensure integration into the business and business strategy, environmental sustainability and specifically greenhouse gas emissions reductions projects, was integrated as one of six non-financial performance metrics that influence executive compensation. The Board of Directors Policy Committee has oversight of the environmental sustainability program and is updated annually on environmental sustainability risks and opportunities, greeNG Program and goal performance, and climate change related priorities of our stakeholders.

ii) An example of how the business strategy has been influenced is the establishment of public environmental performance goals (greenhouse gas, water, and solid waste) and integration of environmental sustainability as one of

the six non-financial performance metrics that determine executive compensation. The environmental sustainability performance is comprised of annual targets for reductions in greenhouse gas emissions, water use, and solid waste generation. The commitment by the Board of Directors and executive team to integrate this performance metric encourages strong support throughout the organization.

iii) The aspects of climate change that have influenced our strategy include the need to reduce global greenhouse gas emissions; changing weather patterns and increased water stress; and future potential changes in the regulatory environment. These aspects informed the development of our greenhouse gas reduction, water conservation, and solid waste diversion goals and strategies.

iv) Our short-term business strategy has been influenced by climate change through implementation of our 2020 goals (30% greenhouse gas reduction, 20% water use reduction, and 70% solid waste diversion) and the annual investments made to accomplish these goals. These investments are driven by results of recurring site specific energy, water, and solid waste assessments.

v) Our long-term business strategy has been influenced by climate change through focused efforts to grow our business while minimizing impact to the environment. This is being accomplished through constructing new buildings to meet green building (e.g. LEED) standards and ensuring that our long-term business operations minimize greenhouse gas emissions, water use, and solid waste generation. Investments in onsite solar systems at two of our Florida facilities and continued assessments of additional opportunities, requires long-term perspective to recognize the value of onsite, renewable power generation.

vi) Our short-and long-term strategic planning integration has given Northrop Grumman a strategic advantage by supporting a) operational efficiency to support competitive pricing and agility to anticipate and meet customer needs, b) strategic positioning for contract competition and c) customer expectations for alignment with sustainability goals outlined in Executive Order 13693, as accounted for in the Council on Environmental Quality's Federal Supplier Greenhouse Gas Management Scorecard. The 2016 scorecard lists Northrop Grumman as the fifth largest federal supplier and gives Northrop Grumman a green rating in all three categories of emissions disclosure, targets, and climate risk.

[vii] An example of a business decision made has been the decision to invest and partner with the California Institute of Technology (Caltech) for the development of the Space Solar Power Initiative (SSPI). Under the agreement, Northrop Grumman will provide up to \$17.5 million to the initiative from 2015-2017. The decision addresses the need for zero carbon, clean energy production and the team will develop innovations necessary to enable a space-based solar power system capable of generating electric power at cost parity with grid-connected fossil fuel power plants.

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## CC2.2c

### Does your company use an internal price on carbon?

No, and we currently don't anticipate doing so in the next 2 years

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## 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

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## CC2.3a

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

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
Adaptation resiliency	Support	Northrop Grumman employees serve as members of scientific organizations, including the National Academy of Sciences (NAS) Board on Atmospheric Sciences and Climate. The Board advises Congress and governmental organizations such as the U.S. Global Change Research Program (USGCRP) regarding strategic decision-making on topics related to and directly impacted by global climate change.	The NAS Board advises Congress and governmental organizations such as the National Science Foundation and the U.S. Global Change Research Program (USGCRP), agencies including the Department of Defense (DoD), NASA, NOAA, and other agencies that address national security, regarding strategic decision-making on topics related to and directly impacted by global climate change.

**CC2.3b**

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

Yes

**CC2.3c**

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

Trade association	Is your position on climate change consistent with theirs?	Please explain the trade association's position	How have you, or are you attempting to, influence the position?
Business Roundtable	Consistent	The Business Roundtable believes, as stated on its website, that steps to address the risks of global warming are prudent and supports collective actions that will lead to the reduction of greenhouse gas emissions on a global basis. It also believes that harnessing America's abundant renewable energy resources in a cost-effective manner diversifies U.S. energy supplies, enhances U.S. energy security and advances environmental stewardship. Business Roundtable CEOs are committed to sustainability and making life better in the communities in which their companies operate, while also creating greater prosperity by driving economic growth and job creation.	Northrop Grumman participates in the Business Roundtable's annual Sustainability Report to reaffirm Northrop Grumman's commitment to sustainability.
International Aerospace Environmental Group	Consistent	IAEG™ is a non-profit corporation comprised of a global group of aerospace companies, established to facilitate harmonization of compliance amongst Aerospace Companies and their supply chains with the existing and emerging laws and regulations protecting human health and the	Engagement: Northrop Grumman is a founding Board member of IAEG and actively engaged in the organization's governance, strategy and objectives. Northrop Grumman representatives at the Board and Work Group levels provide strategic direction and practical solutions for achieving the

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?
		<p>environment. As a non-lobbying organization (as defined in the by-laws), IAEG™ seeks to achieve its objectives by promoting the development of voluntary consensus standards published by an independent standards organization harmonizing environmental requirements applicable to aerospace companies. For example, the IAEG GHG work group identified the need to develop a voluntary consensus standard for GHG Reporting, to drive common and consistent GHG reporting across aerospace companies and their suppliers, to promote improved accounting and accountability for GHG emissions reductions.</p>	<p>goals of the organization and the work groups. During 2015 Northrop Grumman representatives were significant contributors to updates to the IAEG-published "GHG Reporting Guidance for the Aerospace Industry". The Guidance was developed in consultation with the World Resources Institute (WRI) and in accordance with WRI's "Built on GHG Protocol" standards. The update efforts in 2015 were initiated in response to updates to the WRI's GHG Protocol, to ensure conformance to the specifications of the Reporting framework.</p>
Aerospace Industries Association	Consistent	<p>The Aerospace Industries Association (AIA), founded in 1919 only a few years after the birth of flight, is a trade association representing major aerospace and defense manufacturers and suppliers in the United States. AIA was one of four industry groups to write a collective statement on fuel efficiency and carbon dioxide (CO2) emissions to clarify that the International Civil Aviation Organization goals involve participation by the whole aviation sector using a broad array of measures, not just aircraft technology.</p>	<p>Northrop Grumman participates in the AIA Committee on the Environment.</p>

**CC2.3e**

**Please provide details of the other engagement activities that you undertake**

Northrop Grumman is a member of the Conservation International (CI) Business Sustainability Council (BSC). The BSC is a forum for corporate leaders taking positive environmental actions in their businesses and provides members a blend of CI thought leadership and science, practical experience from the field, and shared best practices across corporations and cultures. BSC offers members an annual meeting for collaboration amongst members, online learning and employee engagement tools, and technical and advisory support.

Conservation International informs policy development by serving as a trusted advisor to local, regional and national governments around the world. CI data, methods and tools assist governments in understanding the value of oceans, forests, croplands, water supplies and wildlife populations, and help to inform actions necessary to protect these vital natural resources.

**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?**

Northrop Grumman ensures consistency of strategy through collaboration and regular updates with leadership and stakeholder engagement groups within our organization including the Vice Presidents of Operations/Quality (greeNG Environmental Sustainability Executive Sponsors), Environmental, Health and Safety Leadership Council (ELC), the Facilities Working Council (FWC), Government Relations, and Communications.

Government Relations monitors and tracks state legislation, regulations, and local government ordinances related to environmental policy development and provides regular updates and guidance through facility operations management team meetings to ensure that the Northrop Grumman can adhere to regulations and policies. The facility team meetings serve as a forum for Government Relations to engage internal environmental stakeholders and share knowledge and ideas on how best to manage environmental regulation and policy development as part of our larger public and private partnerships.

Environmental sustainability (greeNG) program representatives participate in monthly state and local update meetings organized by our Government Relations organization. These meetings provide our team further insights into local activities and they provide the Government Relations team a go-to resource for environmental sustainability topics. Environmental technical experts also participate in or maintain regular communication with Northrop Grumman representatives serving within our industry groups to ensure the activities are consistent with the company's strategy.

