2023 to 2024 Departmental Sustainable Development Strategy Report

Executive summary

The 2023 to 2024 Departmental Sustainable Development Strategy (DSDS) report details the National Research Council of Canada's (NRC) progress on its 2023 to 2027 DSDS commitments and how the department is contributing to the Government of Canada's Federal Sustainable Development Strategy (FSDS), which aims to support all 3 dimensions of sustainable development—social, economic and environmental.

Sustainability is a key research and innovation priority for the NRC, as highlighted in the new NRC 2024-2029 Strategic Plan: Research Powering Innovation for Canada. As Canada takes steps to address climate change, increase climate resilience and transition to a prosperous green economy, the NRC is playing an important role in applying its research and innovation capabilities to develop solutions for these problems. In fiscal year (FY) 2023-24, the NRC has made a significant contribution to its 59 DSDS sustainability commitments, ranging from working with Indigenous and Northern partners to develop technologies for better food security and community mental health, to advancing research in battery material discovery and process optimization.

The breadth and diversity of the NRC's capabilities are making a difference in 12 of Canada's FSDS goals, including:

- Zero hunger: working with partners to develop technologies to improve Canada's food systems
- Good health and well-being: developing technologies to improve Northern and Arctic health resources
- Quality education: increasing Northern and Indigenous R&D capacity
- Clean water and sanitation: working with Indigenous and Northern partners on projects to improve water and sewage services
- Affordable and clean energy: advancing research in battery material discovery and process optimization to support Canada's battery supply chain
- Decent work and economic growth: assisting Canadian SMEs in developing and commercializing their clean technologies
- Industry, innovation and infrastructure: developing new building standards and guidance documents to mitigate climate change risks
- Reduced inequalities: delivering software to communities to support the preservation of Indigenous languages
- Sustainable cities and communities: developing new black carbon measurement instruments to support the reduction of harmful air pollutants
- Responsible consumption and production: working with partners to decarbonize the aviation sector
- Climate action: reducing greenhouse gas (GHG) emissions from the NRC's real property portfolio

- Life below water: developing modelling and monitoring tools to better understand and predict climate change impacts on oceans and estuaries
- Life on land: assessing how NRC properties support biodiversity

The NRC remains committed to sustainable development and, through its targeted research and innovation activities, is effectively addressing the commitments outlined in its 2023 to 2027 DSDS and supporting Canada's progress towards the United Nations Sustainable Development Goals. Through continued dedication to these goals, the NRC is supporting a sustainable future for all Canadians.

Introduction to the 2023 to 2024 Departmental Sustainable Development Strategy Report

The 2022 to 2026 Federal Sustainable Development Strategy (FSDS) presents the Government of Canada's sustainable development goals and targets, as required by the *Federal Sustainable Development Act*. This is the first FSDS to be framed using the 17 Sustainable Development Goals (SDGS) of the United Nations 2030 Agenda and provides a balanced view of the environmental, social and economic dimensions of sustainable development.

In keeping with the purpose of the Act, to make decision-making related to sustainable development more transparent and accountable to Parliament, the National Research Council of Canada (NRC) supports the goals laid out in the FSDS through the activities described in the NRC's 2023 to 2027 Departmental Sustainable Development Strategy (DSDS). This report details the progress related to the NRC's DSDS in FY 2023-24.

The *Federal Sustainable Development Act* also sets out 7 principles that must be considered in the development of the FSDS as well as DSDSs. These basic principles have been considered and incorporated in the NRC's DSDS and the 2023 to 2024 DSDS Report.

To promote coordinated action on sustainable development across the Government of Canada, the NRC's departmental strategy reports on Canada's progress towards implementing the 2030 Agenda and advancing the SDGS, supported by the Global Indicator Framework (GIF) and Canadian Indicator Framework (CIF) targets and indicators. The report also captures progress on SDG initiatives that fall outside the scope of the FSDS. [1]

Commitments for the National Research Council of Canada

- Goal 2: Support a healthier and more sustainable food system
- Goal 3: Support mental health and adopt healthy behaviours
- Goal 4: Promote knowledge and skills for sustainable development
- Goal 6: Ensure clean and safe water for all Canadians
- Goal 7: Increase Canadians' access to clean energy
- Goal 8: Encourage inclusive and sustainable economic growth in Canada
- Goal 9: Foster innovation and green infrastructure in Canada
- Goal 10: Advance reconciliation with Indigenous Peoples and take action on inequality
- Goal 11: Improve access to affordable housing, clean air, transportation, parks, and green spaces, as well as cultural heritage in Canada

- Goal 12: Reduce waste and transition to zero-emission vehicles
- Goal 13: Take action on climate change and its impacts
- Goal 14: Conserve and protect Canada's oceans
- Goal 15: Protect and recover species, conserve Canadian biodiversity

Goal 2:
Support a healthier and more sustainable food system

FSDS Context:

Climate change has a profound impact on every aspect of the Canadian food system, from agricultural productivity to food safety and security. To combat these effects, the NRC is working with government and industry partners to increase the climate resilience and adaptability of Canada's food security. This year, the NRC launched 18 new collaborations with clients to develop technologies to strengthen agriculture and marine food systems.

Under its Arctic and Northern Challenge program, the NRC also participated in 5 projects to support the development of technologies to improve food resources in the region. These projects include activities such as:

- analyzing plastics and heavy metals in Nunatsiavut food ways and environments
- cyanotoxin sampling of freshwater resources in the Dehcho Region

- enabling better management and monitoring of a critical food fish in Kugluktuk, Nunavut

Due to higher global temperatures, Canada is expected to be more vulnerable to a wide range of crop pathogens that could negatively impact crops and human health. Canada is also seeing increased cyanotoxins produced by blue-green algae that are contaminating water and natural health products. In response, the NRC is developing new certified reference materials (CRMs) to understand the scale of these risks and help protect the Canadian food system from emerging natural toxins due to climate change.

Shifting towards plant-based proteins can help establish sustainable food systems that are less reliant on traditional animal agriculture, which is resource-intensive and contributes significantly to greenhouse gas emissions, water usage, and land degradation. Working with Queen's University, the NRC is developing CRMs for alternative protein sources like canola and pea plants. This initiative supports the standardization and safety of these novel proteins, promoting a sustainable food supply and reducing the environmental impact of food production, particularly in the Canadian Prairies.

The NRC is also working towards improving ocean food resource management. In response to climate change impacts on marine life, the NRC's collaboration with partners, including the fishing industry and the community of Kangiqsualujjuaq in Nunavik, focuses on using glycomics to assess the health of mussels and fish. This research helps confirm marine resources are safe for consumption and serves as an environmental health indicator, directly benefiting Northern communities economically and nutritionally.

Target theme: Sustainable food systems

Target: By 2030, support improvement in the environmental performance of the agriculture sector by achieving a score of 71 or higher for the Index of AgriEnvironmental Sustainability (Minister of Agriculture and Agri-Food)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Re acl

Build knowledge for sustainable agriculture	Conduct research on agriculture and marine food technologies to improve the sustainability, resiliency and security of Canada's food system **Programs:** Aquatic and Crop Resource Development-Collaborative Science, Technology and Innovation Program-Sustainable Protein Production program	**Performance indicator:** Number of collaborations with clients supporting the development of technologies to improve agriculture or marine food systems **Starting point:** 25 collaborations in FY 2022-23 **Target:** 35 collaborations by March 31, 2027	By advancing research on agriculture and marine food technologies, the NRC is enabling the sustainable transformation of Canadian agriculture and marine bioresources into food and higher value products. **Relevant ambition and target:** CIF ambition: Canadian agriculture is sustainable CIF indicator: Index of Agri-Environmental Sustainability (2.2.1) GIF target:	**Inc** **res** 18 col in I **No** In cor sev col fro pre fisc 15 col in s agr and ma col we lau FY

			By 2030 ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality (2.4).	

Implementation strategies supporting the goal

This section is for implementation strategies that support the goal **"Support a healthier and more sustainable food system"** but not a specific FSDS target

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Resul achie

Enhance Indigenous and Northern food security	Conduct applied research and develop technologies to improve the accessibility, availability and quality of culturally appropriate Northern food resources **Program:** Collaborative Science, Technology and Innovation Program-Arctic and Northern Challenge program	**Performance indicator:** Number of Northern-led research projects supporting the development of technologies to improve Northern and Arctic food resources **Starting point:** 0 in FY 2022-23 **Target:** 4 per year starting in FY 2023-24	By participating in Northern-led projects dedicated to improving Northern and Arctic food resources, the NRC will support Northern and Arctic communities in having adequate economic and physical access at all times to quality foods that are safe and nutritious. **Relevant ambitions and targets:** CIF ambition: Canadians have access to sufficient, affordable and nutritious	**Indic resul** 5 proj FY 20

			food CIF indicator: Prevalence of food insecurity (2.1.1) GIF target: By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round (2.1).	

Ensure the safety of Canada's food system	Develop measurement tools and standards related to food safety and environmental safety **Program:** Metrology	**Performance indicator:** Number of new certified reference materials (CRMs) related to food and environmental safety **Starting point:** 0 in FY 2022-23 **Target:** 5 by March 31, 2027	By developing new measurement tools such as CRMs, the NRC will help to ensure the safety and security of the Canadian food system and will support its protection against emerging natural toxins due to climate change. **Relevant ambitions and targets:** CIF ambition: N/A CIF indicator: N/A GIF target: N/A	**Indic** **resul** 5 new 6 proj FY 20 **Note** 4 new releas food and 1 releas envir safety

Goal 3:
Support mental health and adopt healthy behaviours

FSDS Context:

Through the Arctic and Northern Challenge program, the NRC is supporting a holistic view of health that encompasses physical, mental, emotional and spiritual wellbeing. In a Northern and Indigenous context, this definition is deeply connected to culture and is dependent on a health care system focused on person-centred care that is accessible, comprehensive and appropriate.

This year, the NRC participated in 4 Northern-led projects dedicated to the development of technologies to improve Northern and Arctic health resources. These projects covered topics such as protecting lung health in Nunavut, using digital interventions to enhance mental health and using virtual reality to connect culture and land-based healing to support individual mental health and well-being.

For instance, the Anirniq project in Nunavik, named after the Inuktitut word for "breath of life," addresses the increasing lung health issues caused by climate change such as mold growth in homes and poor air quality from forest fires. This initiative, in partnership with the Inuit-led Kativik Municipal Housing Bureau and Ungava Tulattavik Health Centre, involves local researchers, healthcare workers and community members co-creating a lung health program. This program integrates biomedical, housing and social determinants of health, rooted in the Nunavik Inuit cultural model.

