

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 products and solutions for the military and civilian customers are responsible for provision of critical environmental, geophysical data used by the military, scientific and policy communities to understand the impacts of climate change.

Northrop Grumman established its environmental sustainability program, greeNG, to evaluate and address the company's risks and opportunities related to climate change. The greeNG program is responsible for strategic planning and driving change throughout the company to achieve the environmental sustainability goals.

Northrop Grumman has committed to the following 2020 GHG reduction goal: to reduce absolute GHG emissions 30% from 2010 levels. Northrop Grumman was intentional in its transition to an absolute GHG reduction goal, in recognition of i) expectations to perform, ii) ability to perform and iii) climate and atmospheric science reports and models, including "The 3% Solution: Driving Profits Through Carbon Reduction" published by CDP and WWF in 2013.

CC0.2

Reporting Year

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

Enter Periods that will be disclosed
Fri 01 Jan 2010 - Fri 31 Dec 2010
Sat 01 Jan 2011 - Sat 31 Dec 2011
Sun 01 Jan 2012 - Mon 31 Dec 2012
Tue 01 Jan 2013 - Tue 31 Dec 2013
Wed 01 Jan 2014 - Wed 31 Dec 2014
Thu 01 Jan 2015 - Thu 31 Dec 2015

CC0.3

Country list configuration

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

Select country
United States of America
United Kingdom
Netherlands
Norway
Denmark
Germany
France
Italy
Belgium
Australia

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(\$)

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 for climate change resides with Northrop Grumman's Chairman, Chief Executive Officer (CEO) and President, Wes Bush, the Policy Committee of the Board of Directors (BOD; sub-set of the Board) and the Corporate Policy Council. The Corporate Policy Council is comprised of the CEO, Chief Financial Officer, Chief Human Resources Officer, business unit (sector) presidents and the Corporate Vice Presidents of the Law Department, Government Relations, and Communications. Performance goals are established for purposes of determining executive compensation; Environmental performance is linked to executive compensation as one of six non-financial metrics. The Environmental Performance goal is directly related to achievement of the company's environmental sustainability goals, i.e., greenhouse gas (GHG) emissions reductions and implementation rates of solid waste reduction and water conservation best management practices (BMPs). The Environmental Sustainability Program (greeNG) Managers lead the development of the program strategy. Together they work with multiple functions with the company, including the Environmental, Health and Safety Leadership Council (ELC) and EHS/greeNG Executive Sponsors (VPs), Facilities Working Council (FWC), Global Supply Chain, Investor Relations, Human Resources, including Compensation, Global Corporate Responsibility, including the Employee Resource Groups, and Communications, among others.

The greeNG Program Managers reports to the Corporate EHS Director, who reports to the Vice President of Enterprise Service & International Operations, who reports to the President of Enterprise Services & Chief Strategy Officer. The greeNG Program Managers' responsibilities include developing the enterprise environmental sustainability strategy, working with teams across the company to ensure initiatives are being implemented and accounted for appropriately and accurately, and collaborate with and provide strategic alignment with Global Supply Chain, Investor Relations, Global Corporate Responsibility, Human Resources and Communications, through influence and partnership. An overall business objective of the program is the integration of greeNG as a core business value and a decision criterion at every level and throughout business process across the company and the governance model and its implementation support this objective.

CC1.2

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

Yes

CC1.2a

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

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
Chief Executive Officer (CEO)	Monetary reward	Emissions reduction project Emissions reduction target Efficiency project	• Attainment of environmental performance targets: Environmental sustainability is one of six non-financial metrics on our corporate performance scorecard. The environmental performance metric is comprised of performance relative to three targets including: i) absolute GHG emissions reduction; ii) absolute reduction of water; and iii) solid waste diversion. All three components are linked to climate change. Performance to these metrics is reported annually to the Board of Directors and factored into executive compensation.
Corporate executive team	Monetary	Emissions	• Attainment of environmental performance targets: Environmental sustainability is one of six

Who is entitled to benefit from these incentives?	The type of incentives	Incentivized performance indicator	Comment
	reward	reduction project Emissions reduction target Efficiency project	non-financial metrics on our corporate performance scorecard. The environmental performance metric is comprised of performance relative to three targets including: i) absolute GHG emissions reduction; ii) absolute reduction of water; and iii) solid waste diversion. All three components are linked to climate change. Performance to these metrics is reported annually to the Board of Directors and factored into executive compensation.
Management group	Monetary reward	Emissions reduction project Emissions reduction target Efficiency project	<ul style="list-style-type: none"> Attainment of environmental performance targets: Environmental sustainability is one of six non-financial metrics on our corporate performance scorecard. The environmental performance metric is comprised of performance relative to three targets including: i) absolute GHG emissions reduction; ii) absolute reduction of water; and iii) solid waste diversion. All three components are linked to climate change. Performance to these metrics is reported annually to the Board of Directors and factored into executive compensation.
Business unit managers	Monetary reward	Emissions reduction project Emissions reduction target Efficiency project	<ul style="list-style-type: none"> Attainment of environmental performance targets: Environmental sustainability is one of six non-financial metrics on our corporate performance scorecard. The environmental performance metric is comprised of performance relative to three targets including: i) absolute GHG emissions reduction; ii) absolute reduction of water; and iii) solid waste diversion. All three components are linked to climate change. Performance to these metrics is reported annually to the Board of Directors and factored into executive compensation.
Environment/Sustainability managers	Monetary reward	Emissions reduction project Emissions reduction target Efficiency project	<ul style="list-style-type: none"> Attainment of environmental performance targets: Environmental sustainability is one of six non-financial metrics on our corporate performance scorecard. The environmental performance metric is comprised of performance relative to three targets including: i) absolute GHG emissions reduction; ii) absolute reduction of water; and iii) solid waste diversion. All three components are linked to climate change. Performance to these metrics is reported annually to the Board of Directors and factored into executive compensation.
Facility managers	Monetary reward	Emissions reduction project Emissions reduction target Efficiency project	<ul style="list-style-type: none"> Attainment of environmental performance targets: Environmental sustainability is one of six non-financial metrics on our corporate performance scorecard. The environmental performance metric is comprised of performance relative to three targets including: i) absolute GHG emissions reduction; ii) absolute reduction of water; and iii) solid waste diversion. All three components are linked to climate change. Performance to these metrics is reported annually to the Board of Directors and factored into executive compensation.
All employees	Recognition (non-monetary)	Emissions reduction project Efficiency project Behaviour change related indicator	<ul style="list-style-type: none"> Awards: The Chairman's Awards for Excellence are presented annually to teams that achieve extraordinary financial achievement and outstanding contributions to program excellence, operational excellence, and customer excellence, including contributions that further environmental initiatives and reduce the corporate footprint. Employees may submit GHG reducing initiatives via the company's Innovation Challenges, for which winners may receive a monetary award and recognition in company newsletters and announcements.

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 risk management process related to climate change risks and opportunities includes ongoing analysis and annual updates to the Board of Directors to highlight risks and opportunities, provide performance updates and identify methodologies being deployed to strategically address climate change risks and/or opportunities for the company.

CC2.1b

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

The risks and opportunities associated with climate change were assessed at an enterprise (company) level using historical GHG reduction performance data, current and projected business plans, energy and water markets, climate science data and current and projected regulations. The factors were integrated into a model and run using the following scenarios: a) Do Nothing (i.e., status quo), b) Minimum Impacts (all factors at lowest projected outcome) and c) Maximum Impacts (all factors at highest projected outcome). The range informed the degree of risk associated with the upper and lower boundary of the modelled outputs.

At the operational level, risks and opportunities were assessed at an asset and systems level through energy, water and solid waste assessments at our large sites with outside experts and internal process owners. Examples included building systems (e.g., HVAC, lighting), business processes and manufacturing operations (e.g., ovens, test equipment) for GHG reduction opportunities; cooling tower and business process water systems for water use reduction opportunities and solid waste disposal practices, diversion programs and efficacy of each for solid waste reduction opportunities. The opportunities were evaluated at the business unit (sector) level and prioritized based on i) feasibility, ii) magnitude of impact and iii) financial control of assets and/or systems.

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

Each set of opportunities were reviewed against three criteria: i) ROI, ii) environmental benefit (e.g., MTCO_{2e}, water use, solid waste reduction), and iii) risk factor. The list of opportunities is then prioritized based on their integrated assessment ranking.

The results of the risk and opportunity assessments and proposed mitigation strategies are then reported to and reviewed for technical input and counsel by the a) Vice Presidents of Operations/Quality, b) Environmental, Health and Safety Leadership Council (ELC): Corporate Environmental, Health & Safety (EHS) team, sector EHS Directors, and EHS Legal Counsel), c) Facilities Working Council (Facilities and Real Estate Management directors) for technical input and counsel, and d) Engineering/Manufacturing and Operations/Logistics teams. The outcome of the briefings and implementation plans are then relayed to the e) Corporate Policy Council, f) Corporate Responsibility department, and g) Board of Directors. The final list of opportunities is comprised of projects that fulfill the Board-driven requirements and provide the foundation for the greeNG 2020 performance plans.