**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 (location-based)	100%	30%	2010	732734	2020	Yes, but this target has not been approved as science-based by the Science Based	This is Northrop Grumman's second greenhouse gas and first absolute reduction goal. This goal reflects consideration of science-based climate change projections, inclusive of sources such as The 3% Solution, to ensure our goal is

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
							Targets initiative	impactful. The analysis was conducted prior to the development of CDP's standards that define a Science-based goal as including a Scope 3 target and WRI's publication of the updated Scope 2 Accounting Guidance. The WWF 3% Solution calculator identified 19-24% as a the range for total percentage emissions reduction based on Northrop Grumman's base year emissions, industry classification, business unit emissions distribution/attribution and expected market share change over the goal period time horizon (2010-2020).

### 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%	97%	We continue to have strong performance from emissions reductions activities, but anticipate that the remaining years of the goal period may be more challenging as the lower-marginal cost projects have been realized earlier in the goal period.

### 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?

Don't know

### CC3.3

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

Yes

### CC3.3a

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

Stage of development	Number of projects	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	0	0
To be implemented*	0	0
Implementation commenced*	0	0
Implemented*	133	15715
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
Energy efficiency: Building services	Approximately 60 sustainability focused projects completed within HVAC, Boilers, Lighting, Electrical Equip, compressed air, and pumps and motors.	3300	Scope 1 Scope 2 (location-based) Scope 2 (market-based)	Voluntary	770000	3000000	1-3 years	11-15 years	Building efficiency projects implemented continue to provide opportunities for cost and GHG savings. Additional improvements are being achieved through environmentally beneficial maintenance activities which have higher investments

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
									and extended ROIs.
Process emissions reductions	10 various projects in engineering and manufacturing operations focused on behavioral and process changes. Include items such as emissions recapture systems, thermal test chambers scheduling, gas abatement systems, equipment shutdown programs.	6100	Scope 1 Scope 2 (location-based) Scope 2 (market-based)	Voluntary	200000	270000	1-3 years	6-10 years	Many process related emissions are a result of behavioral changes and provide high value for minimal capital expenditure.
Other	green IT initiatives including client and data center initiatives	1400	Scope 1 Scope 2 (location-based) Scope 2 (market-based)	Voluntary	0	0	1-3 years	3-5 years	

### CC3.3c

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

Method	Comment
Dedicated budget for energy efficiency	In 2016, capital was invested in energy efficiency projects in buildings.
Dedicated budget for other emissions reduction activities	In 2016, capital was invested in environmental sustainability projects that resulted in GHG emissions reduction.
Internal incentives/recognition programs	Executive level officers are held to performance against non-financial metrics that can result only in a downward adjustment to the financial metric score. Environmental Sustainability is one of six non-financial metrics which is measured in terms of reductions in absolute greenhouse gas emissions, potable water use consumption and improvement in solid waste diversion.

#### 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	pg 5	<a href="https://www.cdp.net/sites/2017/88/13488/Climate%20Change%202017/Shared%20Documents/Attachments/CC4.1/2016_noc_ar.pdf">https://www.cdp.net/sites/2017/88/13488/Climate Change 2017/Shared Documents/Attachments/CC4.1/2016_noc_ar.pdf</a>	Northrop Grumman 2016 Annual Report
In other regulatory filings	Complete	pg 21-22	<a href="https://www.cdp.net/sites/2017/88/13488/Climate%20Change%202017/Shared%20Documents/Attachments/CC4.1/2017_noc_proxy.pdf">https://www.cdp.net/sites/2017/88/13488/Climate Change 2017/Shared Documents/Attachments/CC4.1/2017_noc_proxy.pdf</a>	2017 Northrop Grumman Proxy Statement
In voluntary communications	Complete	pg 28-32		Northrop Grumman 2016 Corporate Responsibility Report

#### Further Information

### Module: Risks and Opportunities

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
Emission reporting obligations	Environmental matters, including unforeseen costs associated with regulatory compliance, could have a material adverse effect on our reputation and our financial position, results of operations, and/or cash flows. Our operations are subject to and affected by a variety of federal, state, local and foreign environmental laws	Increased operational cost	3 to 6 years	Direct	More likely than not	Low	Compliance with environmental laws and regulations requires, and is expected to continue to require, significant operating and capital costs. We may be subject to substantial fines, penalties and criminal sanctions for violations. For example, if we are found to be in violation of the Federal Clean Air	Northrop Grumman manages this risk through the company's Environmental, Health & Safety (EHS) and greeNG Environmental Sustainability organizations. The EHS team heads the company's efforts to provide a safe and healthy workplace for our employees, ensure our operations are conducted in an environmentally responsible manner,	In 2016, Northrop Grumman invested more than \$3 million focused specifically on capital projects to reduce greenhouse gas emissions, conserve water, and divert solid waste from landfills. This investment is independent of funding the company provides for environmental sustainability program management, program staff, and

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>and regulations, including as they may be changed over time. As an example, Northrop Grumman has major operations in California such as our Redondo Beach, Palmdale, and Sunnyvale facilities. Our California operations may be subject to future reporting obligations through regulations such as Assembly Bill 32, Green House Gas Solution of Act (Chaptered 2006) developed to reduce greenhouse gas emissions reductions in the state.</p>						<p>Act or the Clean Water Act, the facility(ies) involved in the violation could be placed by the EPA on a list (maintained by the GSA) of facilities that generally cannot perform on U.S. Government contracts until the violation is corrected. The financial implications may include an increase of environmental technical staff needed to appropriately manage reporting obligations. Compliance with environmental laws may also impact our greenhouse gas or other emissions and require</p>	<p>and that our business activities are conducted in accordance with applicable legal requirements and company established goals. An action implemented to manage potential emissions reporting obligations is the establishment of the greenNG environmental sustainability program in 2009, our ongoing commitment to the program, and performance towards our second greenhouse gas reduction goal to reduce emissions by 30% from 2010 to 2020. An example is the installation of SF6 gas abatement systems on our manufacturi</p>	<p>other related administration.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
							participation in cap and trade programs, such as AB32 in California. In AB32, the cap and trade price of carbon has ranged between \$12 and \$14 per tonne over the last two years.	ng lines that significantly reduce SF6 emissions; one project reduced emissions on the laser-saw process line by an estimated 3,500 metric tonnes CO2e per year. By proactively and voluntarily reducing our emissions, we are minimizing exposure to future environmental regulations from the federal government and states (e.g. AB 32) where we do business.	

**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
Tropical cyclones (hurricanes and typhoons)	Our business is subject to disruptions caused by natural disasters	Increased capital cost	1 to 3 years	Direct	Likely	Low-medium	Northrop Grumman recently constructed a new, approximately \$80	At the facility level, annual physical security surveys	Additional design specifications were required to design the building



Risk driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>that could adversely affect our overall financial position. We have significant operations located in regions that may be exposed to damaging storms and other natural disasters. One example is our St. Augustine, Florida Aircraft Integration Center of Excellence where the E-2D Hawkeye aircraft is manufactured. This facility is located in North Florida, near coastal waterways, and subject to hurricanes and tropical storms. Natural and environmental disasters could also disrupt the critical infrastructure needed for normal</p>						<p>million dollar, 368,000 square-foot manufacturing plant at our St. Augustine, FL facility where approximately 1,500 employees are employed. The building is LEED Gold certified and was designed specifically for exposure to hurricane winds in order to mitigate risk of building damage and the potential financial implication of total building loss which could potentially equal or exceed the initial \$80 million construction costs. When extreme weather occurs, the entire facility is subject to closing operations</p>	<p>evaluate risks and opportunities and their potential impacts to the company, personnel, and/or operations and includes risk factors driven by changes in physical climate parameters such as hurricanes, adverse weather, and flooding. Risks are evaluated to determine if the risk is acceptable or if investment in controls is required. An example where investment was required to manage risk is the design decisions made to minimize hurricane damage risk to the new building at the St. Augustine, FL facility. As a result of</p>	<p>and thus, increased cost of construction for the facility. An example of the cost of management for hurricane risks is the cost to implement the integrated, flexible solar panels was approximately the same as the cost of a standard rooftop solar design. However, the generation capacity is reduced by approximately 50% which reduces the recurring cost savings by approximately \$35,000 per year, or a total of \$875,000 over the approximately 25 year lifetime of the solar system.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	business operations.						for a period of time. Although preventative measures may help to mitigate impacts to the facility, damage and disruption may be significant. If insurance or other risk transfer mechanisms are unavailable or insufficient to recover all costs or if we experience a significant disruption to our business, it could have a material adverse effect on our financial position, results of operations and/or cash flows.	hurricane force winds, the building design incorporated the latest wind analysis methodologies and all elements of the building load path were designed for an ultimate wind speed of 130 mph. A unique solar system design that could withstand hurricane-force winds was also required and flexible panels were integrated into the roof design as a result.	