Target theme: Mental health

Target: By March 2027, reduce the percentage of Canadians (aged 15+) with a mental disorder who have expressed that they have an unmet care need to 22% at most (Minister of Health)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	R

Work with partners and stakeholders to expand access to mental health services	Conduct applied research and develop technologies to improve the accessibility, comprehensiveness and appropriateness of Northern health resources **Program:** Collaborative Science, Technology and Innovation Program-Arctic and Northern Challenge program	**Performance indicator:** Number of Northern-led research projects supporting the development of technologies to improve Northern and Arctic health resources **Starting point:** 0 in FY 2022-23 **Target:** 4 per year starting in FY 2023-24	By participating in Northern-led projects focused on improving Northern and Arctic health technologies, the NRC will support the improvement of health resources in the North and Arctic and increased physical, mental, emotional and spiritual wellbeing. **Relevant ambitions and targets:** CIF ambition: Canadians have healthy and satisfying lives CIF indicator:	**Ir** 4 FY **N** Th su de te w ac co ar ap Ar he ta ap en pl en sp

			Percentage of Canadians who perceived their mental health as very good to excellent (3.7.1) GIF target: By 2030 reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being (3.4)

Goal 4:
Promote knowledge and skills for sustainable development

FSDS Context:

Capacity building is a major pillar in the NRC's Arctic and Northern Challenge program. Through this program, the NRC is prioritizing Northern-led research projects with a focus on Northern capacity building to address pressing issues confronting Northerners. The program is guided by several key principles, including:

- building true partnerships based on mutual recognition, trust and transparency
- following the "nothing about us, without us" principle by enabling the leadership of Northern First Nations, Inuit and Métis in research
- protecting the rights of Northerners and Indigenous Peoples living in the North to control and influence research conducted in their communities
- respecting and including local Indigenous Knowledge and epistemologies in the design, execution, interpretation and sharing of research

In FY 2023-24, the program trained a total of 62 people through project-specific training, courses, mentoring and experiential development.

Implementation strategies supporting the goal

This section is for implementation strategies that support the goal **"Promote knowledge and skills for sustainable development"** but not a specific FSDS target

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGS	Result achiev

Support capacity in Indigenous communities	Increase Northern and Indigenous R&D capacity and conduct research to solve climate-driven challenges faced by Northerners **Program:** Collaborative Science, Technology and Innovation Program-Arctic and Northern Challenge program	**Performance indicator:** Number of Northern and Indigenous People trained through ANCP research projects* **Starting point:** 0 in FY 2022-23 **Target:** 30 people per year starting in FY 2023-24 *Training includes project-specific training, courses, mentoring, and experiential development	By conducting research projects, the NRC will support increased individual, organizational and community R&D capacity to address pressing issues confronting Northern and Arctic communities. **Relevant ambitions and targets:** CIF ambition: N/A CIF indicator: N/A GIF target: N/A	**Indica result:** 62 peo trainec FY 202 24

Goal 6:
Ensure clean and safe water for all Canadians

FSDS Context:

The social, economic, cultural and spiritual well-being of Arctic and Northern communities is dependent upon safe and clean water but for many communities, particularly Indigenous communities, access to reliable and safe drinking water has been a significant concern.

In FY 2023-24, the NRC's Arctic and Northern Challenge program worked on 3 projects focused on improving Northern and Arctic water and sewage services. These projects include:

- assessing groundwater vulnerability in Whitehorse, Yukon
- supporting the planning of the future water supply in Pangnirtung in the Qikiqtaaluk Region of Nunavut
- contributing to the inclusive design of pilot water equipment for innovative water strategies in Nunavik which will improve the water quality in household water tanks.

Implementation strategies supporting the goal

This section is for implementation strategies that support the goal **"Ensure clean and safe water for all Canadians"** but not a specific FSDS target

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGS	Result achiev

Work with partners on drinking water quality	Conduct applied research and develop technologies to improve the availability, accessibility and quality of Northern water resources **Program:** Collaborative Science, Technology and Innovation Program-Arctic and Northern Challenge program	**Performance indicator:** Number of Northern-led research projects focused on improving Northern and Arctic water and sewage services **Starting point:** 0 in FY 2022-23 **Target:** 4 per year starting in FY 2023-24	By participating in Northern-led research projects focused on improving Northern and Arctic water and sewage services, the NRC will support the development of technologies that will help increase the quality, availability and accessibility of the Northern safe water supply. **Relevant ambitions and targets:** CIF ambition: Canadians have access to drinking water	**Indica result:** 3 proje in FY 2 24 **Notes:** The numbe project focuse water a sewag system constra by the numbe propos submit to that thema area

			and use it in a sustainable manner CIF indicator: Percentage of municipalities across Canada with sustained drinking water advisories (6.2.1) GIF target: By 2030 achieve universal and equitable access to safe and affordable drinking water for all (6.1)	

Goal 7:
Increase Canadians' access to clean energy

FSDS Context:

Critical minerals play a pivotal role in Canada's goal to shift to clean energy. These minerals, including lithium, cobalt, rare earth elements, and others, are essential components of batteries for zero-emission vehicles and renewable energy storage systems. Canada's Critical Minerals Strategy aims to secure a stable and sustainable supply of these minerals, reducing dependency on foreign sources and supporting domestic manufacturing and innovation.

The NRC is supporting the strategy through its Critical Battery Materials Initiative, which is housed under its Advanced Clean Energy program. This initiative will establish automated, AI-enabled platforms that can discover new critical battery materials and processes in a third of the time it takes today, contributing to the growth of the Canadian battery supply chain.

The NRC's Advanced Clean Energy program is also supporting Canada's transition to clean energy by accelerating the development of clean, renewable fuels, and energy storage materials and devices that will facilitate the transition to low- and zero-carbon fuel and the electrification of our energy supply, across all sectors.

To address challenges in decarbonizing the heavy-duty transport sector where electrification and hydrogen fuel may be less viable, NRC researchers are exploring the use of ammonia in diesel engines to reduce greenhouse gas emissions by up to 60%. In collaboration with researchers from across the world, the NRC is also developing a new energy storage model that simulates electrical and thermal energy storage systems to optimize renewable energy usage, ensuring reliable power supply even when renewable sources are intermittent.

Reducing emissions from the construction industry is crucial for Canada to achieve its emissions reduction goals. Through the Platform to Decarbonize the Construction Sector at Scale, the NRC is working with Canadian industry

to build low carbon construction tools, products and services that reduce life cycle carbon. The NRC is also working with stakeholders to support the needed regulatory framework to systematically scale-up decarbonization through the development and implementation of new low carbon-based codes, requirements, guidelines, standards, and specifications.

In FY 2023-24, the NRC supported the technical committee of the National Model Code Development System to develop a number of proposed changes to the 2025 editions of the National Model Codes, specifically to improve energy efficiency through the alteration of existing buildings and requirements to reduce operational GHG emissions.

Adoption of clean energy solutions in Northern Canada and the Arctic faces significant challenges due to harsh weather conditions, remote locations and logistical constraints. The extreme climate, with long winters and limited daylight, complicates the viability of renewable energy sources like solar and wind power. The NRC is working with communities and research partners to develop innovative solutions to increase access to affordable clean energy in Northern Canada.

In FY 2023-24, in collaboration with Polar Knowledge Canada and Natural Resources Canada, the NRC helped establish an Arctic wind turbine demonstration at the Canadian High Arctic Research Station in Cambridge Bay, Nunavut. This project aims to establish a fully integrated microgrid, enhancing clean energy accessibility in Arctic regions. The NRC is also helping to increase access to affordable clean energy through the Arctic and Northern Challenge program.

In FY 2023-24, in collaboration with the Canada-Inuit Nunangat-United Kingdom Arctic Research Programme, the NRC participated in the REMIROCaN project which focuses on integrating renewable energy

microgrids in remote, off-grid cabins in Nunavut, applying Inuit principles to reduce reliance on fossil fuels, thereby increasing energy resilience and mitigating climate change impacts in Inuit Nunangat.

Target theme: Renewable and non-emitting sources of electricity

Target: By 2030 90%, and in the long term 100% of Canada's electricity is generated from renewable and non-emitting sources (Minister of Natural Resources)

Implementation strategy	**Departmental action**	**Performance indicator** **Starting point** **Target**	**How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGS**	**Re** **ac**

Invest in research, development and demonstration of clean energy technologies	Advance research in material discovery and process optimization for battery materials, including the development of a suite of innovative tools to support the Canadian battery supply chain **Program:** Energy, Mining and Environment	**Performance indicator:** Number of research projects with clients or collaborators supporting battery material discovery and process optimization **Starting point:** 0 **Target:** 30 by March 31, 2027	By conducting research projects with clients and collaborators, the NRC is advancing research in material discovery and process optimization, which will support Canada's clean energy transformation. Finally, by conducting research in material discovery and process optimization, the NRC is supporting the development of clean energy technologies such as low-cost solar cells, which will help	**Ind** **res** 4 p FY **No** CB ap Se an pr 6 n act

	Advance research in material discovery and process optimization for power harvesting, notably flexible and low-cost solar cells **Program:** Advanced Electronics and Photonics-Security and Disruptive Technologies-Nanotechnology	**Performance indicator:** Number of publications produced related to material discovery and process optimization for power harvesting **Starting point:** 10 in FY 2022-23 **Target:** 40 by March 31, 2027	reduce use of fossil fuels. **Relevant ambitions and targets:** CIF ambition: Canadians have access to clean and renewable energy CIF indicator: Proportion of electricity generated from renewable and non-greenhouse gas emitting sources (7.3.1)	**Inc** **res** 12 in yea

Target theme: Energy efficiency

Target: By 2030 600 petajoules of total annual energy savings will be achieved as a result of adoption of energy efficiency codes, standards and practices from a baseline savings of 20.0 petajoules in 2017 to 2018

(Minister of Natural Resources)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	I a

Develop and implement energy efficiency codes and regulations	Support the Canadian Board for Harmonized Construction Codes in the development of potential energy efficiency provisions for the 2025 National Model Codes **Program:** Construction	**Performance indicator:** Number of jurisdictions that have adopted updated energy efficiency requirements for new construction set out by the 2025 editions of the National Model Codes **Starting point:** 0 in FY 2022-23 **Target:** 13 by September 30, 2027	By including the National Model Codes updated requirements related to energy efficiency and greenhouse gas emissions mitigation in new and altered buildings and homes, and for regulating operational greenhouse gas emissions, the NRC will help reduce energy usage and the costs incurred by building owners and operators. **Relevant ambitions and targets:** CIF ambition: Canadians	

		Performance indicator: Number of jurisdictions that have adopted updated energy efficiency requirements for alterations to existing buildings set out by the 2025 editions of the National Model Codes **Starting point:** 0 in FY 2022-23 **Target:** 13 by September 30, 2027	reduce their energy consumption CIF indicator: Annual energy savings resulting from adoption of energy efficiency codes, standards and practices (7.1.1) GIF target: By 2030 double the global rate of improvement in energy efficiency (7.3)	

		Performance indicator: Number of jurisdictions that have adopted updated requirements for the mitigation of operational greenhouse gas emissions set out by the 2025 editions of the National Model Codes **Starting point:** 0 in FY 2022-23 **Target:** 13 by September 30, 2027		

