

C0. Introduction

C0.1

(C0.1) Give a general description and introduction to your organization.

Norfolk Southern Corporation (NYSE: NSC) is one of the nation's premier transportation companies, moving the goods and materials that drive the U.S. economy. Norfolk Southern connects customers to markets and communities to economic opportunity, with safe, reliable, and cost-effective shipping solutions. The company's service area includes 22 states and the District of Columbia, every major container port in the eastern United States, and a majority of the U.S. population and manufacturing base.

Norfolk Southern's strategic objectives are transforming the way we do business to operate more efficiently and better serve customers, while reducing the railroad's overall environmental footprint. Our multi-pronged strategic approach includes evaluating new technologies and implementing industry best practices to help us drive efficiency and lessen are environmental impacts. Moving freight by rail is lower emissions as compared to truck, and customers who choose rail reduce their carbon footprint. Studies show that trains on average are three to four times more fuel-efficient and produce on average 75 percent fewer greenhouse gas emissions than trucks.

Norfolk Southern's fundamental business is the efficient, reliable, and safe movement of large volumes of freight from origins to destinations across long distances.

The value of this service is provided not only by the freight transportation service itself, but also through the measurable positive impact to the environment arising from the inherent efficiencies in moving freight by rail versus other modes of transportation.

Norfolk Southern's operations are subject to federal and state environmental laws and regulations concerning, among other things, emissions to the air; discharges to waterways or ground water supplies; handling, storage, transportation, and disposal of water and other materials; and the clean-up of hazardous material or petroleum releases. Compliance with such environmental laws is a principal objective of our company.

Norfolk Southern also supports and encourages voluntary efforts to conduct its business in accordance with sustainability practices that will help promote corporate success and the health of the environment. The 2020 Corporate Responsibility Report includes data from calendar year 2019. Our 2021 Environmental, Social, and Governance (ESG) Report will be released in August of 2021 and both are available to the public at <http://www.nscorp.com/content/nscorp/en/about-ns/environment.html>.

C0.2

(C0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date	Indicate if you are providing emissions data for past reporting years	Select the number of past reporting years you will be providing emissions data for
Reporting year	January 1 2020	December 31 2020	No	<Not Applicable>

C0.3

(C0.3) Select the countries/areas for which you will be supplying data.

United States of America

C0.4

(C0.4) Select the currency used for all financial information disclosed throughout your response.

USD

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your chosen approach for consolidating your GHG inventory.

Operational control

C-TO0.7/C-TS0.7

(C-TO0.7/C-TS0.7) For which transport modes will you be providing data?

Rail

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

Position of individual(s)	Please explain
Board-level committee	The Norfolk Southern Board of Directors is comprised of the President and CEO, who serves as Chairman, and 12 independent directors. The Board of Directors includes the following six committees, each with a chairperson and a written charter specifying the committee's duties: Executive Committee, Audit Committee, Compensation Committee, Governance and Nominating Committee, Finance and Risk Management Committee, and Safety Committee. The Chairman of the Board, in consultation with the Lead Director and the chairman of the respective committee, establish the agenda for committee meetings. All directors are encouraged to provide input on Board and committee meeting agendas. An example of a climate-related decision made by the Board of Directors was the election of two new company officers with responsibilities for climate-related issues. The positions are: • Executive Vice President and Chief Transformation Officer (CTO). This position oversees a new Transformation Division, which includes NS sustainability issues and initiatives to reduce impacts to the environment. Additionally, the Chief Sustainability Officer reports to the CTO position. • Senior Vice President Government Relations and Chief Legal Officer. This position oversees government relations and legal matters, including issues relative to the environment and climate change. In 2020, this position was elevated to Executive Vice President. The new Board-appointed positions are part of Norfolk Southern's strategic plan to transform the company for next-generation railroading, which includes forward-thinking sustainability strategies to improve fuel economy and reduce emissions.
Board-level committee	The Governance and Nominating Committee's broad responsibilities impact a wide range of NS decisions, including those related to governance, internal and external relationships, legislative developments, sustainability, and overall performance. The committee is in a critical position to guide decisions and, therefore, the committee charter includes the following elements: reviewing NS policy related to sustainability issues, which includes climate and emerging issues; establishing annual and long-term goals and initiatives; and overseeing the sustainability report. As an example of the committee's climate-related decisions, the Board formally revised the G&N Committee's charter document to include the oversight of the sustainability program at NS. The charter states the committee shall review and oversee the corporation's policy relating to sustainability issues, emerging sustainability issues, annual and long-term goals for the corporation's sustainability initiatives, and the corporation's annual sustainability report. This committee ensures that the sustainability initiatives appropriately reflect the expectations of Norfolk Southern's shareholders and reviews the annual sustainability report to ensure an appropriate level of detail and clarity. Our 2021 report titled the Environmental, Social, and Governance (ESG) Report will be released in August of 2021 and both will be available to the public at http://www.nscorp.com/content/nscorp/en/about-ns/environment.html .
Board-level committee	The Finance and Risk Management Committee is a standing committee. The committee provides oversight of NS' Enterprise Risk Management (ERM) process. In consultation with management, the committee: • Recommends to the Board of Directors procedures and processes for the corporation's ERM process, and ensures management and oversight responsibilities for specific, identified areas of risk for the corporation. • Oversees the corporation's ERM process, which addresses sustainability and climate-change risks relating to volatility in energy prices, business interruptions from severe weather, and legislative and regulatory efforts to limit greenhouse gas emissions, as well as financial, legal, and other risk types. • Receives regular presentations and updates on risk-management efforts and approves the work flowing through the ERM process. As an example of a climate-related decision made by the Finance and Risk Management Committee, in 2021, the committee approved the issuance of green bonds to demonstrate Norfolk Southern's commitment to supporting capital investment-promoting sustainable projects. The committee records and reports with a written record its deliberations and decisions, and regularly reports to the Board of Directors the committee's activities and conclusions with respect to the principal matters it considered.

C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Scope of board-level oversight	Please explain
Scheduled – some meetings	Reviewing and guiding strategy Reviewing and guiding major plans of action Reviewing and guiding risk management policies Reviewing and guiding business plans Setting performance objectives	<Not Applicable>	Sustainability is discussed during Governance and Nominating Committee meetings. Climate and sustainability-related issues may also be scheduled topics at some additional meetings of the Board of Directors. The Board provides climate-related oversight through reviewing and guiding risk-management policies, reviewing and guiding strategy, and reviewing major plans of action as it relates to climate change, energy, and environmental policy. Risks are evaluated through a thorough process that considers magnitude of potential risks as well as likelihood of occurrence. This risk-evaluation process helps to inform NS risk-management policies. The Board of Directors provides input on climate-related issues identified through the formal Enterprise Risk Management process, goals outlined in the company's strategic plan developed by the CEO and senior managers, discussions with investors and customers, and feedback from a range of community stakeholders. Norfolk Southern's strategic plan to transform all aspects of the business included establishing and appointing an individual in the position of Executive Vice President and Chief Transformation Officer (CTO) and redefining the Chief Sustainability Officer role which reports to the CTO. The CTO and/or the Chief Sustainability Officer report regularly to the Board on climate-related and other sustainability matters.

C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

Name of the position(s) and/or committee(s)	Reporting line	Responsibility	Coverage of responsibility	Frequency of reporting to the board on climate-related issues
<p>Chief Operating Officer (COO) <i>The Chief Operating Officer (COO) leads the operations and builds on the successful implementation of precision scheduled railroading (PSR). For NS, PSR involves lowering operating costs, which includes the climate-related responsibilities of optimizing locomotive efficiency and reducing energy consumption.</i></p>	<Not Applicable >	Both assessing and managing climate-related risks and opportunities	<Not Applicable>	Quarterly
<p>Other C-Suite Officer, please specify (Chief Transformation Officer) <i>The Chief Transformation Officer (CTO) oversees a new Transformation Division identified as part of our strategic plan. The plan to transform NS for next-generation railroading is built around PSR and NS' five core principles: serve customers, manage assets, control costs, work safely, and develop people.</i></p>	<Not Applicable >	Both assessing and managing climate-related risks and opportunities	<Not Applicable>	Half-yearly
<p>Chief Sustainability Officer (CSO) <i>The Chief Sustainability Officer reports to the CTO position. The Chief Sustainability Officer is responsible for advancing the company's strategy to integrate sustainability practices into daily operations to achieve efficiencies, control costs, generate revenue, and reduce environmental impacts. This position is critical to NS' commitment to environmental, social, and governance practices that positively impact the environment, while simultaneously supporting the growth and evolution of the company.</i></p>	<Not Applicable >	Both assessing and managing climate-related risks and opportunities	<Not Applicable>	Half-yearly
<p>Other C-Suite Officer, please specify (Environmental Policy Council) <i>The Environmental Policy Council (EPC) is charged with the oversight and monitoring of corporate environmental policy. EPC consists of senior executives from across the corporation and is chaired by the EVP Government Relations and Chief Legal Officer, or their designee. EPC conducts at least one formal meeting annually and is accessible on an ad-hoc basis. The following items within the statement of policy directly impact climate-related issues: • Ensure that every employee is trained in the environmental requirements of his/her job. Note that this has particular benefit to the positive impact of changes made in locomotive technology to reduce energy use in 2019. • Properly manage all wastes, including minimizing waste through inventory management, recycling, reduced consumption of energy, use of environmentally preferred materials, and use of non-polluting technologies and work practices.</i></p>	<Not Applicable >	Assessing climate-related risks and opportunities	<Not Applicable>	Annually
<p>Other C-Suite Officer, please specify (Sustainability Advisory Council) <i>The Corporate Sustainability Advisory Council includes department leaders across the company and is chaired by the Chief Sustainability Officer. This group meets 3-4 times per year and serves both as advisors and ambassadors for our sustainability program.</i></p>	<Not Applicable >	Both assessing and managing climate-related risks and opportunities	<Not Applicable>	Annually

C1.2a

(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).

The Chief Operating Officer (COO) leads the operations and builds on the successful implementation of precision scheduled railroading (PSR). For NS, PSR involves lowering operating costs, which includes the climate-related responsibilities of optimizing locomotive efficiency and reducing energy consumption.

The Chief Transformation Officer (CTO) oversees a new Transformation Division identified as part of our strategic plan. The plan to transform NS for next-generation railroading is built around PSR and NS' five core principles: serve customers, manage assets, control costs, work safely and develop people. These five principles optimize the network and create the most efficient network which in turn reduces emissions and focuses on climate-related issues.

The Chief Sustainability Officer reports to the CTO position. The Chief Sustainability Officer is responsible for advancing the company's strategy to integrate sustainability practices into daily operations to achieve efficiencies, control costs, generate revenue, and reduce impacts. This position is critical to NS' commitment to environmental, social, and governance practices that positively impact the environment, while simultaneously supporting the growth and evolution of the company.

The Environmental Policy Council (EPC) is charged with the oversight and monitoring of corporate environmental policy. EPC consists of senior executives from across the corporation and is chaired by the EVP and Chief Legal Officer, or their designee. EPC conducts at least one formal meeting annually and is accessible on an ad-hoc basis. The Environmental Policy Council (EPC) is committed to protecting the quality of the environment; therefore, climate-related issues that impact the environment are within the purview of the committee's responsibilities. Additionally, the EPC comprises senior management, department heads, and the Chief Sustainability Officer, who operate as leaders of various operational areas and can work together to impact change. The EPC statement of policy includes the following responsibilities:

- Ensuring that environmental training for each job is conducted. Note that this has particular benefit to the positive impact of changes made in locomotive technology to reduce energy use in 2020.
- Managing all wastes, including minimizing waste through inventory management, recycling, reduced consumption of energy, greater use of environmentally preferred materials, and use of non-polluting technologies, procedures, and work practices. Internal auditing is conducted.
- Protecting environmental quality of NS' real estate through sound management of land, water, and other property resources.
- Ensuring continuing improvement, measuring performance, and reporting environmental information.
- Overseeing and monitoring environmental policies and practices that are deemed necessary for NS to facilitate compliance with all applicable environmental laws and regulations, giving due regard to both existing and prospective legal requirements, as well as overseeing NS' corporate sustainability program.

The Corporate Sustainability Advisory Council includes department leaders across the company and is chaired by the Chief Sustainability Officer. This group meets 3-4 times per year and serves both as advisors and ambassadors for our sustainability program. Each of the described positions has oversight and responsibility within their roles and reports and communicates to the full Board of Directors on issues, including climate issues related to their purview. Each of these positions has the authority, influence, and resources to act on climate-related risks and opportunities in alignment with our corporate strategy

C1.3

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

	Provide incentives for the management of climate-related issues	Comment
Row 1	Yes	

C1.3a

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).