CC2.2**Is climate change integrated into your business strategy?**

Yes

CC2.2a**Please describe the process of how climate change is integrated into your business strategy and any outcomes of this process**

i) The business strategy has been influenced by accounting for the following aspects of operational impacts: a) sustained emphasis on operational efficiency, b) conducting of impact assessments to evaluate GHG emissions associated with business plans and decisions, c) capacity-building and cross-business unit collaboration in support of customer needs and program execution, d) forecasting and strategic positioning of Northrop Grumman's capabilities in support of customer needs in climate change-relevant programs (e.g., energy security).

An example of how the business strategy has been influenced is the establishment of environmental performance metrics as one of the six non-financial performance metrics that determine executive compensation. The performance metric is informed by progress toward the corporate environmental sustainability goals, including GHG emissions reduction. This commitment by the Board of Directors and executive team encourages strong support throughout the organization.

ii) Climate change aspects that have influenced the business strategy include: a) regulatory requirements, b) energy costs and market vulnerabilities, c) changing weather patterns and severity, d) business continuity risks and e) uncertainty.

iii) The most important components of the short-term strategy are a) a suite of GHG emissions reduction opportunities, b) return on investment of emissions-reduction initiatives, c) diversity of opportunities across functional areas and business units, including applicability of tax incentives and utility company options, d) mitigation and avoidance planning to effectively manage business growth and long-term strategic plans e) stakeholder engagement opportunities. Our short-term strategy is linked to our GHG reduction target. For example, in 2015, we implemented building and facilities infrastructure improvements and conducted water efficiency and use reduction opportunity assessments, from which projects were implemented (e.g., cooling tower cycle modifications) which contributed to our GHG emissions reduction performance.

iv) The most important components of the long-term strategy that have been influenced by climate change include a) research and development investment costs and opportunities and b) human and financial resources necessary to support the research, development and sustainment efforts and c) examination of alternative and renewable energy systems on-site and through PPAs. Our long-term strategy is linked to our GHG reduction target. For example, in 2015, we developed a renewable energy opportunity analysis tool to evaluate financial, environmental,

feasibility and other key decision factors for implementing renewable energy projects. The tool leverages existing data management processes and energy team evaluations of renewable energy opportunities, to provide a summary of the decision criteria and recommendation for the projects (Go, Go If, No Go).

v) The short-and long-term strategic planning integration has given Northrop Grumman a competitive 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.

vi) Significant business decisions made in 2015 include: Northrop Grumman continued procurement of bulk energy to maintain cost stability of energy in energy-volatile markets and integrate more renewable energy into our portfolio to mitigate regulatory risks (e.g., AB32); continued support of the U.S. Air Force (USAF) bases' energy management program (reduce USAF's risks, energy costs, and Scope 1, Scope 2 emissions); completed construction of a Northrop Grumman Center of Excellence in St. Augustine, FL, in conformance with LEED certification design criteria, including installation of solar roof PV panels, the only Aircraft Center of Excellence that is LEED certified in the U.S.

CC2.2c

Does your company use an internal price of carbon?

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

CC2.3

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

- Direct engagement with policy makers
- Trade associations
- Other

CC2.3a

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

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
Energy efficiency	Neutral	Northrop Grumman is a member of the National Association of Manufacturers (NAM) and engages in pertinent policy issues as they relate to our business and sustainability commitments. The NAM fully supports the ongoing national effort to protect our environment and improve public health through appropriate laws and regulations. American industry has established a strong record in environmental protection, and these achievements can	The NAM believes that the objectives of the Clean Air Act to protect public health and welfare are desirable and supportable and believes that fostering a climate of technological innovation best achieves environmental objectives. American industry is achieving significant improvements in air quality. Because of the enormity of capital expenditure and operation and maintenance costs associated with compliance with federal air quality

Focus of legislation	Corporate Position	Details of engagement	Proposed legislative solution
		generate further progress, looking forward toward reducing environmental impacts and increasing sustainability in operations.	programs, the NAM believes that federal policymakers must seek out thorough, balanced, sound and objective scientific studies before making regulatory decisions. The NAM also recognizes that manufacturers who make market-based decisions to deploy energy efficient technology also reduce emissions that may fall under the jurisdiction of the Clean Air Act. The NAM recognizes that appropriate use of market-based mechanisms achieve environmental objectives more effectively than command-and-control programs.
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?
International Aerospace	Consistent	IAEG™ is a non-profit corporation comprised of a global group of aerospace companies, established to facilitate	Engagement: Northrop Grumman is a founding Board member of IAEG and actively engaged in the organization's

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?
Environmental Group		<p>harmonization of compliance amongst Aerospace Companies and their supply chains with the existing and emerging laws and regulations protecting human health and the 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>governance, strategy and objectives. Northrop Grumman representatives at the Board and Work Group levels provide strategic direction and practical solutions for achieving the 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 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 Environment committee, and in 2015, as the committee was reestablishing itself, Northrop Grumman did not attempt to influence the position, but rather participate to understand the rationale and drivers behind the position.</p>

CC2.3e

Please provide details of the other engagement activities that you undertake

Conservation International, environmental NGO – Partner, Advisor

i) Northrop Grumman’s engagement with Conservation International (CI) is a partnership that began with the formal stand-up of the corporate greeNG program in 2009. Northrop Grumman became a member of CI’s Business and Sustainability Council, a forum for corporate sustainability leaders to gain access to CI’s thought leadership and science, practical experience from the field and shared best practices across corporations to inform corporate sustainability strategy and drive performance. In 2015, for a fourth consecutive year, the Northrop Grumman Foundation conducted a joint initiative, the ECO Classroom Program, with CI to promote awareness and enhance environmental science education for middle and high school teachers nationwide. The ECO Classroom program supports four teams of teachers in their study at the La Selva Biological Station in Costa Rica, alongside CI’s scientists to gain a deeper, hands-on understanding of scientific field study methodologies and data collection processes. The teachers in turn, can take these experiences back to their classrooms, providing them enhanced tools and methods to

help get their students excited about environmental sustainability and science, technology, engineering and math (STEM).

ii) Topics of engagement with CI in 2015 primarily included industry trends and leadership commitments such as water scarcity and watershed protection. In 2015, CI continued to provide guidance and counsel to the greeNG program, supporting the greeNG program's commitment to objectivity and external stakeholder perspective. With the ECO Classroom, the primary topic of engagement is environmental sustainability and STEM education awareness and promotion.

iii) The nature of the engagement with CI in 2015 included a) participation in the Business and Sustainability Council's annual member meeting with discussions related to the integration of environmental and social performance to achieve sustainable production and b) participation in water conservation webinars. The Northrop Grumman Foundation provided financial and administrative support for execution of the ECO Classroom, managing the application and selection process and the logistics coordination for the selected teachers for their trip to Costa Rica.

iv) In consultations with CI related to stakeholder engagement and CI recommended strategies to promote stakeholder engagement and buy-in related to Northrop Grumman's 2020 environmental sustainability goals. The Northrop Grumman Foundation and CI promoted the ECO Classroom to improve awareness of the program's offerings.

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?

Through and with the Vice Presidents of Operations/Quality, Environmental, Health and Safety Leadership Council (ELC) and the Facilities Working Council (FWC), as well as through direct contact and coordination with the Government Affairs and Communications departments, the greeNG program monitors and conducts periodic (e.g., quarterly) updates and check-ins with the leaders of these organizations to facilitate two-way communications. Where necessary, the greeNG Program supports these organizations' efforts where policy positions are discussed, often by providing the perspective of proposed policy impacts on Northrop Grumman's environmental performance goals and the environment and climate. The cross-functional composition of the ELC and FWC allows the greeNG Leadership Team to coordinate and influence the engagement with policymakers to ensure the engagement is consistent with our overall climate change strategy. Our communications process assures that climate change-related communications are reviewed for overall consistency with our direction and strategic focus.

International Aerospace Environmental Group (IAEG): The Corporate EHS Director initiated the membership with IAEG in 2011, on behalf of Northrop Grumman, and the greeNG Program Director and Senior Environmental Legal Counsel serve on the Board of IAEG. Through monthly teleconferences and semi-annual meetings, the Northrop Grumman Board members and work group liaisons engage with IAEG on the implementation process in response to policy and regulatory requirements and voluntary programs. Northrop Grumman directly supports the Chemical Reporting, GHG Reporting and Supply Chain Environmental Harmonization Work Groups.

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	734353	2020	Yes	This is Northrop Grumman's 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 impactful. The analysis was conducted prior to 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	50%	75.67%	Due to strong performance in the early years and through 2015, we had realized excellent performance, exceeding expectations. We expect absolute emissions reductions to be more challenging in future years due to the size and scope of contract-driven programs.