Invest in research, development and demonstration of energy efficiency technologies	Support the development of industry carbon accounting tools and zero- or low-carbon construction materials **Program:** Construction	**Performance indicator:** Number of Canadian Construction Materials Centre validated low-carbon products, tools and services that are in use in the built environment **Starting point:** 0 in FY 2022-23 **Target:** 12 by March 31, 2027	By working with industry, academia and other stakeholders, the NRC is supporting the development of carbon accounting and decision support methodologies that will minimize, and ultimately eliminate, the life cycle carbon emissions of buildings and infrastructure. **Relevant ambitions and targets:** CIF ambition: Canadians reduce their energy consumption CIF indicator:	

			Annual energy savings resulting from adoption of energy efficiency codes, standards and practices (7.1.1) GIF target: By 2030 double the global rate of improvement in energy efficiency (7.3)	

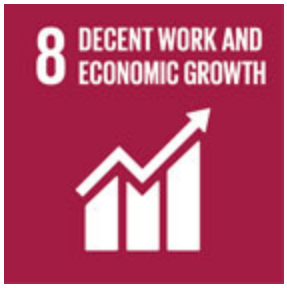
Target theme: Clean fuels

Target: By 2030 increase Canada's capacity to produce clean fuels by 10% over 2021 levels (Minister of Natural Resources)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Resu achi

Invest in research, development and demonstration of clean fuels	Accelerate the development of clean, renewable fuels (low-carbon fuels and hydrogen) **Program:** Energy, Mining and Environment	**Performance indicator:** Number of research projects with academia and industry supporting research in materials for hydrogen production and CO_2 conversion **Starting point:** 40 in FY 2022-23 **Target:** 60 by March 31, 2027	By conducting R&D projects to develop new technologies with collaborators, the NRC is supporting the development of new materials for zero-emission transportation fuels and chemical feedstocks. **Relevant ambitions and targets:** CIF ambition: Canadians have access to clean and renewable energy CIF indicator: Proportion of electricity	**Indi** **resu** 33 pr start FY 2(

		Performance indicator: Number of clean fuel technology demonstrations reaching technology readiness level (TRL) 5 **Starting point:** 4 in FY 2022-23 **Target:** 8 by March 31, 2027	generated from renewable and non-greenhouse gas emitting sources (7.3.1) GIF target: By 2030 increase substantially the share of renewable energy in the global energy mix (7.2)	**Indi** **resu** 1 de in FY



Goal 8:
Encourage inclusive and sustainable economic growth in Canada

FSDS Context:

Sustainable economic growth is necessary for long-term prosperity while safeguarding environmental and social well-being. The NRC is supporting this goal by investing in clean technologies through the Industrial Research Assistance Program (NRC IRAP)—Canada's leading innovation assistance program for small and medium-sized businesses (SMEs). NRC IRAP assists approximately 10,000 SMEs each year by providing advice, connections, and funding to increase their innovation capacity and take ideas to market.

In FY 2023-24, NRC IRAP supported 477 new clean technology projects totalling up to $86.5 million in grants and contributions. This support will help to grow Canada's clean technology sector and help innovative SMEs commercialize their novel technologies. The NRC also supports industry clients through its network of research centres by fostering innovation, technology development and collaboration. In FY 2023-24, 84% of NRC clients reported that they saw benefits from working with the NRC, including increased jobs, sales and improved capabilities. By working closely with businesses, the NRC accelerates the commercialization of new technologies, enhances competitiveness and stimulates economic growth across sectors.

Access to high-speed internet is crucial for fostering sustainable and equitable economic growth in Canada. It enables businesses to participate more fully in the digital economy, expanding market reach and increasing productivity. Additionally, reliable internet access supports the delivery of essential services such as healthcare, education and government services online, improving efficiency and accessibility for all Canadians. Despite progress, some Canadians still lack access to high-speed internet, particularly those in remote and rural areas where the cost of infrastructure development can be prohibitive.

The NRC's High-throughput and Secure Networks Challenge program develops disruptive technologies and technologies that improve the cost and performance of delivering secure, affordable and high-speed internet services in rural and remote communities across Canada. Since the start of the program in 2019, the NRC developed 68 technologies that will enable 5G high-speed telecommunications networks and will support the Government of Canada's efforts in increasing broadband internet access.

Target theme: Support for workers and business

Target: By 2026, there are at least 245,000 jobs in the clean tech products sector, an increase from 2019 (Minister of Innovation, Science and Industry)

Implementation strategy	**Departmental action**	**Performance indicator** **Starting point** **Target**	**How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs**	**Re ac**

Support growth in the clean tech products sector	Advance the development of clean technologies to drive economic growth and technological competitiveness **Program:** National Research Council of Canada Industrial Research Assistance Program (NRC IRAP)* *Performance indicators listed for NRC IRAP will be monitored by the NRC until IRAP's transition to the new Canada Innovation Corporation by 2025	**Performance indicator:** Number of clean technology projects supported **Starting point:** 571 in FY 2022-23 **Target:** 567 projects per year* *Target is based on the average number of projects from FY 2019-20 to FY 2022-23. Since NRC IRAP does not have sector-specific funding allocation, the number of clean technology	By providing advice, connections, and funding to Canadian small and medium-sized enterprises (SMEs), NRC IRAP is supporting the growth of Canada's clean tech sector and helping Canadian SMEs increase their innovation capacity and take ideas to market. **Relevant ambitions and targets:** CIF ambition: Canadians contribute to and benefit from sustainable economic growth	**In re** 47 FY **N** In 24 su 47 pr 36 in th de of te to to $8 in co

		projects supported by NRC IRAP over a given fiscal year is dependent on the projects presented by clients and whether those are meeting the criteria in place.	CIF indicator: Jobs in the clean technology products sector (8.6.1) GIF target: N/A	

		Performance indicator: Value ($) of clean technology projects supported **Starting point:** $83.3M in FY 2022-23 **Target:** $78.6M in contribution agreement value per year.* *Target is based on the average number of projects from FY 2019-20 to FY 2022-23. Since NRC IRAP does not have sector-specific funding		**In re** $8 FY

		allocation, value of clean technology projects supported by NRC IRAP over a given fiscal year is dependent on the projects presented by clients and whether those are meeting the criteria in place.		

Other	Provide research and technical services to industry clients and collaborators to help Canadian businesses grow, innovate and commercialize technologies **Programs:** Advanced Electronics and Photonics-Nanotechnology-Security and Disruptive Technologies, Aerospace, Aquatic and Crop Resource Development, Automotive and Surface Transportation, Construction, Digital Technologies, Energy Mining and Environment,	**Performance indicator:** Percentage of R&D clients surveyed who report positive benefits of working with NRC (e.g., increased jobs, sales, R&D capacity and other benefits) **Starting point:** 89% in FY 2022-23 **Target:** At least 90% each year starting in FY 2023-24	By proving a broad range of research and technical services to industry clients and collaborators, the NRC furthers their capacity to bring innovative products, services and processes to market, which in turn supports increased economic growth and competitiveness. **Relevant ambitions and targets:** CIF ambition: Canadians contribute to and benefit from sustainable economic growth	**In re** 84 FY **N** Su re in th er ha fo to re NF re cli ap all tir im m

	Herzberg Astronomy & Astrophysics, Human Health Therapeutics, Medical Devices, Metrology, Ocean, Coastal and River Engineering		CIF indicator: N/A GIF target: N/A	

Target theme: Connectivity in Canada

Target: By 2030 ensure that 100% of Canadians have access to broadband speeds of at least 50 Mbps download and 10 Mbps upload (Minister of Rural Economic Development)

Implementation strategy	**Departmental action**	**Performance indicator** **Starting point** **Target**	**How the departmental action contributes to the FSDS goal and target and where applicable, to Canada's 2030 agenda national strategy and SDGS**

Invest in broadband capacity across Canada	Develop technologies that will enable 5G next-generation high-speed telecommunications networks **Program:** Collaborative Science, Technology and Innovation Program-High-throughput and Secure Networks Challenge program	**Performance indicator:** Number of technologies developed (e.g., prototypes, models, demonstrations, proof of concepts, research platforms, system architectures) **Starting point:** 30 from FY 2019-20 to FY 2022-23 **Target:** 55 by March 31, 2027	By developing disruptive technologies that improve the cost and performance of delivering secure, affordable and high-speed internet service in rural and remote communities, the NRC is supporting increased broadband across Canada. **Relevant ambitions and targets:** CIF ambition/targe N/A CIF indicator: N/A GIF target: N/A

Goal 9:
Foster innovation and green infrastructure in Canada

FSDS Context:

Infrastructure is a major pillar in Canada's National Adaptation Strategy, which outlines a shared path to a more climate-resilient Canada. The strategy highlights the impact of climate change on physical infrastructure but also emphasizes that physical infrastructure holds the highest potential for preventing or lessening the effects of climate change. The NRC is advancing the strategy through research initiatives such as the Climate Resilient Built Environment Initiative which is included in Canada's Adaptation Action Plan.

In FY 2023-24, the NRC advanced the development of a number of infrastructure guidance and standards, and informed proposed changes to the National Model Codes and Canadian Highway Bridge Design Code, expected to be published in FY 2025-26. By producing robust guidance and standards, and by supporting code development, the NRC is ensuring that the top climate change risks to buildings and infrastructure are addressed by decision-makers and professionals.

The NRC is also developing guidelines for life cycle assessments to stimulate innovation in low-carbon materials, technologies and design of infrastructure. The NRC has developed 2 key guidelines, namely the infrastructure life cycle assessment and the National Whole-Building Life Cycle Assessment (wbLCA) Practitioner's Guide. The latter, developed in

collaboration with Treasury Board Secretariat and the City of Vancouver, is now referenced in policies by the City of Vancouver, Canada Green Building Council, and the City of Toronto, aiding in sustainable building practices.

Rail systems are a critical component of Canada's infrastructure, they transport approximately $320 billion of goods annually and move 50% of the country's exported goods [2]. Using its research and testing data to inform industry practices, the NRC began drafting guidelines and best practices to enhance the resilience of Canada's passenger railway systems against climate impacts and aims to publish them by March 31, 2026. The NRC has also made progress in risk mapping for railway systems, developing 2 tools to predict wildfire and flooding risks, which are being deployed and tested with railway partners.