Entitled to incentive	Type of incentive	Activity incentivized	Comment
Corporate executive team	Monetary reward	Efficiency target	NS' 2020 annual monetary incentive is designed to compensate executives based on achievement of annual corporate performance metrics: operating income, weighted at 60 percent, and operating ratio, weighted at 40 percent. Both operating income and operating ratio are calculated using operating expenses. Fuel expenses are the third-largest expense, so improvements in fuel efficiency can result in significant improvements to our operating income and operating ratio. Since locomotive fuel drives over 90 percent of our Scope 1 and Scope 2 emissions, the annual cash incentive encourages the C-Suite to focus on fuel and operating efficiencies that ultimately result in emissions reduction per ton-mile.
Management group	Monetary reward	Efficiency target	NS' annual monetary incentive is designed to compensate management based on achievement of annual corporate performance metrics: operating income, weighted at 60 percent, and operating ratio, weighted at 40 percent. Both operating income and operating ratio are calculated using operating expenses. Fuel expenses are the third-largest expense, so improvements in fuel efficiency can result in significant improvements to our operating income and operating ratio. Since locomotive fuel drives over 90 percent of our Scope 1 and Scope 2 emissions, the annual cash incentive encourages management to focus on fuel and operating efficiencies that ultimately result in emissions reduction per ton-mile.
All employees	Monetary reward	Efficiency project	NS also has a "Spot Award Program." The Spot Award is designed to meaningfully and promptly provide a financial reward to members of our team who – through agile, collaborative, and inclusive ways of working – make important contributions to our company. When considering an individual for a Spot Award, the following are considered: • The award is reserved for superior performance outside an employee's normal job responsibilities. • The award should recognize a one-time achievement, e.g., successful completion of a high-impact project or development and implementation of an innovative business solution. • An award value of \$1,000 – 0 – \$5,000 is suitable for most awards. • For accomplishments that may not meet the requirement for a Special Contribution Award of \$25,000 or greater, but deserve an award greater than \$5,000, an enhanced \$10,000 Spot Award can be made with CEO approval. One of the past recipients that received a sustainability Spot Award was recognized for storing non-necessary locomotives and supplying energy management locomotives to every train, which promotes asset utilization and network efficiency. Additionally, another sustainability Spot Award was given for exceptional innovation demonstrated to determine and implement low-cost solutions to a recurring flooding problem area.
All employees	Non-monetary reward	Efficiency project	The Spirit Award recognizes the exceptional accomplishments of NS employees. Managers are encouraged to use the award as a means to express appreciation to employees for contributions and exemplary talents that drive the five principles behind the NS Way to: • Serve customers • Manage assets • Control costs • Work safely • Develop people Demonstrating the NS Way values is essential in maintaining forward momentum as NS strives to not only meet, but exceed, every industry standard, including those tied to environmental and climate-change goals. The Spirit Award recognizes employees who exceed expectations by acknowledging the importance of the company values and how they play a key role in achieving NS' mission. When considering an individual for a Spirit Award, the following are considered: • The award recognizes individuals or teams for superior performance outside normal job responsibilities, outstanding performance of job responsibilities, or successful completion of a high-impact project. • The award recognizes individuals or teams for making a significant contribution in the creation, development, or diffusion of innovative solutions to business challenges. • The award recognizes individuals or teams for collaborative and inclusive ways of working. One of the recipients that received a Spirit Award was recognized for quickly identifying and correcting a lubricant leak, which prevented possible environmental contamination to a nearby river.

C2. Risks and opportunities

C2.1

(C2.1) Does your organization have a process for identifying, assessing, and responding to climate-related risks and opportunities?

Yes

C2.1a

(C2.1a) How does your organization define short-, medium- and long-term time horizons?

	From (years)	To (years)	Comment
Short-term	0	6	For NS, the short-term planning horizon encompasses the period in which tactical and operational decisions are made based on the assets already in place.
Medium-term	7	50	NS is a capital-intensive company. Our planning horizons are, in large part, determined by the acquisition and disposition cycles of our key assets. Most operational assets have a lifecycle that ranges from six years (electronic components) to 50 years (statutory limit of railcars in interline service). Our medium-term planning horizon encompasses those years in which the majority of its operational assets, including locomotives, rail, railcars, radios, and operational electronics, will be retired and replaced.
Long-term	51	100	While most NS assets are procured and retired within a 7-to-50-year, medium-term horizon, many decisions span a significantly longer period. For instance, in 2016, we completed the retirement and replacement of a railroad bridge in Letchworth State Park in Portageville, NY. The original bridge was 147 years old, and was replaced by a bridge that NS hopes will provide productive service for another 150 years. Numerous other operating properties have been in service for our company and its predecessors for 100 years or more. Hence, our long-term planning horizon extends 100 years or more.

C2.1b

C2.1b) How does your organization define substantive financial or strategic impact on your business?

The Norfolk Southern Enterprise Risk Council utilizes the Enterprise Risk Management (ERM) program to identify and define substantive financial or strategic impacts to operations. Part of the ERM process is categorizing risks as either Tier 1 Risks or Tier 2 Risks.

Risks are evaluated based on both the quantitative and qualitative factors of 1) impact & likelihood; and 2) management preparedness. Impact is defined as "a measure of tangible and intangible effect(s) a risk will have on the organization in the next 12 months," and is rated by evaluating the financial, operational, and reputational outcomes. Adverse effect on free cash flow and duration of business interruption are used as quantitative indicators of financial and operational impact, respectively. Substantial financial impacts are quantified as costs exceeding \$50M. Reputational harm is considered qualitatively based upon factors such as anticipated level of regulatory scrutiny, scope of media coverage, and impact to brand. Tier 1 Risks are those that NS determines carry "high risk exposures accompanied with management identifying improvement opportunities" or need for additional preparedness. The risks identified in this category, if unaddressed, can lead to a substantive financial or strategic impact on our business. Norfolk Southern's Tier 1 substantive risks include:

- 1. Regulatory Compliance**, which can impact long-term operating costs, revenues, and profitability, could be impacted by expansion of economic or operational regulations imposed on NS and its customers.
- 2. Catastrophic Incidents** could greatly and immediately impact operating costs, particularly in the event of catastrophic loss resulting from a major derailment or other catastrophic event. Extreme weather events and changes in climate patterns can impact the condition of rail infrastructure over time, leading to increased frequency or duration of service interruptions on the NS network.
- 3. Cybersecurity and IT System Resiliency** could affect operating costs, efficiencies, and corporate reputation as a result of any failures to prevent cyber-attacks, safeguard sensitive corporate data, and/or maintain and upgrade critical systems essential to core business functionality.

C2.2

(C2.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.

Value chain stage(s) covered

Direct operations
Upstream
Downstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

More than once a year

Time horizon(s) covered

Short-term
Medium-term
Long-term

Description of process

The Enterprise Risk Management (ERM) program uses a workshop approach to assess which risks and/or opportunities could have a substantive financial or strategic impact. Workshops are held for risk identification and prioritization. Risks are reported using a heat map developed as a result of discussions during these workshops. The risks identified as carrying "high risk exposures" or a need for additional preparedness, if unaddressed, can lead to a substantive financial or strategic impact on NS' business. Norfolk Southern's Tier 1 substantive risks are as follows. 1. Regulatory Compliance, which can impact long-term operating costs; revenues and profitability could be impacted by expansion of economic or operational regulations imposed on NS and its customers. 2. Catastrophic Incidents could greatly and immediately impact operating costs, particularly in the event of catastrophic loss resulting from a major derailment or other catastrophic event. Extreme weather events and changes in climate patterns can impact the condition of rail infrastructure over time leading to increased frequency or duration of service interruptions on the NS network. 3. Cybersecurity and IT System Resiliency could affect operating costs, efficiencies, and corporate reputation as a result of any failures to prevent cyber-attacks, safeguard sensitive corporate data, and/or maintain and upgrade critical systems essential to core business functionality. The following case studies describe the process used to identify, assess, and respond to both physical and transitional risks using the ERM process. "Service resiliency" has been identified as a Tier 1 Risk. The ERM process defined the service resiliency risk as: "Growth objectives and financial measures, including long-term revenues, earnings per share, and operating ratio could be impacted by an inability to effectively execute our rail service plan and appropriately adjust and respond to unexpected service challenges (e.g., extreme weather, demand spikes, rail breaks, equipment malfunctions). A second order risk is experiencing a reduction in network velocity that creates new or exacerbates existing service issues by straining assets, resources, and the current cost structure." An example case study of the using the ERM process to identify, assess, and respond to a Tier 1 climate-related PHYSICAL risk was the train service interruption caused by historic flooding of the Missouri and Grand Rivers, resulting in submerged or washed-out train track, which impacted NS train service, product delivery, scheduling, finances, and customer service. The ERM process had identified this as a possibility, assessed potential response options, and pre-planned for the re-routing of train traffic until damaged train track could be repaired. Pre-planned contractors, supplies, and equipment were deployed to repair and normalize train service as quickly as possible. The pre-planning for this physical risk event resulted in restoring train service as quickly as possible, minimizing the financial impacts and customer disruption caused by this event. An example case study of the using the ERM process to identify, assess, and respond to a Tier 1 climate-related TRANSITIONAL risk is the need to minimize greenhouse gas emissions. Traditionally, diesel fuel is the primary energy source for freight haul by rail, creating most of the NS greenhouse gas emissions. The ERM process identified the transition away from diesel fuel as a Tier 1 Risk to NS freight haul. Various alternatives to using traditional diesel fuel were assessed (e.g., replacing diesel fuel with other energy sources, implementing technology to limit diesel fuel emissions, improving train handling), resulting in responses to limit diesel fuel use and associated greenhouse gas emissions. Examples include: • A computer-driven Energy Management System, also referred to as Trip Optimizer and LEADER, which reduces energy use by braking and accelerating the train through pre-programmed topography and rail conditions to most efficiently move the train. This technology acts like a "smart cruise control" for the train. • Precision scheduled railroading (PSR) is a key initiative to reorganize the workforce; optimize assets, train routes, and train schedules; and incorporate customer needs in a manner that optimizes train performance, thereby reducing energy use, while still meeting the customer demands. • "Sleeper cars" – a new technology that reduces the amount of energy used during a cold weather layover. Previously, the locomotive needed to stay running through the night to operate properly during the next day's use. The "Sleeper" technology reduces the amount of energy to meet the engine requirement. The result of these and similar initiatives resulted in a 28 percent reduction in greenhouse gas emissions since year 2015, with a recently accepted Science-based target (SBT) to further reduce NS greenhouse gas emissions intensity by 42 percent between 2019 and 2034.

C2.2a

(C2.2a) Which risk types are considered in your organization's climate-related risk assessments?

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	NS considers risks associated with current regulations through both our Law and Government Relations Departments. These departments have an in-depth understanding of the current regulatory landscape and are therefore well-positioned to assess and manage risks as they relate to current regulations. NS, through its Government Relations Department, assesses risks due to current and emerging regulations that may impact our suppliers. We consider the risks associated with current regulations, including U.S. carbon markets and taxes, locomotive emission standards, and renewable energy legislation. For example, if one of our suppliers is not able to meet locomotive air emission regulatory requirements, this could impact our operating costs and potentially the ability of NS to operate the necessary number of locomotives to meet the business demand. Because there are only two manufacturers of locomotives, both impacted by the air emission regulations, this is a risk for our company.
Emerging regulation	Relevant, always included	NS reviews and monitors potential financial risks to us from emerging federal and state regulations, as well as emerging carbon-pricing mechanisms, and includes this information in our risk-management process. These risks have the potential to impact our costs for fuel and the commodity mix that we transport. Based on this information, we assess our current and future risk and associated mitigation options as a result of emerging regulations. NS considers risks associated with emerging regulations through our Government Relations Department. The department has an in-depth understanding of the regulatory landscape, including emerging regulations, and is therefore well-positioned to assess and manage risks as they relate to new and changing regulations. A specific emerging regulation is pending legislation to manage carbon emissions on the coal, crude, and fracking industries. Our coal, crude, and fracking industry customers may have their businesses negatively impacted by the legislation, resulting in a decrease of their product and, in turn, we could experience a decrease in shipments of their materials and products.
Technology	Relevant, always included	Technology upon which NS relies for its operations is subject to cyber risks and, in turn, can create climate-related risks. For example, increasingly, locomotive technologies are subject to air emissions requirements. We have an initiative to reduce energy emissions with a computer-driven Energy Management System, also referred to as Trip Optimizer and LEADER. Because the Trip Optimizer and LEADER systems can be negatively impacted by information technology issues related to cyber-security and IT system resiliency, NS identifies technology as a risk. This has been identified as a Tier 1 Risk by the ERM. This risk to the rail optimization system could ultimately increase our carbon emissions by resulting in a technology interruption of the Trip Optimizer and LEADER systems.
Legal	Relevant, sometimes included	NS' legal services section handles research, advice, supervision, and representation for transactions affecting our corporate real estate holdings, industrial development, telecommunications, facilities, and operations management. Risks associated with the interpretation of federal and state laws like the Clean Water Act (CWA) and Clean Air Act can impact the scope of the railroad's compliance obligations and increase the cost of compliance. A specific risk is the interpretation regarding jurisdictional waters of the U.S. Portions of NS rail right-of-way have lower topography that could potentially be regulated, which would increase both the time and cost to maintain our infrastructure. NS takes a management-system approach to identify legal obligations but assumes some risk as the interpretation of these legal obligations can create a financial impact, resulting in re-allocation of resources from voluntary climate/environmental improvement measures and programs. An example of a legal risk related to the transition to a low-carbon economy is a concern for an increase in regulatory fines and penalties as carbon-emission limits become stricter, requiring increased legal involvement to address these fines and penalties.
Market	Relevant, always included	NS has a wide range of clients, including pharmaceuticals, automotive, electronics, and retailers, just to name a few. During NS' risk-assessment process, consideration is given to climate-related risks in the markets where we operate. One segment of our market is agriculture and forest commodities, which can be impacted by climate. Crops may be impacted by a climate-driven drought or destructive rain, hurricanes, or tornadoes. Forest products could be impacted by the increase in drought, ice storms, and tropical systems. As a result, this could adversely affect our business operations and contribute to lower rail-shipment volumes. Based on this information, we assess our current and future risks and associated mitigation options as a result of potential changes in the market.
Reputation	Relevant, sometimes included	NS's Enterprise Risk Management processes and team structure are defined to detect, monitor, assess, escalate, and mitigate risks in all aspects of our business whether they emanate from regulatory, technology, legal, market, reputation, or physical direct effects – or the indirect effects emanating from our upstream or downstream partners. The process considers the inherent dangers in each risk as well as the palliative effects of our mitigating actions. The resultant residual risk is evaluated and prioritized based on its likelihood of occurrence and the magnitude of its impact should it occur. Items that rank highly on NS' priority list are escalated and evaluated again. If we determine that additional mitigation actions could be productive, the risk is assigned to an internal entity that can best develop the appropriate mitigation. High-priority risks are presented to senior management and the Board for discussion, advice, and monitoring. NS has demonstrated and documented leadership in environmental stewardship, leading and supporting forest and wetland restoration efforts across multiple states and in partnership with many non-profit organizations. NS' Thoroughbred Code of Ethics and SPIRIT values of integrity and respect require "doing the right thing" and "believing in the importance of all our stakeholders" – this includes ensuring that our actions or actions of our partners do not negatively impact the railroad's reputation in the industry or in our communities. A reputational risk is the risk of changing customer or community perceptions of an organization's contribution to or detractor from the transition to a lower-carbon economy. An example of NS' response to a reputational risk is the application and acceptance of a Science-Based Target (SBT) for reducing our greenhouse gas emissions, demonstrating our commitment and ambition toward a low-carbon economy.
Acute physical	Relevant, sometimes included	Acute physical risks for NS include severe weather events, such as hurricanes, flood waters, winter storms, and tornadoes. These extreme events can submerge, wash out, or destroy miles of train track and, as a result, interrupt operations. For example, during 2019, the Kansas City District mainline (rail route) was out of service for a 20-day continuous period due to flooding. This means this mainline rail route could not be used by NS. Restoration and repair of the mainline cost NS \$18,860,000 in capital and \$1,000,000 in expenses. NS monitors the risk of flooding by conducting inspections to look for opportunities to do the following: armor the roadbed; raise track in specific areas prone to flooding; install culverts, or pipes, to drain water underneath road or railway in flood-prone areas; and reinforce bridge ends to prevent a potential washout of bridge structures during floods. If rail lines are out of service due to severe weather, our operations, customer service, and fuel efficiencies are negatively affected.
Chronic physical	Relevant, sometimes included	Weather patterns and extreme variability in air temperatures impact operations and may increase the risk of rail failure. In some cases, the risk is a result of a longer period that can have a cumulative effect. An example of this risk to NS is extreme cold, which can contribute to broken rail and, in turn, may lead to derailments along with interrupting train movements. Extreme heat can also cause rail-alignment issues. Weather-related patrols must be significantly increased during periods of temperature extremes to identify weakened or misaligned rail to prevent business interruptions. These patrols are also inspecting track for signs of undermining due to erosion or increasingly higher water levels in the adjacent areas. In order to proactively address the slow, chronic impact of weather pattern changes, the inspections identify necessary projects to strengthen the rail bed in order to avoid future rail failure and derailment.