CC3.2

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

Yes

CC3.2a

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

Level of aggregation	Description of product/Group of products	Are you reporting low carbon product/s or avoided emissions?	Taxonomy, project or methodology used to classify product/s as low carbon or to calculate avoided emissions	% revenue from low carbon product/s in the reporting year	% R&D in low carbon product/s in the reporting year	Comment
Product	Northrop Grumman, in partnership with L3 Communications, designed an advanced hybrid electric drive for surface combatant ships as part of the Navy's (customer) interest in understanding the feasibility of a hybrid topology in the CG Class vessels.	Avoided emissions	Other: The Climate Registry Global Warming Potential	1%	Less than or equal to 10%	The estimated MTCO _{2e} reduction associated with the hybrid electric system assumes a ship's electrical power to be a constant average 24-hour load, defined by the U.S. Navy as approximately 2,600 kW, and an average of the ship's operational time at 9 knots or less. The hybrid electric topology results in reduced fuel savings of approximately 21,000 barrels per year, equivalent to an estimated 24% reduction from traditional topology. The estimated emissions avoidance is calculated by converting the 21,000 barrels of fuel avoided to MTCO _{2e} : 21,000 barrels x 42 (1 barrel of oil = 42 U.S. gallons) = 882,000 gallons fuel oil x 4.46 kg/CO ₂ (liquefied natural gas, TCRGWP 2014) = 3,900 kg CO ₂ = 3,900 MTCO _{2e} .

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*	150	18245
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	More than 60 sustainability focused projects completed within HVAC, Boilers, Lighting, Electrical Equip, compressed air, and pumps and motors.	3200	Scope 1 Scope 2 (location-based) Scope 2 (market-based)	Voluntary	700000	2300000	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 and extended ROIs.
Process emissions reductions	15 various projects in engineering and manufacturing	1200	Scope 1 Scope 2 (location-	Voluntary	400000	1100000	1-3 years	6-10 years	Many process related emissions are a result of behavioral changes and

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
	operations focused on behavioral and process changes. Include items such as thermal test chambers, gas abatement systems, equipment shutdown programs.		based) Scope 2 (market-based)						provide high value for minimal capital expenditure. Most capital expenditures were related to new equipment to replace old, inefficient equipment such as freezers and spray booths ventilation systems.
Other	green IT projects including client and data center initiatives	2300	Scope 1 Scope 2 (location-based) Scope 2 (market-based)	Voluntary			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 other emissions reduction activities	In 2015, approximately \$4 million was invested in environmental sustainability projects, including energy-efficiency and GHG emissions reduction initiatives.
Employee engagement	In 2015, we launched a voluntary employee engagement program that enables employees to take action to support the 2020 environmental sustainability goals. In Spring of 2015, we launched the pilot campaign, focused on water conservation. Approximately 100 employees (of the estimated 3,500 employee population targeted, ~3%) participated. Water conservation has direct impacts on energy use, therefore, the impact is small but encouraging. The employee engagement program will continue through 2020 and be available to the entire employee population.

Method	Comment
Compliance with regulatory requirements/standards	GHG emission regulations are applicable to a select number of our California (CA) and United Kingdom (UK) operations. CA Assembly Bill 32 is applicable to a very limited number of operations; the United Kingdom Energy Efficiency Scheme (CRC) could be applicable in the future. To mitigate risk and environmental impacts, we invest in GHG emission reduction initiatives. For example, in 2015, we invested approximately \$4 million in environmental sustainability projects, including energy-efficiency and emissions reduction initiatives to avoid/reduce emissions, including projects in California operations that are currently subject to abbreviated reporting requirements under AB32. If emissions increase or the AB32 threshold is reduced, these operations and/or others would be subject to full reporting requirements and potentially the carbon cap-and-trade scheme, which increases operational and capital costs. The cost of investing in emissions reduction activities is far less than the cost of purchasing carbon credits for an indefinite period of time, possibly in perpetuity.

Page: CC4. Communication

CC4.1

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

Publication	Status	Page/Section reference	Attach the document	Comment
In voluntary communications	Complete	22	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC4.1/2015-noc-cr-report.pdf	The 2015 Corporate Responsibility Report includes our 2015 GHG and sustainability performance in the Environmental section.

Module: Risks and Opportunities

Page: CC5. Climate Change Risks

CC5.1

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

- Risks driven by changes in regulation
- Risks driven by changes in physical climate parameters
- Risks driven by changes in other climate-related developments

CC5.1a

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

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Emission reporting obligations	Northrop Grumman is subject to certain GHG reporting requirements. For example, due to operations in California, we are subject to facility-level emissions reporting to the California Air Resource Board (CARB) for applicable facilities in California in accordance with Assembly Bill 32 (AB32). We do not currently have California facilities with aggregate stationary source and process emissions that subject us to the comprehensive reporting requirements or the cap-and-trade program; however, we do have California-based facilities	Increased operational cost	>6 years	Direct	Likely	Low	The potential financial implications of cap and trade schemes (e.g., AB32) include increased energy costs for applicable facilities/operations and potential cap-and-trade emissions purchases. The potential financial implications include applicability of the cap-and-trade value of credits for emissions above the industry threshold. In 2015, the credits cost an average of \$12.80 per MTCO _{2e} which would increase future operating costs to mitigate emissions and purchase offsets. (Not applicable in 2015)	The methods used to manage these risks include implementation of energy efficiency and GHG reduction assessments to identify energy optimization opportunities. We continually conduct assessments of operations for energy efficiency opportunities and in 2015, we developed a Renewable Energy Opportunity Analysis Tool that provides the framework to conduct and compare financial, environmental, and feasibility attributes of on-site renewable energy projects at Northrop Grumman	In 2015, the cost associated with CARB's emissions reporting scheme was effectively \$0, as equipment, process and energy management is accounted for in EHS and Facilities employees' salaries. As a supporter of the Environmental Defense Fund Climate Corps Program, through which we had a Fellow in 2015, the cost includes training, travel costs, and the labor for the equivalent of approximately 1/4 of an FTE Analyst salary, equivalent to an approximate investment of \$10,000 - \$12,000

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	that meet the abbreviated GHG reporting requirements, effective in 2013. If operations in this or other California facilities increase GHG emissions, we could become subject to the full reporting, and depending on emissions levels, required to participate in the carbon credit cap-and-trade market, which would increase operational costs.							facilities. The tool leverages existing data management processes and energy tiger team evaluations of renewable energy opportunities using a standardized analytical framework and decision criteria to enable informed decision-making.	annually.
Fuel/energy taxes and regulations	An increase in fuel and/or energy prices from shifts in the energy market will have direct financial impacts on Northrop Grumman through increased operational costs. The business depends on traditional energy sources as its primary source of energy; therefore, increased costs	Increased operational cost	>6 years	Direct	About as likely as not	Medium	The potential financial implications of an increase in energy prices include increased operating costs, which could affect Northrop Grumman's cost structure and competitive rate advantage. In accordance with California energy requirements, Northrop Grumman must buy renewable portfolio standard (RPS) credits from CA-certified sources.	Management methods deployed to address the California energy market requirements included addition of a GHG clause into energy procurement broker contracts to ensure purchases fulfill CA energy specifications. Northrop Grumman bulk purchases	Northrop Grumman estimates that performing energy conservation on back shifts saves approximately 2,000,000 kWh per year, or 600 metric tons of CO2 per year, and \$170,000 in energy savings.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	and/or taxes on traditional energy sources would increase the company's operational costs.						These credits/units are 3-4 times more expensive than national green-e certified RECs at approximately \$12/MTCO ₂ e. Therefore, the financial implications are energy management price include a 3-4x increase in costs at for a certain proportion of energy demands, and the expectation that the RPS credit cost will continue to increase in price in the short-term.	electrical energy to provide our operations a fixed energy price 24/7/365, allowing us flexibility for managing internal peak energy demands. For example, in 2015, our California-based energy manager purchased bulk energy from deregulated markets to support our California operations' energy demands.	

CC5.1b

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

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in precipitation extremes and droughts	Northrop Grumman has operations worldwide, including manufacturing operations	Increased operational cost	1 to 3 years	Direct	Very likely	Low-medium	The financial implications of significant changes in precipitation are driven by rising costs of water	Methods used to manage the growing risks associated with significant changes in precipitation include implementation of water conservation	In 2015, Northrop Grumman invested more than \$4 million on energy efficiency and

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>located in regions that are at risk for water scarcity and increasing water availability risk. Certain processing operations are water-dependent operations within the company; a moderate proportion of that production is conducted in California where drought conditions persisted through 2015. If drought conditions continue, we expect to see increased water rates, which would increase operational costs.</p>						<p>and the need for utilities to diversify their electricity sources to reduce reliance on hydropower in water stressed areas such as California. For example, from FY2014-2015 to FY2015-2016, a period of significant drought in California, water prices increased 10% in the West Basin Municipal Water District (\$51/cfs to \$56/cfs monthly service fee) which serves a large part of Los Angeles County where Northrop Grumman has manufacturing operations. If drought conditions continue, we expect to see increased water rates which could have a meaningful impact on operational</p>	<p>best management practices (BMPs) across the company, and focused initiatives in water scarce areas to drive water use. For example, in 2015, we conducted water use assessments at major water use operations in California to identify upgrades, modifications, projects that will achieve meaningful water use reductions.</p>	<p>water reduction initiatives in support of our GHG reduction goal. This cost is independent of funding for program management, program staff, and other related administration.</p>

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Change in temperature extremes	Northrop Grumman has significant operations located in regions that may be affected by extreme temperature changes. As global temperatures continue to intensify due to climate change, we could experience greater energy demand due to fluctuations and/or sustained changes in heating/cooling days, which would increase operational costs.	Increased operational cost	3 to 6 years	Direct	Likely	Low-medium	costs. The potential financial implications of extreme temperature changes would be direct energy costs from increased cooling/heating demands and operational costs. Without energy cost mitigation strategies, we could see energy cost increases of at least \$3-\$11 million between 2013-2015. In 2015, that increase could have been approximately \$1-3.3 million.	The methods used to manage this risk include energy cost mitigation strategies, investment in energy-efficient buildings, HVAC systems, and business process enhancement to minimize practicable costs and risks associated with temperature extremes. In 2015, we continued the use of our energy management system for domestic and international operations for energy utility bills and data accounting as well as water utility accounting. The system allows us to analyze energy and water use on a monthly basis with more fidelity, and conduct predictive modelling using the system's 20-year history of heating/cooling days to anticipate demand increases/decreases as well as have more immediate visibility to increases in water utility prices, particularly in regions	The costs associated with these actions include capital and expense funding to support implementation of Northrop Grumman's energy management system. The costs were factored into the ROI calculation, equivalent to a savings of approximately \$4 million.

