

# Natural Resources Canada

2016–17

## **Departmental Results Report**

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The Honourable James Gordon Carr, P.C., M.P.  
Minister of Natural Resources

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## Minister's message

I am pleased to present the 2016–17 Departmental Results Report for Natural Resources Canada and to outline how my Department has delivered on our commitments to Canadians.

Our mandate is clear — to create a sustainable resource advantage for Canadians by promoting growth, enhancing competitiveness and demonstrating environmental leadership. As this report demonstrates, we have made significant progress.

My Department has established a productive relationship with provinces and territories on energy and we are working to advance joint priorities under the Canadian Energy Strategy.



Through the Pan-Canadian Framework on Clean Growth and Climate Change as well as our decisions on major energy projects, we have demonstrated that the economy and the environment go hand in hand. We have also doubled-down on science-based decision-making, renewed and deepened our relationships with Indigenous communities and made significant investments in the clean technologies that will drive our future.

Our investments in green mining and innovation in forestry are helping those industries transform their operations and expand their markets while continuing to emphasize sustainable practices.

We are modernizing the National Energy Board and reviewing our environmental assessment processes so that Canadians can have confidence in the way projects are evaluated.

We have acted both at home and abroad, advancing domestic policy on energy efficiency, electricity interconnections and clean energy while breaking new ground in international cooperation.

Our focus is on Canadians — as can be seen by the results we measured and the indicators we have chosen. We want to make sure, for example, that the science we conduct informs the decisions Canadians make on a daily basis, whether it is which appliance to purchase or which new market to explore. And we are approving important resource projects to bring jobs and opportunities to Canadians across the country.

We are also investing in green infrastructure, such as charging stations for electric vehicles, so Canadians can make confident choices about the kind of vehicles they buy.

I look forward to working with the remarkable people of my Department to continue to deliver for Canadians.

The Honourable James Gordon Carr, P.C., M.P.  
Minister of Natural Resources

## Results at a glance

Natural Resources Canada (NRCan) promotes the sustainable development of Canada's natural resources. Through our innovative research facilities, we conduct cutting-edge science in energy, forestry, minerals and metals, and earth observation. We also represent Canada internationally in meeting our global commitments to develop our resources sustainably.

In 2016–17, NRCan continued making progress on the [Minister's Mandate Letter Commitments](#),<sup>i</sup> delivering results in the following areas:

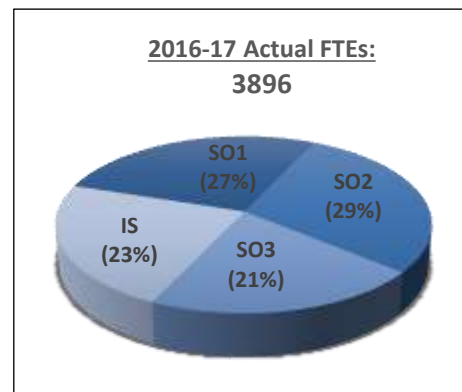
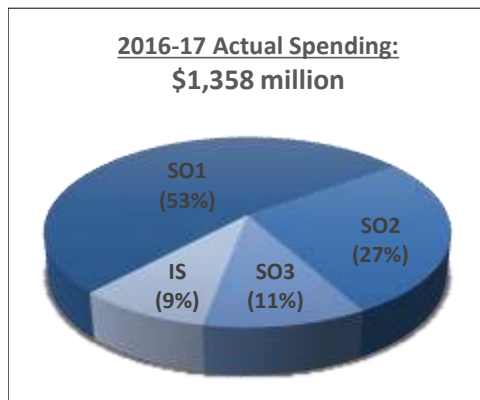
- **Advancing Canada's interests in natural resources trade and investment:** Through trade missions, ministerial dialogues and engagement with provinces and territories, NRCan promoted greater access to new markets, attracted investment and generated economic growth. The Department supported changes to building codes for mid-rise wood construction in Asia to help expand global market potential for Canada's forest sector, building on Canada's own success with tall wood construction. For example, a new Tall Wood Building Code was adopted in China in February 2017 that will increase the height of timber structures from three to five storeys. As well, four major pipelines were approved under the Interim Strategy for reviewing major resource projects. The Interim Strategy has also set the tone for extensive consultation with provinces and territories, particularly with Indigenous peoples, and enhanced environmental assessments. Under the Canadian Energy Strategy (CES), we worked with the provinces and territories to develop an energy action plan that will advance energy infrastructure, improve energy efficiency, expand new technology and innovation, and promote international collaboration.
- **Supporting the climate change agenda:** Canada strongly believes in doing its part to combat climate change, as evidenced in our signing the Paris Agreement in 2015. To fulfil our commitments at home, NRCan leads or co-leads 30 of the 54 actions under the Pan-Canadian Framework on Clean Growth and Climate Change (PCF) and provides expert support for 10 other actions. In 2016, Canada renewed its partnership with the United States and Mexico under the Leaders' Statement on a North American Climate, Clean Energy and Environment Partnership. Under this agreement, the three countries agreed to align energy efficiency regulations, make energy infrastructure more resilient and reduce methane emissions. Federal participation in the CES positions our energy sector to drive immediate emission reductions and make the transformative changes required in the longer term to significantly improve energy efficiency, accelerate the transition to low-carbon sources of energy, promote cleaner electricity generation, and advance technology and innovation. We are doing the same in mining, bringing together stakeholders to identify and develop green technologies, processes and knowledge for sustainable mining under the Green Mining