C2.3

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.3a

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Acute physical	Increased severity and frequency of extreme weather events such as cyclones and floods
----------------	--

Primary potential financial impact

Increased capital expenditures

Climate risk type mapped to traditional financial services industry risk classification

<Not Applicable>

Company-specific description

Climate-related extreme weather events may impact NS' "service resiliency" by rendering some of our train tracks unusable. Acute extreme weather events, such as super storms, hurricanes, tornadoes, and floods, may negatively impact the continuous availability of our rail infrastructure, which provide transportation services to our customers. Flooding caused by unusually high precipitation may render such rail infrastructure inaccessible (i.e., underwater). Customer traffic requiring that infrastructure cannot be readily processed. This may occur anywhere in the country, but is most frequently in the Midwest near the Missouri and Grand Rivers. This climate-related risk may result in lost revenue if: 1) customers find another way to ship their freight, or 2) increased costs incurred by NS to move traffic over a longer route, lease rail equipment for longer periods of time, or move excess equipment accumulating in yards waiting for delivery. An example of this effect is the recent rising floodwaters of the Missouri River, which severed our line for a month in 2019. Some traffic to and from our Kansas City terminal and interchange with Western carriers was halted. Some traffic was diverted to utilize alternative routes, albeit at extra cost. Even upon reopening, congestion at origin and destination – especially at our intermodal terminals – delayed certain traffic for several additional days. In total, flood waters washed out about 3,000 feet of track across more than a dozen locations, scouring holes as deep as 20 to 30 feet. The worst washout undermined a 1,500-foot-long section. Another climate-related situation that threatens NS' rail is extreme temperatures. The threat is breakage of rail due to extreme cold. Extreme heat can also cause rail alignment issues. Weather-related patrols are conducted to inspect rails and replace any weakened rail to prevent business interruptions. These patrols are also inspecting track for signs of undermining due to erosion or increasingly higher water levels in the adjacent areas. To proactively address the slow, chronic impact of weather pattern changes, the inspections identify necessary projects to strengthen the rail bed to avoid future rail failure and derailment.

Time horizon

Short-term

Likelihood

Virtually certain

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

10000

Potential financial impact figure – maximum (currency)

25000000

Explanation of financial impact figure

The potential annual range of financial impact is based on actual expenses associated with actual extreme weather events in 2020. NS maintains financial records for weather-related events using both capital expenditure and non-capital expense codes. This enables NS to review historical capital and non-capital annual costs from extreme weather events, identify trends, estimate financial impact ranges for both capital and non-capital expenditures, and make projections for future budget planning. The financial tracking is broken down into the following sections: • Major Damages that Required Capitalization – A summary report that includes the Authorization for Expenditure (AFE) project number, short title of the event, dollar amount of the AFE, and a brief description of the impact of the weather event (i.e., historic high river levels) • Other Events Where Damage Was Not Significant Enough to Require Capitalization – The reports include accounting identifier number, title, dollar amount of cost of damage restoration, and description of cost • Monthly System Wide Capture Codes for Various Weather-Related Costs – The report includes accounting code, month, dollar amount incurred, and description (i.e., snow removal)

Cost of response to risk

240000

Description of response and explanation of cost calculation

One example of an acute, severe flooding event was experienced at Lake Michigan which resulted in lakeshore and inland flooding, erosion, and other damage. Norfolk Southern experienced impacts along the lakeshore, most notably in the area of milepost CD 500 around Pine Yard which experienced continual flooding as a result of high lake levels. The existing drainage structures in the yard were not capable of handling this volume of water. Large rental pumping equipment had to be brought in to remove water from the yard. In late May 2020, NS began tracking the costs of continuing to pump flood water out of the yard while working to develop a permanent solution to increase drainage capacity to cope with sustained flooding. In total in 2020, NS spent over \$240k on temporary measures to remove water from the Pine Yard area via short-term measures like pumping and temporary drainage changes. A plan was developed to install a permanent pumping solution and that was progressed in late 2020. The cost of response figure provided is specific to the 2020 Lake Michigan event and is included in NS records maintained by NS as "2020 Cost of Restoring Damaged Roadway Assets Where Damage Was Influenced by Weather Events." • To respond to the damage NS used: Rental Pumps - \$125,000 Equipment = \$20,100 NS labor = \$61,500 Material – Pipe/Other = \$19,000 Material - Stone = \$14,400 In 2020, there were eight events – including bridge washout and replacement, bridge repairs, rail yard damage, and derailments – caused directly or indirectly by high water or hurricanes. An additional 37 separate events caused by heavy rains or high water resulted in more minimal repairs, such as railbed stabilization and repairs due to landslides and slope failures. NS tracks costs for restoring damaged roadway assets where damage was influenced by weather events.

Comment

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Emerging regulation	Mandates on and regulation of existing products and services
---------------------	--

Primary potential financial impact

Increased capital expenditures

Climate risk type mapped to traditional financial services industry risk classification

<Not Applicable>

Company-specific description

The emerging regulations on carbon emissions, whether voluntary or required, exist and the challenge is for NS to work at lowering emissions to maintain regulatory compliance and not lose market share by failing to provide the low-carbon transportation solution. Emerging regulations that mandate the reduction of carbon emissions could increase our operating costs, including capital expenditures, such as a carbon tax, the purchase of carbon credits, investments in new technologies, or the retirement of otherwise-productive assets to comply with the regulation. As reported in the NS annual report, NS is "driving improvement with our brand of precision scheduled railroading" and "transforming our business with technology." The entire rail freight transportation industry, including NS, relies primarily on diesel fuel for its locomotives. As regulations emerge limiting greenhouse gas (GHG) emissions, the ability for NS to rely on traditional diesel fuel as an energy source becomes more challenging. As an example of NS' response to these challenges, we adopted PSR, a railroad operating model to improve the efficiency of train operations and thereby reduce diesel fuel usage and associated GHG emissions. We have also invested in technology, such as Trip Optimizer and LEADER, to improve individual locomotive performance to reduce fuel usage and GHG emissions. Additionally, we are involved in researching alternative energy options for powering locomotives.

Time horizon

Medium-term

Likelihood

More likely than not

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

200000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

The financial impact of regulation would be highly dependent on the specifics of the regulation. The bipartisan proposal of the Climate Leadership Council proposes a \$40 per metric ton carbon tax with a 5 percent increase per year. NS currently has around 5 million metric tonnes of emissions per year, so if this carbon tax legislation were passed, it would impose a \$200 million additional operating cost on NS per year and increase 5 percent each year.

Cost of response to risk

72400000

Description of response and explanation of cost calculation

NS understands and stays current on emerging climate-related regulations and trends. The risk of future regulations as well as investors and customers requiring us to reduce our air emissions exists. As a result, NS has acted to research and make changes to our locomotive technology to continue to reduce our carbon footprint. The result of the technology study was the identification of three LEADER and Trip Optimizer technologies with the following results: 1) Locomotive conversions from DC to AC traction, which increases tonnage capabilities (ability to pull) thereby reducing fuel use. 2) Installation of Energy Management Systems on locomotives, which interacts with data on the weather conditions, conditions of the rails, and upcoming hills and turns – and in doing so, limits fuel usage as a result of abrupt braking and acceleration. 3) "Sleeper" stations installed at cold weather terminals. These stations keep the locomotive engine warm when not running, which is critical during cold weather. Keeping the engine warm without keeping the locomotive idling is a fuel-reduction measure. The total cost for the LEADER and Trip Optimizer technologies is \$72,400,000. The LEADER Technology costs were \$33,900,000 The Trip Optimizer Technology costs were \$38,500,000

Comment

Technology and locomotive enhancements and operating efficiencies are core to the bottom line of the business and are always being worked on to improve.

Identifier

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Emerging regulation	Mandates on and regulation of existing products and services
---------------------	--

Primary potential financial impact

Decreased revenues due to reduced demand for products and services

Climate risk type mapped to traditional financial services industry risk classification

<Not Applicable>

Company-specific description

Legislation to reduce carbon emissions could result in less demand for products from NS coal customers that rely on NS rail service to ship their product and supplies. For 2020, total NS revenue is reported to be \$9.789 billion. Approximately 11 percent (\$1.077 billion) of corporate revenue comes from the transport of coal. This regulatory shift toward more carbon-friendly energy sources could negatively impact traditional fossil fuel energy customers, resulting in decreased NS shipments and revenues for these materials. For example, domestic coal-fired energy generation is expected to continue to decline as utility providers face increased regulatory pressures along with decreased demand and volatility in the market.

Time horizon

Medium-term

Likelihood

About as likely as not

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

53839500

Potential financial impact figure – maximum (currency)

215358000

Explanation of financial impact figure

For 2020, total NS revenue is reported to be \$9.789 billion. Approximately 11 percent (\$1.077 billion) of corporate revenue comes from the transport of coal. Emerging regulation that reduces the demand for coal has a direct financial impact on NS revenues. The impact of emerging legislation on NS revenues is highly dependent on the specifics of that legislation. The estimated range of potential financial impact is based on a potential 5 percent (minimum) to a 20 percent (maximum) decrease in revenue from reduced shipments of coal.

Cost of response to risk

0

Description of response and explanation of cost calculation

NS' action to address this risk includes: 1) the ongoing monitoring of the status of the legislation impacting greenhouse gas emissions, 2) being mindful that this revenue stream is at risk of being reduced due to possible regulatory impacts on the coal, crude, and fracking industries, and 3) continuing to grow NS' business to compensate for the potential of reduced revenue associated with the traditional fossil fuel energy sector. As part of its overall business strategy, NS maintains a budget for marketing and growing new customers. These marketing efforts are simply redirected toward other sectors to grow new business to offset the potential loss in revenues from the traditional fossil fuel energy sector. Therefore, the cost of response to this risk is already part of the normal marketing budget.

Comment**C2.4****(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?**

Yes

C2.4a**(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.****Identifier**

Opp1

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

NS rail transport emits on average 75 percent less greenhouse gas emissions per ton-mile as compared to trucks. Efficiency benefits realized from the NS Precision Scheduled Railroad (PSR) operating model coupled with NS implementation of emission-reducing technologies, such as Trip Optimizer, LEADER, and sleeper cars, reduces NS greenhouse gas emissions. The NS network of interconnected rail lines and intermodal facilities provides shippers the ability to easily access our transportation services for an efficient and environmentally friendly way to haul their freight. We communicate to our customers the climate change and transportation efficiency benefits associated with the movement of goods via train versus truck. As customers pursue less carbon-intensive modes of transporting freight, our rail services provide an opportunity for customers to reduce their climate impact. This shift toward a low-carbon economy can result in increased revenue opportunities for Norfolk Southern. A recent shipper survey indicates that 15 percent of shippers may convert some business from truck to rail because of the increased stakeholder focus on Environmental, Social, and Governance (ESG) considerations.

Time horizon

Medium-term

Likelihood

More likely than not

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

53080000

Potential financial impact figure – maximum (currency)

265400000

Explanation of financial impact figure

The estimated opportunity for an increase in revenue resulting from a change in NS customer preferences for freight haul is based on a recent shipper survey indicating 15 percent of shippers may convert some business from truck to rail because of the increased stakeholder focus on ESG. Assuming this truck-to-rail revenue increase would fall within the NS Intermodal revenues of approximately \$2.654 billion was used to estimate the range of potential revenue increase by assuming a lower and upper bound of 2 and 10 percent increase in Intermodal revenues resulting from increased demand for NS services.