**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
Reputation	Environmental matters, including unforeseen costs associated with compliance could have a material adverse effect on our reputation and our financial position, results of operations and/or cash flows. As Northrop Grumman continues to grow as a global security company, Northrop Grumman remains committed to sustainable performance through effective environmental stewardship, strong corporate citizenship, devotion to diversity and inclusion and maintenance of high standards of ethics, business conduct and corporate	Increased operational cost	1 to 3 years	Direct	Likely	Low	Being a good corporate citizen is fundamental to our business. A continued focus on minimizing our environmental footprint and protecting the local environment benefits our stakeholders, ensures that we maintain trust within our communities, and aids in attracting top talent to Northrop Grumman. The qualitative implications of a negative reputation with any of our stakeholders could impact our ability to win contracts, maintain or expand operations in local communities, and our ability to attract	Northrop Grumman recognizes that environmental sustainability provides strategic and tactical value, and benefits our shareholders, customers, employees and the communities in which we operate. Northrop Grumman's greenNG environmental sustainability program was established to voluntarily and proactively address environmental sustainability issues such as greenhouse gas emissions, water conservation, and solid waste generation. Through alignment of our corporate responsibility programs and environme	In 2016, Northrop Grumman invested more than \$3 million focused specifically on capital projects to reduce greenhouse gas emissions, conserve water, and divert solid waste from landfills. This investment is in addition to funding for environmental sustainability program management, program staff, and other related administration. Through corporate giving programs, Northrop Grumman also invested approximately \$484,000 focused on environmental programs in our communities.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>governance. They are fundamental to our business success, part of our key measurements and integral to our culture. Our performance aligns with the environmental sustainability objectives of our customers set through Executive Order 13693 and enables us to respond to inquiries such as the Council on Environmental Quality's Federal Supplier Greenhouse Gas Management Scorecard. The 2016 scorecard lists Northrop Grumman as the fifth largest federal supplier and gives Northrop Grumman a green rating in all three</p>						<p>and retain top talent.</p>	<p>ntal sustainability priorities, Northrop Grumman is investing in local environmental organizations to support environmental protection in the communities in which we operate. For example, in alignment with our water stewardship focus and the locations where we have operations, we support Heal the Bay in Santa Monica, California and the Chesapeake Bay Foundation in Annapolis, Maryland through corporate giving and employee volunteer events. Through these programs and through publishing our annual</p>	

Risk driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	categories of emissions disclosure, targets, and climate risk. In our communities, our performance has also been recognized. For example, in 2016 Northrop Grumman was awarded the City of Huntsville's Achievement Award for emissions reductions.							Corporate Responsibility Report, Northrop Grumman is demonstrating and communicating our commitment to the environment to our various stakeholders.	

#### 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
Other regulatory drivers	Environmental matters, including unforeseen costs associated with regulatory compliance, could have a material adverse effect on our reputation and our financial position, results of operations, and/or cash flows. Our operations are subject to and affected by a variety of federal, state, local and foreign environmental laws and regulations, including how they may be changed over time. Monitoring potential regulations allows for proactive response through initiatives like energy	Reduced operational costs	3 to 6 years	Direct	More likely than not	Low	Northrop Grumman is increasing its operational efficiency through proactive implementation of projects to reduce greenhouse gas emissions, conserve water, and divert solid waste. In 2016, more than \$3 million was invested in projects with estimated financial implications of approximately \$1 million in operational cost savings per year. Continued investments in energy efficiency and greenhouse gas emissions reductions will be required to successfully accomplish our 30% greenhouse gas reduction goal by	Northrop Grumman's environmental sustainability program is driving voluntary reductions of greenhouse gas emissions, water use, and solid waste generation. Proactively managing our environmental footprint positions us to be able to respond to future regulations that may impact our operations, as well as create operational efficiency and cost savings for our business. For example, we set 2020 goals of a 30% reduction in greenhouse gas	In 2016, Northrop Grumman invested more than \$3 million focused specifically on capital projects to reduce greenhouse gas emissions, conserve water, and divert solid waste from landfills. This investment is independent of funding the company provides for environmental sustainability program management, program staff, and other related administration.

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>efficiency emissions reductions projects that also provide long-term operational cost savings. As an example, Northrop Grumman has major operations in California such as our Redondo Beach, Palmdale, and Sunnyvale facilities. These California operations may be subject to future state-level greenhouse gas (e.g. AB32) or water conservation regulations (e.g. Governor's Drought Executive Order B-29-15).</p>						<p>year-end 2020 and are expected to continue to provide cost savings to our operations .</p>	<p>emissions from 2010, 20% reduction in water use from 2014, and 70% solid waste diversion. To drive performance, environmental sustainability, including greenhouse gas reduction projects, is one of Northrop Grumman's corporate performance metrics. We perform facility assessments for energy, water, and solid waste to identify opportunities and inform our project plans. Each year we invest in projects that drive energy efficiency, greenhouse gas emissions reduction, water</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								conservation, and solid waste diversion.	

**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
Other physical climate opportunities	As physical changes in temperature extremes, precipitation and drought, and snow and ice occur, it may increase demand for technologies and capabilities provided by Northrop Grumman that support environmental and weather research. From observations to decision support, Northrop Grumman	Increased demand for existing products/services	3 to 6 years	Indirect (Client)	Likely	Low-medium	Northrop Grumman's capabilities support an array of environmental intelligence programs that support the need to better understand physical climate change. The financial implications are program specific and based on individual contract value. One example of a Northrop Grumman program	The methods being used to manage these opportunities begin with Northrop Grumman's business development/customer relationship management practices. Northrop Grumman has supported NASA environmental data missions since the 1980s and our support has matured and evolved over time. We showcase our expanded suite of technical capabilities and supporting IT platforms, including those designed for environmental and climate monitoring via press releases and our public website. Our environmental	Managing these opportunities requires the company to invest in maintaining our existing business development and customer relationships in order to continue showcasing our environmental intelligence capabilities to our customers.



Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>develops and operates systems and services to deliver environmental intelligence through science, sensors and enterprise services. Examples include the Global Hawk air vehicle that is being used by NASA earth science missions, sustainment services for the Air Force Weather program, and the AstroMesh-Lite(R) reflector being developed for NASA JPL's Soil Moisture Active Passive (SMAP), spacecraft.</p>						<p>that supports environmental intelligence is the \$300 million Air Force contract for the Systems Engineering, Management and Sustainment (SEMS) III. This contract continues the facilitation of enterprise-level systems engineering, systems management and sustainment services to the U.S. Air Force Weather (AFW) program. AFW delivers a full range of terrestrial and space environmental information, products and services</p>	<p>and weather information solutions have a dedicated page on our capabilities website and describes our initiatives that support weather and environmental science. Northrop Grumman extended the NASA Space Act Agreement into 2018 and will continue joint use and shared cost of the Northrop Grumman-produced Global Hawk unmanned aircraft. The aircraft is used for science missions and flight demonstrations, including hurricane surveillance, atmospheric research and exploration of new mission capabilities.</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
							to military users worldwide.		