Initiative, and in forestry, where we are pursuing innovative technologies and new uses for forest fibre under the Investments in Forest Industry Transformation program.

- **Enhancing development and implementation of clean technology and innovation:**  
NRCan continues to invest in research, development and demonstration of innovative clean technologies to address the most pressing environmental issues. These investments are helping Canadian companies grow and position themselves as world leaders in the clean technology market. We supported Shell Canada’s Quest Carbon Capture and Storage Facility, a key project that successfully reached its target of capturing and storing over 1 million tons of carbon dioxide. The project continues to be one of the most successful large-scale carbon capture and storage demonstration projects in the world. The Department also developed innovative approaches in mining that reduce energy consumption and environmental impacts while producing economic benefits to industry. One such example is the use of bacteria instead of chemicals to recover nickel from mine waste and low-grade deposits. Leveraging Budget 2016, NRCan is also investing in technologies to reduce greenhouse gas (GHG) emissions in the oil and gas sector, and in new infrastructure such as vehicle charging stations for cleaner transportation. In 2016, we announced Canada’s international Mission Innovation commitment to double funding for clean energy and technology research and development, from \$387 million to \$775 million by 2020. To foster greater confidence for Canadians and more certainty for investors, NRCan is modernizing the National Energy Board, supporting the review of environmental assessments and developing an implementation strategy for major resource projects.
- **Strengthening engagement and collaboration, including with Indigenous communities:**  
Canadians should have a voice on matters that affect them most. Consultations were held with Indigenous communities that could be affected by the Interim Strategy for resource development, particularly the Trans Mountain Expansion and Line 3 Replacement pipeline projects. For the first time ever, we created Indigenous Advisory and Monitoring Committees to ensure direct involvement at each stage of project development and support our commitment to a renewed relationship with Indigenous peoples. NRCan met with over 1,000 Canadians in 10 cities, including with Indigenous groups, to hear their views on modernizing the National Energy Board. We also considered the comments made in more than 200 emails. As well, we supported economic development for Indigenous peoples by promoting greater participation in the forest sector through the Indigenous Forestry Initiatives program. The program facilitated the allocation of harvest wood, installation of energy-efficient heat sources and participation in the negotiation of a power purchase agreement for the supply of power and the creation of new jobs for Indigenous communities.



- Making world-class science available to Canadians:** NRCan is a science department and our work provides hard data for evidence-based decision-making. In the spirit of transparency, accountability and engagement with Canadians, we have made information publicly available through the Open Government initiative. Tools such as the Federal Geospatial Platform provide publicly available information, including socioeconomic and environmental data, to Canadians through the Open Maps portal. We developed ways to help Canadian businesses minimize negative environmental impacts while decreasing costs, for example, through a process for extracting tight oil by using carbon dioxide waste. We tested new tools and innovative new products for eventual use by industry, including energy-efficient building materials and climate modelling tools. We assessed Canada’s natural resource potential on land and offshore to make balanced decisions about sustainable development and environmental protection, and we provided better data for potential investors through geoscience surveys and forest inventories. We updated the 2016 Canadian Wildland Fire Strategy to assist with the implementation of wildland fire preparedness and response, and we provided extensive support, including detailed satellite imagery, to equip decision-makers and first responders to take timely and informed action during the Fort McMurray forest fires in 2016.