Cost to realize opportunity

0

Strategy to realize opportunity and explanation of cost calculation

Monitoring legislation and communicating with customers about their preferences is a regular part of NS' marketing efforts. As such, there are no additional costs to realize the opportunity to increase NS Intermodal revenues as a result of increased demand for NS services. NS monitors legislation that could affect our customers' preferences. Additionally, NS marketing teams communicate with customers on a regular basis to learn of the factors that drive their consumption of rail transport and adjust products and services to secure extra business where possible. As part of the NS strategy to increase Intermodal revenues as customers seek low-carbon transportation options, weS developed a web-based carbon calculator referred to as "The Green Machine." This tool is located on NS' website and offers potential new customers (possibly moving from truck carriers to NS rail system) the opportunity to compare the truck versus rail carbon footprint for transporting their commodity. As shippers realize the lower carbon footprint advantages shipping by NS rail as compared to truck, the opportunity to grow NS business revenue in a low-carbon economy becomes more apparent. There are many factors that influence NS bringing in new business. As existing and new customers re-examine their supply chains to lower their contracted transportation emissions, this could benefit NS rail, which is the lower-carbon option for surface transportation.

Comment

There are many factors that influence NS bringing in new business. As existing and new customers re-examine their supply chains to lower their contracted transportation emissions this could benefit rail which is the lower carbon option for surface transportation.

Identifier

Opp2

Where in the value chain does the opportunity occur?

Downstream

Opportunity type

Energy source

Primary climate-related opportunity driver

Participation in carbon market

Primary potential financial impact

Increased revenues through access to new and emerging markets

Company-specific description

NS has been involved in developing carbon emission-reduction projects since 2010. We have two forestry projects ongoing, with a total enrolled acreage just over 20,000 acres. Together, these two forest projects have generated over 600,000 carbon credits for NS and are annually sequestering another 80,000 metric tons per year of CO2 from the atmosphere, which generates additional credits. Carbon credits generated from current and future projects at NS provides us several opportunities. We can use them to offset our own emissions. We can also use them to offset the emissions of our customer's shipments, which could provide incentive for them to increase shipments on NS. Finally, we can sell the credits to generate revenue for NS. The monetary value of these credits should continue to increase if both the compliance and voluntary carbon markets continue to develop. Demand for credits has been increasing and should continue as more companies are setting aggressive emission reduction goals. Emerging regulation could also drive a demand for credits. As the low-carbon economy continues to develop, NS is positioned to participate in marketing carbon offsets.

Time horizon

Medium-term

Likelihood

Very likely

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

<Not Applicable>

Potential financial impact figure – minimum (currency)

3600000

Potential financial impact figure – maximum (currency)

6000000

Explanation of financial impact figure

NS currently has around 240,000 carbon credits in the voluntary market . Such credits have been recently trading in the range of \$15 to \$25 each. The potential financial impact was calculated by multiplying the current price range by 240,000 carbon credits. The demand for voluntary credits is anticipated to be thirty times greater by 2030. Future credits from annual sequestration are not included in these calculations as they are not guaranteed.

Cost to realize opportunity

30000

Strategy to realize opportunity and explanation of cost calculation

There is currently mounting pressure on companies to reduce their emissions and in some cases even voluntarily committing to going carbon neutral, which would be zero net emissions. NS works with two carbon development companies to verify and register offsets from our existing projects. The majority of the annual project costs is the responsibility of the carbon developer. Our annual responsibility for the verification and registration of credits averages around \$30,000 per year which is a flat fee but market based. Carbon credits generated from current and future projects at NS provides us several opportunities. We can use them to offset our own emissions. We can also use them to offset the emissions of our customer's shipments, which could provide incentive for them to increase shipments on NS. Finally, we can sell the credits to generate revenue for NS.

Comment

Identifier

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Resilience

Primary climate-related opportunity driver

Resource substitutes/diversification

Primary potential financial impact

Reduced direct costs

Company-specific description

NS was experiencing a high rate of shoreline erosion, endangering a main access road at the Lambert's Point marine and rail terminal in Norfolk, VA. Sea-level rise and storm frequency resulted in increased erosion rates from 1 foot to 1.5 feet annually. We chose to use a low-carbon and environmentally friendly repair alternative by constructing a 900-foot vegetated living shoreline (a combined marsh, oyster habitat, and sand and rock breakwater structure) in lieu of a steel sheet-pile bulkhead. NS engineers prepared a basis of design report to evaluate a steel bulkhead versus a natural living shoreline for their resilience to climate change, and forecasted performance, lifecycle costs, and longevity of the two alternatives. System parameters included the erosion history of the site, tidal range, storm surge, sea level rise, and contributions to GHG emissions. The alternative shoreline stabilization solution was 900 LF of steel sheet pile bulkhead that would have also required regrading the shoreline back towards an access road and rail line. The estimated cost of that alternative was \$3 million, and the steel production would have added to NS's Scope 3 emissions. Accordingly, we selected the living shoreline alternative as it met fiscal, environmental, and social responsibility goals and was considered a sustainable and more resilient long-term infrastructure solution.

Time horizon

Short-term

Likelihood

Virtually certain

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

2000000

Potential financial impact figure – minimum (currency)

<Not Applicable>

Potential financial impact figure – maximum (currency)

<Not Applicable>

Explanation of financial impact figure

NS evaluated alternatives to address the shoreline erosion at the NS Lambert Point Terminal. Installing traditional sheet pile was estimated to cost approximately \$3 million, while construction of a living shoreline option was estimated to cost approximately \$1 million. The reduced direct operating cost by selecting the living shoreline option was approximately \$2 million.

Cost to realize opportunity

1064000

Strategy to realize opportunity and explanation of cost calculation

NS engineers prepared a basis of design report to evaluate design alternatives and environmental system scenarios to help forecast performance, lifecycle costs, and longevity of the infrastructure. System parameters included the erosion history of the site, tidal range, storm surge, sea level rise, and contributions to GHG emissions. In 2019, NS asked engineers to design an erosion control structure at its Lambert's Point Terminal in Norfolk to address the 1 to 1.5 feet of erosion rate along an unprotected stretch of shoreline. If left unimproved, the erosion would begin to undermine an access road and railyard on the west end of terminal. NS had evaluated several structural alternatives in the past to address erosion at the site, including a steel sheet-pile bulkhead, a stone revetment, and a landscaped living shoreline. Each alternative was evaluated in terms of construction costs, lifecycle cost, resilience to sea level rise and storm surge, environmental impact, and contribution to Scope 3 emissions from construction. A living shoreline was selected for its resilience to future sea level rise, storm surge, low-carbon construction footprint, coastal habitat creation, and cost effectiveness in addressing erosion at the terminal. The total cost to realize this opportunity was \$1,064,000. Costs: Planning and Design \$207,000 Construction Management \$77,000 Construction \$780,000 TOTAL COST \$1,064,000

Comment

C3. Business Strategy

C3.1

(C3.1) Have climate-related risks and opportunities influenced your organization's strategy and/or financial planning?

Yes

C3.1b

(C3.1b) Does your organization intend to publish a low-carbon transition plan in the next two years?

	Intention to publish a low-carbon transition plan	Intention to include the transition plan as a scheduled resolution item at Annual General Meetings (AGMs)	Comment
Row 1	No, we do not intend to publish a low-carbon transition plan in the next two years	<Not Applicable>	Climate-related risks and opportunities have influenced NS strategy and financial planning; however, we are not prepared at this time to publish a low-carbon transition plan .

C3.2

(C3.2) Does your organization use climate-related scenario analysis to inform its strategy?

Yes, qualitative and quantitative

C3.2a

(C3.2a) Provide details of your organization's use of climate-related scenario analysis.

Climate-related scenarios and models applied	Details
2DS Other, please specify (Internal methodology)	A climate-related scenario analysis was used to establish a science-based target. The Science Based Target initiative (SBTI) approved NS' new GHG emissions intensity target, which is consistent with reductions required to keep global warming to well-below 2 degrees Celsius. Norfolk Southern utilizes an internal methodology to evaluate potential scenarios where climate change may impact safety and/or operations. Short-, medium-, and long-term time horizon scenarios are evaluated. A case study example for the short-term scenario analysis is the annual exercise of creating a capital expenditure budget incorporating response to the historical climate and weather-related events. A medium-term horizon scenario includes longer term planning of capital expenditures like facility consolidation, construction, and any infrastructure investments. Long-term horizon scenario includes strategic planning based on new and emerging technology projections or growth projections. A case study example of a long-term scenario analysis includes topics like rising sea levels which may force decisions of relocation of assets along coastal cities. A key element of the PSR model, managing assets (e.g., trains, buildings, workforce), seeks to determine the minimal NS footprint necessary to provide quality service for our customers. For example, , after analyzing historical workforce location scenarios (e.g., multiple regional office locations, locations on coastal areas, and the current office location practices), we decided to consolidate our office workforce into a new headquarters building in Atlanta, GA, convenient to mass transit to reduce employee commute. The new headquarters makes excellent use of outdoor spaces, particularly for an urban environment, and will be LEED certified once completed in 2021 to ensure a "climate-friendly" office space and reduced carbon footprint.

C3.3

(C3.3) Describe where and how climate-related risks and opportunities have influenced your strategy.

	Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence
Products and services	Yes	Recognizing the need to address climate-related risks and opportunities as customers seek low-carbon transportation services, the Precision Scheduled Railroad (PSR) operating model was implemented at NS to improve rail transportation services to our customers. The PSR model improves efficiencies in asset utilization, workforce, and train performance. NS achieved significant reductions in fuel consumption and associated greenhouse gas (GHG) emissions. The PSR strategies create year-over-year improvements in operating efficiencies, resulting in annual reductions in GHG emissions. Recognizing the potential of these efficiencies, NS applied for and received an approved science-based target (SBT) for reducing GHG emissions into the future. Since railroad transport service is on average 3-4 times more fuel efficient and emits approximately 75% less GHG emissions than highway transport, NS has made a substantial strategic decision to underscore intermodal freight haul in future planning and partner with trucking customers to use train service for long haul and truck service for local delivery. A typical intermodal freight train can carry the freight of hundreds of trucks therefore taking congestion off roads and reducing carbon emissions. Any carbon restrictive regulation could cause potential customers to shift business to rail, therefore creating advantages for NS.
Supply chain and/or value chain	Yes	Recognizing the need to address climate-related risks and opportunities as customers seek low-carbon transportation services and improvements to supply and/or value chains, NS launched a new long-term operating plan that overhauls the way the railroad runs trains across the network. This results in fewer, heavier trains, reducing circuitry and train miles, reducing car handlings, and increasing network velocity – all which contribute to lower carbon emissions per ton-mile. As a result NS operates with roughly 20 percent fewer locomotives and 21 percent fewer rail cars, significantly reducing GHG emissions. A case study describes the strategy, development, and implementation of our new operating plan. Recognizing the need to address climate-related risks and opportunities as customers seek low-carbon transportation services and improvements to supply and/or value chains, NS' network planning and optimization team developed our plan using modelling and simulation tools to run scenarios and analyze operating data and train flows. Weeks before the plan rollout, the marketing teams met with hundreds of customers to communicate expectations for the transition and explain the supply chain and environmental benefits of the program. Through these efforts, 60,000 carloads of new business were generated by assisting 90 industries build or expand their use of the NS network, removing carbon-emitting heavy trucks from the highway.
Investment in R&D	Yes	Investment in research and development (R&D) is driven by safety, innovation, operating efficiency, and the opportunity to reduce the industry's carbon contributions through the development of new technologies that can reduce GHG emissions from locomotive operations. A strategic investment is the installation of Energy Management (EM) System technologies. NS has been invested in R&D of energy management/fuel conservation systems since 2005. Since that time, NS continues to drive technology development in this area. In 2016, NS began installing the latest EM technologies, implementing throttle control on road locomotives. The throttle control installations continue to drive fuel conservation on the NS road fleet with 432 new installations in 2019 and 172 new installations in 2020. The goal is to have all NS road locomotives in use equipped with an auto-throttle capable EM system. Another R&D project involved the assembly of a Tier 4 switcher locomotive to be tested in conjunction with Progress Rail. This test will check the feasibility of exhaust after treatment utilizing diesel exhaust fluid (DEF) solution to reduce exhaust emissions in the rail industry. The continuing initiatives to improve locomotive fuel efficiency have resulted in conserving more than 130 million gallons of diesel since 2015 and avoiding more than 1.3 million metric tonnes of CO2 emissions. NS improved our emissions intensity per gross ton miles (GTM) by 7 percent between 2019 and 2020 alone.
Operations	Yes	The most substantial strategic decision in the operations area between 2010 and 2020 is the continuation, contribution, and continual monitoring of NS' locomotive idle-reduction policies. To further reduce the carbon footprint from railroad operations through reductions in fuel consumption and carbon emissions, NS developed idle-reduction policies and programs to eliminate unnecessary engine idling. For operational reasons, locomotives must sometimes be kept idling to prevent the engine from freezing in cold weather or to maintain proper pressure in air brake lines. To offset that, our road locomotives are outfitted with automatic engine start/stop technology that saves fuel by automatically shutting down an idling engine when conditions allow. In cold weather, the locomotive will shut down automatically when certain engine temperature thresholds are met and then restart as needed to prevent freezing. These practices are governed by Equipment Operation & Handling Rule L-238. NS monitors compliance with L-238 via auditing. Out of 22,223 locomotives audited, 98.6 percent complied with L-238. In addition, NS has expanded the use of our customized plug-in heater systems, known as the "Sleeper," that are installed in rail yards to eliminate engine idling. Locomotives can be shut down and plugged into the "Sleeper," which heats the engine and keeps the battery system charged. Through innovative public-private partnerships aimed at reducing transportation-related emissions in urban environments, NS has installed "Sleeper" units at rail yards in Atlanta, Chicago, Kansas City, Missouri, and across Ohio. An additional 16 installations were completed at yards in Erie, Buffalo, Chicago, Calumet, and Burns Harbor in 2020.