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
								such as California, where drought conditions are significantly impacting water availability.	

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
Fluctuating socio-economic conditions	We depend heavily on a single customer, the U.S. Government, for a substantial portion of our business. Changes in this customer's priorities and spending could have a material adverse effect on our financial position, results of operations and/or cash flows. Our primary customer is the U.S. Government, from which we derived 83 percent of our	Reduced demand for goods/services	>6 years	Direct	Likely	High	Fluctuating socio-economic conditions create uncertainty for contract execution and/or sustainment. In 2015, our sales decreased 1.8% (\$23.9B to \$23.5B) from 2014 levels due to various drivers, including federal budget reductions. If federal budgets continue to decline, we may face increasing pressure for lower margins, which reduces overhead	Northrop Grumman manages these risks through scheduled and ongoing engagement with policymakers and senior administration and DoD officials to discuss the risks associated with budget reductions, and impacts to priority programs, current and planned. For example, Northrop Grumman is a member of several trade organizations, including the Aerospace	Northrop Grumman calculates management costs quarterly and cumulatively on an annual basis. The aggregate is referred to as "operating income" [sales - (operating costs + expenses)]. We record changes in estimated contract operating margin at completion (net EAC adjustments) using the cumulative catch-up method of

Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>sales during the 2015. The U.S. Government has been implementing significant reductions in government spending and other significant program changes. We cannot predict the impact on existing, follow-on, replacement or future programs from potential changes in priorities due to changes in defense spending levels, military strategy and planning and/or changes in social-political priorities.</p>						<p>budget, including R&D funds.</p>	<p>industries Association, which in 2015 continued its appeal to the U.S. Congress about the risks and impacts of sequestration and budget reductions to the aerospace industry. As members, we regularly participate in meetings, including those of the Environmental Committee of AIA. Continuing from prior years into 2015, Northrop Grumman's CEO has addressed the risks associated with sequestration, citing sequestration's effect on the Department of Defense's budget as "remov[ing] the flexibility of the department to manage the core structure, to manage its operations, to manage all of the things that it has to manage in a rational way."</p>	<p>accounting. In 2015, the net EAC adjustments totaled \$580 million (net positive).</p>

Attachments

[https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/ClimateChange2016/CC5.ClimateChangeRisks/Avionics Magazine_NorthropGrummanCEOSeesSequestrationSquashDomesticGrowthasInternationalSalesFlourish.pdf](https://www.cdp.net/sites/2016/88/13488/Climate%20Change%202016/Shared%20Documents/Attachments/ClimateChange2016/CC5.ClimateChangeRisks/Avionics%20Magazine_NorthropGrummanCEOSeesSequestrationSquashDomesticGrowthasInternationalSalesFlourish.pdf)

Page: CC6. Climate Change Opportunities

CC6.1

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

- Opportunities driven by changes in regulation
- Opportunities driven by changes in physical climate parameters
- Opportunities driven by changes in other climate-related developments

CC6.1a

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

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
Voluntary agreements	Northrop Grumman facilitated a PPA with a California-based landlord for solar installation. The opportunity presented via the PPA provides us with stable, lower cost electricity from the landlord; the landlord benefitted from the tax credit(s)	Reduced operational costs	3 to 6 years	Indirect (Client)	Virtually certain	Low	The financial implications related to voluntary agreements such as the power purchase agreement (PPA) with the California-based landlord, include reduced annual energy costs that are between 1-5% below traditional energy prices. There are no	The methods being used to manage voluntary agreements include limited Northrop Grumman labor and limited consultant engagement. For example, Northrop Grumman established an energy tiger team to evaluate alternative and	The costs associated with voluntary agreements are expense (vs. capital); i.e., Northrop Grumman contract administration and labor costs, which are nominal and represent less than \$10,000 annually.

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	and income generated from the sale of electricity to Northrop Grumman and any excess to the local utility; thereby demonstrating support for renewable energy.						net-additional costs (\$0) to facilitate the PPA; rather, we expect to realize up to a 5% annual savings on energy costs.	renewable energy opportunities. Also in 2015, we developed a renewable energy analysis tool that leverages data management processes to provide a concise summary of the financial, environmental and feasibility attributes of a renewable energy project.	
Fuel/energy taxes and regulations	Deregulated energy markets create an opportunity for companies to conduct bulk energy purchases that save money, improve forward planning, and mitigate risk associated with energy cost fluctuations that more frequently occur in regulated markets. Northrop Grumman	Reduced operational costs	1 to 3 years	Direct	Virtually certain	Low	Financial implications related to fuel/energy taxes and regulations include the benefits of 1) cost stability realized via strategic bulk energy purchases, 2) reduced Northrop Grumman cash management costs due to more predictable budgeting and	The method used to manage fuel/energy taxes and regulations include dedicated expert energy market knowledge. In 2015, we updated the regulated vs. unregulated markets and purchased bulk energy, prioritizing areas with high MWh-energy use.	The costs associated with fuel/energy taxes are expense (vs. capital); i.e., Northrop Grumman labor costs. There were no net-additional costs (\$0) to facilitate the PPA. In 2015 we realized approximately a 5% annual savings on energy costs and expect the annual savings

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	leverages its deregulated electrical energy purchasing using long-term fixed-price purchases and deploying a strategic bulk energy purchase plan.						fewer short-term operational cash loans. Northrop Grumman expects to save approximately than \$3.2 million annually, for the short-term, through this energy strategy and related financial management.		to remain steady in the near-term.

CC6.1b

Please describe the 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
Induced changes in natural resources	The Northrop Grumman-built Global Hawk was awarded the prestigious William W. Ottersen Award for Innovation. Since the first mission in 1998, Global	Increased demand for existing products/services	3 to 6 years	Direct	Very likely	Medium	The financial implications of changes induced by climate change are primarily indirect. Northrop Grumman supports Global Hawk environmental	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	Northrop Grumman calculates management costs quarterly and cumulatively on an annual basis. The aggregate is referred to as "operating income"

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>Hawk has supported numerous missions to collect environmental and humanitarian data. The award is further reinforcement of the benefits the Global Hawk offers to global society, which could help with promotion and future sales of Global Hawk as the premier platform for aerial data collection. Our primary customer, the U.S. federal government, has an increasing demand for environmental monitoring technology due to changes in the environment and the Global</p>						<p>monitoring missions for NASA and DoD. In 2013, we were awarded a multi-year \$169 million contract for contract logistics support for the RQ-4 Global Hawk by the U.S. Air Force that was active in 2015.</p>	<p>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, at a series of customer-facing events, including the Australian Avalon Air Show in February 2015.</p>	<p>[sales - (operating costs + expenses)]. We record changes in estimated contract operating margin at completion (net EAC adjustments) using the cumulative catch-up method of accounting. In 2015, the net EAC adjustments totaled \$580 million (net positive).</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	Hawk's capabilities for environmental observation data collection.								
Other physical climate opportunities	In 2015, the NASA Jet Propulsion Laboratory successfully deployed the Soil Moisture Active Passive (SMAP) spacecraft. SMAP provides unmatched data capabilities enabled in part by the largest spinning mesh reflector ever deployed in space, designed and built by Astro Aerospace, a Northrop Grumman company. SMAP measures soil moisture, which helps scientists	Increased demand for existing products/services	>6 years	Indirect (Client)	Likely	Low-medium	The financial implications of these opportunities include the contract value for support of NASA/JPL's mission. Northrop Grumman initiated the study for the mesh reflector in 2008 and began development of the reflector in 2009, completing its development in 2015. In fiscal year (FY) 2015, SMAP had a program value of \$74.9M and projected budget requests totaling approximately \$50M for FYs	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. 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	Northrop Grumman calculates management costs quarterly and cumulatively on an annual basis. The aggregate is referred to as "operating income" [sales - (operating costs + expenses)]. We record changes in estimated contract operating margin at completion (net EAC adjustments) using the cumulative catch-up method of accounting. In 2015, the net EAC

Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>improve understanding of how water and carbon circulate, affecting everything from changes in growing season length to severe weather frequency. SMAP will enable scientists to analyze the impacts of climate change on soil moisture. Successful deployment and completion of the SMAP spacecraft mission could increase the demand for sustained program support and/or present significant opportunities for Northrop Grumman to win future</p>						2016-2019.	<p>public website. In February 2015, we published a press release announcing the successful deployment of Northrop Grumman's AstroMesh Reflector for the NASA SMAP Satellite. Press release included in supporting documents.</p>	<p>adjustments totaled \$580 million (net positive).</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	contracts with NASA JPL.								