**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
Reputation	Northrop Grumman continues to focus on high levels environmental sustainability – it's good for our business, supports the communities where we operate, and is important to our customers. Northrop Grumman's environmental sustainability programs and initiatives supports the company's broader spectrum	Other: Competitive Advantage	3 to 6 years	Direct	Likely	Low-medium	Northrop Grumman supports significant contracts and programs for the U.S. federal government, including NASA, NOAA and DoD. Future financial implications from consideration of environmental impacts and reputation in contract awards may include additional program awards from our U.S. government and	The methods being used to manage this opportunity include continued execution of Northrop Grumman's commitment to environmental stewardship, ethical behavior, and transparency through robust environmental reporting. For example, since 2009 (and through 2015), Northrop Grumman has disclosed its	In order to ensure successful accomplishment of our public 2020 goals, in 2016 Northrop Grumman invested more than \$3 million in energy efficiency, water conservation, and solid waste management projects. Successful accomplishment of our 2020 goals and other environmental objectives through continued investment is important to maintaining our reputation as an

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>of capabilities, including technology applications that offer global environmental benefits. Our performance aligns with the environmental sustainability objectives of our customers set through Executive Order 13693 and enables us to respond to requests such as the GSA's CDP Supply Chain request and the Federal Supplier Greenhouse Gas Scorecard. The 2016 scorecard lists Northrop Grumman as the fifth largest federal</p>						<p>allied forces' customers. In 2016, sales to the U.S. Government totaled more than \$20 billion. Northrop Grumman is well positioned to respond to customer requests on environmental sustainability and climate change subjects.</p>	<p>environmental sustainability performance in the annual Corporate Responsibility Report and CDP Climate Change Response. For five consecutive years, Northrop Grumman has received Leadership recognition from CDP and in 2016 was also included in the Dow Jones Sustainability Index for North America. In response to customer requests, we submitted our Climate Change Response to the General Services Administration (one of our customers) via the CDP Supply Chain</p>	<p>environmentally responsible company.</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>supplier and gives Northrop Grumman a green rating in all three categories of emissions disclosure, targets, and climate risk. The leadership and performance that Northrop Grumman demonstrates can create a competitive advantage now and in the future, as the U.S. government accounts for environmental impacts in its procurement processes and policies.</p>							<p>program. The Council on Environmental Quality (environmental policy council of the Administration) published the Federal Supplier Greenhouse Gas Management Scorecard identifying the top suppliers (by FY2015 spend) and assessed Northrop Grumman (the fifth largest supplier) as a green rating in a) a public emissions reduction target, b) public disclosure of GHG emissions inventory, and c) climate risk disclosure.</p>	

**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	171410
Scope 2 (location-based)	Fri 01 Jan 2010 - Fri 31 Dec 2010	561324
Scope 2 (market-based)	Fri 01 Jan 2010 - Fri 31 Dec 2010	561324

#### 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)
Other

#### 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

GHG Protocol Scope 2 Guidance (An amendment to the GHG Protocol - Corporate Standard)

#### CC7.3

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

Gas	Reference
CO2	IPCC Fourth Assessment Report (AR4 - 100 year)
CH4	IPCC Fourth Assessment Report (AR4 - 100 year)
N2O	IPCC Fourth Assessment Report (AR4 - 100 year)
HFCs	IPCC Fourth Assessment Report (AR4 - 100 year)
PFCs	IPCC Fourth Assessment Report (AR4 - 100 year)
SF6	IPCC Fourth Assessment Report (AR4 - 100 year)
NF3	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Chloroform	IPCC Fourth Assessment Report (AR4 - 100 year)
Other: Methylene Chloride	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
		Other:	

#### Further Information

#### Attachments

[https://www.cdp.net/sites/2017/88/13488/Climate\\_Change\\_2017/Shared\\_Documents/Attachments/ClimateChange2017/CC7.EmissionsMethodology/CDP-Worksheet-for-question-CC7.4.xlsx](https://www.cdp.net/sites/2017/88/13488/Climate_Change_2017/Shared_Documents/Attachments/ClimateChange2017/CC7.EmissionsMethodology/CDP-Worksheet-for-question-CC7.4.xlsx)

**Page: CC8. Emissions Data - (1 Jan 2010 - 31 Dec 2010)**

#### 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 CO<sub>2</sub>e**

171410

#### 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	In 2010, location and market-based GHG inventories are the same. Northrop Grumman did not purchase RECs in 2010 and residual mix emission factors were not available for European locations.

#### CC8.3a

**Please provide your gross global Scope 2 emissions figures in metric tonnes CO<sub>2</sub>e**

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
561324	561324	In 2010, location and market-based GHG inventories are the same. Northrop Grumman did not purchase RECs in 2010 and residual mix emission factors were not available for European locations.

#### 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?**

Yes

**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
Mobile emissions for small fleets (<10 vehicles)	Emissions are not relevant	No emissions excluded	No emissions excluded	Fuel consumption (diesel, gasoline and propane) for all reporting sites comprises 0.64% of the baseline total inventory. Therefore, it was concluded that emissions associated with sites that have fewer than 10 vehicles are immaterial to the GHG inventory. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Non-utility fuel data for sites less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	For sites less than 100,000 square feet, fuel deliveries that are not utility based (e.g., natural gas and propane) are excluded because they are not common at Northrop Grumman and are immaterial to the baseline inventory. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Process Emissions excluded for buildings less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	A majority of manufacturing and testing is performed at the Northrop Grumman sites and campuses that are greater than 100,000 sq.ft. The majority of buildings in the Northrop Grumman real estate portfolio that are less than 100,000 sq. ft are used primarily as office space and not for manufacturing operations. Thus, any process emissions related to operations in these sites are considered immaterial. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Refrigerant emissions of HFCs	Emissions are not relevant	No emissions excluded	No emissions excluded	Baseline assessments of refrigerant (HFC) emissions were made for both processes (e.g. thermal chambers) and fugitive (e.g. facility HVAC equipment) and were considered immaterial to the inventory. This was reassessed in 2012 and immateriality threshold is still met. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.

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
Emissions of PFCs from fire suppression systems	Emissions are not relevant	No emissions excluded	No emissions excluded	Northrop Grumman tracks fire suppression system leaks and releases. In our baseline year, releases accounted for less than 0.05 percent of the GHG inventory and were deemed immaterial to the inventory. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.

#### 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 Data Management	The majority of Northrop Grumman Scope 1 emissions are from combustion of natural gas for heating of buildings. These data are collected through utilities and controlled through an automated IT system. The majority of Scope 1 emission data from fuel combustion and process emission come from procurement records that are managed by an ERP system. The remaining fraction of Scope 1 data are collected through procurement records that are manually managed. Given the size of Northrop Grumman's GHG inventory, any errors due to manual Scope 1 data management comprise less than a 2% uncertainty.
Scope 2 (location-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	Northrop Grumman accounts for emissions from its full real estate footprint (as reported in the annual SEC 10-K filing) that is within its operation control. Our utility bill pay system automatically captures utility bill data for greater than 95% of our real estate footprint, and the remaining square footage is accounted for by estimating the electricity use. Emissions resulting from this estimation result in a less than 2% uncertainty in the Northrop Grumman Scope 2 emissions. The Northrop Grumman inventory has been third party verified to the reasonable assurance level and at a materiality of 5% for the total scope 1 and scope 2 greenhouse gas inventory.
Scope 2 (market-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	The sources of uncertainty in Northrop Grumman's market-based Scope 2 emission inventory are the same as the sources of uncertainty of the location-based Scope 2 emission inventory. The only difference between Northrop Grumman's market-based and location-based Scope 2 inventories are accounting for REC purchases that are Green-e certified and using residual mix emission factors for European locations, which do not introduce any additional uncertainty.