C3.4

(C3.4) Describe where and how climate-related risks and opportunities have influenced your financial planning.

	Financial planning elements that have been influenced	Description of influence
Row 1	Revenues Assets	NS invested \$5.6 million in GreenTrees in 2011, which reforested 10,000 acres of hardwoods and is currently sequestering over 50,000 metric tons of CO2 per year. These generated carbon offsets are verified through the American Carbon Registry. For the vintage years 2018 and 2019, the verification was completed in 2020. 51,785 tons of carbon offsets were approved by ACR for each of the 2018 and 2019 vintage years based on a June 24, 2020, verification report. Such offsets can be retired against NS emissions, used to provide incentive to customers to convert more shipments to rail, or sold to other companies needing to lower their emissions. We currently have around 240,000 offsets, which represent about 5 percent of our total emissions. Between 2016 and 2030, the trees will generate an estimated 1.12 million carbon credits for Norfolk Southern.

C3.4a

(C3.4a) Provide any additional information on how climate-related risks and opportunities have influenced your strategy and financial planning (optional).

NS works to achieve balance between business operations and the environment. A commitment to sustainable business practices makes a positive difference in business today and is based on the current risks associated with climate changes. All of the following strategies are identified in NS' Corporate Responsibility Report.

- NS adopted a carbon-mitigation strategy, Trees and Trains, that turns the company's carbon footprint into a corporate opportunity. In our largest project, the company invested \$5.6 million over five years to reforest 10,000 acres of hardwoods in the Mississippi River Alluvial Valley. Between 2016 and 2030, the trees will generate an estimated 1.12 million carbon credits that NS can use to offset its carbon emissions or sell to others wishing to offset their environmental impacts.
- Through its progressive locomotive rebuilding program, NS has developed a new class of low-emission Eco locomotives for rail yard service now used in Chicago, Pittsburgh, Atlanta, and Macon, GA. These public-private partnerships tap funds available to reduce transportation-related diesel emissions. NS is helping these areas improve air quality and meet their commitments under the federal Clean Air Act.
- To reduce unnecessary locomotive idling in rail yards, NS developed the "Sleeper," an innovative plug-in system that charges batteries and heats engines, allowing locomotives to be turned off in freezing weather. This idle-reduction technology, another public-private venture, helps NS achieve sustainability's triple bottom line of social, environmental, and economic benefits. The Sleeper enhances air quality in neighborhoods around rail yards, reduces emissions linked to climate change, and lowers fuel use and costs for NS.
- As part of the railroad's strategic plan, NS adopted an aggressive goal to improve locomotive fuel-efficiency by nearly 9 percent from 2015 to 2020. The effort aims to reduce both fuel costs and locomotive fleet emissions, the company's largest source of greenhouse gas emissions. We exceeded this goal with a 9.4% improvement in fuel efficiency.
- Since introducing a prototype battery-operated switcher locomotive in 2009, NS continues studying the use of battery power to reduce carbon emissions. We are exploring development of a "micro-hybrid" solution to reduce locomotive engine idling. The idea is to equip locomotives with a small auxiliary battery pack to operate critical engine systems while the engine is shut off. Today's sophisticated locomotive engine systems can quickly drain power from the main battery if the locomotive is shut off for too long.
- NS is improving the energy efficiency of its office, yard, shop, and field facilities by replacing older lighting and HVAC equipment with the most cost- and energy-efficient technologies available. For example, a \$53 million energy-conversion project at the company's Juniata locomotive shop in Altoona, PA is reducing the shop's carbon emissions by nearly 60 percent, improving energy efficiency by half, and saving \$4 million annually in operating costs.

C4. Targets and performance

C4.1

(C4.1) Did you have an emissions target that was active in the reporting year?

Intensity target

C4.1b

(C4.1b) Provide details of your emissions intensity target(s) and progress made against those target(s).

Target reference number

Int 1

Year target was set

2020

Target coverage

Company-wide

Scope(s) (or Scope 3 category)

Scope 1+2 (location-based)

Intensity metric

Other, please specify (Metric tons CO2e per million gross ton-miles (MGTM))

Base year

2019

Intensity figure in base year (metric tons CO2e per unit of activity)

13.38

% of total base year emissions in selected Scope(s) (or Scope 3 category) covered by this intensity figure

100

Target year

2034

Targeted reduction from base year (%)

42

Intensity figure in target year (metric tons CO2e per unit of activity) [auto-calculated]

7.7604

% change anticipated in absolute Scope 1+2 emissions

-37.5

% change anticipated in absolute Scope 3 emissions

0

Intensity figure in reporting year (metric tons CO2e per unit of activity)

12.44

% of target achieved [auto-calculated]

16.7271691935369

Target status in reporting year

New

Is this a science-based target?

Yes, and this target has been approved by the Science Based Targets initiative

Target ambition

Well-below 2°C aligned

Please explain (including target coverage)

Norfolk Southern's GHG emissions intensity was 12.44 metric tons of CO2 equivalents per million gross ton miles in 2020 as compared to the base year (2019), which was 13.38 metric tons of CO2 equivalents per million gross ton miles. Norfolk Southern set a SBT validated in 2021 by the Science Based Target initiative, in line with a well-below 2 degree Celsius scenario, committing to reduce GHG emissions intensity (Scope 1 + 2) by 42 percent by 2034.

C4.2

(C4.2) Did you have any other climate-related targets that were active in the reporting year?

No other climate-related targets

C4.3

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	0	0
To be implemented*	0	0
Implementation commenced*	3	1200000
Implemented*	2	909300
Not to be implemented	0	0

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Initiative category & Initiative type

Company policy or behavioral change	Resource efficiency
-------------------------------------	---------------------

Estimated annual CO2e savings (metric tonnes CO2e)

454650

Scope(s)

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

34192759

Investment required (unit currency – as specified in C0.4)

0

Payback period

11-15 years

Estimated lifetime of the initiative

6-10 years

Comment

Norfolk Southern is improving techniques and training associated with locomotive assignment and handling. It is a core component of our emissions intensity reduction target, currently set to reduce consumption/emissions intensity by 42 percent in the period from 2019 through 2034. This equates to 2.5 percent absolute emissions reductions annually. Using the estimated annual CO2e savings and converting this to gallons of diesel conserved at approximately \$1.29 per gallon (U.S. Energy Information Administration – average 2020 wholesale diesel price), and assuming that half of our reduction comes through this training and technique, this would represent a \$34.2 million savings per year.

Initiative category & Initiative type

Energy efficiency in production processes	Automation
---	------------

Estimated annual CO2e savings (metric tonnes CO2e)

454650

Scope(s)

Scope 1

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

34192759

Investment required (unit currency – as specified in C0.4)

0

Payback period

11-15 years

Estimated lifetime of the initiative

6-10 years

Comment

Norfolk Southern is installing two vendors' version of train energy management hardware and software on our locomotives. This software coaches locomotive engineers as to how to handle a train more efficiently and complements our standard training and assignment improvements, mentioned above. Energy Management is a core component of our emissions intensity reduction target, currently set to reduce consumption/emissions by 8.6 percent in the period from 2016 through 2020. Using the estimated annual CO2e savings and converting this to gallons of diesel conserved at approximately \$1.29 per gallon (U.S. Energy Information Administration – average 2020 wholesale diesel price), and assuming that half of our reduction comes through this energy management technology, this would represent a \$34.2 million savings per year.

C4.3c

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Compliance with regulatory requirements/standards	Norfolk Southern's locomotive emissions, which comprise approximately 91 percent of total Scope 1 and Scope 2 emissions, are governed by EPA "Tier" regulations that limit greenhouse gas, particulate, and other emissions based on locomotive manufacture date. Norfolk Southern complies with all such EPA regulations.
Financial optimization calculations	When investments in sustainability can provide a sufficient financial return even without a material price on GHG emissions, Norfolk Southern will pursue that investment.
Partnering with governments on technology development	Norfolk Southern partners with local governments to invest in lower-emission technologies when the local entity is willing to contribute capital to compensate for an unfavorable financial investment result. A prime example of this is NS' pursuit of lower emission locomotives through locally sponsored, federally funded CMAQ grants.

C4.5

(C4.5) 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

C4.5a

(C4.5a) 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

Company-wide

Description of product/Group of products

Norfolk Southern is a provider of transportation services, almost entirely by rail. As a rail carrier, our competition includes all of the forms of freight transportation. Rail transport is on average is three to four times more fuel efficient than truck transport. As a result, rail is often able to help customers avoid carbon emissions through this advantageous emission profile over trucks. It is estimated that our customers annually avoid around 15 million metric tons of emissions by choosing rail instead of truck.

Are these low-carbon product(s) or do they enable avoided emissions?

Avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify (Calculated avoided emissions)

% revenue from low carbon product(s) in the reporting year

92

% of total portfolio value

<Not Applicable>

Asset classes/ product types

<Not Applicable>

Comment

Rail transport is three to four times more fuel efficient than trucks and three to four times more efficient in terms of greenhouse gas emissions. So, if 10 percent of freight moved by trucks switched to rails, total fuel savings would exceed 1.6 billion gallons annually, and GHG emissions would fall by 17 million tons (AAR).

C5. Emissions methodology

C5.1

(C5.1) Provide your base year and base year emissions (Scopes 1 and 2).

Scope 1

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

4784047

Comment

NS 2019 base year Scope 1 emissions were 4,784,047 metric tons CO2e.

Scope 2 (location-based)

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

201474

Comment

NS 2019 base year Scope 2 emissions were 201,474 metric tons CO2e.

Scope 2 (market-based)

Base year start

January 1 2019

Base year end

December 31 2019

Base year emissions (metric tons CO2e)

201474

Comment

NS reported a Scope 2 location-based figure in 2019.

C5.2

(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate emissions.

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)
US EPA Center for Corporate Climate Leadership: Indirect Emissions From Purchased Electricity
US EPA Center for Corporate Climate Leadership: Direct Emissions from Stationary Combustion Sources
US EPA Center for Corporate Climate Leadership: Direct Emissions from Mobile Combustion Sources

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO2e?

Reporting year

Gross global Scope 1 emissions (metric tons CO2e)

3786837

Start date

<Not Applicable>

End date

<Not Applicable>

Comment

Global scope 1 emissions in 2020 were independently verified.

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We are reporting a Scope 2, market-based figure

Comment

NS calculated Scope 2 location based emissions using the U.S. EPA's eGrid. NS calculated Scope 2 market based emissions using the Green-e residual mix emission factors.

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO2e?

Reporting year

Scope 2, location-based

193097

Scope 2, market-based (if applicable)

176274

Start date

<Not Applicable>

End date

<Not Applicable>

Comment

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

No

C6.5

(C6.5) Account for your organization's gross global Scope 3 emissions, disclosing and explaining any exclusions.

Purchased goods and services

Evaluation status

Relevant, calculated

Metric tonnes CO2e

12454

Emissions calculation methodology

Norfolk Southern estimated emissions using the WRI/WBCSD GHG Protocol Scope 3 Evaluator Tool, which is based on the Quantis Suite software. NS reviewed all purchased goods and services, annual spend, and excluded goods and services already accounted for within Scope 1, 2, and 3. The tool uses environmental input-output data based on the World Input-Output Database (WIOD) and the Open IO Database. Due to these value chain emissions estimates being rough approximations, they will not be included in the footprint.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Purchased goods and services annual spend is managed by the Norfolk Southern Procurement Department.

Capital goods

Evaluation status

Relevant, calculated

Metric tonnes CO2e

1159359

Emissions calculation methodology

Norfolk Southern estimated emissions using the WRI/WBCSD GHG Protocol Scope 3 Evaluator Tool, which is based on the Quantis Suite software. NS reviewed all purchased goods and services, annual spend, and excluded goods and services already accounted for within Scope 1, 2, and 3. The tool uses environmental input-output data based on the World Input-Output Database (WIOD) and the Open IO Database. Due to these value chain emissions estimates being rough approximations, they will not be included in the footprint.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Capital annual spend is managed by the Norfolk Southern.

Fuel-and-energy-related activities (not included in Scope 1 or 2)

Evaluation status

Relevant, calculated

Metric tonnes CO2e

882285

Emissions calculation methodology

Norfolk Southern estimates fuel- and energy-related activities that are not included in Scope 1 and 2 by using the total locomotive diesel fuel and multiplying it by the wheel-to-tank (WTT) emission factor for diesel. This includes emissions associated with the upstream supply chain process, from extraction to delivery of the fuel to NS.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Annual spend from diesel fuel purchases is obtained directly from the Norfolk Southern's R-1 Report which is submitted to the U.S. Surface Transportation Board (STB). The NS R-1 Report is used to obtain the annual locomotive fuel use from freight, yard switching, and work trains. These data, representing the single largest source of GHG emissions data, represents one of the most closely tracked metrics by NS.

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO2e

215

Emissions calculation methodology

Emissions were calculated based on the fuel-based method as outlined in the GHG Protocol's "Technical Guidance for Calculating Scope 3 Emissions." Norfolk Southern requested our highest-volume suppliers to report data related to transportation of their goods. This data was used to calculate emissions from upstream transportation and distribution by determining the amount of fuel consumed and applying the appropriate emission factor for that fuel.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

80

Please explain

Norfolk Southern calculated and reported emissions from the transportation and distribution of products purchased, including rails, ties, ballasts, and locomotives, in the reporting year between the company's tier 1 suppliers and its own operations in vehicles not owned or operated by Norfolk Southern.