- Strategic Outcome 1 (SO1): Canada’s Natural Resource Sectors are Globally Competitive
- Strategic Outcome 2 (SO2): Natural Resource Sectors and Consumers are Environmentally Responsible
- Strategic Outcome 2 (SO3): Canadians have Information to Manage their Lands and Natural Resources, and are Protected from Related Risks
- Internal Services

For more information on the Department’s plans, priorities and results achieved, see the “Results: what we achieved” section of this report.



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## Operating context and key risks

### Operating context

Canada's wealth of natural resources, which include renewable and non-renewable energy, minerals and metals, and forests, are key to our economic prosperity and provide Canadians with good jobs and business opportunities. In 2016, our natural resource sectors directly or indirectly provided 1.7 million jobs and accounted for 16% of GDP in Canada. NRCan's present and future challenge is to promote its economic and environmental goals at the same time, building the natural resource sectors' contribution to our economy, while also achieving environmental results such as reduced greenhouse gas (GHG) emissions, through sustainable practices.

As NRCan pursues its economic and environmental goals, domestic and global factors affect its operating context.

Domestically, wildfires around Fort McMurray, Alberta in the spring and summer of 2016 not only threatened lives and livelihoods, they also adversely impacted the forest industry, oil production, and employment. Meanwhile in the global economy, the prevalence of financial and debt woes and the increasing trend toward protectionism translated into slower overall economic growth, slower growth in global trade and investment, and low commodity prices. For example, the prices of minerals and metals remained far below the levels of several years ago and although the price of crude oil increased modestly in 2016, it remained less than half the price seen in mid-2014. Notwithstanding this broader global context, the International Monetary Fund estimated that Canada's annual rate of economic growth over 2016-2021 will average 1.8%, which is the second-highest expected rate among G7 countries.

Budget 2016 and Budget 2017 presented expanded opportunities for the Department with renewed emphasis and significant investments for addressing climate change and adaptation, as well as a strong focus on innovation such as in the field of clean technologies.

The Paris Agreement of 2015 continued to anchor Canada's commitment to a 30% reduction in its GHG emissions by 2030 compared to 2005 levels. Our natural resource sectors, as Canada's predominant sources of GHG emissions, remained key players in advancing efforts for emission reductions and delivering on our international commitments. NRCan deepened its engagement in actions against climate change through the Pan-Canadian Framework on Clean Growth and Climate Change (PCF), and supported PCF priorities related to energy efficiency, electricity infrastructure, energy technology and innovation, and international collaboration.

As economic growth through innovation is a priority of the Government of Canada, the global movement to address climate change provides an economic opportunity that we have begun to seize through innovation. With increasing worldwide demand for clean technologies and a global

market estimated to more than \$1.15 trillion in 2017,<sup>1</sup> Canada emphasized its efforts on targeting opportunities to become a global leader in clean technology innovation in 2016-17. These efforts aim to create good jobs for Canadians while helping to meet our climate change goals. NRCan has continued to take action to ensure that Canada’s clean technology companies in the natural resource sectors are well positioned to compete in this large and growing global market. Commitments in Budget 2016 and Budget 2017 reinforced NRCan’s focus on advancing research, development, demonstration and adoption of clean technologies in the natural resource sectors and contributing to the multi-country initiative Mission Innovation, which aims to accelerate global clean energy innovation.

## Key risks

The key strategies deployed by the Department to manage its risks and opportunities are outlined below.

Risks	Mitigating strategy	Link to the Department’s programs	Link to mandate letter commitments or to government-wide and Departmental priorities
<b>Climate Change</b>			
<p>If Canada’s actions to meet international climate change commitments are insufficient and if Canada fails to keep pace in adapting to climate change, then the competitiveness of some of Canada’s natural resource sectors could be threatened, including their ability to access foreign markets.</p>	<p>In 2016-17, NRCan’s risk responses included:</p> <ul style="list-style-type: none"> <li>• Engaging with provinces and territories to advance the Pan-Canadian Framework on Clean Growth and Climate Change (PCF) and the Canadian Energy Strategy (CES) to support the transition toward a low-carbon future and ensure Canada is a global leader in the sustainable development and use of the full range of its energy assets.</li> <li>• Leveraging Budget 2016 funding to establish energy efficiency policies and programs and maintain clean energy policy capacity in order to: <ul style="list-style-type: none"> <li>○ Advance the development and demonstration of clean energy technologies;</li> <li>○ Help deploy infrastructure for alternative transportation fuels;</li> <li>○ Invest in technologies to reduce GHG emissions from the oil and gas sector; and,</li> <li>○ Facilitate regional dialogues and studies to identify electricity infrastructure projects with the highest potential to reduce GHG emissions.</li> </ul> </li> <li>• Delivering the Energy Innovation Program to reduce emissions from energy production and use, and to find long-term solutions for reducing and eliminating air pollutants. Projects included research, development and/or demonstration of electric vehicle infrastructure, cleaner oil and gas technologies, and clean energy innovation in priority areas such as: <ul style="list-style-type: none"> <li>○ Promoting renewable, smart grid and storage systems;</li> </ul> </li> </ul>	<p>1.1 Market Access and Diversification</p> <p>2.1 Energy-efficient Practices and Low-carbon Energy Sources</p> <p>2.2 Technology Innovation</p> <p>3.1 Protection for Canadians and Natural Resources</p>	<ul style="list-style-type: none"> <li>• Canadian Energy Strategy</li> <li>• Pan-Canadian Framework on Clean Growth and Climate Change</li> </ul>