#### 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	Reasonable assurance	<a href="https://www.cdp.net/sites/2017/88/13488/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.6a/NG-Asrnc%20Stmnt-EY2010-Reasonable-061412.pdf">https://www.cdp.net/sites/2017/88/13488/Climate Change 2017/Shared Documents/Attachments/CC8.6a/NG - Asrnc Stmnt - EY2010 - Reasonable-061412.pdf</a>	Page 2	ISO14064-3	100

#### 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	Reasonable assurance	<a href="https://www.cdp.net/sites/2017/88/13488/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.7a/NG-Asrnc%20Stmnt-EY2010-Reasonable-061412.pdf">https://www.cdp.net/sites/2017/88/13488/Climate Change 2017/Shared Documents/Attachments/CC8.7a/NG - Asrnc Stmnt - EY2010 - Reasonable-061412.pdf</a>	Page 2	ISO14064-3	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
No additional data verified	

#### CC8.9

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

No

#### Further Information

Page: CC8. Emissions Data - (1 Jan 2011 - 31 Dec 2011)

#### 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 CO<sub>2</sub>e

155656

#### 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	In 2011, location and market-based GHG inventories are the same. Northrop Grumman did not purchase RECs in 2011 and residual mix emission factors were not available for European locations.

#### CC8.3a

Please provide your gross global Scope 2 emissions figures in metric tonnes CO<sub>2</sub>e

Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
537302	537302	In 2011, location and market-based GHG inventories are the same. Northrop Grumman did not purchase RECs in 2011 and residual mix emission factors were not available for European locations.

#### 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?**

Yes

#### 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
Mobile emissions for small fleets (<10 vehicles)	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.
Non-utility fuel data for sites less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.
Process Emissions excluded for buildings less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.
Refrigerant emissions of HFCs	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.
Emissions of PFCs from fire suppression systems	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.

#### 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 Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (location-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (market-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.

#### 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	Reasonable assurance			ISO14064-3	100

#### 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 (%)
Location-based	Annual process	Complete	Reasonable assurance			ISO14064-3	100

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	Reasonable assurance			ISO14064-3	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
No additional data verified	

#### CC8.9

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

No

#### Further Information

**Page: CC8. Emissions Data - (1 Jan 2012 - 31 Dec 2012)**

#### 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 CO<sub>2</sub>e

138513

#### 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	We report both location-based and market-based Scope 2 emissions. Market-based inventory accounts for RECs and uses residual mix emission factors for European locations.

#### 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
489687	487518	

#### 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?

Yes

#### 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
Mobile emissions for small fleets (<10 vehicles)	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.
Non-utility fuel data for sites less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.
Process Emissions excluded for buildings less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.
Refrigerant emissions of HFCs	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.
Emissions of PFCs from fire suppression systems	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for explanation of exclusions.

#### 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 Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (location-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (market-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.

#### 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	Reasonable assurance			ISO14064-3	100

#### 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 (%)
Location-based	Annual process	Complete	Reasonable assurance			ISO14064-3	100

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	Reasonable assurance			ISO14064-3	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
No additional data verified	

#### CC8.9

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

No

#### Further Information

**Page: CC8. Emissions Data - (1 Jan 2013 - 31 Dec 2013)**

#### 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 CO<sub>2</sub>e

145684

#### 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	

#### CC8.3a

Please provide your gross global Scope 2 emissions figures in metric tonnes CO<sub>2</sub>e



Scope 2, location-based	Scope 2, market-based (if applicable)	Comment
474943	466457	

#### 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?

Yes

#### 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
Mobile emissions for small fleets (<10 vehicles)	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for sources and explanation of exclusions.
Non-utility fuel data for sites less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for sources and explanation of exclusions.
Process Emissions excluded for buildings less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for sources and explanation of exclusions.
Refrigerant emissions of HFCs	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for sources and explanation of exclusions.
Emissions of PFCs from fire suppression systems	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for sources and explanation of exclusions.

#### 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 Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (location-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (market-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.

## 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	Reasonable assurance			ISO14064-3	100

## 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 (%)
Location-based	Annual process	Complete	Reasonable assurance			ISO14064-3	100

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	Reasonable assurance			ISO14064-3	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
No additional data verified	

#### CC8.9

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

No

#### Further Information

**Page: CC8. Emissions Data - (1 Jan 2014 - 31 Dec 2014)**

#### 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 CO<sub>2</sub>e

142126

#### 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	We report both location-based and market-based Scope 2 emissions. Market-based inventory accounts for RECs and uses residual mix emission factors for European locations.

#### 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
462977	453622	

#### 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?

Yes

#### 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
Mobile emissions for small fleets (<10 vehicles)	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for source information and explanation of exclusions.
Non-utility fuel data for sites less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.
Process Emissions excluded for buildings less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.
Refrigerant emissions of HFCs	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.
Emissions of PFCs from fire suppression systems	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.

#### 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 Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (location-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (market-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.

#### 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	Reasonable assurance			ISO14064-3	100

#### 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 (%)
Location-based	Annual process	Complete	Reasonable assurance			ISO14064-3	100

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	Reasonable assurance			ISO14064-3	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
No additional data verified	

#### CC8.9

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

No

#### Further Information

**Page: CC8. Emissions Data - (1 Jan 2015 - 31 Dec 2015)**

#### 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 CO<sub>2</sub>e

141184

#### 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	We report both location-based and market-based Scope 2 emissions. Market-based inventory accounts for RECs and uses residual mix emission factors for European locations.

#### 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
432923	424690	

#### 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?

Yes

#### 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
Mobile emissions for small fleets (<10 vehicles)	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.
Non-utility fuel data for sites less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.
Process Emissions excluded for buildings less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.
Refrigerant emissions of all HFCs	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.
Emissions of PFCs from Fire Suppression systems	Emissions are not relevant	No emissions excluded	No emissions excluded	See question 8.4a for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) or source information and an explanation of exclusions.

#### 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 Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (location-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.
Scope 2 (market-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	See question 8.5 for CC8 Emissions Data - (1 Jan 2016-31 Dec 2016) for further information on uncertainty.

## 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	Reasonable assurance			ISO14064-3	100

## 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 (%)
Location-based	Annual process	Complete	Reasonable assurance			ISO14064-3	100



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	Reasonable assurance			ISO14064-3	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
No additional data verified	

#### CC8.9

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

No

#### 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 CO<sub>2</sub>e

130490

#### 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	We report both location-based and market-based Scope 2 emissions. Market-based inventory accounts for RECs and uses residual mix emission factors for European locations.

#### 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
400915	392008	

**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?

Yes

**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
Mobile emissions for small fleets (<10 vehicles)	Emissions are not relevant	No emissions excluded	No emissions excluded	Fuel consumption (diesel, gasoline and propane) for all reporting sites comprises 0.64% of the baseline total inventory. Therefore, it was concluded that emissions associated with sites that have fewer than 10 vehicles are immaterial to the GHG inventory. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Non-utility fuel data for sites less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	For sites less than 100,000 square feet, fuel deliveries that are not utility based (e.g., natural gas and propane) are excluded because they are not common at Northrop Grumman and are immaterial to the baseline inventory. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Process Emissions excluded for buildings less than 100,000 square feet	Emissions are not relevant	No emissions excluded	No emissions excluded	A majority of manufacturing and testing is performed at the Northrop Grumman sites and campuses that are greater than 100,000 sq.ft. The majority of buildings in the Northrop Grumman real estate portfolio that are less than 100,000 sq. ft are used primarily as office space and not for manufacturing operations. Thus, any process emissions related to operations in these sites are considered immaterial. This category is continuously monitored

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
				and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Refrigerant emissions of HFCs	Emissions are not relevant	No emissions excluded	No emissions excluded	Baseline assessments of refrigerant (HFC) emissions were made for both processes (e.g. thermal chambers) and facility HVAC equipment and were considered immaterial to the inventory. This was reassessed in 2012 and immateriality threshold is still met. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Emissions of PFCs from fire suppression systems	Emissions are not relevant	No emissions excluded	No emissions excluded	Northrop Grumman tracks fire suppression system leaks and releases. In our baseline year, releases accounted for less than 0.05 percent of the GHG inventory and were deemed immaterial to the inventory. This category is continuously monitored and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.