Waste generated in operations

Evaluation status

Relevant, calculated

Metric tonnes CO2e

70353

Emissions calculation methodology

Activity data sources for waste generated in operations were the annual total mass of waste (short tons) and the proportion of waste being sent to the landfill, recycled, and incinerated. Emission factors were obtained from the EPA Waste Reduction Model (WARM) Version 15 (Management Practices and Background Documents, May 2019). Only end-of-life process emission factors were used from the WARM documentation. For waste sent to the landfill, the emission factor associated with mixed municipal solid waste (MSW) material was used. For recycled waste, emissions from material recovery in preparation for recycling were assumed to have been allocated to the recycled material; therefore, the emission factor used for recycled waste was zero metric tonnes of carbon dioxide equivalent (MTCO2e)/short ton. For incinerated waste, the emission factor associated with dimensional lumber was used since only crossties were burned for energy. NS wastes were assumed to be composed of mixed MSW and mixed recyclables.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

Norfolk Southern has collected data related to GHG emissions from waste generated in its operations.

Business travel

Evaluation status

Relevant, calculated

Metric tonnes CO2e

12575

Emissions calculation methodology

Emissions were calculated based on the distance-based method as outlined in the GHG Protocol's "Technical Guidance for Calculating Scope 3 Emissions." Air travel miles were obtained from our travel service providers. Rental car miles were obtained from our main rental agency. NS also included employee reimbursed mileage.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

85

Please explain

An insignificant amount of business travel is not arranged through our corporate travel provider; accordingly, this activity and related emissions are considered inconsequential and not included in the calculation.

Employee commuting

Evaluation status

Relevant, calculated

Metric tonnes CO2e

79240

Emissions calculation methodology

The average commute time per state and average fuel required for round-trip commute per state are gathered from 2016 Census Bureau data. It was assumed that one minute of commute is equivalent to one mile travelled and the overall fuel source is gasoline. The total number of NS employees per state was multiplied by the fuel required for a round-trip commute daily to calculate the gallons of gasoline used per day. The totals were then multiplied by 261 days to account for work days within 2020. Using the emissions factors identified by EPA, the total emissions for CO2e was calculated. Please note that this is a high-end estimate as the figures used for the total number of NS employees per state are W-2 figures that include any employees that received wages or salary during the 2020 year.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

0

Please explain

This is the third year that NS has calculated our emissions from employee commuting. NS Human Resources maintains the information used to calculate commuting emissions.

Upstream leased assets

Evaluation status

Relevant, calculated

Metric tonnes CO2e

1443

Emissions calculation methodology

NS leased facilities were identified per state. The electricity consumption of the facilities in each state was estimated by using a factor of 15.9 kWh for each facility's square footage. Using the emissions factors for GHG pollutants obtained from EPA's eGRID 2019, the total emissions for CO2e was calculated. A leased facility located in Quebec, Canada was not included in the data since it is out of scope for the eGRID database.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Norfolk Southern calculated GHG emissions from upstream leased assets that were not reported in Norfolk Southern's Scope 1 and 2 emissions. The scope of these assets is office space. All office space lease rates include utilities. Accordingly, no data is available for electricity consumption for the specific leased spaces. The assets in the calculation do include emissions from natural gas for heating the buildings where this data was available. The energy and electrical utility emissions at facilities leased by Norfolk Southern is included in the lease agreements and is therefore not reported separately.

Downstream transportation and distribution

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

This category includes emissions that occurred in the reporting year from transportation and distribution of sold products in vehicles not owned or controlled by the reporting company. Norfolk Southern does not distribute sold products. As such, the emissions generated by downstream transportation and distribution are not relevant to Norfolk Southern.

Processing of sold products

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

Norfolk Southern is primarily a provider of freight transportation services, not a manufacturer or vendor of products for sale. As such, the emissions generated by processing of sold products are not relevant to Norfolk Southern.

Use of sold products

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

This category includes emissions from the use of goods and services sold by the reporting company in the reporting year. Norfolk Southern is primarily a provider of freight transportation services, not a manufacturer or vendor of products for sale. As such, the emissions generated by use of sold products are not relevant to Norfolk Southern.

End of life treatment of sold products

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

This category includes emissions from the waste disposal and treatment of products sold by the reporting company at the end of their life. Norfolk Southern does not sell products and therefore, does not produce emissions from the waste disposal of products. As such, this category of emissions is not relevant to Norfolk Southern's operations as a rail transportation company.

Downstream leased assets

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

This category includes emissions from the operation of assets that are owned by the reporting company (acting as lessor) and leased to other entities in the reporting year that are not already included in Scope 1 or Scope 2. Norfolk Southern does not act as a lessor. Therefore, emissions from downstream leased assets are not relevant to Norfolk Southern.

Franchises

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

Norfolk Southern does not currently own franchises. As such, the emissions generated by franchises are not relevant to Norfolk Southern.

Investments

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

Based on the definition of "investment" provided in the GHG Protocol's "Technical Guidance for Calculating Scope 3 Emissions," this category is not relevant to Norfolk Southern's operations. This category includes Scope 3 emissions associated with NS' investments in the reporting year not already included in Scope 1 or Scope 2. This category is applicable to investors and companies that provide financial services. Norfolk Southern does not provide financial services. As such, the emissions generated by investments are not relevant to Norfolk Southern.

Other (upstream)

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

NS did not evaluate any other upstream data.

Other (downstream)

Evaluation status

Not relevant, explanation provided

Metric tonnes CO2e

<Not Applicable>

Emissions calculation methodology

<Not Applicable>

Percentage of emissions calculated using data obtained from suppliers or value chain partners

<Not Applicable>

Please explain

NS did not evaluate any other downstream data.

C6.7

(C6.7) Are carbon dioxide emissions from biogenic carbon relevant to your organization?

Yes

C6.7a

(C6.7a) Provide the emissions from biogenic carbon relevant to your organization in metric tons CO2.

	CO2 emissions from biogenic carbon (metric tons CO2)	Comment
Row 1	256663	NS emissions from biofuels were 256,663 metric tons CO2e in 2020.

C6.10

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO2e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

0.00044135

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO2e)

3979759

Metric denominator

unit total revenue

Metric denominator: Unit total

9789000000

Scope 2 figure used

Location-based

% change from previous year

8

Direction of change

Decreased

Reason for change

The emissions intensity improvement results from a large decrease in absolute emissions (1,005,763 metric tonnes of CO2e). Total revenue also decreased by \$1.51 billion due to the COVID-19 pandemic; however, due to efficiencies through precision scheduled railroading, technologies, and training initiatives, the emissions intensity still improved by 8 percent.

C-TS6.15

(C-TS6.15) What are your primary intensity (activity-based) metrics that are appropriate to your emissions from transport activities in Scope 1, 2, and 3?

Rail

Scopes used for calculation of intensities

Report just Scope 1

Intensity figure

0.000021

Metric numerator: emissions in metric tons CO2e

3560177

Metric denominator: unit

t.mile

Metric denominator: unit total

164056102000

% change from previous year

-9.94

Please explain any exclusions in your coverage of transport emissions in selected category, and reasons for change in emissions intensity.

This metric includes Scope 1 emissions from locomotives and excludes Scope 2 emissions. This is the most appropriate indicator of emissions related to NS transport activities.

ALL

Scopes used for calculation of intensities

Report just Scope 1

Intensity figure

0.000021

Metric numerator: emissions in metric tons CO2e

3560177

Metric denominator: unit

t.mile

Metric denominator: unit total

164056102000

% change from previous year

-9.94

Please explain any exclusions in your coverage of transport emissions in selected category, and reasons for change in emissions intensity.

This metric includes Scope 1 emissions from locomotives and excludes Scope 2 emissions. This is the most appropriate indicator of emissions related to NS transport activities.

C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	3751242	IPCC Fifth Assessment Report (AR5 – 100 year)
CH4	8017	IPCC Fifth Assessment Report (AR5 – 100 year)
N2O	27578	IPCC Fifth Assessment Report (AR5 – 100 year)

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

Country/Region	Scope 1 emissions (metric tons CO2e)
United States of America	3786837

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

By activity

C7.3c

(C7.3c) Break down your total gross global Scope 1 emissions by business activity.

Activity	Scope 1 emissions (metric tons CO2e)
Transport services activities	3786837

C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-T07.4/C-TS7.4

(C-CE7.4/C-CH7.4/C-CO7.4/C-EU7.4/C-MM7.4/C-OG7.4/C-ST7.4/C-T07.4/C-TS7.4) Break down your organization’s total gross global Scope 1 emissions by sector production activity in metric tons CO2e.

	Gross Scope 1 emissions, metric tons CO2e	Net Scope 1 emissions , metric tons CO2e	Comment
Cement production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Chemicals production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Coal production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Electric utility activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Metals and mining production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (upstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (midstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (downstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Steel production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport OEM activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport services activities	3786837	<Not Applicable>	All NS Scope 1 emissions can be attributed to transport services activities.

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted for in Scope 2 market-based approach (MWh)
United States of America	193097	176274	421322	0

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

By facility

C7.6b

(C7.6b) Break down your total gross global Scope 2 emissions by business facility.

Facility	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Florida	661	649
Iowa	56	71
New York	2357	1448
Delaware, Maryland, New Jersey, Pennsylvania	24478	23127
Michigan	3497	4103
Indiana, Ohio, West Virginia	96450	69259
Louisiana	446	435
Illinois and Missouri	8601	17618
Alabama and Georgia	22284	25183
Kentucky, Mississippi, Tennessee	13716	13259
North Carolina, South Carolina, Virginia	20551	21122

C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7

(C-CE7.7/C-CH7.7/C-CO7.7/C-MM7.7/C-OG7.7/C-ST7.7/C-TO7.7/C-TS7.7) Break down your organization's total gross global Scope 2 emissions by sector production activity in metric tons CO2e.

	Scope 2, location-based, metric tons CO2e	Scope 2, market-based (if applicable), metric tons CO2e	Comment
Cement production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Chemicals production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Coal production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Metals and mining production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (upstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (midstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Oil and gas production activities (downstream)	<Not Applicable>	<Not Applicable>	<Not Applicable>
Steel production activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport OEM activities	<Not Applicable>	<Not Applicable>	<Not Applicable>
Transport services activities	0	0	Transport service activities (i.e., freight haul) use diesel-powered locomotives, which do not contribute to Scope 2 emissions. No freight haul activities are powered by electricity.

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Decreased

C7.9a

(C7.9a) 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.

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable energy consumption	161232	Decreased	3	NS more than tripled its use of biofuels between 2019 and 2020 from 2% of total fuel usage to 7% total fuel usage. (Increase in biofuels emissions [2019 to 2020] / total 2019 locomotive fuel emissions)*100 = (161,232/4,675,964) * 100 = 3%
Other emissions reduction activities	402305	Decreased	8	NS Scope 1 and 2 emissions from 2019 to 2020 decreased in part due to emissions-reduction activities. In 2020, as an estimate, approximately 8 percent out of our total 20 percent absolute emissions reductions (402,305 tCO2e) were reduced by a change in our emissions-reduction activities, and our total S1 and S2 emissions in the previous year were 4,985,522 tCO2e; therefore, we arrived at -8 percent through $(-402,305/4,985,522) * 100 = -8$ percent (i.e., an 8-percent decrease in emissions).
Divestment		<Not Applicable >		
Acquisitions		<Not Applicable >		
Mergers		<Not Applicable >		
Change in output	603458	Decreased	12	NS Scope 1 and 2 emissions from 2019 to 2020 decreased in part due to reduced activity during the COVID-19 pandemic. In 2020, as an estimate approximately 12 percent out of our total 20 percent absolute emissions reductions (603,458 tCO2e) were reduced by a decline in activity, and our total S1 and S2 emissions in the previous year were 4,985,522 tCO2e; therefore, we arrived at -12 percent through $(-603,458/4,985,522) * 100 = -12$ percent (i.e., a 12-percent decrease in emissions).
Change in methodology		<Not Applicable >		
Change in boundary		<Not Applicable >		
Change in physical operating conditions		<Not Applicable >		
Unidentified		<Not Applicable >		
Other		<Not Applicable >		

C7.9b

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Location-based

C8. Energy

C8.1

(C8.1) What percentage of your total operational spend in the reporting year was on energy?

More than 10% but less than or equal to 15%

C8.2

(C8.2) Select which energy-related activities your organization has undertaken.

	Indicate whether your organization undertook this energy-related activity in the reporting year
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	No
Consumption of purchased or acquired steam	No
Consumption of purchased or acquired cooling	No
Generation of electricity, heat, steam, or cooling	No

C8.2a

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total (renewable and non-renewable) MWh
Consumption of fuel (excluding feedstock)	Please select	950987	14849949	15800936
Consumption of purchased or acquired electricity	<Not Applicable>	0	421322	421322
Consumption of purchased or acquired heat	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired steam	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of purchased or acquired cooling	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Consumption of self-generated non-fuel renewable energy	<Not Applicable>	<Not Applicable>	<Not Applicable>	<Not Applicable>
Total energy consumption	<Not Applicable>	950987	15271271	15271271

C8.2b

(C8.2b) Select the applications of your organization's consumption of fuel.

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	No
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	No
Consumption of fuel for the generation of cooling	No
Consumption of fuel for co-generation or tri-generation	No

C8.2c

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

Fuels (excluding feedstocks)

Diesel

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

14390474

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Emission factor

0.433

Unit

metric tons CO2e per barrel

Emissions factor source

U.S. EPA Emission Factor Hub (March 26, 2020). The emission factor provided is a calculated combined emission factor using U.S. EPA Emission Factor Hub emission factors and global warming potentials for CO2, N2O, and CH4.

Comment

NS consumed approximately 14,390,474 MWh of diesel fuel in the reporting year.

Fuels (excluding feedstocks)

Natural Gas

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

157733

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Emission factor

0.053

Unit

metric tons CO2e per million Btu

Emissions factor source

U.S. EPA Emission Factor Hub (March 26, 2020). The emission factor provided is a calculated combined emission factor using US EPA Emission Factor Hub emission factors and global warming potentials for CO2, N2O, and CH4.

Comment

NS consumed approximately 157,733 MWh of natural gas in the reporting year.