Target theme: Green infrastructure and innovation

Target: By 2023 and each year thereafter until 2026, 30% of Sustainable Development Technology Canada's portfolio of SD Tech Fund-supported technologies are commercialized annually (Minister of Innovation, Science and Industry)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Res ach

Invest in the deployment and adoption of clean technologies	Support industry in addressing technical challenges in critical mineral value chains through conducting collaborative R&D **Program:** Energy, Mining and Environment	**Performance indicator:** Number of platforms commissioned to perform collaborative research in the area of processes and materials discovery for the mid-stream battery supply chain **Starting point:** 0 **Target:** 2 by March 31, 2027	By developing platforms, which are self-driving laboratories that combine robotics and artificial intelligence to accelerate materials discovery, the NRC will help industry develop solutions for technical challenges in the critical mineral value chains and provide Canadian firms with a competitive advantage. **Relevant ambitions and targets:** CIF ambition/target: N/A	**Ind** **res** FY 2 **Not** Pro and des has and com is to the yea

			CIF indicator: N/A GIF target: N/A	

Target: By FY 2027-28, the federal share of the value of green infrastructure projects approved under the Investing in Canada Plan will reach $27.6 billion (Minister of Intergovernmental Affairs, Infrastructure and Communities)

Implementation strategy	**Departmental action**	**Performance indicator** **Starting point** **Target**	**How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGS**	**Resu achie**

Develop and implement climate-resilient codes and standards	Develop new and improved building codes, regulations, standards, and guidelines to take action against climate change risks **Programs:** Construction-Ocean, Coastal and River Engineering	**Performance indicator:** Number of new standards and guidance documents produced against climate change risks **Starting point:** 0 in FY 2022-23* **Target:** 30 by March 31, 2026 *30 standards and guidance documents were produced from 2016-2021 through the Climate Resilient Buildings and Core Public Infrastructure Initiative	By developing new and improved building codes, regulations, standards, and guides, the NRC is helping to ensure that Canadian infrastructure is resilient to top climate change risks. Furthermore, by developing new climate-related guidelines and best practices, and new risk mapping and prediction tools, the NRC will help to ensure that the Canadian railway system and freight railway	**Indic resul** 0 star or gu docu FY 20 **Note** New stand and g docu are u devel throu Clima Resili Envir Initia initial are e to be publi FY 20 with t majo expe FY 20 Code chan the N Mode and C Highv

			operators and regulators will be better prepared for climate change risks.	Bridg Desig are b consi for FY 26.

Relevant ambitions and targets:
CIF ambition: Canadians have access to modern and sustainable infrastructures

CIF indicator: N/A

GIF target: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development

	Develop new guidelines and best practices that address specific climate-related challenges (gaps) for the passenger railway systems in Canada **Program:** Automotive and Surface Transportation	**Performance indicator:** Number of guidelines or best practices developed to address climate-related challenges for the railway transit system **Starting point:** 0 in FY 2022-23 **Target:** 5 guidelines by March 31, 2027	and human well-being, with a focus on affordable and equitable access for all (9.1)	**Indic resul** FY 20 **Note** NRC-A the p of wr best p docu which inclu multi guide that v addre variou infras challe by Ma 2026. final guide best p docu could utilize devel of a t speci which expec lead t

				Natio Stanc Cana focus passe rail sy adapt and resilie clima chang

Other	Develop new risk mapping tools to reduce railway transportation interruptions by predicting risks for key railway corridors, including climate-related risks **Program:** Automotive and Surface Transportation	**Performance indicator:** Number of new risk mapping tools developed and adopted by freight railway operators and regulators. **Starting point:** 0 in FY 2022-23 **Target:** At least 3 by March 31, 2027		**Indic resul** FY 20 **Note** The N devel wildfi mapp which deplc numb Cana short and a mapp that i flood and n layers data v being with a partn

Goal 10: Advance reconciliation with Indigenous Peoples and take action on inequality

FSDS Context:

The NRC is committed to advancing reconciliation with Indigenous Peoples and taking action on inequality as these goals are integral to fostering a more equitable, inclusive and sustainable future for Canada. In FY 2023-24, in alignment with its Indigenous Engagement Strategy, the NRC developed 9 resources to enhance intercultural competency and strengthen research relationships with Indigenous communities. These resources included engagement strategies, best practices toolkits and learning sessions, all aimed at fostering respectful and informed interactions.

Preserving Indigenous languages is crucial to reconciliation efforts. These languages hold cultural significance and are important for Indigenous groups communication of knowledge. By developing technologies that support their preservation, the NRC is supporting Indigenous communities towards self-determination and fostering stronger relationships between Indigenous and non-Indigenous Peoples. In FY 2023-24, the NRC contributed to the preservation and revitalization of Indigenous languages through the Canadian Indigenous languages technology project. This initiative saw 24 Indigenous language communities in Canada adopt new methodologies and software, enhancing educational resources and community engagement. In addition, 19 communities outside of Canada have also adopted these tools.

The NRC recognizes the value of Indigenous knowledge and strives to learn from it to develop solutions that address pressing issues impacting the quality of life of Northern peoples. All projects conducted under the Arctic and Northern Challenge program interweave Indigenous knowledge to achieve research objectives. For instance, one project aims to learn from Indigenous-made clothing to inform the design of personal protective equipment for harsh weather.

A diverse workforce is key to driving innovation. The NRC's representation and hiring goals, and initiatives of the NRC's equity, diversity and inclusion strategy, aim to support a more inclusive workplace and to correct historical barriers in accessing employment. In FY 2023-24, the NRC exceeded its representation targets for women and racialized persons, met its target for persons with disabilities and essentially met its target for Indigenous Peoples, missing by only 1%.

The NRC also introduced several diversity-focused initiatives to tackle employment inequalities among equity-deserving groups. These included:

- the Indigenous Student Employment program, providing job opportunities and exposure to NRC projects for Indigenous students
- the NRC Sponsorship pilot program, aimed at supporting high-potential Indigenous and racialized employees who aspire to grow into executive-level roles
- the Internship for Persons with Disabilities pilot program, offering meaningful work experiences to enhance professional skills and support inclusivity

The NRC strives for a workplace culture that supports and fosters accessibility and a built environment that is welcoming and accessible for employees, partners and members of the public.

In December 2023, the NRC published its first Accessibility Plan progress report, highlighting the completion of 17% of planned actions. These actions resulted in:

- improved organizational awareness of barriers faced by persons with disabilities
- the establishment of an accessibility advisory body

- increased representation and hiring of persons with disabilities
- the launch of a self-identification campaign and persons with disabilities employee network
- the promotion of available support services and mentorship opportunities for persons with disabilities
- implementation of accessibility assessments for NRC buildings
- accessibility training and new guidelines for procurement officers

The NRC continues to focus on developing a diverse, respectful and inclusive workplace where persons with disabilities have equal opportunities to grow and can bring different perspectives to the table.

Target theme: Advancing reconciliation with First Nations, Inuit, and the Métis communities

Target: Between 2023 and 2026, and every year on an ongoing basis, develop and table annual progress reports on implementing *the United Nations Declaration on the Rights of Indigenous Peoples Act* (Minister of Justice and Attorney General of Canada)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Res ach

Implement the *United Nations Declaration on the Rights of Indigenous Peoples Act*	Develop intercultural competency, resources and training to strengthen research relationships with Indigenous researchers and communities **Program:** Internal Services-Indigenous Engagement	**Performance indicator:** Number of resources (e.g., toolkits) developed to help strengthen Indigenous relationships **Starting point:** 0 in FY 2022-23 **Target:** 5 by March 31, 2027	By developing resources such as toolkits and delivering training sessions to NRC employees, the NRC will help develop intercultural competency within the organization and build intentional relationships with Indigenous researchers, innovators, and communities to advance equity for First Nations, Inuit and Métis communities. By developing speech- and text-based	**Ind** **resu** 9 re FY 2

			technologies, in collaboration with Indigenous communities and language experts, the NRC is supporting Indigenous language students, educators, translators, transcribers and other language professionals, and contributing to the revitalization of Indigenous languages. By integrating Indigenous knowledge in ANCP projects, and by developing applied technologies,	

	Work with Indigenous communities and language experts to develop technologies that contribute to the revitalization of Indigenous languages **Program:** Digital Technologies	**Performance indicator:** Number of language communities that adopt the methodologies and software for their community **Starting point:** 16 in FY 2022-23 **Target:** 24 by March 31, 2027	the NRC is helping ensure that project outputs address the pressing issues that impact the quality of life of Northern peoples and will support strong and sustainable Northern communities through applied technology and innovation. **Relevant ambitions and targets:** CIF ambition: Canadians live free of discrimination and inequalities are reduced	**Ind** **resu** 24 c in F

			CIF indicator: N/A GIF target: By 2030 empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status (10.2)	

	Use Indigenous knowledge in study design, data collection, project implementation, training and/or technology advancement **Program:** Collaborative Science, Technology and Innovation Program-Arctic and Northern Challenge program	**Performance indicator:** Percentage of research projects that integrate Indigenous knowledge from Indigenous Peoples **Starting point:** 0 in FY 2022-23 **Target:** 75% by March 31, 2027		**Ind** **resu** of A rese proj FY 2 **Not** desi proj dem inte Indi kno fron Indi Peo they they indi not.

Target theme: Taking action on inequality

Target: Each year, the federal public service meets or surpasses the workforce availability for women, Indigenous persons, persons with a disability, and members of a visible minority (President of the Treasury Board)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Re

Advance gender equality in the Government of Canada	Increase representation of Employment Equity designated groups (Indigenous Peoples, women, racialized persons and persons with disabilities) at the NRC **Program:** Internal Services- Human Resources Branch	**Performance indicator:** Ratio of the NRC workforce made up of underrepresented groups relative to Canadian average labour market availability **Starting point:** Results in FY 2022-23 Women: 1.0 Indigenous Peoples: 0.6 Racialized persons: 1.0 Persons with disabilities: 0.6 **Target:** Targets for FY 2023-24 were as follows: Women: 1.00 Indigenous Peoples: 0.75 Racialized persons: 1.00 Persons with	By having a workforce representative of Canada's diverse population, the NRC is advancing equity and diversity, supporting innovation, and enhancing scientific and knowledge advancement. **Relevant ambitions and targets:** CIF ambition: Canadians live free of discrimination and inequalities are reduced CIF indicator: N/A GIF target:	**In** Re FY W In Pe Ra pe Pe di

		disabilities: 0.65 Targets for FY 2024-25 are as follows: Women: 1.0 Indigenous Peoples: 0.77 Racialized persons: 1.0 Persons with disabilities: 0.70	By 2030 empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status (10.2)	

Foster diversity, inclusion and accessibility in the federal public service	Execute the NRC Accessibility Plan 2023-2025 to ensure that NRC is an accessible employer **Program:** Internal Services-Human Resources Branch	**Performance indicator:** Percentage of accessibility plan actions completed as planned **Starting point:** 0 **Target:** 100% by March 31, 2025	By implementing the NRC Accessibility Plan, the NRC will identify, remove and prevent barriers to accessibility and help create a respectful and inclusive workplace and culture. **Relevant ambitions and targets:** CIF ambition: Canadians live free of discrimination and inequalities are reduced CIF indicator: N/A GIF target: By 2030	**In** 17 co FY **N** Ta NF Pl ba ca (i. De

			empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status (10.2)	

	Support the Government of Canada's Procurement Strategy for Indigenous Businesses through contracting with Indigenous businesses **Program:** Internal Services- Finance and Procurement Services Branch	**Performance indicator:** Percentage of procurement contracts with Indigenous businesses. **Starting point:** 1.8% in FY 2022-23 **Target:** 5% by March 31, 2025	By supporting the Government of Canada's Procurement Strategy for Indigenous Business, the NRC is helping Indigenous businesses succeed and grow through increased opportunities in the procurement process. **Relevant ambitions and targets:** CIF ambition: Canadians live free of discrimination and inequalities are reduced CIF indicator: N/A	**In** 1. pr co FY **N** Th pr pu sc ec su 41 gc pr av th lin Th op In bu su sc ec be int pr sp re ec th