CC6.1c

Please describe the 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 demonstrate environmental performance to stated commitments and gains additional reputational benefits from the company's public disclosure and transparency initiatives. The integrity of the environmental sustainability program and initiatives demonstrates a broader	Other: Competitive Advantage	>6 years	Direct	Very likely	Medium-high	Northrop Grumman supports significant contracts and programs for the U.S. federal government, including NASA, NOAA and DoD. Future financial implications include contract and program awards from our U.S. government and allied forces' customers. In 2015, Northrop Grumman's U.S.	The methods being used to manage this opportunity include continued execution of Northrop Grumman's commitment to environmental stewardship, ethical behavior, and transparency. For example, since 2008 (and through 2015), Northrop Grumman has disclosed its environmental sustainability	Northrop Grumman calculates management costs quarterly and cumulatively on an annual basis. The aggregate is referred to as "operating income" [sales - (operating costs + expenses)]. We record changes in estimated contract operating margin at completion (net EAC

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>spectrum of our capabilities, including GHG reduction and technology applications that offer global environmental benefits. Evident of the increasing attention and focus on GHG emissions accountability by our customer, the U.S. government, 2015 marked three significant milestones: - We were invited to participate in the White House Supplier GHG Roundtable with President Obama and key agency leaders including EPA Administrator Gina McCarthy and the Secretary of Energy, Ernest Moniz; - President Obama signed Executive Order</p>						<p>government sales were \$19.5 billion, equivalent to 83 percent of total 2015 sales.</p>	<p>performance in the annual Corporate Responsibility Report and CDP Climate Change Response. For four consecutive years, Northrop Grumman has received Leadership recognition from CDP, including 2015 where we were scored a 100/100 for disclosure and A- for performance. In response to customer requests, we submitted our 2015 Climate Change Response to the General Services Administration (one of our customers) via the CDP Supply Chain program. Our leadership recognition by the U.S. government was possible due to</p>	<p>adjustments) using the cumulative catch-up method of accounting. In 2015, the net EAC adjustments totaled \$580 million (net positive).</p>

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	<p>13693 - Planning for Federal Sustainability in the Next Decade; and - The Council on Environmental Quality (environmental policy council of the Administration) published the Federal Supplier Greenhouse Gas Management Scorecard identifying the top suppliers (by FY2014 spend) and status on a) a public emissions reduction target and b) public disclosure of GHG emissions inventory. Northrop Grumman was #5 on the list and earned two top (green) marks. The leadership and performance that Northrop Grumman demonstrates can create a</p>							<p>our full disclosure in CDP and the public availability of the data contained therein re: our GHG Inventory and climate change strategy and governance.</p>	

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	competitive advantage now and in the future, if/as the U.S. government accounts for environmental impacts in its procurement processes and policies.								
Induced changes in human and cultural environments	Northrop Grumman company received a contract from NASA's Jet Propulsion Laboratory (JPL) to design and manufacture the radar antenna for its NASA-ISRO Synthetic Aperture Radar (NISAR) satellite. NISAR is a joint project between the United States and India and will be the first radar imaging satellite to use dual L-band and S-band frequencies. The satellite is designed to observe complex	Increased demand for existing products/services	3 to 6 years	Indirect (Client)	Likely	Medium-high	The financial implications of changes induced by climate change are indirect and stem from Northrop Grumman's contract to support the NISAR satellite program, which was awarded in 2015 and will continue through 2021. The NISAR satellite is accounted for in NASA's Earth Science Budget, which was approximately 35% of the Science budget for 2015, whose	The methods being used to manage these opportunities including executing Northrop Grumman's business development practices, technical expertise and customer relationships. For example, Northrop Grumman worked closely with NASA and JPL in 2014 and 2015 to understand operational needs to inform the proposal for the NISAR Satellite	Northrop Grumman calculates management costs quarterly and cumulatively on an annual basis. The aggregate is referred to as "operating income" [sales - (operating costs + expenses)]. We record changes in estimated contract operating margin at completion (net EAC adjustments) using the cumulative catch-up method of

Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact	Estimated financial implications	Management method	Cost of management
	processes including ecosystem disturbances, ice-sheet dynamics, and natural hazards such as earthquakes, tsunamis, volcanoes and landslides. Data collected from NISAR will reveal information about the evolution and state of the Earth's crust, climate change, and aid future resource and hazard management.						estimated total was \$5.2 billion.	program. Through this process, we leverage established credibility and customer intimacy to work with and support NASA and JPL.	accounting. In 2015, the net EAC adjustments totaled \$580 million (net positive).

Attachments

[https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/ClimateChange2016/CC6.ClimateChangeOpportunities/NG AstroMesh Reflector Successfully Deploys SMAP Satellite.pdf](https://www.cdp.net/sites/2016/88/13488/Climate%20Change%202016/Shared%20Documents/Attachments/ClimateChange2016/CC6.ClimateChangeOpportunities/NG%20AstroMesh%20Reflector%20Successfully%20Deploys%20SMAP%20Satellite.pdf)

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	172269
Scope 2 (location-based)	Fri 01 Jan 2010 - Fri 31 Dec 2010	562084
Scope 2 (market-based)	Fri 01 Jan 2010 - Fri 31 Dec 2010	562084

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

International Aerospace Environmental Group (IAEG) Voluntary Greenhouse Gas Reporting Guidance for the Aerospace Industry (published 2014)

CC7.3

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

Gas	Reference
CO2	IPCC Second Assessment Report (SAR - 100 year)
CH4	IPCC Second Assessment Report (SAR - 100 year)
N2O	IPCC Second Assessment Report (SAR - 100 year)
HFCs	IPCC Second Assessment Report (SAR - 100 year)
PFCs	IPCC Second Assessment Report (SAR - 100 year)
SF6	IPCC Second Assessment Report (SAR - 100 year)
NF3	IPCC Second Assessment Report (SAR - 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
 See attachments

Attachments

[https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/ClimateChange2016/CC7.EmissionsMethodology/7.4 Emissions Factors.xlsx](https://www.cdp.net/sites/2016/88/13488/Climate%20Change%202016/Shared%20Documents/Attachments/ClimateChange2016/CC7.EmissionsMethodology/7.4%20Emissions%20Factors.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 CO₂e

172269

CC8.3

Does your company have any operations in markets providing product or supplier specific data in the form of contractual instruments?

Yes

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
562084	562084	

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 assessed 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 assessed 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 assessed and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Process and fugitive emissions of all 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 assessed 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
Fugitive emissions from PFCs in 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 assessed and was reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Direct emissions of CH4 and N2O from the combustion of fossil fuels	Emissions are not relevant	No emissions excluded	No emissions excluded	CH4 and N2O emissions are excluded for mobile and stationary combustion of natural gas, diesel, gasoline, jet fuel and aviation gas. For the baseline year, these emissions would have accounted for 0.119 percent of GHG inventory and were deemed immaterial to the inventory. This category is continuously assessed 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	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	Scope 1 uncertainty results from the exclusions established (reported in question 8.4) by Northrop Grumman based on the non-relevance of the emissions to the total GHG inventory. Uncertainty also originates from the estimation of building natural gas usage for a subset of buildings where usage data is not available and/or is not being collected through the automated utility data reporting system. 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 (location-based)	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	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, 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%	Data Gaps Assumptions Extrapolation	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, 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.

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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.6a/NG - Assurance Statement - EY2010 - Reasonable-061412.pdf	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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.7a/NG - Assurance Statement - EY2010 - Reasonable-061412.pdf	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

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 CO2e
154642

CC8.3

Does your company have any operations in markets providing product or supplier specific data in the form of contractual instruments?
No

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
537934		Market-based Scope 2 emissions are not reported for this interim reporting year as they are not required for 2016 CDP Reporting.

CC8.4

Are there are 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		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		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		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.
Process and fugitive emissions of all HFCs	Emissions are not relevant	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.
Fugitive emissions from PFCs in fire suppression systems	Emissions are not relevant	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.
Direct emissions of CH4 and N2O from the combustion of fossil	Emissions are not relevant	No emissions excluded		CH4 and N2O emissions are excluded for mobile and stationary combustion of natural gas, diesel, gasoline, jet fuel and aviation gas. For the baseline year, these emissions would have accounted for 0.119 percent of GHG inventory and were

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
fuels				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	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	Scope 1 uncertainty results from the exclusions established (reported in question 8.4) by Northrop Grumman based on the non-relevance of the emissions to the total GHG inventory. Uncertainty also originates from the estimation of building natural gas usage for a subset of buildings where usage data is not available and/or is not being collected through the automated utility data reporting system. 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 (location-based)	Less than or equal to 2%	Data Gaps Assumptions Extrapolation	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, 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			

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
(market-based)			

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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.6a/NG - Assurance Statement - EY2011 - Reasonable-061412.pdf	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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.7a/NG - Assurance Statement - EY2011 - Reasonable-061412.pdf	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

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 CO2e

135363

CC8.3

Does your company have any operations in markets providing product or supplier specific data in the form of contractual instruments?