#### 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 Data Management	The majority of Northrop Grumman Scope 1 emissions are from combustion of natural gas for heating of buildings. These data are collected through utilities and controlled through an automated IT system. The majority of Scope 1 emission data from fuel combustion and process emission come from procurement records that are managed by an ERP system. The remaining fraction of Scope 1 data are collected through procurement records that are manually managed. Given the size of Northrop Grumman's GHG inventory, any errors due to manual Scope 1 data management comprise less than a 2% uncertainty.
Scope 2 (location-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	Northrop Grumman accounts for emissions from its full real estate footprint (as reported in the annual SEC 10-K filing) that is within its operation control. Our utility bill pay system automatically captures utility bill data for greater than 95% of our real estate footprint, and the remaining square footage is accounted for by estimating the electricity use. Emissions resulting from this estimation result in a less than 2% uncertainty in the Northrop Grumman Scope 2 emissions. The Northrop Grumman inventory has been third party verified to the reasonable assurance level and at a materiality of 5% for the total scope 1 and scope 2 greenhouse gas inventory.

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 2 (market-based)	Less than or equal to 2%	Assumptions Extrapolation Data Management	The sources of uncertainty in Northrop Grumman's market-based Scope 2 emission inventory are the same as the sources of uncertainty of the location-based Scope 2 emission inventory. The only difference between Northrop Grumman's market-based and location-based Scope 2 inventories are accounting for REC purchases that are Green-e certified and using residual mix emission factors for European locations, which do not introduce any additional uncertainty.

#### 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	Reasonable assurance	<a href="https://www.cdp.net/sites/2017/88/13488/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.6a/Assurance%20Statement.pdf">https://www.cdp.net/sites/2017/88/13488/Climate Change 2017/Shared Documents/Attachments/CC8.6a/Assurance Statement.pdf</a>	Page 2	ISO14064-3	100

#### 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 (%)
Location-based	Annual process	Complete	Reasonable assurance	<a href="https://www.cdp.net/sites/2017/88/13488/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.7a/Assurance%20Statement.pdf">https://www.cdp.net/sites/2017/88/13488/Climate Change 2017/Shared Documents/Attachments/CC8.7a/Assurance Statement.pdf</a>	Page 2	ISO14064-3	100
Market-based	Annual process	Complete	Reasonable assurance	<a href="https://www.cdp.net/sites/2017/88/13488/Climate%20Change%202017/Shared%20Documents/Attachments/CC8.7a/Assurance%20Statement.pdf">https://www.cdp.net/sites/2017/88/13488/Climate Change 2017/Shared Documents/Attachments/CC8.7a/Assurance Statement.pdf</a>	Page 2	ISO14064-3	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
No additional data verified	

### CC8.9

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

No

### Further Information

**Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2010 - 31 Dec 2010)**

### 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
Belgium	32
Germany	561
France	953
United Kingdom	549
Italy	150
Netherlands	380
Norway	3
United States of America	168782
Algeria	0
Australia	0
Canada	0
China	0
Denmark	0
Japan	0
Saudi Arabia	0
Singapore	0
South Korea	0
Switzerland	0
Taiwan	0
United Arab Emirates	0

#### CC9.2

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

By business division

By GHG type

#### CC9.2a

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

Business division	Scope 1 emissions (metric tonnes CO2e)
Aerospace Systems	67238
Mission Systems	86289
Technology Services	3099
Enterprise Services & Chief Strategy Office	12237
Information Systems	2547

#### CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CO2	141252
CH4	68
N2O	340
HFCs	4817
PFCs	989

GHG type	Scope 1 emissions (metric tonnes CO2e)
SF6	23909
NF3	35
Other: Chloroform	0
Other: Methylene Chloride	0

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**Further Information**

**Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2011 - 31 Dec 2011)**

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**CC9.1**

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

**CC9.2**

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

**Further Information**

**Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2012 - 31 Dec 2012)**

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**CC9.1**

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

**CC9.2**

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

**Further Information**

**Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2013 - 31 Dec 2013)**

---

**CC9.1**

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

**CC9.2**

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

**Further Information**

CC9.1

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

CC9.2

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

Further Information

CC9.1

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

CC9.2

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

Further Information

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
Australia	0
Belgium	33
Denmark	111
France	713
Germany	572
Italy	178
Japan	0
Netherlands	148
Norway	0



Country/Region	Scope 1 metric tonnes CO2e
Saudi Arabia	0
Singapore	0
South Korea	27
Switzerland	0
Taiwan	0
United Arab Emirates	0
United Kingdom	467
United States of America	128241
Algeria	0
Canada	0
China	0

## CC9.2

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

By business division

By GHG type

## CC9.2a

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

Business division	Scope 1 emissions (metric tonnes CO2e)
Aerospace Systems	52389
Mission Systems	64587
Technology Services	2651
Enterprise Services & Chief Strategy Office	10863

## CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CO2	112290
CH4	181.6
N2O	239
HFCs	4854
PFCs	2064
SF6	10800
NF3	58
Other: Chloroform	0.4
Other: Methylene Chloride	3

## Further Information

**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)
Canada	2	2	8	0
United States of America	551713	551713	1235910	0
China	42	42	50	0
Belgium	15	15	58	0
Germany	3874	3874	9598	0
Denmark	17	17	51	0
France	293	293	3443	0
United Kingdom	3077	3077	5476	0
Italy	1374	1374	3404	0
Netherlands	62	62	158	0
Norway	2	2	224	0
Australia	853	853	926	0
Algeria	0	0	0	0
Japan	0	0	0	0
Saudi Arabia	0	0	0	0
Singapore	0	0	0	0
South Korea	0	0	0	0
Switzerland	0	0	0	0
Taiwan	0	0	0	0
United Arab Emirates	0	0	0	0

**CC10.2**

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

By business division

**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)
Aerospace Systems	190102	190102
Mission Systems	290086	290086

<b>Business division</b>	<b>Scope 2, location-based (metric tonnes CO2e)</b>	<b>Scope 2, market-based (metric tonnes CO2e)</b>
Technology Services	39729	39729
Enterprise Services & Chief Strategy Office	20279	20279
Information Systems	21128	21128

**Further Information**

**Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2011 - 31 Dec 2011)**

**CC10.1**

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

**CC10.2**

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

**Further Information**

**Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2012 - 31 Dec 2012)**

**CC10.1**

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

**CC10.2**

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

**Further Information**

**Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2013 - 31 Dec 2013)**

**CC10.1**

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

**CC10.2**

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

**Further Information**

**Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2014 - 31 Dec 2014)**

**CC10.1**

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

**CC10.2**

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

Further Information

**Page: CC10. Scope 2 Emissions Breakdown - (1 Jan 2015 - 31 Dec 2015)**

**CC10.1**

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

**CC10.2**

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

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)
Algeria	47	47	91	0
Australia	1425	1425	1845	0
Belgium	39	43	99	0
Canada	76	76	148	0
China	83	83.2	162	0
Denmark	13	16	28	0
France	213	83	2568	0

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)
Germany	5502	7802	10247	0
Italy	1220	1216.2	2851	0
Japan	116	116	226	0
Netherlands	98	105.2	188	0
Norway	0.4	11.2	24	0
Saudi Arabia	54	54	105	0
Singapore	55	55	108	0
South Korea	178.6	179	314	0
Switzerland	16	16	32	0
Taiwan	18	18	36	0
United Arab Emirates	47	47	92	0
United Kingdom	2225	2709.2	5071	0
United States of America	389489	377906	1062661	22227

#### CC10.2

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

By business division

#### 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)
Aerospace Systems	155250	155250
Mission Systems	205348	202855
Technology Services	27320	26475
Enterprise Services & Chief Strategy Office	12997	7428