Fuels (excluding feedstocks)

Kerosene

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

21170

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Emission factor

75.2

Unit

kg CO2 per million Btu

Emissions factor source

U.S. EPA Emission Factor Hub (March 26, 2020). The emission factor provided is a calculated combined emission factor using US EPA Emission Factor Hub emission factors and global warming potentials for CO2, N2O, and CH4.

Comment

NS consumed approximately 21,170 MWh of kerosene in the reporting year.

Fuels (excluding feedstocks)

Propane Liquid

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

44609

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Emission factor

0.241

Unit

metric tons CO2e per barrel

Emissions factor source

U.S. EPA Emission Factor Hub (March 26, 2020). The emission factor provided is a calculated combined emission factor using U.S. EPA Emission Factor Hub emission factors and global warming potentials for CO₂, N₂O, and CH₄.

Comment

NS consumed approximately 44,609 MWh of propane in the reporting year.

Fuels (excluding feedstocks)

Motor Gasoline

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

223576

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Emission factor

0.377

Unit

metric tons CO₂e per barrel

Emissions factor source

U.S. EPA Emission Factor Hub (March 26, 2020). The emission factor provided is a calculated combined emission factor using U.S. EPA Emission Factor Hub emission factors and global warming potentials for CO₂, N₂O, and CH₄.

Comment

NS consumed approximately 223,576 MWh of gasoline in the reporting year.

Fuels (excluding feedstocks)

Biodiesel

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

950987

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Emission factor

73.84

Unit

kg CO₂ per million Btu

Emissions factor source

U.S. EPA Emission Factor Hub (March 26, 2020).

Comment

NS consumed approximately 950,987 MWh of biodiesel in the reporting year.

Fuels (excluding feedstocks)

Jet Gasoline

Heating value

LHV (lower heating value)

Total fuel MWh consumed by the organization

11216

MWh fuel consumed for self-generation of electricity

<Not Applicable>

MWh fuel consumed for self-generation of heat

<Not Applicable>

MWh fuel consumed for self-generation of steam

<Not Applicable>

MWh fuel consumed for self-generation of cooling

<Not Applicable>

MWh fuel consumed for self-cogeneration or self-trigeneration

<Not Applicable>

Emission factor

0.413

Unit

metric tons CO2e per barrel

Emissions factor source

U.S. EPA Emission Factor Hub (March 26, 2020). The emission factor provided is a calculated combined emission factor using US EPA Emission Factor Hub emission factors and global warming potentials for CO2, N2O, and CH4.

Comment

NS consumed approximately 11,216 MWh of jet fuel in the reporting year.

C8.2e

(C8.2e) Provide details on the electricity, heat, steam, and/or cooling amounts that were accounted for at a zero emission factor in the market-based Scope 2 figure reported in C6.3.

Sourcing method

None (no purchases of low-carbon electricity, heat, steam or cooling)

Low-carbon technology type

<Not Applicable>

Country/area of consumption of low-carbon electricity, heat, steam or cooling

<Not Applicable>

MWh consumed accounted for at a zero emission factor

<Not Applicable>

Comment

For calculations of the Scope 2 market-based figure in response C6.2, NS obtained the Weighted Grid Mix Residual Mix Emission Factor, first determining a weighting factor for each state according to the MWh usage in that state (state MWh/total MWh), next multiplying the weighting factor times the residual mix emission factor for the state, and finally, adding all the weighted amounts to get a single Weighted Grid Mix Emission Factor representative of the entire system. NS does not currently purchase low-carbon electricity, heat, steam or cooling, but is exploring options for future renewable sources.

C-TS8.2f

(C-TS8.2f) Provide details on the average emission factor used for all transport movements per mode that directly source energy from the grid.

Category	Emission factor unit	Average emission factor: unit value	Comment
Please select	Please select		Grid-sourced electricity does not provide motive power for Norfolk Southern transportation movements. All moves are powered by diesel.

C-TS8.5

(C-TS8.5) Provide any efficiency metrics that are appropriate for your organization's transport products and/or services.

Activity

Rail

Metric figure

0.002242

Metric numerator

Other, please specify (Gallons)

Metric denominator

Revenue-ton.mile

Metric numerator: Unit total

367836640

Metric denominator: Unit total

164056102000

% change from last year

-3.4

Please explain

U.S. Class 1 Rail companies commonly use "Revenue Ton-Mile per gallon of diesel (RTM/gal)" as a freight haul efficiency metric. This measures the ability of a freight train to transport one U.S. short ton of freight a certain distance (miles) per gallon of diesel fuel. For this metric, the larger the better. Sometimes this ratio is inverted to "gallons of fuel per RTM". For this metric, less is better since it represents the gallons of fuel needed to move one ton of freight one mile.

C9. Additional metrics

C9.1

(C9.1) Provide any additional climate-related metrics relevant to your business.

C-TO9.3/C-TS9.3

(C-TO9.3/C-TS9.3) Provide tracking metrics for the implementation of low-carbon transport technology over the reporting year.

Activity

Rail

Metric

Fleet adoption

Technology

Other, please specify (More fuel-efficient locomotives)

Metric figure

120

Metric unit

Other, please specify (number of locomotives)

Explanation

Norfolk Southern is continuously upgrading our existing fleet. At our Juniata locomotive shop in Altoona, PA, Norfolk Southern regularly rebuilds locomotives into more efficient machines, benefiting both customers and the environment. In 2020, NS and our contractors rebuilt 120 locomotives. NS is also leveraging our investment in positive train control (PTC) by integrating onboard locomotive energy management, train-handling systems into the safety-based PTC technology. The merging of these advanced technologies provides us with enhanced operational safety while giving us greater capabilities to improve locomotive fuel economy. NS deployed two types of onboard Energy Management (EM) systems – LEADER and Trip Optimizer. By the end of 2020, NS outfitted approximately 1,532 road locomotives – about 92% of our road fleet – with EM technology integrated into PTC. In addition, our entire network is certified to operate trains equipped with Trip Optimizer or LEADER, meaning it has been mapped and is equipped with the required hardware and software that communicates with the train-handling technologies.

C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6

(C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6) Does your organization invest in research and development (R&D) of low-carbon products or services related to your sector activities?

	Investment in low-carbon R&D	Comment
Row 1	Yes	

C-TO9.6a/C-TS9.6a

(C-TO9.6a/C-TS9.6a) Provide details of your organization's investments in low-carbon R&D for transport-related activities over the last three years.

Activity

Rail

Technology area

Smart systems

Stage of development in the reporting year

Applied research and development

Average % of total R&D investment over the last 3 years

81-100%

R&D investment figure in the reporting year (optional)

11000000

Comment

At NS, locomotive fuel efficiency is a top priority. Norfolk Southern's strategy to reduce locomotive diesel fuel use is multi-pronged and ever-evolving as we evaluate new technologies and industry best practices. On average, trains are approximately three to four times more fuel efficient than trucks. NS builds upon this advantage and further reduces emissions through fuel management systems. In 2020, NS invested approximately \$11 million in R&D of these fuel management systems. NS made improvements in our onboard energy management technologies, resulting in more efficient train handling. NS deployed two types of onboard energy management systems – LEADER and Trip Optimizer. These GPS-based systems identify the proper throttle position and dynamic braking setting to achieve optimal fuel efficiency based on factors such as track topography and train tonnage. The latest models have automated features similar to cruise control in automobiles, enabling the train to operate in an autopilot mode. NS also utilizes a fuel management system known as Horsepower Per Ton 2.0 (HPT). This operations tool conserves fuel by enabling train crews to match locomotive horsepower with operating requirements, such as train type, tonnage, and topography of track segments. In addition, NS expanded the use of our customized plug-in heater systems, known as the "Sleeper," that are installed in rail yards to eliminate engine idling. Locomotives can be shut down and plugged into the "Sleeper," which heats the engine and keeps the battery system charged. Through innovative public-private partnerships aimed at reducing transportation-related emissions in urban environments, NS installed "Sleeper" units at rail yards in Atlanta, Chicago, Kansas City, Missouri, and across Ohio in 2019. An additional 16 installations were completed at yards in Erie, Buffalo, Chicago, Calumet, and Burns Harbor in 2020.

C10. Verification

C10.1

(C10.1) Indicate the verification/assurance status that applies to your reported emissions.

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2 (location-based or market-based)	Third-party verification or assurance process in place
Scope 3	Third-party verification or assurance process in place

C10.1a

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements.

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

NS Statement of Emissions- KPMG 7-28-2021_Final.pdf

Page/ section reference

Scope, statement of verification, and standard: page 1 emissions: 2-5

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

C10.1b

(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 2 emissions and attach the relevant statements.

Scope 2 approach

Scope 2 location-based

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

NS Statement of Emissions- KPMG 7-28-2021_Final.pdf

Page/ section reference

Scope, statement of verification, and standard: page 1 emissions: 2-5

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

C10.1c

(C10.1c) Provide further details of the verification/assurance undertaken for your Scope 3 emissions and attach the relevant statements.

Scope 3 category

Scope 3: Business travel

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

NS Statement of Emissions- KPMG 7-28-2021_Final.pdf

Page/section reference

Scope, statement of verification, and standard: page 1 emissions: 2-5

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

Scope 3 category

Scope 3: Employee commuting

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

NS Statement of Emissions- KPMG 7-28-2021_Final.pdf

Page/section reference

Scope, statement of verification, and standard: page 1 emissions: 2-5

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

Scope 3 category

Scope 3: Upstream leased assets

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

NS Statement of Emissions- KPMG 7-28-2021_Final.pdf

Page/section reference

Scope, statement of verification, and standard: page 1 emissions: 2-5

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

Scope 3 category

Scope 3: Waste generated in operations

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

NS Statement of Emissions- KPMG 7-28-2021_Final.pdf

Page/section reference

Scope, statement of verification, and standard: page 1 emissions: 2-5

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

Scope 3 category

Scope 3: Upstream transportation and distribution

Verification or assurance cycle in place

Annual process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

NS Statement of Emissions- KPMG 7-28-2021_Final.pdf

Page/section reference

Scope, statement of verification, and standard: page 1 emissions: 2-5

Relevant standard

Attestation standards established by AICPA (AT105)

Proportion of reported emissions verified (%)

100

C10.2

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

Yes

C10.2a

(C10.2a) Which data points within your CDP disclosure have been verified, and which verification standards were used?

Disclosure module verification relates to	Data verified	Verification standard	Please explain
C4. Targets and performance	Year on year emissions intensity figure	Attestation standards established by AICPA (AT105)	Emissions intensity figures are verified during the third-party verification of the annual GHG Inventory. NS Statement of Emissions- KPMG 7-28-2021_Final.pdf

C11. Carbon pricing

C11.1

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

No, but we anticipate being regulated in the next three years

C11.1d

(C11.1d) What is your strategy for complying with the systems you are regulated by or anticipate being regulated by?

NS' strategy for complying with systems we anticipate being regulated by includes emissions-reductions strategies, efficiency upgrades, and generation of carbon credits. We anticipate being regulated in the next three years.

C11.2

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

Yes

C11.2a

(C11.2a) Provide details of the project-based carbon credits originated or purchased by your organization in the reporting period.

Credit origination or credit purchase

Credit origination

Project type

Agriculture

Project identification

Trees and Trains: Norfolk Southern teamed up with GreenTrees, a reforestation and carbon capture company, to plant 6 million trees on 10,000 acres in the Mississippi Alluvial Valley, the nation's largest watershed and a vital wildlife habitat. The multi-year Trees and Trains program restored former woodlands in the valley, the nation's largest watershed and a vital wildlife habitat, and generated economic benefits for multiple stakeholders. GreenTrees' largest corporate investor, NS is helping to revitalize the region's economy while improving its environmental health. The reforested land has produced approximately 240,000 carbon credits for NS so far and eventually will generate 1.12 million tons of carbon-offset credits, equivalent to one-fifth of NS' annual carbon emissions. For the vintage years 2018 and 2019, the verification was completed in 2020. 51,785 tons of carbon offsets were approved by ACR for each of the 2018 and 2019 years based on a June 24, 2020, verification report.

Verified to which standard

ACR (American Carbon Registry)

Number of credits (metric tonnes CO2e)

103570

Number of credits (metric tonnes CO2e): Risk adjusted volume

103570

Credits cancelled

Not relevant

Purpose, e.g. compliance

Voluntary Offsetting

C11.3

(C11.3) Does your organization use an internal price on carbon?

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

C12. Engagement

C12.1

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers
Yes, our customers

C12.1a

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Information collection (understanding supplier behavior)

Details of engagement

Collect climate change and carbon information at least annually from suppliers

% of suppliers by number

0.7

% total procurement spend (direct and indirect)

36

% of supplier-related Scope 3 emissions as reported in C6.5

82

Rationale for the coverage of your engagement

NS is committed to being a responsible steward of the environment and helping to protect the communities where we operate and source materials. As part of that effort, NS seeks suppliers that demonstrate a commitment to sustainable business practices. To that end, Norfolk Southern has a sourcing sustainability statement. This statement lists six ways that companies can demonstrate sustainable projects and policies, including: 1) documented corporate sustainability strategy, 2) plans and processes to reduce GHG emissions, 3) commitment to increase post-consumer recycled content, 4) documented reduction in landfill-bound waste, 5) documented minimization in packaging materials, and 6) demonstrated commitment to consolidate shipments. The NS sourcing statement says that, "Consideration will be given to suppliers who demonstrate a sustainability focus, including the above initiatives; who work to exceed their sustainability performance expectations; and who demonstrate transparency of their supply chain impacts through documentation, including country of origin." The target suppliers are those with potential impact, including wood tie treaters, rail mills, taxi crew-haul carriers, diesel fuel providers, intermodal facility operators, used cross-tie dispositions, ballast quarries, locomotives, and others. In total, NS has nearly 7,000 suppliers. Starting with a 2015 pilot, NS continues to survey key suppliers in its major supply chains on their sustainability efforts. The engagement is through email and a review of supplier website information regarding control and remediation efforts. Through supplier engagement, NS gains understanding of steps taken to mitigate environmental impact and to express NS interest in control and improvement. NS also supports a diverse supply chain, encouraging competition, adding resiliency, and making our business more sustainable.