Yes

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
489629		Market-based Scope 2 emissions are not reported for this interim reporting year as they are not required for 2016 CDP Reporting.

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		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		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		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.
Process and fugitive emissions of all HFCs	Emissions are not relevant	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

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
				reflected in the NGC GHG inventory that received reasonable assurance through third party verification.
Fugitive emissions from PFCs in fire suppression systems	Emissions are not relevant	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.
Direct emissions of CH4 and N2O from the combustion of fossil fuels	Emissions are not relevant	No emissions excluded		CH4 and N2O emissions are excluded for mobile and stationary combustion of natural gas, diesel, gasoline, jet fuel and aviation gas. For the baseline year, these emissions would have accounted for 0.119 percent of 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	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	Scope 1 uncertainty results from the exclusions established (reported in question 8.4) by Northrop Grumman based on the non-relevance of the emissions to the total GHG inventory. Uncertainty also originates from the estimation of building natural gas usage for a subset of buildings where usage data is not available and/or is not being collected through the automated utility data reporting system. The

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
			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 (location-based)	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	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, 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)			

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 (%)

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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.6a/CY12 Assurance Statement - Northrop Grumman.pdf	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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.7a/CY12 Assurance Statement - Northrop Grumman.pdf	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

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 CO₂e

148786

CC8.3

Does your company have any operations in markets providing product or supplier specific data in the form of contractual instruments?

No

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
474479		Market-based Scope 2 emissions are not reported for this interim reporting year as they are not required for 2016 CDP Reporting.

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		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

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
				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		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		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.
Process and fugitive emissions of all HFCs	Emissions are not relevant	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.
Fugitive emissions from PFCs in fire suppression systems	Emissions are not relevant	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.
Direct emissions of CH4 and N2O from the combustion of fossil fuels	Emissions are not relevant	No emissions excluded		CH4 and N2O emissions are excluded for mobile and stationary combustion of natural gas, diesel, gasoline, jet fuel and aviation gas. For the baseline year, these emissions would have accounted for 0.119 percent of 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	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	Scope 1 uncertainty results from the exclusions established (reported in question 8.4) by Northrop Grumman based on the non-relevance of the emissions to the total GHG inventory. Uncertainty also originates from the estimation of building natural gas usage for a subset of buildings where usage data is not available and/or is not being collected through the automated utility data reporting system. 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 (location-based)	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	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, 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)			

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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.6a/NGC CY 2013 - Assurance Statement rev 1.pdf	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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.7a/NGC CY 2013 - Assurance Statement rev 1.pdf	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

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 CO₂e

144510

CC8.3

Does your company have any operations in markets providing product or supplier specific data in the form of contractual instruments?

No

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
463187		Market-based Scope 2 emissions are not reported for this interim reporting year as they are not required for 2016 CDP Reporting.

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		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		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.

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
Process emissions excluded for buildings less than 100,000 square feet	Emissions are not relevant	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.
Process and fugitive emissions of all HFCs	Emissions are not relevant	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.
Fugitive emissions from PFCs in fire suppression systems	Emissions are not relevant	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.
Direct emissions of CH4 and N2O from the combustion of fossil fuels	Emissions are not relevant	No emissions excluded	No emissions excluded	CH4 and N2O emissions are excluded for mobile and stationary combustion of natural gas, diesel, gasoline, jet fuel and aviation gas. For the baseline year, these emissions would have accounted for 0.119 percent of 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.

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

Scope	Uncertainty range	Main sources of uncertainty	Please expand on the uncertainty in your data
Scope 1	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	Scope 1 uncertainty results from the exclusions established (reported in question 8.4) by Northrop Grumman based on the non-relevance of the emissions to the total GHG inventory. Uncertainty also originates from the estimation of building natural gas usage for a subset of buildings where usage data is not available and/or is not being collected through the automated utility data reporting system. 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 (location-based)	More than 2% but less than or equal to 5%	Data Gaps Assumptions Extrapolation	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, 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)			

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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.6a/CY14 NGC Assurance Statement.pdf	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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.7a/CY14 NGC Assurance Statement.pdf	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

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 CO2e

145368

CC8.3

Does your company have any operations in markets providing product or supplier specific data in the form of contractual instruments?

Yes

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
433105	424755	

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.

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
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.
Process and fugitive emissions of all 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.
Fugitive emissions from PFCs in 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.
Direct emissions of CH4 and N2O from the combustion of fossil fuels	Emissions are not relevant	No emissions excluded	No emissions excluded	CH4 and N2O emissions are excluded for mobile and stationary combustion of natural gas, diesel, gasoline, jet fuel and aviation gas. For the baseline year, these emissions would have accounted for 0.119 percent of 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	More than 2% but less than or equal to 5%	Data Gaps Assumptions Data Management	Scope 1 uncertainty results from the exclusions established (reported in question 8.4) by Northrop Grumman based on the non-relevance of the emissions to the total GHG inventory. Uncertainty also originates from the estimation of building natural gas usage for a subset of buildings where usage data is not available and/or is not being collected through the automated utility data reporting system. 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 (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, 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	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, 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.

CC8.6

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

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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.6a/CY15 NGC Assurance Statement-ASRauthorized.pdf	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	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.7a/CY15 NGC Assurance Statement-ASRauthorized.pdf	2	ISO14064-3	100
Market-based	Annual process	Complete	Reasonable assurance	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC8.7a/CY15 NGC Assurance Statement-ASRauthorized.pdf	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

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	23
Germany	556
Denmark	0
France	963
United Kingdom	555
Italy	148
Netherlands	390

Country/Region	Scope 1 metric tonnes CO2e
Norway	3
United States of America	169630

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)
NGAS - Aerospace Systems	66544
NGES - Electronic Systems	82285
NGIS - Information Systems	9551
NGTS - Technical Services	1956
NGESS/CORP - Enterprise Shared Services/Corporate	11932

CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CH4	0
CO2	139969
HFCs	2996
N2O	17
NF3	34
PFCs	1371
SF6	27881

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

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	17
Germany	467
Denmark	0
France	740
United Kingdom	514
Italy	623
Netherlands	357

Country/Region	Scope 1 metric tonnes CO2e
Norway	3
United States of America	151921

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)
NGAS - Aerospace Systems	61642
NGES - Electronic Systems	71763
NGIS - Information Systems	7666
NGTS - Technical Services	1857
NGESS/CORP - Enterprise Shared Services/Corporate	11714

CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CH4	0

GHG type	Scope 1 emissions (metric tonnes CO2e)
CO2	128061
HFCs	2000
N2O	25
NF3	32
PFCs	1863
SF6	22661

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

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	131
Germany	617
Denmark	0
France	820
United Kingdom	548
Italy	167
Netherlands	312
Norway	3
United States of America	132765

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)
NGAS - Aerospace Systems	53514
NGES - Electronic Systems	62401
NGIS - Information Systems	7577
NGTS - Technical Services	1553
NGESS/CORP - Enterprise Shared Services/Corporate	10318

CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CH4	0
CO2	121048
HFCs	1222
N2O	27
NF3	41

GHG type	Scope 1 emissions (metric tonnes CO2e)
PFCs	1149
SF6	11876

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?

Yes

CC9.1a

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

Country/Region	Scope 1 metric tonnes CO2e
Belgium	139
Germany	568
Denmark	3
France	834
United Kingdom	380
Italy	180
Netherlands	144

Country/Region	Scope 1 metric tonnes CO2e
Norway	3
United States of America	146535

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)
NGAS - Aerospace Systems	60462
NGES - Electronic Systems	69753
NGIS - Information Systems	7054
NGTS - Technical Services	1874
NGESS/CORP - Enterprise Shared Services/Corporate	9643

CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CH4	0

GHG type	Scope 1 emissions (metric tonnes CO2e)
CO2	122829
HFCs	2060
N2O	17
NF3	30
PFCs	1483
SF6	22367

Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2014 - 31 Dec 2014)

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	124
Germany	582
Denmark	55
France	584
United Kingdom	603
Italy	183
Netherlands	201
Norway	0
United States of America	142178

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)
NGAS - Aerospace Systems	54743
NGES - Electronic Systems	71563
NGIS - Information Systems	6443
NGTS - Technical Services	1978
NGESS/CORP - Enterprise Shared Services/Corporate	9783

CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CH4	0
CO2	116197
HFCs	2159
N2O	18
NF3	30
PFCs	1191
SF6	24915

Page: CC9. Scope 1 Emissions Breakdown - (1 Jan 2015 - 31 Dec 2015)

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	130
Germany	510
Denmark	105
France	719
United Kingdom	510
Italy	529
Netherlands	205
Norway	0
United States of America	142660

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)
NGAS - Aerospace Systems	52994
NGES - Electronic Systems	74326
NGIS - Information Systems	6764
NGTS - Technical Services	1791
NGESS/CORP - Enterprise Shared Services/Corporate	9493

CC9.2c

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

GHG type	Scope 1 emissions (metric tonnes CO2e)
CH4	0
CO2	114060
HFCs	3074
N2O	0
NF3	38
PFCs	810
SF6	27386

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)
Australia	853	853	926	0
Belgium	8	8	31	0
Germany	3874	3874	9598	0
Denmark	17	17	51	0
France	292	292	3443	0
United Kingdom	3077	3077	5476	0
Italy	1374	1374	3404	0
Netherlands	69	69	186	0
Norway	2	2	224	0
United States of America	552519	552519	1237963	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 emissions, location based (metric tonnes CO2e)	Scope 2 emissions, market-based (metric tonnes CO2e)
NGAS - Aerospace Systems	181879	181879
NGES - Electronic Systems	196035	196035
NGIS - Information Systems	141861	141861
NGTS - Technical Services	22029	22029
NGESS/CORP - Enterprise Shared Services/Corporate	20281	20281

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?