#### Further Information

**Page: CC11. Energy**

#### 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	0
Steam	0
Cooling	0

### CC11.3

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

585762

### CC11.3a

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

Fuels	MWh
Aviation gasoline	327
Diesel/Gas oil	11810
Jet gasoline	67646
Kerosene	16
Liquefied petroleum gas (LPG)	412
Motor gasoline	8147
Natural gas	490752
Propane	6651

### 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
Direct procurement contract with a grid-connected generator or Power Purchase Agreement (PPA), where electricity attribute certificates do not exist or are not required for a usage claim	511	0	Solar power purchased from the landlord of a leased facility via a power purchase agreement (PPA) Northrop Grumman helped the landlord establish with the utility company.
Energy attribute certificates, Renewable Energy Certificates (RECs)	20857	0	Zero-emissions Renewable Energy Certificates certified by green-e standards
Off-grid energy consumption from an on-site installation or through a direct line to an off-site generator owned by another company	859	0	On-site solar systems

**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
1086896	1086037	859	859	859	Renewable energy from on-site solar systems

**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	2.74	Decrease	Northrop Grumman executed 15,715 metric tonnes CO <sub>2</sub> e equivalent of emissions reduction activities in 2016. Our 2015 Scope 1 + 2 (location-based) emissions were 574,107 metric tonne CO <sub>2</sub> e. Therefore, $(15,715 / 574,107) * 100 = 2.74\%$ .
Divestment			
Acquisitions			
Mergers			
Change in output			
Change in methodology			
Change in boundary			
Change in physical operating conditions			
Unidentified			
Other			

**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?

Location-based

### CC12.2

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

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator: Unit total revenue	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.00002168	metric tonnes CO2e	24508000000	Location-based	11.15	Decrease	Implemented in 2016 a wide range of emissions reduction activities, including building and process efficiency projects and green IT initiatives.

### CC12.3

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

Intensity figure =	Metric numerator (Gross global combined Scope 1 and 2 emissions)	Metric denominator	Metric denominator: Unit total	Scope 2 figure used	% change from previous year	Direction of change from previous year	Reason for change
0.01570	metric tonnes CO2e	square foot	33852000	Location-based	6.65	Decrease	Implemented in 2016 a wide range of emissions reduction activities, including building and process efficiency projects and green IT initiatives. Square footage represents owned and leased square footage and excludes subleased space as reported in



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
							the Annual Report.

**Further Information**

**Page: CC13. Emissions Trading**

**CC13.1**

**Do you participate in any emissions trading schemes?**

No, and we do not currently anticipate doing so in the next 2 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	Forests	Mississippi Valley Project	Other: American Carbon Standard	11000	11000	Yes	Voluntary Offsetting

**Further Information**

**Page: CC14. Scope 3 Emissions**

**CC14.1**

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

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
Purchased goods and services	Relevant, not yet calculated				
Capital goods	Relevant, not yet calculated				
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Relevant, calculated	26155	Northrop Grumman calculated metric tonnes of CO2e due to distribution loss using the average U.S. nation-wide loss provided by the EIA ( <a href="https://www.eia.gov/tools/faqs/faq.php?id=105&amp;t=3">https://www.eia.gov/tools/faqs/faq.php?id=105&amp;t=3</a> ). The nation-wide loss was approximately 4.7%. Based on Northrop Grumman's purchased electricity for 2016 (1,085,526,240 kWh), we calculated the amount of electricity that would have been needed to deliver those kWh taking into consideration a 4.7% loss. We then calculated the kWh that were lost during distribution and applied the eGRID 2014v2 U.S. average emission factor of 1,130.17 lb/kWh CO2e, which resulted in 26,155 metric tonnes of CO2e due to transmission and distribution loss.	0.00%	The primary kWh data used by Northrop Grumman comes from bill pay IT system. However, 4.7% assumed distribution loss came from EIA. Therefore, stating that 0% of data came from suppliers or value chain partners.
Upstream transportation and distribution	Relevant, calculated	733660	Northrop Grumman is an EPA SmartWay partner and utilizes ground shipment data collected, managed and provided by our partner shipping organization. It is broken down into two categories: i) tracked mileage data through our partner's Freight Bill Audit Program (FBAP) and ii) number of shipments based on receipts not input into FBAP. The GWPs are consistent with our Scope 1 and Scope 2 emissions inventory and come from the IPCC Fourth Assessment Report. Emission factors are provided by our shipping partner. The information is tracked by our shipping partner and 98.8% of the emissions reported for upstream distribution is calculated using primary data from the SmartWay program. The remaining emissions data is calculated using receipts and average emissions derived from the SmartWay program. Receipt data uses an average miles per shipment (based on	98.80%	98.8% of shipping emissions are reported via SmartWay

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
			tracked shipments) to get total miles travelled. The estimated mileage data is converted to MTCO2e using an average CO2/mile emission factor, which is derived from the SmartWay program.		
Waste generated in operations	Relevant, calculated	3057	Northrop Grumman auditable sites track their annual waste by category (commodity, product, unit, etc.) and by management method. Northrop Grumman waste categories were mapped to corresponding categories using the EPA WARM model, which generates emissions in MTCO2e for each material category and management method. The reported emissions represent the actual waste data collected that was sent to landfill in 2016 as calculated by the EPA WARM model.	51.00%	
Business travel	Relevant, calculated	126685	All activity data related to business travel is provided by Northrop Grumman's central travel management system. Activity data include number of hotel nights booked, rental car miles travelled and emissions, train miles travelled, and number of air miles travelled. The emissions from air travel and train travel are calculated using emission factors from the U.S. EPA Center for Corporate Climate Leadership GHG Emission Factors Hub. Emissions from hotel stays are calculated using the respective emission factor from Carbon Fund. Emissions from car rentals are provided by the central travel management system. The GWPs are consistent with our Scope 1 and Scope 2 emissions inventory and come from the IPCC Fourth Assessment Report. The GHG inventory for business travel achieved Limited Assurance via Third Party Verification from LRQA America's Sustainability, Inc.	99.40%	A portion of emissions from car rentals are extrapolated based on spend data.
Employee commuting	Relevant, calculated	181788	Employee commuting accounts for the emissions associated with Northrop Grumman employee commutes to/from work. The GWPs are consistent with our Scope 1 and Scope 2 emissions inventory and come from the IPCC Fourth Assessment Report. The emissions are calculated using emission factors from the U.S. EPA Center for Corporate Climate Leadership GHG Emission Factors Hub. Employee headcount is primary data from the Annual Report (10K) filing. Estimating factors and averages are used from reputable public sources (e.g., EPA). Each business sector	30.60%	National averages for commute miles to work, MPG, and AVR are used to calculate employee commuting emissions.

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
			provides an average vehicle ridership (AVR) value for the sector. If not available, an average is used. The AVR value is multiplied by the number of employees per sector and an average fuel economy; it is then multiplied by the emission factor for the total commuting emissions.		
Upstream leased assets	Not relevant, explanation provided				Northrop Grumman reports emissions from leased spaces as part of Scope 1 and Scope 2 inventories since we consider leased space within our operational control. Therefore, we do not have additional emissions to report as part of this Scope 3 category.
Downstream transportation and distribution	Not relevant, explanation provided				According to the Voluntary GHG Reporting Guidance for the Aerospace Industry (IAEG, 2016), downstream transportation and distribution emissions are most often

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
					<p>captured in a customer's Scope 1 emissions or are more appropriately quantified in Scope 3 Category 4. Therefore, Category 9 is irrelevant to the aerospace industry. The International Aerospace Environmental Group (IAEG) is a non-profit organization of global aerospace companies created to collaborate on and share environmental solutions for the industry.</p>
Processing of sold products	Not relevant, explanation provided				<p>Products and services provided by Northrop Grumman do not require further processing, transformation or inclusion in another product before use by the end consumer. This status is a function of</p>