			GIF target: Ensure equal opportunity and reduce inequalities of outcomes, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard (10.3)	se su pa su th pa co ot rig re alt su or Th de In pr to ba in pe co to bu

Goal 11:
Improve access to affordable housing, clean air, transportation, parks, and green spaces, as well as cultural heritage in Canada

FSDS Context:

In Canada, thousands of hospital visits and more than 15,000 premature deaths each year are linked to air pollution. Studies have shown it is the most important environmental contributor to poor health and premature deaths, and the overall loss associated with air pollution has an economic value of $120 billion per year [3]. In addition to having a huge impact on our health, black carbon, the second-largest contributor to global warming after carbon dioxide, exacerbates global warming in snow-covered territories by darkening their surface. Reducing air pollution is crucial to foster sustainable development. The NRC is supporting this goal through a number of research activities such as developing new building solutions, standards and guidelines, and evaluating new technologies to reduce the health risk from indoor air pollution. In FY 2023-24, the NRC helped develop 6 standards and guidelines aimed at reducing health risks from indoor air pollution, including international standards on ventilation related to COVID-19 and radon control. The NRC also evaluated 6 new technologies that address indoor air quality, to validate their effectiveness before they are deployed. These include air cleaning devices to control infectious aerosols indoors and other indoor air pollution, as well as a spray foam product to reduce radon ingress.

To mitigate the impact of wildfire smoke, the NRC conducted 2 Remotely Piloted Aircraft System (RPAS) flights in partnership with McGill University to collect data on wildfire plumes to determine air quality protection measures and support the development of guidelines. The NRC also advanced the measurement of black carbon and methane by developing a calibration-free method and designing a prototype instrument that measures light absorption across the full solar spectrum, increasing the accuracy and reliability of black carbon measurements.

Implementation strategies supporting the goal

This section is for implementation strategies that support the goal **"Improve access to affordable housing, clean air, transportation, parks, and green spaces, as well as cultural heritage in Canada"** but not a specific FSDS target

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Res ach

Research the impacts of air pollution	Support industry to develop innovative building solutions, standards, and guidelines to reduce health risk from indoor air pollution **Program:** Construction	**Performance indicator:** Number of standards, guides and guidelines addressing health risks associated to indoor air pollution **Starting point:** 5 in FY 2022-23 **Target:** 8 by March 31, 2027	By developing new innovative building solutions, standards, and guidelines addressing health risks associated to indoor air pollution, the NRC is supporting improved air quality and health in Canada, and will provide Canadians with the tools to make informed decisions to reduce their exposure to indoor air pollutants. **Relevant ambitions and targets:** CIF ambition:	**Indi** **resu** 6 st of F

		Performance indicator: Number of new technologies addressing health risks associated to indoor air pollution evaluated in research projects **Starting point:** 30 in FY 2022-23 **Target:** 35 by March 31, 2027	Canadians live in healthy, accessible, and sustainable cities and communities CIF indicator: N/A GIF target: N/A	**Indi** **resu** tech FY 2

	Develop sensor technologies to deliver environmental pollutants data to environmental scientists, regulators and all levels of government and industry **Program:** Advanced Electronics and Photonics-Security and Disruptive Technologies-Nanotechnology	**Performance indicator:** Number of sensor projects for environmental monitoring developed **Starting point:** 7 as of FY 2022-23 **Target:** 14 by March 31, 2027	By developing sensors for pollutants, the NRC is helping environmental scientists, regulators, other government departments and industry access quality data on pollutants and supporting research on air and water pollution. **Relevant ambitions and targets:** CIF ambition: Canadians live in healthy, accessible, and sustainable cities and communities CIF indicator: N/A	**Indi** **resu** 10 p FY 2

			GIF target: N/A	

	Support the development of guidelines to help mitigate the impact of wildfire smoke on populations **Program:** Aerospace-Construction	**Performance indicator:** Number of wildfire flights conducted to collect spatial and temporal profiles of wildfire plumes **Starting point:** 0 in FY 2022-23 **Target:** 5 by March 31, 2027	By conducting wildfire flights, the NRC will be able to collect spatial and temporal profiles of wildfire plumes and assess its contribution to indoor air pollution which will help determine air quality protection measures and support the development of guidelines for healthy cities and communities. CIF Ambition: Canadians live in healthy, accessible, and sustainable cities and	**Indi** **resu** in F

			communities. CIF Indicator: N/A GIF Target: N/A	

	Develop the next generation of black carbon and methane measurement instruments **Program:** Metrology	**Performance indicator:** Number of black carbon measurement instruments developed through NRC research projects with external partners **Starting point:** 1 in FY 2022-23 **Target:** 2 by March 31, 2027	By developing the next generation of black carbon and methane measurement instruments, the NRC is supporting government and industry partners in reducing harmful air pollutants such as black carbon. **Relevant ambitions and targets:** CIF ambition: Canadians live in healthy, accessible, and sustainable cities and communities CIF indicator: N/A	**Indi** **resu** 2 ins in F

			GIF target: N/A	

	Publish new datasets on air pollutants to support emissions research and monitoring **Program:** Aerospace-Metrology	**Performance indicator:** Number of datasets of high-resolution sampling made available for research and monitoring of emissions **Starting point:** 0 in FY 2022-23 **Target:** 1 by March 31, 2027	By generating datasets on air pollutants for research and monitoring, the NRC will help in the evaluation of emissions trends and ultimately support emission reductions. **Relevant ambitions and targets:** CIF ambition: Canadians live in healthy, accessible, and sustainable cities and communities CIF indicator: N/A GIF target: N/A	**Indi** **resu** 0 da FY 2 **Not** The com 3 fli FY 2 whi use inst as w ups mod emi mor This prep inst and colle proc futu whi data colle con

Goal 12:
Reduce waste and transition to zero-emission vehicles

FSDS Context:

In the context of a global transition to low-carbon modes of transportation, industry needs to adopt new technologies to comply with strict government standards and increased consumer demand for more environmentally responsible vehicles.

In FY 2023-24, the NRC supported this transition with 48 innovative projects through its Clean and Energy Efficient Transportation program, including projects focused on:

- aerodynamics
- batteries
- electrical machines
- hydrogen
- fleet energy efficiency

The NRC is also supporting the development of measurement standards for electric vehicle charging stations, including the National Power and Energy Measurement Standard for Fast High Voltage DC Chargers and a Partial Discharge Testing Facility for high voltage components. Electric charging stations charge customers based on how long they charge or an estimate of the charge, but there is currently no accurate way to measure the exact amount of electricity transferred to the vehicle. By creating accurate

measurement standards, calibration labs and service providers can help electric charging stations accurately measure and charge for electricity, supporting Canada's transition to zero-emission vehicles.

The NRC is also helping decarbonize the aviation industry, participating in 31 collaborations with leading innovators from SMEs, multinational corporations and academic institutions, to develop technologies for low-emission aircraft. To advance aircraft charging, the NRC supported Pratt & Whitney Canada in developing an advanced mobile charging unit (MCU) capable of charging high-power batteries up to 1,500 volts. This technology is crucial for the propulsion system of a hybrid-electric flight demonstrator project, marking a significant step towards the electrification and decarbonization of aircraft travel. The MCU aligns with aerospace industry standards and can also return unused energy to the electrical grid, enhancing energy efficiency in aviation.

Greening government operations and moving towards a low-carbon government are important to achieving Canada's goals for environmental and sustainable development. In support of this goal, the NRC continued to improve its internal operations, specifically in regards to waste management, fleet management and green procurement. In FY 2023-24, the NRC continued to divert its waste from landfills, with a notable 96% diversion rate for construction and demolition waste. In terms of fleet management, 11% of light-duty and executive fleet vehicles were zero-emission or hybrids in FY 2023-24, as well as a 55% reduction in Scope 1 GHG emissions from the conventional fleet.

Canada must reduce its plastic waste to protect its environment and to promote responsible consumption and production practices. In FY 2023-24, the NRC developed a decision support tool called the Ocean Microplastic Explorer (COMEX) to aid in the management and development of policy

decisions regarding plastic pollution. The NRC is also working on methods to reduce the waste of other materials such as rare earth magnets used in electronic vehicles. The NRC is collaborating with Canadian SMEs to develop a novel, eco-friendly recycling method for rare earth magnets. This new approach bypasses traditional, environmentally harmful recycling methods by directly converting end-of-life magnets into powders suitable for 3D printing new magnetic parts. This advancement not only reduces the environmental impact but also addresses the supply risk by recycling critical materials domestically.

Target theme: Zero-emission vehicles

Target: Aim is to have 35% of medium- and heavy-duty vehicles sales being zero emission by 2030 and 100% by 2040 for a subset of vehicle types based on feasibility (Minister of Transport; Minister of Environment and Climate Change)

Implementation strategy	**Departmental action**	**Performance indicator** **Starting point** **Target**	**How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs**	**Re ac**

Make zero-emission vehicles more affordable and improve supply	Conduct research on clean and energy efficient transportation, including on addressing the technical requirements for adoption of electric and connected vehicles **Program:** Automotive and Surface Transportation	**Performance indicator:** Number of research projects with external partners supporting clean and energy efficient transportation **Starting point:** 111 from FY 2020-21 to FY 2022-23 **Target:** 55 per year starting in FY 2023-24	By conducting research projects focused on clean and energy efficient transportation, the NRC is supporting Canada's transition to low-carbon modes of transportation. **Relevant ambitions and targets:** CIF ambition: Canadians consume in a sustainable manner CIF indicator: Proportion of new light-duty vehicle registrations that are zero-emission vehicles (12.1.1) GIF target: N/A	**In re** 48 FY **N** Fe pr si ar du pr ur ar ca re te Pr cc ac ar to ae ba el m hy fle ef

	Develop innovative technologies and support the development of policies to decarbonize the aviation industry **Program:** Aerospace	**Performance indicator:** Number of external partners involved in decarbonization projects **Starting point:** 9 in FY 2022-23 **Target:** 12 per year starting in FY 2023-24	By collaborating with industry partners on decarbonization-related projects, the NRC is supporting the development of disruptive technologies for low-emission aircraft such as high-power or energy dense batteries, hydrogen systems, electric propulsion systems and novel aircraft configurations, which will reduce the environmental impact of the aviation industry. **Relevant ambitions and targets:** CIF ambition: Canadians	**In re** 25 FY **N** Pa in ar siz er m ar in cc cc in RT ur

			consume in a sustainable manner CIF indicator: N/A GIF target: N/A	

	Develop reliable measurement and quality assurance protocols for electric vehicles and rapid charging stations **Program:** Metrology	**Performance indicator:** Number of new measurement standards developed for electric vehicles charging stations **Starting point:** 0 in FY 2022-23 **Target:** 1 by March 31, 2027	By developing new measurement tools and quality assurance protocols, the NRC will help increasing electric vehicle performance and support the implementation of standards of rapid charging stations. **Relevant ambitions and targets:** CIF ambition: Canadians consume in a sustainable manner CIF indicator: N/A GIF target: N/A	**In re** 0 : FY **N** 2 pr su ot go de ur in m st