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)
Australia	853		926	0
Belgium	8		30	0
Germany	3766		9331	0
Denmark	18		54	0
France	282		3321	0
United Kingdom	3007		5351	0
Italy	1451		3595	0
Netherlands	84		222	0
Norway	2		242	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)
United States of America	528464		1190555	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 emissions, location based (metric tonnes CO2e)	Scope 2 emissions, market-based (metric tonnes CO2e)
NGAS - Aerospace Systems	180484	
NGES - Electronic Systems	188781	
NGIS - Information Systems	128446	
NGTS - Technical Services	18261	
NGESS/CORP - Enterprise Shared Services/Corporate	21963	

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)
Australia	978		1132	0
Belgium	5		21	0
Germany	4323		10043	0
Denmark	13		42	0
France	294		3275	0
United Kingdom	2794		5656	0
Italy	1481		3833	0
Netherlands	81		227	0
Norway	4		242	0
United States of America	479656		1155437	9334

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 emissions, location based (metric tonnes CO2e)	Scope 2 emissions, market-based (metric tonnes CO2e)
NGAS - Aerospace Systems	173969	
NGES - Electronic Systems	170786	
NGIS - Information Systems	108642	
NGTS - Technical Services	17414	
NGESS/CORP - Enterprise Shared Services/Corporate	18818	

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?

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)
Australia	1246		1437	0
Belgium	6		27	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	4425		10278	0
Denmark	13		41	0
France	239		2658	0
United Kingdom	2089		4690	0
Italy	1305		3376	0
Netherlands	96		268	0
Norway	2		118	0
United States of America	465058		1129114	21412

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 emissions, location based (metric tonnes CO2e)	Scope 2 emissions, market-based (metric tonnes CO2e)
NGAS - Aerospace Systems	173311	
NGES - Electronic Systems	164388	
NGIS - Information Systems	105541	
NGTS - Technical Services	16803	
NGESS/CORP - Enterprise Shared Services/Corporate	14436	

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?

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)
Australia	1841		2189	0
Belgium	15		17	0
Germany	4677		10145	0
Denmark	13		35	0
France	197		2491	0
United Kingdom	2029		4105	0
Italy	1143		2815	0
Netherlands	133		330	0
Norway	0		27	0
United States of America	453139		1102291	21397

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 emissions, location based (metric tonnes CO2e)	Scope 2 emissions, market-based (metric tonnes CO2e)
NGAS - Aerospace Systems	163337	
NGES - Electronic Systems	163363	
NGIS - Information Systems	104641	
NGTS - Technical Services	17000	
NGESS/CORP - Enterprise Shared Services/Corporate	14846	

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?

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)
Australia	1649	1649	2064	0
Belgium	4	6	18	0
Germany	5539	7856	10315	0
Denmark	13	15	27	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)
France	225	87	2711	0
United Kingdom	1789	2098	3871	0
Italy	1255	1251	2933	0
Netherlands	48	64	111	0
Norway	0	13	27	0
United States of America	422583	411716	1084626	21695

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 emissions, location based (metric tonnes CO2e)	Scope 2 emissions, market-based (metric tonnes CO2e)
NGAS - Aerospace Systems	166597	166597
NGES - Electronic Systems	144748	146166
NGIS - Information Systems	90386	85163
NGTS - Technical Services	18189	17486
NGESS/CORP - Enterprise Shared Services/Corporate	13185	9343

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	Energy purchased and consumed (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

589713

CC11.3a

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

Fuels	MWh
Diesel/Gas oil	13613
Motor gasoline	8873

Fuels	MWh
Jet gasoline	63663
Liquefied petroleum gas (LPG)	400
Natural gas	503164

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	Comment
Grid-connected generation owned, operated or hosted by the company, with energy attribute certificates created and retired by company	838	On-site solar systems.
Energy attribute certificates, Renewable Energy Certificates (RECs)	20857	Our operations in USA have purchased RECs to cover part of the electricity consumption during the period. All RECs are Green-e certified.

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
1106703	1105865	838	838	838	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	3.00	Decrease	Emissions reductions activities in 2015 resulted in a reduction of 18,245 MTCO ₂ e from 2014: 2014 global scope 1 and scope 2 emissions were 607,697 MTCO ₂ e. Therefore, we arrived at a 3% reduction by the following calculation: (Total Projects) / (2014 S1+S2 Location Emissions) x 100 = (18,245 MTCO ₂ e) / (607,697 MTCO ₂ e) x 100 = 3.00% reduction impact
Divestment	0	No change	
Acquisitions	0	No change	
Mergers	0	No change	

Reason	Emissions value (percentage)	Direction of change	Please explain and include calculation
Change in output	0	No change	
Change in methodology	0	No change	
Change in boundary	0	No change	
Change in physical operating conditions	0	No change	
Unidentified	0	No change	Not applicable
Other	0	No change	Not applicable

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
0.0000245887	metric tonnes CO2e	23526000000	Location-based	2.9	Decrease	Implementation of emissions reduction activities.

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
0.01682	metric tonnes CO2e	square foot	34392000	Location-based	5.16	Decrease	Implementation of emissions reduction activities and sustained efficiency performance from prior emissions reduction activities.

Page: CC13. Emissions Trading

CC13.1

Do you participate in any emissions trading schemes?

No, but we anticipate doing so in the next 2 years

CC13.1b

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

Northrop Grumman tracks pending, existing and proposed regulations related to emissions trading schemes to identify the program structure(s) and mitigation options. We have operations in regions where emissions trading schemes exist and are proposed, including California, the United Kingdom and France. Our strategy is to analyze the regulations to understand and identify opportunities for operational modifications needed to remain below the threshold emissions levels, including implementation of emissions avoidance and/or reductions activities. Simultaneously, the greenNG Program and managers at potentially impacted sites analyze the human and financial resource impacts and develop an action plan, as needed. Such plans are briefed to business unit executive management and the Corporate Policy Council (executive leadership) for review and approval.

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 of CO2e)	Number of credits (metric tonnes CO2e): Risk adjusted volume	Credits cancelled	Purpose, e.g. compliance
Credit purchase	Forests	Mississippi Valley Project - reforestation	Other: American Carbon Standard (ACS)	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		[optional, not required]		Northrop Grumman is exploring methods for identifying, accounting and quantifying the emissions associated with this Scope 3 category. It is a complex category of data to collect and requires a careful approach for accurate and consistent accounting.
Capital goods	Relevant, not		[optional, not required]		Northrop Grumman is exploring methods for

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
	yet calculated				identifying, accounting and quantifying the emissions associated with this Scope 3 category. It is a complex category of data to collect and requires a careful approach for accurate and consistent accounting.
Fuel-and-energy-related activities (not included in Scope 1 or 2)	Relevant, not yet calculated		[optional, not required]		Northrop Grumman does not produce fuels or energy. Therefore, in accordance with the WRI Scope 3 Protocol, this category of emissions is not relevant
Upstream transportation and distribution	Relevant, calculated	761695	i) DESCRIPTION: 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. GWPs used are the same as those for NGC's Scope 1 and Scope 2 emissions: 1 for CO2, 21 for CH4 and 310 for N2O all sourced from the IPCC Second Annual Report. Emission factors are provided by our shipping partner. ii) DATA QUALITY: The information is tracked from by our shipping partner and 70.6% of the emissions reported for upstream distribution use primary data from the Smart Way program and thus, is of high quality. The remaining data is based on receipts, and averages developed from the primary data are then applied to calculate emissions. Therefore, some uncertainty exists in the remaining emissions. iii)The shipping partner tracks mileage data for exact ground miles	70.60%	[optional, not required]

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
			travelled and converts it to emissions using a CO2/mile emission factor by carrier. Non-SmartWay receipt data uses an average miles per shipment (based on tracked shipments) to get total miles travelled. The estimated mileage data is converted to MTCO2e using an average CO2/mile emission factor.		
Waste generated in operations	Relevant, not yet calculated		Northrop Grumman auditable sites track their monthly waste generated in a central database. Waste is categorized to distinguish non-hazardous solid waste, hazardous waste, universal waste and recycling. A diversion rate (from landfill) is calculated based on Recycled and/or Avoided /Total Waste to calculate a diversion rate. When accurate conversion factors are available and verified, Northrop Grumman can convert waste stream quantities into MTCO2e.		We are exploring methods to accurately account for emissions in this Scope 3 category.
Business travel	Relevant, calculated	142281	.i) DESCRIPTION: All primary business travel data is received from our central travel management system, including the number of hotel nights booked, rental car miles travelled and emissions, train miles travelled, and number of air miles travelled. The emission factors used include air domestic average for jet fuel in business travel from the DEFRA emission factor set, emissions per gallon of fuel consumed from the EPA, and hotel stays using the CarbonFund methodology. GWP used are the same as our Scope 1 and Scope 2 emissions, 1 for CO2, 21 for CH4 and 310 for N2O all sourced from the Second Annual Report. ii) DATA QUALITY: The GHG inventory	99.45%	[optional, not required]