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
					Northrop Grumman's role as a prime contractor to the U.S. and allied governments . Where Northrop Grumman is a supplier to another prime contractor, post-processing is minimal and considered immaterial.
Use of sold products	Not relevant, explanation provided				Northrop Grumman's customer base is primarily the U.S. Government, principally the Department of Defense and intelligence community. We also conduct business with foreign, state and local governments , as well as commercial customers. Our products and services are designed to meet contractual

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
					<p>requirements of our customers. Detailed insight into the use patterns of our products or services once they are in our customer's possession is not publicly available. Due to the nature of our business and customer requirements, performance and use specifications are not publicly available. Northrop Grumman believes that "not relevant, explanation provided" is the most appropriate available response.</p>
End of life treatment of sold products	Not relevant, explanation provided				<p>Northrop Grumman's customer base is primarily the U.S. Government, principally the Department of Defense</p>

Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
					<p>and intelligence community. We also conduct business with foreign, state and local governments, as well as commercial customers. Our products and services are designed to meet contractual requirements of our customers. Products are sold to government customers who take formal possession of the product. Customers have their own property disposition process for owned-property, especially products used for military and defense operations. Due to the nature of our business and customer requirements, Northrop Grumman</p>



Sources of Scope 3 emissions	Evaluation status	metric tonnes CO2e	Emissions calculation methodology	Percentage of emissions calculated using data obtained from suppliers or value chain partners	Explanation
					believes that "not relevant, explanation provided" is the most appropriate available response.
Downstream leased assets	Not relevant, calculated	4279	As of December 2016, Northrop Grumman had approximately 34 million square feet of floor space, of which approximately 260,000 square feet were leased to third parties. We calculated Northrop Grumman's average MWh/sq ft, based on the facilities within our operational control. By multiplying the average MWh/sq ft, we derived electricity usage for the facilities Northrop Grumman leases to third parties. Using the U.S. national average CO2e emission factor from eGRID2014v2, we calculated GHG emissions from downstream leased assets.		Emissions for this category are immaterial. As of December 2016, Northrop Grumman had approximately 34 million square feet of floor space, of which approximately 260,000 square feet was leased to third parties.
Franchises	Not relevant, explanation provided				Northrop Grumman does not own or operate franchises.
Investments	Not relevant, explanation provided				Northrop Grumman is not a financial institution or financial services organization. Therefore, in accordance with the WRI Scope 3 Protocol, this

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
					category of emissions is not relevant to Northrop Grumman.
Other (upstream)					
Other (downstream)					

#### CC14.2

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

Third party verification or assurance process in place

#### CC14.2a

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

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 3 emissions verified (%)
Annual process	Complete	Limited assurance	<a href="https://www.cdp.net/sites/2017/88/13488/Climate%20Change%202017/Shared%20Documents/Attachments/CC14.2a/Assurance%20Statement.pdf">https://www.cdp.net/sites/2017/88/13488/Climate Change 2017/Shared Documents/Attachments/CC14.2a/Assurance Statement.pdf</a>	Page 2	ISO14064-3	12

#### 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
Upstream transportation & distribution	Emissions reduction activities	3.68	Decrease	Continued engagement with our shipping partner and the SmartWay shipping program focuses on increased efficiency in our shipments. By doing so we reduce the number of trips and indirectly reduce our scope 3 emissions.

#### 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
- Yes, other partners in the value chain

#### CC14.4a

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

Suppliers - Our suppliers must maintain the highest standards of ethics and integrity. Our Supplier Standards of Business Conduct set forth the fundamental requirements that we expect our suppliers (and those who work for them, including employees and subcontract labor) to comply with at all tiers. Under our Supplier Standards of Business Conduct we expect that our suppliers will comply with all applicable environmental laws, regulations, and directives and operate as responsible stewards of the environment. In the event of a violation of our Northrop Grumman Supplier Standards of Business Conduct, we may pursue corrective action to remedy the situation. In addition, our standard terms and conditions include the requirement that suppliers shall maintain environmental, health and safety management systems as appropriate to ensure compliance with applicable federal, state and local requirements. Suppliers must further agree to continuously promote a safe and healthy workplace and a sustainable environment related to water and air quality, water and energy conservation, greenhouse gas emission reductions, solid and hazardous waste reductions. Suppliers are also obligated to convey the requirement of this clause to its suppliers. Northrop Grumman also participates in the CDP Supply Chain program and uses this program as an additional means of engaging with suppliers. We prioritize our engagement with our suppliers by regarding our suppliers as essential team members and having processes for assessing, monitoring, rating and improving performance and risk levels in our supply chain. One of the methods we use to determine if the engagement is successful is our supplier rating process, which helps us make decisions, predict performance and identify suppliers at risk of reduced performance.

Customers - Our methods for engagement with customers include indirect methods such as responding to the 2016 General Services Administration (GSA) request for CDP Climate Change inventory data and confirming greenhouse gas information for the Council on Environmental Quality's 2016 Federal Supplier Greenhouse Gas Scorecard. Northrop Grumman also participates in customer-driven forums and will directly reach out to customers when opportunities exist. In September 2016, Northrop Grumman invited a guest speaker from Office of the Assistant Secretary of Defense for Energy, Installations, and Environment (OSD EI&E) to speak at our Environmental, Health & Safety Conference on the importance of environmental sustainability to the DoD. Our strategy for prioritizing customer engagement on environmental sustainability is to leverage existing customer relationships and to build new engagements that enhance internal knowledge of the importance of environmental sustainability to our customers. Our measure for success is ability to continue to meet customer requests through programs such as CDP Supply Chain and the Federal Supplier GHG Management Scorecard, as well as the creation of targeted engagements with our customers such as that with the OSD EI&E.

Partners - Our methods for engagement with partners include membership-based involvement with non-profit organizations. For example, Northrop Grumman is a founding member of the International Aerospace Environmental Group (IAEG), which was formed to develop collaborative approaches for global aerospace companies in the realm of environmental compliance and sustainability. Our strategy to engage with partners is to leverage groups or organizations that provide added value. Through the GHG Management and Reporting Workgroup #3, IAEG has developed GHG Reporting Guidance for the Aerospace Industry, a supplement to the GHG Protocol. The measure of success for this partner engagement is collaboration in development and adoption of the Guidance as well as the improvement in consistency in GHG emissions reporting within the aerospace industry.

**CC14.4b**

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

Type of engagement	Number of suppliers	% of total spend (direct and indirect)	Impact of engagement
Compliance	5000	100%	[Note to CDP: The CDP entry field for "Number of Suppliers" limits the entry to 5000. In fiscal year 2016, Northrop Grumman had approximately 9,500 suppliers.]. Our suppliers must maintain the highest standards of ethics and integrity. Our Supplier Standards of Business Conduct set forth the fundamental requirements that we expect our suppliers (and those who work for them, including employees and subcontract labor) to comply with at all tiers. Under our Supplier Standards of Business Conduct we expect that our suppliers will comply with all applicable environmental laws, regulations, and directives and operate as responsible stewards of the environment. In the event of a violation of our Northrop Grumman Supplier Standards of Business Conduct, we may pursue corrective action to remedy the situation. In addition, our standard terms and conditions include the requirement that suppliers shall maintain environmental, health and safety management systems as appropriate to ensure compliance with applicable federal, state and local requirements. Suppliers must further agree to continuously promote a safe and healthy workplace and a sustainable environment related to water and air quality, water and energy conservation, greenhouse gas emission reductions, solid and hazardous waste reductions. Suppliers are also obligated to convey the requirement of this clause to its suppliers.

**Further Information**

**Module: Sign Off**

**Page: CC15. Sign Off**

**CC15.1**

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

Name	Job title	Corresponding job category
Mark Caylor	Chief Strategy Officer, Corporate Vice President, and President of Enterprise Services Member of Northrop Grumman's Corporate Policy Council	Other: Chief Strategy Officer, Corporate Vice President, and President of Enterprise Services

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**Further Information**

**GDP: [D][-,][D2]**