<sup>1</sup> Analytica Advisors, [2017 Canadian Clean Technology Industry Report – Synopsis](#)

Risks	Mitigating strategy	Link to the Department's programs	Link to mandate letter commitments or to government-wide and Departmental priorities
	<ul style="list-style-type: none"> <li>○ Reducing diesel fuel use in northern and remote communities;</li> <li>○ Addressing methane and volatile organic compounds;</li> <li>○ Reducing GHG emissions in the building sector;</li> <li>○ Promoting carbon capture, use and storage; and</li> <li>○ Improving industrial efficiency.</li> <li>● Conducting enhanced research and analysis to develop scientific knowledge of forest disturbances (e.g. wildland fire, pests and climate change) to forecast impacts and develop mitigation and adaptation strategies.</li> <li>● Pursuing domestic and international partnerships in research, development and demonstration (RD&amp;D) to advance climate change objectives.</li> <li>● Providing geoscience knowledge to inform climate change adaptation solutions for transportation and community infrastructure in the North.</li> <li>● Conducting research to better understand the risk potential (i.e. remobilization) of metals in lake and river ecosystems in a changing climate.</li> <li>● Supporting climate change adaptation by industry and by communities through capacity building, collaboration, providing tools and information, and implementing requirements defined by the Federal Adaptation Policy Framework.</li> <li>● Enabling governments, private companies and Canadians to make informed decisions regarding climate change and adaptation by providing new 'big data' tools and infrastructure for analyzing geospatial data, and expanding publicly accessible landmass information through the Open Maps platforms.</li> </ul>		
<b>Energy Infrastructure</b>			
<p>If the public does not trust in Canada's ability to expand its infrastructure in a safe and environmentally sound manner, then Canada's ability to increase production and diversify markets may be limited.</p>	<p>In 2016-17, NRCan's risk responses included:</p> <ul style="list-style-type: none"> <li>● Partnering with provinces and territories in implementing the CES.</li> <li>● Supporting the Government of Canada review of environmental assessment processes, in particular regarding energy infrastructure.</li> <li>● Implementing a transition strategy for Major Resource Projects.</li> <li>● Working to modernize the National Energy Board.</li> <li>● Contributing to increased understanding of pipeline safety and integrity through research and development of materials, and in turn, developing codes and standards for the safe design, construction, operation and maintenance of oil and gas pipelines.</li> <li>● Working with the Canadian Northern Economic Development Agency to develop the evidence base to support infrastructure corridors in the North.</li> <li>● Making science and knowledge available to key stakeholders to support decision-making (e.g., Federal</li> </ul>	<p>1.1 Market Access and Diversification</p> <p>1.3 Investment in Natural Resource Sectors</p>	<ul style="list-style-type: none"> <li>● Canadian Energy Strategy</li> <li>● Interim Strategy for Reviewing Major Natural Resource Projects</li> <li>● National Energy Board Modernization</li> <li>● North American Energy Collaboration</li> <li>● Renewed Relationships with Indigenous Peoples</li> </ul>