		Performance indicator: Number of new prototype measurement tools developed with external partners to diagnose faults in electric vehicle power electronics **Starting point:** 0 in FY 2022-23 **Target:** 1 by March 31, 2027		**In re** 0 FY **N** 2 pr su ot g d u in m to

Target theme: Federal leadership on responsible consumption

Target: By 2030 the Government of Canada will divert from landfill at least 75% by weight of non-hazardous operational waste (All Ministers)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	RESUL ACHIE

Maximize diversion of waste from landfill	Complete waste audits for large buildings and report the annual rate of diversion of waste from landfill **Program:** Special Purpose Real Property	**Performance indicator:** Percentage by weight of non-hazardous operational waste diverted from landfill **Starting point:** 65% in FY 2022-23 **Target:** 75% by weight of non-hazardous operational waste diverted from landfill annually by 2030	By diverting non-hazardous operational waste and plastic waste from landfill, the NRC is helping reduce emissions from the production, transportation, and disposal of material. **Relevant ambitions and targets:** CIF ambition: Canadians consume in a sustainable manner CIF indicator: Total waste diversion per capita (12.3.1) GIF target: By 2030 substantially	**Indica result** 53% of non-hazard operat waste diverte FY 202 **Notes** The decrea operat waste diversi rate is based factors First, previo audits includ data fr the CC period where buildir were l occupi and genera less wa

				reduce waste generation through prevention, reduction, recycling and reuse (12.5)	Secon the cu audits includ large labora buildir howev there a no diversi or recycli progra for lab waste availab Ottaw The NI explor option lab wa diversi

		Performance indicator: Percentage by weight of plastic waste diverted from landfill **Starting point:** 55% in FY 2022-23 **Target:** 75% by weight of plastic waste diverted from landfill annually by 2030		**Indica result** 49% of plastic waste diverte FY 202 **Notes** The decrea plastic waste diversi rate is based 2 factc First, previo audits includ data fr the CC period where buildir were l occupi and genera less wa Secon the cu

				audits includ large labora buildir howev there a no diversi or recycli progra for lab waste availab Ottaw The NI explor option lab wa diversi A revis re-educat campa is bein develc for lau in the curren fiscal y

Target: By 2030 the Government of Canada will divert from landfill at least 90% by weight of all construction and demolition waste (All Ministers)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Result achiev

Maximize diversion of waste from landfill	Ensure public tender construction project general contractors track and disclose the amount of construction and demolition waste generated, as well as the amount diverted from landfill Program: Special Purpose Real Property-Office of Facilities Renewal Management	**Performance indicator:** Percentage by weight of construction and demolition waste diverted from landfill in Crown-owned buildings for applicable projects **Starting point:** 47% in FY 2022-23 Target: 90% by weight of non-hazardous operational waste diverted from landfill annually by 2030	By diverting construction and demolition waste from landfill, the NRC is helping reduce emissions from the production, transportation and disposal of material. **Relevant ambitions and targets:** CIF ambition: Canadians consume in a sustainable manner CIF indicator: Total waste diversion per capita (12.3.1) GIF target: By 2030 substantially reduce waste	**Indica result:** 96% of constr and demoli waste diverte FY 202

			generation through prevention, reduction, recycling and reuse (12.5)	

Target: The Government of Canada's procurement of goods and services will be net-zero emissions by 2050, to aid the transition to a net-zero, circular economy (All Ministers)

Implementation strategy	**Departmental action**	**Performance indicator Starting point Target**	**How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs**	**Resul achie**

Disclose embodied carbon in construction	Disclose the amount of embodied carbon in the structural materials of major construction projects, based on material carbon intensity or a life cycle analysis **Program:** Special Purpose Real Property-Office of Facilities Renewal Management	**Performance indicator:** Percentage of major construction projects that disclose embodied carbon for structural materials **Starting point:** 0% in FY 2022-23 **Target:** 100% of major construction projects disclose embodied carbon for structural materials by 2030	By tracking the amount of embodied carbon in the structural materials of major construction projects, the NRC will develop a better understanding of emissions associated to its major construction projects and develop mitigation strategies. **Relevant targets or ambitions:** CIF ambition: N/A CIF indicator: N/A GIF target: N/A	**Indica result** projec FY 202 **Notes** No ide projec FY 202 that m requir for rep

	Reduce embodied carbon from structural materials of major construction projects by 30%, starting in 2025, using recycled and lower-carbon materials, material efficiency and performance-based design standards **Program:** Special Purpose Real Property-Office of Facilities Renewal Management	**Performance indicator:** Percentage of reduction in embodied carbon from the structural materials of major construction projects completed during the year **Starting point:** 0% in FY 2022-23 (this is a new requirement in FY 2023-24) **Target:** 30% reduction by 2025		**Indica result** 0% rec in FY 2 **Notes** No ide projec FY 202 that m requir for embo carbo report Repor reduct start i

Transform the federal light-duty fleet	New light-duty and executive fleet vehicle purchases will include zero-emission vehicles (ZEVs) or hybrids **Program:** Special Purpose Real Property	**Performance indicator:** Percentage of light-duty and executive fleet vehicles that are ZEVs or hybrids **Starting point:** 7% in FY 2022-23 **Target:** 100% of light-duty and executive fleet vehicles are ZEVs or hybrid by 2030	By purchasing zero-emission vehicles or hybrids, the NRC is reducing greenhouse gas emissions from conventional fleet operations and enhancing sustainable consumption. **Relevant ambitions and targets:** CIF ambition: Canadians consume in a sustainable manner CIF indicator: Proportion of new light-duty vehicle registrations that are zero-emission	**Indica result** 11% o vehicl FY 202 **Notes** 11% o fleet is compr electri vehicl

	Optimize and rationalize federal vehicle fleet management through application of telematics and development of a fleet strategic plan **Program:** Special Purpose Real Property	**Performance indicator:** Percentage reduction in Scope 1 GHG emissions from conventional fleet relative to FY 2005-06 levels **Starting point:** 57% reduction in FY 2022-23 (153 ktCO2e) **Target:** 40% reduction by 2025	vehicles (12.1.1) GIF target: Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries (12.1).	**Indica result** 55% o emissi FY 202 (160 k **Notes** Return more opera for fle usage acquis new Z the en the ye highes contri factor slight increa emissi during report perioc

Strengthen green procurement criteria	Build capacity in green procurement to incorporate "greening" criteria into NRC procurement practices (e.g., carbon reduction, sustainable plastics, training) to aid the transition to a net-zero, circular economy **Program:** Internal Services-Finance and Procurement Services Branch	**Performance indicator:** Percentage of "green"-trained procurement officers **Starting point:** 98% in FY 2022-23 **Target:** 100% every year starting in FY 2023-24	By incorporating environmental considerations into purchasing decisions, the NRC is helping suppliers reduce the environmental impact of goods and services delivered, and their supply chains. **Relevant ambitions and targets:** CIF ambition: Canadians consume in a sustainable manner CIF indicator: Proportion of businesses that adopted selected environmental	**Indica result** 100% procu officer FY 202

			protection activities and management practices (12.2.1) GIF target: Promote public procurement practices that are sustainable, in accordance with national policies and priorities (12.7)	

Implementation strategies supporting the goal

This section is for implementation strategies that support the goal **"Reduce waste and transition to zero-emission vehicles"** but not a specific FSDS target

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Res ach

Boost the supply of critical minerals for the green and digital economy	Support the development of new or improved battery recycling processes to boost critical minerals supply chains **Program:** Energy, Mining and Environment	**Performance indicator:** Number of critical minerals projects that advance by one or more technology readiness level (TRL) **Starting point:** 0 in FY 2022-23 **Target:** 10 by March 31, 2027	By conducting research projects with clients and collaborators, the NRC will advance the development of new or improved battery recycling processes that will help boost the supply of critical minerals and support Canada's clean energy transformation. **Relevant ambitions and targets:** CIF ambition/target: N/A CIF indicator: N/A GIF target: N/A	**Ind** **res** 3 pr FY 2

Remediate high-priority contaminated sites	Continue to monitor, risk-manage or remediate identified contaminated sites **Program:** Internal Services-Health, Safety and Environment Branch	**Performance indicator:** Number of site files that are closed or have long-term risk management plans in place **Starting point:** 11 in FY 2022-2023 **Target:** 12 by March 31, 2027	By assessing contaminated sites and implementing remediation activities, the NRC is reducing risks from contaminated sites on human health and the environment. **Relevant ambitions and targets:** CIF ambition/target: N/A CIF indicator: N/A GIF target: N/A	**Ind** **res** 11 s as c FY 2

Research innovative solutions for plastics	Develop and deploy a Decision Support System (DSS) to reduce the risks of plastics to the environment, wildlife and human health **Programs:** Ocean, Coastal and River Engineering-Energy, Mining and Environment-Aquatic and Crop Resources Development-Collaborative Science, Technology and Innovation Program-Ocean program	**Performance indicator:** Percentage of users reporting that the DSS is an effective tool in supporting policy and management decisions to reduce the potential risks of plastics to the environment, wildlife and human health **Starting point:** N/A (the development of the DSS tool was at 50% completion in March 2023) **Target:** 90% in FY 2026-27	By developing and deploying a DSS, the NRC will give researchers and policymakers greater understanding of plastic pollution distributions and risks to Canada's aquatic systems. It will also support the reduction of plastic pollution and mitigate risks of exposure to the environment and human health. **Relevant ambitions and targets:** CIF ambition: N/A CIF indicator: N/A GIF target: N/A	**Ind** **res** pro Sur res be a in F 27. **Not** The vers the mic dec sup call Can Oce Mic Exp (CO was suc dev and laur FY 2 for use dev and are

				bef too for use
	Reduce plastic waste from food packaging by developing technologies for sustainable plastic sources and packaging **Program:** Automotive and Surface Transportation	**Performance indicator:** Number of technologies developed supporting sustainable food packaging **Starting point:** 1 in FY 2022-23 **Target:** 3 by March 31, 2027	By developing technologies for sustainable packaging, especially for food applications, the NRC will support the development of new products with potential for biomass and recycled plastics reclamation and the use of compostable plastics. **Relevant ambitions and targets:** CIF ambition/target: N/A CIF indicator: N/A GIF target: N/A	**Ind res** 4 tech in F (3 r sus pac and 1 co tech

Goal 13:
Take action on climate change and its impacts

FSDS Context:

Canada must take immediate action to meet its target of achieving net-zero emissions by 2050, which requires transitioning to a cleaner economy. The NRC is positioned to support this transition by improving the environmental sustainability of its operations and collaborating with industry to develop necessary technologies and tools. In FY 2023-24, the NRC recommissioned 10.6% of its building footprint to enhance energy efficiency and reported a 48.4% reduction in GHG emissions compared to the baseline year of FY 2005-06.