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>for business travel achieved Limited Assurance via Third Party Verification from LRQA America's Sustainability, Inc. iii) METHODOLOGY: Air travel: exact miles travelled were used to calculate the emissions. Rental car emissions: exact miles driven and the average fuel economy per vehicle type were provided by the rental car company. This data was then converted to CO2 emissions. Train travel emissions: miles travelled and associated emission factor used to calculate emissions. Hotel stays: the number of hotel nights was converted to emissions using the CarbonFund methodology. Note: Train travel is new for RY2016 (2015 data)</p>		
Employee commuting	Relevant, calculated	188875	<p>ii) DESCRIPTION: Employee commuting accounts for the emissions associated with Northrop Grumman employee commutes to/from work. GWPs used are the same as Northrop Grumman's Scope 1 and Scope 2 emissions: 1 for CO2, 21 for CH4 and 310 for N2O all sourced from the IPCC Second Annual Report. EMISSIONS FACTORS for emissions per mile gallon consumed are sourced from The Climate Registry General Reporting Protocol. ii) DATA QUALITY: Employee headcount is primary data from the Annual Report (10K) filing. Estimating factors and averages are used from reputable public sources (e.g., EPA). iii) METHODOLOGY: Each business sector 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</p>	29.20%	[optional, not required]

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
			economy; it is then multiplied by the emission factor for the total commuting emissions.		
Upstream leased assets	Not relevant, explanation provided		[optional, not required]		Emissions from leased assets including real estate, vehicles, and equipment are included within our operational control boundary and Scope 1 and 2 emissions inventory. Therefore, this category of Scope 3 emissions does not apply.
Downstream transportation and distribution	Not relevant, explanation provided		Emissions associated with Downstream Transportation & Distribution are not typically relevant to the Aerospace Industry. Category 9 only includes transportation- and distribution-related emissions that occur after the reporting company pays to produce and distribute its products. SOURCE: The Voluntary GHG Reporting Guidance for the Aerospace Industry (International Aerospace Environmental Group publication, 2014); Northrop Grumman is an IAEG member and signatory to the supplemental guidance provided therein.		[optional, not required]
Processing of sold products	Not relevant, explanation provided		[optional, not required]		In most cases, products and services provided by Northrop Grumman sold products do not require further processing, transformation or inclusion in another product before use by the end consumer. This status is a function of 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	Not relevant,		[optional, not required]		Due to the security implications associated

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
products	explanation provided				with the products and services sold in the defense industry, Northrop Grumman believes the emissions derived from this category meet an additional criterion for determining materiality, based on the classified nature of our products and services.
End of life treatment of sold products	Not relevant, explanation provided		[optional, not required]		Due to the security implications associated with the products and services sold in the defense industry, Northrop Grumman believes the emissions derived from this category meet an additional criterion for determining materiality, based on the classified nature of our products and services.
Downstream leased assets	Not relevant, calculated		[optional, not required]		Northrop Grumman's downstream leased assets represent less than 2% of our total owned footprint and the associated emissions are not material to Northrop Grumman's Scope 3 GHG emissions inventory
Franchises	Not relevant, explanation provided		[optional, not required]		Northrop Grumman does not own or operate franchises.
Investments	Not relevant, explanation provided		[optional, not required]		Northrop Grumman is not a financial institution or financial services organization. Therefore, in accordance with the WRI Scope 3 Protocol, this category of emissions is not relevant to Northrop Grumman.
Other (upstream)	Not evaluated		[optional, not required]		There are no additional upstream emissions categories applicable to Northrop Grumman.
Other (downstream)	Not evaluated		[optional, not required]		There are no additional downstream emissions categories applicable to Northrop Grumman.

CC14.2

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

Third party verification or assurance process in place

CC14.2a

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

Verification or assurance cycle in place	Status in the current reporting year	Type of verification or assurance	Attach the statement	Page/Section reference	Relevant standard	Proportion of reported Scope 3 emissions verified (%)
Annual process	Complete	Limited assurance	https://www.cdp.net/sites/2016/88/13488/Climate Change 2016/Shared Documents/Attachments/CC14.2a/CY15 NGC Assurance Statement-ASRauthorized.pdf	2	ISO14064-3	13

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	1.9	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 engagement and measures of success

Strategy for Prioritizing Engagements :

Northrop Grumman's strategy for prioritizing engagement with suppliers emphasizes a "light touch", i.e., non-intrusiveness. We prioritize use of existing information and tools that do not require direct inquiries of our suppliers beyond existing communications to the maximum extent possible. For example, Northrop Grumman employs the following practices:

1) Contract terms and conditions: Northrop Grumman has instituted requirements in contract terms & conditions to explicitly require behaviors, products and/or services of our suppliers that support our environmental sustainability goals and practices. We leverage Northrop Grumman's Procurement and Global Supply Chain quality assurance process to ensure suppliers are providing the required products and services.

CDP Supply Chain Program: using our program membership, we utilize the GHG data from reporting companies to obtain GHG inventory data for Northrop Grumman suppliers. Our engagement in the CDP Supply Chain program is deliberately indirect, so as to assess the scope and level of data currently available via this public channel, to inform us of gaps in GHG data availability prior to reaching out to suppliers via the module offered by CDP.

Industry trade associations: Northrop Grumman is a member of the International Aerospace Environmental Group (IAEG), a non-profit corporation comprised of a global group of aerospace companies, established to facilitate harmonization of compliance among Aerospace Companies and their supply chains with the existing and emerging laws and regulations protecting human health and the environment. Within IAEG, Northrop Grumman is an active participant in the GHG Accounting & Reporting work group and Supply Chain Sustainability Harmonization work group with the objective of creating a standard industry approach to accounting for and reporting GHG emissions data and streamline inquiries made of suppliers, as the aerospace industry has a significant proportion of shared suppliers, to minimize the administrative burden.

Northrop Grumman uses these strategies to extract relevant GHG data from suppliers, and will, as needed, deploy additional avenues to capture desired data.

Measures of Success:

Contract terms and conditions: The scope of operations and comprehensiveness of the contract (i.e., enterprise-wide vs. select operations) deployed with explicit environmental sustainability requirements.

CDP Supply Chain: The proportion of our supply chain - in actual numbers and spend - that are currently reporting to CDP.

IAEG: The proportion of participating IAEG member companies relative to the aerospace industry; a strategy and final product that will effectively capture GHG data from the common aerospace supply chain companies.

Methods of Engagement:

SUPPLIERS: Northrop Grumman engages with supply chain companies directly via contract negotiations, quality assurance reviews, and ongoing support dialogue. Via the CDP Supply Chain program, Northrop Grumman is using an indirect engagement route, electing to capture data already reported rather than add additional administrative burdens by way of additional questions.

CUSTOMERS: Northrop Grumman received a request for CDP Climate Change GHG inventory data from the General Services Administration (GSA) in 2015, we provided our complete CDP disclosure. In 2015, we were invited to participate in the White House Supplier GHG Roundtable with President Obama and key agency leaders including EPA Administrator Gina McCarthy and the Secretary of Energy, Ernest Moniz; an event that intentionally coincided with President Obama's signing Executive Order 13693 - Planning for Federal Sustainability in the Next Decade.

PARTNERS: International Aerospace Environmental Group: The International Aerospace Environmental Group (IAEG) was formed to develop collaborative approaches for global aerospace companies in these following areas: 1) Chemical Reporting; 2) GHG Reporting & Accounting; and 3) Supply Chain Sustainability Harmonization. The objective is to coordinate information gathering across the common industry and supplier networks to respond to regulatory requirements and voluntary reporting initiatives in a consistent manner. The objective is to create a streamlined and minimally burdensome approach for suppliers and member organizations through fostering consistency in data reporting. Northrop Grumman is a founding Board member of IAEG and actively engaged in the strategy and direction of IAEG and its work groups.

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

Number of suppliers	% of total spend (direct and indirect)	Comment
10	52.1%	The nature of the global security industry creates a business environment in which one company is rarely the sole provider for a program, but rather, is more often in a prime-subcontractor/subcontractor-prime agreement with industry peers. This business structure results in significant financial relationships with our strategic suppliers which is why the percent of spend with a relatively small number of strategic suppliers. Our engagement with these suppliers is frequent and critical for general business; with regards to climate change and how/if it impacts programs, the engagement is primarily indirect.

CC14.4c

If you have data on your suppliers' GHG emissions and climate change strategies, please explain how you make use of that data

How you make use of the data	Please give details
Other	Supplier GHG emissions data is used to develop a baseline, from which materiality may be assessed, priorities identified and engagement strategies developed. We are at the nascent phase of this initiative, still seeking to understand and define a baseline.

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	President, Enterprise Services and Chief Strategy Officer	Chief Operating Officer (COO)

Further Information

CDP