Risks	Mitigating strategy	Link to the Department's programs	Link to mandate letter commitments or to government-wide and Departmental priorities
	<p>Geospatial Platform, Advanced Mineral Project Inventory, Forest Ecosystem Science and Application, Adaptation Platform, Geo-Mapping for Energy and Minerals (GEM)).</p> <ul style="list-style-type: none"> <li>Engaging communities that are close to proposed pipeline and shipping corridors, and using the findings from these engagement activities to inform Cabinet decision-making.</li> <li>Committing to establish Indigenous Advisory and Monitoring Committees to support the meaningful participation of Indigenous communities in the monitoring of the Trans Mountain Expansion (TMX) and Line 3 Pipeline Projects over their full lifecycles.</li> </ul>		
<b>Hazards and Emergency Management</b>			
<p>If Canada's measures to mitigate, respond to, and recover from, in a timely and effective manner, natural and anthropogenic (human-induced) emergency events involving critical infrastructure are insufficient, there could be significant impacts on Canadian public health and safety, the environment, the economy and public confidence.</p>	<p>In 2016-17, NRCan's risk responses included:</p> <ul style="list-style-type: none"> <li>Strengthening Canada's pipeline safety regime by implementing new measures on prevention, preparedness and response, and liability and compensation.</li> <li>Modernizing the safety and security regime for Canada's offshore and nuclear energy industries.</li> <li>Supporting government-wide emergency preparedness efforts led by Public Safety Canada, particularly for aspects related to energy production and distribution, energy supply disruption, offshore oil, and gas and nuclear incidents.</li> <li>Contributing to the development of a comprehensive action plan that supports better prediction of, preparation for, and response to natural disasters.</li> <li>Renewing NRCan's Strategic Emergency Management Plan to align with the whole of government EM strategy renewal in response to natural and man-made hazard.</li> <li>Enhancing earthquake monitoring.</li> <li>Developing tests and maintaining and supporting emergency management plans under the Emergency Management Act.</li> <li>Enhancing emergency management by increasing resources for training, exercises, and strengthening integrated response planning and operations.</li> <li>Updating the 2016 Canadian Wildland Fire Strategy to assist with the implementation of wildland fire preparedness and response.</li> <li>Developing floodplain-mapping guidelines, in partnership with Public Safety Canada; new science and technology to prepare for the 2018 launch of the RADARSAT Constellation Mission; and supporting data that is accessible through the Open Government Portal, including Open Maps.</li> <li>Generating and disseminating knowledge about hazards to government and industry clients through monitoring services, provision of scientific, technical information and expertise.</li> </ul>	<p>1.1 Market Access and Diversification</p> <p>3.1 Protection for Canadians and Natural Resources</p> <p>4.1 Internal Services</p>	<ul style="list-style-type: none"> <li>Interim Strategy for Reviewing Major Natural Resource Projects</li> <li>Renewed Relationships with Indigenous Peoples</li> </ul>

Risks	Mitigating strategy	Link to the Department's programs	Link to mandate letter commitments or to government-wide and Departmental priorities
	<ul style="list-style-type: none"> <li>• Providing subject-matter expertise (including radiological monitoring, civil liability, and other technical support) under the Federal Nuclear Emergency Plan, led by Health Canada.</li> <li>• Increasing infrastructure protection against cyber threats, and increasing participation in National Security initiatives and exercises to ensure NRCan is recognized as a security partner in the broader community and supported in case of security incidents, including cyber security.</li> </ul>		
<b>Clean Innovation</b>			
<p>If Canada fails to anticipate or respond to increased demand for more innovative approaches to energy, mining and forest sector challenges, it will struggle to remain competitive and to take advantage of global market opportunities.</p>	<p>In 2016-17, NRCan's risk responses included:</p> <ul style="list-style-type: none"> <li>• Implementing initiatives related to Mission Innovation, in collaboration with other departments.</li> <li>• Along with other MI member governments: <ul style="list-style-type: none"> <li>○ Adopting an enabling framework, forming a steering committee, and announcing a baseline investment amount and doubling target for clean energy research, development and demonstration (RD&amp;D). Canada announced it would target a doubling in federal clean energy RD&amp;D investments, from a baseline of \$387M in 2014-15 to \$775M in 2019-20; and</li> <li>○ Launching seven Innovation Challenges to encourage increased engagement by the global research community, industry, and investors, while providing opportunities for new collaboration among MI members.</li> </ul> </li> <li>• Advancing collaboration for a North American Partnership on Climate, Clean Energy, and Environment.</li> <li>• Implementing initiatives to improve energy efficiency, to support RD&amp;D of clean technologies, to support demonstration of electric vehicle charging technologies, and to invest in the oil and gas sector to reduce GHG emissions.</li> <li>• Developing strategic partnerships to support innovation in the natural resource sectors, such as: <ul style="list-style-type: none"> <li>○ The Investments in Forest Industry Transformation program pursued new wood-based products or uses for forest fibre, as well as innovative technologies; and</li> <li>○ The Green Mining initiative that brought together stakeholders to develop green technologies, processes and knowledge for sustainable mining.</li> </ul> </li> <li>• Developing technologies to reduce capital/ operating costs as well as GHG and environmental impacts for the emerging industries of rare earth elements and chromite.</li> <li>• Pursuing pilot projects with stakeholders to test new technology for removing contaminants from mine wastewater.</li> </ul>	<p>1.2 Innovation for New Products and Processes</p> <p>1.3 Investment in Natural Resource Sectors</p> <p>2.1 Energy-efficient Practices and Low-carbon Energy Sources</p> <p>2.2 Technology Innovation</p> <p>2.3 Responsible Natural Resource Management</p> <p>3.1 Protection for Canadians and Natural Resources</p>	<ul style="list-style-type: none"> <li>• North American Energy Collaboration</li> <li>• Clean Technology and Innovation</li> <li>• North American Partnership on Climate, Clean Energy, and Environment</li> </ul>