The NRC is also developing methods to report on energy, water and waste for new office leases to better manage GHG emissions in its leased spaces. Finally, to protect its assets from climate change risks and inform risk mitigation plans, the NRC completed asset-level climate risk and vulnerability assessments for its critical assets in FY 2023-24.

Through the Climate Resilient Built Environment Initiative, the NRC is contributing to the Government of Canada's climate resilience efforts by providing guidance, tools and standards which contribute to long-lasting infrastructure and buildings, including retrofits and upgrades. These efforts will help communities build resilience, reduce disaster risks and conserve costs over the long term.

In FY 2023-24, the NRC advanced pilot studies aimed at mitigating urban heat islands—urban areas that are warmer than their rural counterparts due to human activities and dense infrastructure. These studies, which

concentrated on the use of nature-based solutions and protecting vulnerable buildings like schools and care facilities, will help reduce the effects of extreme heat and urban heat islands, safeguarding particularly at-risk populations.

In order to meet emissions targets and its sustainable development goals, the Canadian transportation sector must undergo substantial changes. In terms of marine transportation, in collaboration with Transport Canada, the NRC is helping reduce maritime emissions by developing tools to analyze hydrodynamic interactions in Canadian fishing vessels. The NRC is using this new capability to understand how hydrodynamic interactions between hull, propeller, rudder and appendage systems affect performance efficiency, greenhouse gas emissions and underwater radiated noise which will help to develop and test future noise mitigation solutions and energy-saving technologies. In another project, the NRC is working with Transport Canada, BC Ferries and Simon Fraser University to apply AI techniques to shipboard data to study how navigation could be more fuel efficient. Through this project, the NRC helped to develop a real-time fuel consumption prediction model. The goal is to integrate this model into vessels to provide operators with optimal navigation parameters, potentially reducing fuel consumption.

In support of resilient shores, the NRC has established Canada's first emergency flood barrier testing facility, working with industry bodies to develop and certify flood barrier solutions and standards. This work also promotes nature-based solutions for flood and erosion risk management, supporting projects like Living Dykes in Surrey, British Columbia.

The NRC is also collaborating with Indigenous communities to develop marine renewable energy solutions with consultations and environmental assessments in the northern region. The NRC, Nunavut Nukkiksautiit

Corporation and other Indigenous partners carried out culturally appropriate stakeholder consultations and fieldwork within Indigenous territories to assess the unique environmental conditions and hydrokinetic potential in Northern and remote communities to inform the development of these solutions.

The NRC has a number of research initiatives to support the green transformation of the aviation sector and ground transportation. In FY 2023-24, for instance, the NRC worked on boundary layer ingestion (BLI) technology to improve the efficiency of aircraft engines. This technology has the potential to significantly reduce fuel consumption and emissions, contributing to the global effort towards more sustainable aviation practices. In a collaboration with the University of Calgary and major Canadian transportation companies, the NRC developed AI-driven tools that optimize truck routes. This technology helps planners select the most effective routes, notably under adverse weather conditions, reducing travel distances, operational costs and environmental impact. The software's ability to anticipate traffic patterns and suggest optimal routes is a game-changer for logistics and supply chain management.

Target theme: Federal leadership on greenhouse gas emissions reductions and climate resilience

Target: The Government of Canada will transition to net-zero carbon operations for facilities and conventional fleets by 2050 (All Ministers)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs

Implement the Greening Government Strategy through measures that reduce greenhouse gas emissions, improve climate resilience, and green the government's overall operations	Conduct whole building (or asset) life cycle assessments for major building and infrastructure projects **Program:** Special Purpose Real Property	**Performance indicator:** Percentage of major building and infrastructure projects having completed whole building (or asset) life cycle assessment in reporting year **Starting point:** 0% in FY 2022-23 (this is a new requirement in FY 2023-24) **Target:** 100% major buildings and infrastructure projects having completed whole building (or asset) life cycle assessment* *Target will be formalized as part of the NRC's Real Property	By completing whole building (or asset) life cycle assessments, the NRC will be better positioned to quantify the amount of embodied carbon that is associated with its major infrastructure projects, and use this information as a design tool to reduce emissions. **Relevant ambitions and targets:** CIF ambition: Canadians reduce greenhouse gas emissions CIF indicator: Greenhouse gas emissions

		Strategy at the end of FY 2023-24. Reporting will start in FY 2024-25.	(13.1.1) GIF target: Integrate climate change measures into national policies, strategies and planning (13.2)

	Adopt the use of clean electricity through Public Services and Procurement Canada (PSPC) Power Purchase Agreement (PPA) **Program:** Special Purpose Real Property	**Performance indicator:** Percentage of eligible sites participating in PSPC's clean electricity PPA **Starting point:** 0% in FY 2022-23 **Target:** 100% of eligible sites participating when clean electricity PPA becomes available* *Target date to be confirmed once PPA is implemented	By participating in the purchase of clean electricity, the NRC will contribute to the Government of Canada's objectives of greening its procurement, lowering its emissions and encouraging the transition to a clean economy. **Relevant ambitions and targets** CIF ambition: Canadians reduce greenhouse gas emissions CIF indicator: Greenhouse gas emissions (13.1.1) GIF target: Integrate climate

			change measures into national policies, strategies and planning (13.2)

	Recommission large energy-intensive buildings on a regular cycle **Program:** Special Purpose Real Property	**Performance indicator:** Percentage of total building footprint with recommissioning activities completed in reporting year **Starting point:** 9% in FY 2022-23 **Target:** 10% per fiscal year starting in FY 2023-24	By recommissioning its buildings on a regular cycle through actions such as optimizing energy efficiency, implementing smart building technologies, the NRC is ensuring that its buildings are operating efficiently and reducing GHG emissions. **Relevant ambitions and targets** CIF ambition: Canadians reduce greenhouse gas emissions CIF indicator: Greenhouse gas emissions (13.1.1)

			GIF target: Integrate climate change measures into national policies, strategies and planning (13.2)

	Report building energy, water usage and waste generated using Energy Star Portfolio Manager for all new office leases and lease renewals for space over 500 m^2 landlords **Program:** Special Purpose Real Property	**Performance indicator:** Percentage of office leases (> 00 m^2) that are reporting energy, water and waste generation using Energy Star Portfolio Manager **Starting point:** 0% in FY 2022-23 **Target:** 100% by 2025	Buildings with the highest scores will generally minimize energy use and therefore GHG emissions from heating and electricity (where applicable). By reporting on the GHG emissions of leased space, the NRC will be able to better monitor GHG emission performance in subsequent lease negotiations. **Relevant ambitions and targets:** CIF ambition: Canadians reduce their greenhouse gas emissions

	Report on GHG emissions from the majority of leased office space **Program:** Special Purpose Real Property	**Performance indicator:** Percentage of leased office floor area reporting GHG emissions **Starting point:** 0% in FY 2022-23 (GHG emissions from leased facilities are not currently reported) **Target:** 30% by 2025	CIF indicator: Greenhouse has emissions (13.1.1) GIF target: Integrate climate change measures into national policies, strategies and planning (13.2)

Modernize through net-zero carbon buildings	Design and construct all new buildings (including build-to-lease and public-private partnerships) to be net-zero carbon unless a life cycle cost-benefit analysis indicates net-zero-carbon-ready construction **Program:** Special Purpose Real Property-Office of Facilities Renewal Management	**Performance indicator:** Percentage reduction in GHG emissions from real property from FY 2005-06 **Starting point:** 48% reduction in FY 2022-23 (37,216 ktCO2e) **Target:** 70% reduction by 2030	By taking actions such as rationalizing its portfolio, sharing facilities and reducing demand for energy or switching to lower carbon sources of energy, the NRC is reducing GHG emissions from its real property operations. **Relevant ambitions and targets:** CIF ambition: Canadians reduce greenhouse gas emissions CIF indicator: Greenhouse gas emissions (13.1.1) GIF target: Integrate climate change measures into national policies,

Apply a greenhouse gas reduction life cycle cost analysis for major building retrofits	Incorporate GHG emissions reduction into the departmental decision-making process using GHG options and a life cycle costing analysis methodology for all major retrofits **Program:** Special Purpose Real Property-Office of Facilities Renewal Management		strategies and planning (13.2)

Target: The Government of Canada will transition to net-zero carbon national safety and security fleet operations by 2050 (Ministers with national safety and security fleets)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Result achiev

Improve environmental performance of national safety and security fleets	Help develop state-of-the-art fleet platforms and technologies for the Royal Canadian Navy and the Canadian Coast Guard to enable green and sustainable fleet operations **Program:** Ocean, Coastal and River Engineering	**Performance indicator:** Number of projects with clients or collaborators supporting sustainable fleet operations **Starting point:** 36 in FY 2022-23 **Target:** 36 active projects per year starting in FY 2023-24	By developing fleet platforms and new technologies, the NRC is enhancing the capability and sustainability of Canada's defence fleets. **Relevant ambitions and targets:** CIF ambition: Canadians reduce greenhouse gas emissions CIF indicator: Greenhouse gas emissions (13.1.1) GIF target: N/A	**Indica result:** 36 proj in FY 2 24 **Notes:** This cc include project the OC strateg resear pillars Zero Impact Ships a Secure Canad well as relevar project within Safe Operat pillar (notab those relatec ships i ice)

Target: The Government of Canada will transition to climate resilient operations by 2050 (All Ministers)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Resu achi

Reduce risks posed by climate change to federal assets, services and operations	Develop plans to reduce the climate risk of mission critical assets with moderate to high risks **Program:** Special Purpose Real Property-Office of Facilities Renewal Management	**Performance indicator:** Percentage of mission critical assets with moderate to high risks related to climate change that have a risk mitigation plan. **Starting point:** 0% in FY 2022-23 (Asset-level climate risk and vulnerability assessment initiated in 2023) **Target:** 100% by March 31, 2027	By developing a climate-resilient real property portfolio plan, the NRC will be better positioned to prioritize its real property assets for a detailed risk assessment and the implementation of adaptation measures. **Relevant ambitions and targets:** CIF ambition: Canadians are well equipped and resilient to face the effects of Climate change CIF indicator: Proportion of municipal	**Indi** **resu** FY 2 **Not** Asse clim and vuln asse com FY 2 will the deve of ri miti plan

			organization who factored climate change adaptation into their decision-making process (13.3.1) GIF targets: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries (13.1) Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning (13.3)	

Implementation strategies supporting the goal

This section is for implementation strategies that support the goal **"Take action on climate change and its impacts"** but not a specific FSDS target