Impact of engagement, including measures of success

Norfolk Southern sent outreach emails to the 11 largest suppliers asking them to complete a CDP survey. The suppliers were asked to identify the proportion of their greenhouse gas emissions that could be attributed to business conducted with Norfolk Southern. The measure of success for NS engagement is the number of suppliers who respond to the survey. Approximately 82 percent of the suppliers contacted completed the survey with a goal of continued improvement for each engagement.. Suppliers were asked to identify the proportion of their GHG emissions that they can attribute to business with Norfolk Southern. An impact on NS' supplier engagement is the formation of partnerships. NS partners with suppliers on innovative business solutions that assist in efforts to reduce the environmental impacts of railroad operations. Formation of partnerships help to mobilize action and drive OEM development of future low-carbon technology. Through partnership with our rail providers in 2020 we were able to source 92% of our purchased rail from recycled materials.

Comment

C12.1b

(C12.1b) Give details of your climate-related engagement strategy with your customers.

Type of engagement

Collaboration & innovation

Details of engagement

Run a campaign to encourage innovation to reduce climate change impacts

% of customers by number

10

% of customer - related Scope 3 emissions as reported in C6.5

0

Portfolio coverage (total or outstanding)

<Not Applicable>

Please explain the rationale for selecting this group of customers and scope of engagement

Norfolk Southern's stewardship of resources extends beyond its own business operations. The company also helps customers effectively manage their environmental and economic impacts in the community. NS is committed to keeping customers fully informed as operations are transformed. The railroad conducts a customer forum, including senior leadership, operating personnel, and account representatives, to reduce transportation-related carbon emissions. For this initiative, NS contacted approximately 10 percent of its largest customers by spend. The rationale for selection within this group of customers is that these are the customers likely have the biggest impact. Norfolk Southern is committed to be an industry leader in environmental responsibility. Strong sustainability practices are good for the business, the economy, and the environment, and they benefit the company's people, the communities and customers we serve, and our stakeholders. As part of NS' strategic plan to transform the approach to business, in early 2019, the company formed two new departments – the Network Planning and Optimization Department and Customer Operations Department. These departments are focused on creating efficient operations, and a best-in-class service and customer experience across three areas of responsibility. One involves collaborating with customers and NS field transportation forces to optimize service and engagement. Another is ensuring that we have the terminals, equipment, and assets needed to provide consistent and reliable service today and in the future. The third is pursuing new technologies and practices that support continuous improvement in operations performance and service to meet evolving market demands. NS subsidiaries share the railroad's commitment to provide efficient, productive, and sustainable freight transportation for customers. Trains are three to four times more fuel-efficient on average than trucks, reducing GHG emissions by 75 percent on average per ton-mile of freight.

Impact of engagement, including measures of success

In a multi-year effort, NS is improving the way it engages and communicates with customers. A goal of our strategic plan is to create a smarter, faster, and more responsive railroad to serve the evolving needs of our customers. This includes upgrading the e-commerce portal, AccessNS. The effort includes developing an enhanced and robust Customer Relationship Management (CRM) system and proactive communications tools that help customers meet their service priorities. One example of how NS engaged with its customers was by conducting interviews with customers in order to identify core sustainability issues. Thoroughbred Direct Intermodal Services, a logistics provider, and Triple Crown Services, subsidiaries of NS, a multimodal carrier, earned a place on the U.S. Environmental Protection Agency's first SmartWay High Performer list in 2018. The list recognizes shippers, carriers, and logistics service providers for supply chain efficiencies that help their customers reduce transportation-related greenhouse gas emissions and lower shipping costs. TDIS and TCS, who manage door-to-door freight transport services, rely heavily on rail-based solutions to reduce supply-chain emissions. In measuring success with NS customers through client interaction and further enhance efficiency, NS identifies opportunities for individual rail yards to gain more efficient operations.

C12.3

(C12.3) Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?

- Direct engagement with policy makers
- Trade associations

C12.3a

(C12.3a) On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
Energy efficiency	Support	Freight railroads voluntarily invest millions of dollars each year into technologies supporting improved fuel efficiency metrics. Freight railroads remain significantly more fuel efficient than over-the-road trucking options. NS energy efficiency advocacy is coordinated through the Association of American Railroads.	Work towards government understanding of railroads' improved fuel efficiency metrics and cautiously impose new requirements that may support the increased efficiency.

C12.3b

(C12.3b) Are you on the board of any trade associations or do you provide funding beyond membership?

Yes

C12.3c

(C12.3c) Enter the details of those trade associations that are likely to take a position on climate change legislation.

Trade association

Association of American Railroads

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Association of American Railroads (AAR) is the standard-setting organization for North America's railroads. America's freight railroads operate the safest and most efficient, cost-effective, and environmentally sound freight transportation system in the world. As Congress considers legislation to limit emissions of carbon dioxide and other greenhouse gases, it should consider the environmental friendliness of freight railroading. Climate legislation offers an opportunity for policymakers to encourage the movement of freight by environmentally friendly rail. AAR works with elected officials and leaders in Washington, D.C., to advance sound public policy that supports the interests of the freight rail industry to ensure it will continue to meet America's transportation needs today and tomorrow. Freight railroads, like NS, invest millions of dollars each year into technologies to support improved fuel efficiency metrics. Freight railroads remain significantly more fuel efficient than over-the-road trucking options. NS energy efficiency advocacy is coordinated through the AAR.

How have you influenced, or are you attempting to influence their position?

Norfolk Southern consulted with the AAR regarding the trade association's position on this issue and concurs with the current position.

C12.3f

(C12.3f) 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?

NS' Government Relations team seeks to educate and inform public officials about issues important to NS' business, and it supports public officials and candidates whose views match those of Norfolk Southern. By doing so, Norfolk Southern furthers public policy goals that are consistent with its business, values, and strategies.

To advocate our position, the corporation relies on government relations professionals, assisted as needed by subject matter experts. Norfolk Southern's adopted corporate procedure states that only authorized employees and contract lobbyists may engage in lobbying activities, as defined by the appropriate jurisdiction, on behalf of the corporation. In addition, the procedure requires a corporation employee who has engaged in lobbying on behalf of the corporation to report the time spent on such lobbying, and any associated expenses, immediately following the close of the calendar quarter in which such lobbying occurred. The procedure further requires that persons who engage in lobbying on behalf of the corporation comply with all applicable legal requirements.

NS continues to have ongoing dialogue with regulators and policymakers. As part of its oversight role, the Governance and Nominating Committee of the corporation's Board of Directors reviews, at least annually, the corporation's political contributions, including spending related to trade associations and other tax-exempt organizations.

C12.4

(C12.4) 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

In mainstream reports

Status

Complete

Attach the document

annual-report-2020.pdf

Page/Section reference

Page 3 - Our Commitment to Corporate Responsibility Page K14- Climate change risk factors Page K14 - Risks from severe weather conditions Page K26 - Fuel consumption

Content elements

Governance
Strategy
Risks & opportunities
Other metrics

Comment

Publication

In mainstream reports, incorporating the TCFD recommendations

Status

Underway – previous year attached

Attach the document

NS-2020-CRR-report.pdf

Page/Section reference

Page 1 – Sustainability Reimagined Page –8-9 - The Competitive Rail Advantage: Efficiency and the Environment Pages DS-1 -11 – Data Scorecard

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment

Norfolk Southern's 2021 Environmental, Social, and Governance (ESG) Report which incorporates TCFD recommendations will be available to the public the first week of August 2021. Attached is last years 2020 Corporate Responsibility Report. <http://www.nscorp.com/content/nscorp/en/about-ns/sustainability.html>

C15. Signoff

C-FI

(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.

Norfolk Southern's reporting structure is setup to include Executive Vice President and Chief Transformation Officer who directly reports to the Chief Executive Officer and the Board of Directors as an equal reporting position to the Chief Financial Officer who reports directly to the Chief Executive Officer. The Executive VP and Chief Transformation Officer is the highest member of the C-Suite responsible for climate related issues.

C15.1

(C15.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	Executive Vice President/Chief Transformation Officer, NS' reporting structure includes the EVP/CTO who directly reports to the CEO and the Board as an equal reporting position to the CFO.	Chief Financial Officer (CFO)

SC. Supply chain module

SC0.0

(SC0.0) If you would like to do so, please provide a separate introduction to this module.

SC0.1

(SC0.1) What is your company's annual revenue for the stated reporting period?

	Annual Revenue
Row 1	9789000000

SC0.2

(SC0.2) Do you have an ISIN for your company that you would be willing to share with CDP?

Yes

SC0.2a

(SC0.2a) Please use the table below to share your ISIN.

	ISIN country code (2 letters)	ISIN numeric identifier and single check digit (10 numbers overall)
Row 1	US	6558441084

SC1.1

(SC1.1) Allocate your emissions to your customers listed below according to the goods or services you have sold them in this reporting period.

Requesting member

Ford Motor Company

Scope of emissions

Scope 1

Allocation level

Company wide

Allocation level detail

<Not Applicable>

Emissions in metric tonnes of CO₂e

25166

Uncertainty (±%)

2

Major sources of emissions

Locomotive diesel emissions

Verified

No

Allocation method

Allocation based on another physical factor

Please explain how you have identified the GHG source, including major limitations to this process and assumptions made

Norfolk Southern uses the operational control approach to report Scope 1, 2, and 3 emissions. Approximately 90% of NS's carbon footprint (considering Scope 1 and 2 emissions) is attributed to locomotive diesel fuel consumed in the transportation of freight. The service we provide our customers is the transportation of their freight, therefore the major emission source attributable to our customers is locomotive diesel fuel consumption.

Requesting member

The Dow Chemical Company

Scope of emissions

Scope 1

Allocation level

Company wide

Allocation level detail

<Not Applicable>

Emissions in metric tonnes of CO₂e

12123

Uncertainty (±%)

2

Major sources of emissions

Locomotive diesel emissions

Verified

No

Allocation method

Allocation based on another physical factor

Please explain how you have identified the GHG source, including major limitations to this process and assumptions made

Norfolk Southern uses the operational control approach to report Scope 1, 2, and 3 emissions. Approximately 90% of NS's carbon footprint (considering Scope 1 and 2 emissions) is attributed to locomotive diesel fuel consumed in the transportation of freight. The service we provide our customers is the transportation of their freight, therefore the major emission source attributable to our customers is locomotive diesel fuel consumption.

SC1.2

(SC1.2) Where published information has been used in completing SC1.1, please provide a reference(s).

Norfolk Southern uses its annual average freight train fuel efficiency in conjunction with specific customer data (Revenue Ton Miles (RTM) shipped) to allocate emissions to that customer. Norfolk Southern's average fuel efficiency for 2020 was 446 RTM/gallon diesel fuel consumed. CSX uses a measure called Revenue Ton Miles (RTM) to normalize annual GHG emissions and determine GHG emission intensity. A Revenue Ton Mile or Lading Ton Mile is a calculation of Tons of lading x Miles it moves. For example, if you move 20 tons 10 miles you would have 200 Revenue Ton Miles (20 tons * 10 Miles = 200 Revenue Ton Miles). Because NS is able to track revenue ton miles by customer, this information can be used to allocate emissions to a customer based on the Revenue Ton Miles of their shipments. NS uses Emission Factors and Global Warming Potentials from the EPA Center for Corporate Climate Leadership GHG Emission Factors Hub (March 2020), (www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub) for CO₂, N₂O, and CH₄ to determine total metric tons of CO₂-Eq emissions allocated to a specific customer: For example, if a customer shipped 1 million RTM with Norfolk Southern in 2020, then 1,000,000 RTM/ (446 RTM/ gal) = 2,242 gallons of diesel fuel consumption. By multiplying the emission factors by 2,242 gallons and converting kilograms or grams to metric tons, emissions for each greenhouse gas are determined for that customer. By multiplying N₂O and CH₄ emissions by their Global Warming Potential, all greenhouse gases are converted to CO₂-equivalents and added for a total metric ton of CO₂-equivalents.

Emission Factors used:

CO₂ EF = 10.21 kg CO₂/gallon diesel

N₂O EF = 0.26 g N₂O/gallon diesel

CH₄ EF = 0.8 g CH₄/gallon diesel

GWPs used:

1 MT CO₂ = 1

1 MT N₂O = 298

1 MT CH₄ = 25

SC1.3

(SC1.3) What are the challenges in allocating emissions to different customers, and what would help you to overcome these challenges?

Allocation challenges	Please explain what would help you overcome these challenges
We face no challenges	Norfolk Southern currently uses the described method of allocating carbon to individual customers based on emissions per revenue ton mile, published references from the EPA Center for Corporate Climate Leadership GHG Emission Factors Hub (March 2020), and the tracked individual customers Revenue Ton Miles.

SC1.4

(SC1.4) Do you plan to develop your capabilities to allocate emissions to your customers in the future?

Yes

SC1.4a

(SC1.4a) Describe how you plan to develop your capabilities.

We hope to, over time, develop the capacity to segment our business and determine the different fuel efficiencies of our commodities.

SC2.1

(SC2.1) Please propose any mutually beneficial climate-related projects you could collaborate on with specific CDP Supply Chain members.

SC2.2

(SC2.2) Have requests or initiatives by CDP Supply Chain members prompted your organization to take organizational-level emissions reduction initiatives?

No

SC4.1

(SC4.1) Are you providing product level data for your organization's goods or services?

No, I am not providing data

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

	I am submitting to	Public or Non-Public Submission	Are you ready to submit the additional Supply Chain questions?
I am submitting my response	Investors Customers	Public	Yes, I will submit the Supply Chain questions now

Please confirm below

I have read and accept the applicable Terms