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Re ac

Collaborate on emergency management and disaster risk reduction	Collaborate with Health Canada to reduce the impacts of extreme heat through pilot studies **Program:** Construction	**Performance indicator:** Number of pilot studies completed to reduce the impacts of extreme heat **Starting point:** 0 **Target:** 4 by March 31, 2026	By conducting pilot studies, the NRC will support the development of innovative solutions to prevent and mitigate negative health consequences resulting from extreme heat events. **Relevant ambitions and targets:** CIF ambition: Canadians are well equipped and resilient to face the effects of Climate change CIF indicator: N/A GIF target: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters	**In re** FY **N** Re ef ex im ur th Cli Re En In FY th or sc ba so re he ef m ov ris vu bu lo ca ar in

			in all countries (13.1)	ne stu Br Co In bu m re re co ov we ex Ch th Bu to ov dv ar co fo

	Help Canadian industry develop emergency flood barriers and support communities in emergency response planning **Program:** Ocean, Coastal and River Engineering	**Performance indicator:** Number of clients supported with emergency response planning and the development of flood barriers **Starting point:** 13 in FY 2022-23 **Target:** 5 active clients per year starting in 2023-24	By working with industry and community clients with emergency response planning and in the development of flood barriers, the NRC is supporting increased resilience to extreme weather events and other environmental factors on Canada's shorelines and infrastructure. **Relevant ambitions and targets:** CIF ambition: Canadians are well equipped and resilient to face the effects of climate change CIF indicator: N/A	**In re** cli FY **N** Re 27 O pe flo pr flo na so en re In re th cli pa m pr

			GIF target: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries (13.1)	

	Develop resilient infrastructure designs, and advanced technologies and decision-making tools for resilient asset management **Programs:** Construction-Ocean, Coastal and River Engineering	**Performance indicator:** Number of decision-making tools updated or developed to support public infrastructure management **Starting point:** 0 in FY 2022-23 **Target:** 10 by March 31, 2028	By developing new technologies and decision-making tools, the NRC will support increased resilience to extreme weather events and other environmental factors on Canada's buildings, shorelines and infrastructure. **Relevant ambitions and targets:** CIF ambition: Canadians are well equipped and resilient to face the effects of climate change CIF indicator: N/A GIF target:Strengthen resilience and adaptive capacity	**In re** in **Ne** In nc we de m pu int bu ar fo fe th Cli Re En In ini 2 (ar to pu FY wi m ex FY A su

				to climate-related hazards and natural disasters in all countries (13.1)	co he wh up In Ca lau ne to 80 or re cr co wi an St Co Ca ef su gl en go Na Ac St pr de gu st he cli to

				ar int
		Performance indicator: Number of projects with clients or collaborators related to resilient shores **Starting point:** 31 in FY 2022-23 **Target:** 31 active projects per year starting in 2023-24		**In re 31 FY**

Goal 14:
Conserve and protect Canada's oceans

FSDS Context:

Oceans play a crucial role in the well-being of communities throughout Canada. They have the potential to be part of climate solutions, enhance prospects for coastal and inland communities, and help foster a sustainable and thriving blue economy. Healthy oceans are critical to fighting climate change and protecting marine life. That is why Canada has committed to conserving 30% of our marine and coastal areas by 2030. In alignment with this goal, the NRC has developed 4 new modelling and monitoring tools that are designed to enhance understanding and prediction of climate change impacts on oceans and estuaries, including a method to predict anoxic (no oxygen) episodes in estuaries using machine learning and chaos theory.

With its expertise in ocean science, the NRC plays an important role in safeguarding Canada's coasts and oceans. In FY 2023-24, the Intergovernmental Oceanographic Commission of UNESCO endorsed the NRC as a Decade Implementing Partner for the United Nations Decade of Ocean Science for Sustainable Development (2021 to 2030). Coordinated by UNESCO, the Ocean Decade provides a framework for scientists and stakeholders from diverse sectors to develop the scientific knowledge and partnerships needed to reverse the decline of the ocean system and catalyze opportunities for the sustainable development of this massive marine ecosystem. The NRC plans to launch 6 projects under this framework focused on areas such as coastal resilience, flood mapping, microplastics, seaweed aquaculture, zero-waste fish processing and marine decarbonization using autonomous ships.

The presence of microplastics in our oceans poses significant ecological and human health concerns. These minuscule plastic particles, often originating from the breakdown of larger plastic items and synthetic fibers, threaten marine life across Canada's extensive coastal and freshwater ecosystems. To combat this, the NRC is working with partners to generate

and disseminate information on micro and nanoplastics pollution to increase our understanding of pollution and climate change impacts on Canada's marine ecosystems and to support conservation efforts. In FY 2023-24, the NRC developed a multidisciplinary team to tackle the issue of microplastics in Canadian waters. This team is using a multi-pronged approach to address this issue, including developing real-time 3D sensing technology for tracking microplastics, creating AI-enhanced models to predict the movement and impact of these plastics in water systems, studying the chemical properties and fate of microplastics, and using zebrafish to understand the biological impacts of microplastics.

Target theme: Ocean protection and conservation

Target: Conserve 25% of marine and coastal areas by 2025, and 30% By 2030 in support of the commitment to work to halt and reverse nature loss by 2030 in Canada, and achieve a full recovery for nature by 2050 (Minister of Fisheries, Oceans and the Canadian Coast Guard)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Resu achie

Build knowledge of coastal and marine ecosystems and marine protected areas	Develop innovative ocean health modelling and monitoring technologies to enable better understanding and prediction of climate change impacts on oceans and potential solutions **Program:** Aquatic and Crop Resources Development-Digital Technologies	**Performance indicator:** Number of modelling and monitoring tools developed to better understand and predict climate change impacts on oceans and estuaries **Starting point:** 0 **Target:** 5 by March 31, 2027	By developing new modelling and monitoring technologies, the NRC will support increased understanding of pollution and climate change impacts on Canada's marine ecosystems and support conservation efforts. **Relevant ambitions and targets:** CIF ambition: Canada protects and conserves marine areas and sustainably manages ocean fish stocks	**Indic resul** 4 in FY 20 24

			CIF indicator: Proportion of marine and coastal areas conserved (14.1.1) GIF target: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans (14.2)	

	Support Canada in understanding and mitigating the impacts of extreme weather events and other environmental factors on Canada's shorelines and related infrastructure **Program:** Ocean, Coastal and River Engineering	**Performance indicator:** Number of publications on the impacts of extreme weather events and other environmental factors on Canada's shorelines and related infrastructure **Starting point:** 7 in FY 2022-23 **Target:** 28 by March 31, 2027	By conducting research on resilient shorelines and related infrastructure, the NRC is helping ensure that Canada has the capabilities to mitigate the impacts of extreme weather events and other environmental factors. **Relevant ambitions and targets:** CIF ambition: Canada protects and conserves marine areas and sustainably manages ocean fish	**Indic resul** 13 in FY 20 24

			stocks CIF indicator: Proportion of marine and coastal areas conserved (14.1.1) GIF target: By 2020, conserve at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information (14.5)	

Implementation strategies supporting the goal

This section is for implementation strategies that support the goal **"Conserve and protect Canada's oceans"** but not a specific FSDS target

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Resul achie

Reduce marine litter and support the Canada-wide Strategy on Zero Plastic Waste	Generate and disseminate knowledge on micro and nanoplastics pollution to improve the availability of accurate information to predict accumulation zones and plastic pollution pathways in different marine environments **Programs:** Ocean, Coastal and River Engineering-Energy, Mining and Environment-Aquatic and Crop Resources Development-Metrology-Collaborative	**Performance indicator:** Number of project partners participating in data sharing agreements (including academia, science-based departments and agencies, Canadian SMEs, and Indigenous organizations) **Starting point:** 0 in FY 2022-23 **Target:** 10 partners by March 31, 2027	By developing new technologies and methods to assess plastic pollution, the NRC will help reduce barriers to assess plastic pollution in Canada's water ways, and support prevention and reduction of plastic pollution. **Relevant ambitions and targets:** CIF ambition: Canada protects and conserves marine areas and sustainably manages ocean fish	**Indic resul** FY 20 **Note** The N has initiat discu with s poter partn estab data shari agree

	Science, Technology and Innovation Program-Ocean program		stocks CIF indicator: N/A GIF target: N/A	

Goal 15: Protect and recover species, conserve Canadian biodiversity

FSDS Context:

Canada's conservation network is varied and unique, extending beyond just national wildlife areas and national parks. The Government of Canada is recognizing lands and waters that are managed in a manner that achieves long-term conservation of biodiversity, maintains ecosystems and supports healthy populations of wild species. These areas are known as other effective area-based conservation measures (OECMs). In FY 2023-24, the NRC assessed 9 of its properties to determine if they could be recognized as OECMs using established pan-Canadian criteria. This work will lead to positive long-term outcomes in conservation and biodiversity outside of protected areas.

Target theme: Conservation of land fresh water

Target: Conserve 25% of Canada's land and inland waters by 2025, working toward 30% by 2030 from 12.5% recognized as conserved as of the end of 2020, in support of the commitment to work to halt and reverse nature

loss by 2030 in Canada, and achieve a full recovery for nature by 2050 (Minister of Environment and Climate Change)

Implementation strategy	Departmental action	Performance indicator Starting point Target	How the departmental action contributes to the FSDS goal and target and, where applicable, to Canada's 2030 agenda national strategy and SDGs	Res ach

Conserve natural spaces	Assess NRC properties for suitability and recognition as other effective area-based conservation measures (OECMs) **Program:** Internal Services-Health, Safety and Environment Branch	**Performance indicator:** Number of NRC properties assessed for suitability as OECMs **Starting point:** 1 in FY 2022-23 **Target:** All 12 NRC-owned properties assessed by March 31, 2027	By assessing its properties for suitability as OECMs, the NRC will identify which areas are managed to achieve positive long-term outcomes in conservation and biodiversity outside of protected areas. **Relevant ambitions and targets:** CIF ambition/target: N/A CIF indicator: N/A GIF target: N/A	**Ind** **res** FY 2 **Not** The trac all 1 own pro ass Mar

Integrating Sustainable Development

The NRC will continue to consider FSDS goals and targets in its decision-making through its Strategic Environmental Assessment (SEA) process. An SEA for a policy, plan or program proposal includes an analysis of the impacts of the given proposal on the environment, including on relevant

FSDS goals and targets. A detailed SEA review is required if the implementation of the proposal could result in important environmental effects in Canada or abroad.

A public statement is also required to demonstrate that environmental effects including the impacts on achieving the FSDS goals and targets of the approved policy, plan or program have been considered during the proposal development and decision-making process. While the NRC did not complete any SEAs in FY 2023-24, it will continue to adhere to the Cabinet Directive on Strategic Environmental and Economic Assessment and release a public statement if future proposals require a detailed SEA.

Footnotes

1 The NRC leveraged its internal generative AI tool (AI Zone) to support the development of content within this report. All AI-generated content has been reviewed and validated by a human.

2 RAC-NSCTF-Submission-July-2022.pdf (railcan.ca)

3 Health Impacts of Air Pollution in Canada 2021 Report - Canada.ca

From: National Research Council Canada

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