Risks	Mitigating strategy	Link to the Department's programs	Link to mandate letter commitments or to government-wide and Departmental priorities
	<ul style="list-style-type: none"> <li>Undertaking a national engagement exercise including 11 ministerial roundtables, dialogue with over 350 domestic and international clean technology stakeholders, and an interactive website.</li> </ul>		

NRCan's risk environment consists of ongoing risks that require ongoing mitigation, but do not lend themselves to being fully addressed over a period of one or several years.

Throughout 2016-17, NRCan closely monitored its global and domestic context and implemented strategies to manage its risks and seize its opportunities. These strategies aimed to ensure that Canada's resource sectors remain globally competitive; enjoy expanded access to foreign markets; build safe and secure energy infrastructure; pursue innovative approaches and clean technologies; use sustainable, environmentally sound practices; and advance our international commitments on climate change.

Taking action to address climate change is important for protecting human health and the environment. At the same time, meeting our international commitments on climate change is important for maintaining and expanding the access our natural resource sectors have to foreign markets and for supporting the competitiveness of their products. NRCan collaborated with a wide range of domestic and international partners in 2016-17 to make progress on our climate change commitments and to continue adapting to a changing climate. Among other actions, the Department worked with the United States and Mexico to advance North American energy collaboration; with provinces and territories to promote energy efficiency and develop cleaner, renewable energy and get it onto a smarter electricity grid; promote energy efficiency; and with industry and communities to build capacity and support climate change adaptation. NRCan widely shares knowledge, information and tools with the full range of stakeholders.

Using environmentally sound approaches to continue building and improving the secure infrastructure needed for transporting Canada's energy resources to domestic and international markets is essential for earning public trust and diversifying our market access. Among other actions, NRCan partnered with provinces and territories to continue implementing the CES, which involves working together with Indigenous communities, industry, researchers, and other organizations, with the shared purpose of further developing energy resources in an environmentally and socially responsible manner. While infrastructure projects continue to encounter environmental, social and regulatory challenges, progress is being made to help Canada improve its energy infrastructure.



Canada's ability to prevent, respond to, and recover from natural and man-made emergencies involving our critical infrastructure is of paramount importance to public health and safety, the environment and our economy. The public, and notably Indigenous communities, need to have confidence that Canada has established effective emergency management practices. In 2016-17, risks to critical infrastructure continued to increase in complexity. To mitigate this risk, NRCan put in place emergency management plans, contributed to the Federal Response Emergency Plan led by Public Safety Canada, and shared its specialized knowledge on hazards with other governments and industry. The Department implemented new legislative provisions under the Nuclear Liability and Compensation Act to enhance Canada's ability to respond and recover from damages from a potential nuclear incident. NRCan also worked on new standards to improve pipeline integrity and contribute to the effective and safe transport of fossil fuels in Canada. NRCan played a key role in responding to the Fort McMurray wildfires by providing advice and expertise in the area of geomatics. By processing data from satellites to create geospatial analysis, NRCan was able to equip officials and first-responders with comprehensive intelligence, thus facilitating better and faster decision-making.

Fostering the development of innovative solutions to challenges in the energy, mining and forest sectors is vital if Canada is to be competitive and take advantage of growing global demand and market opportunities. The strong focus of Budget 2016 on innovation presented an opportunity for the Department to support innovation with respect to clean technologies in the natural resource sectors. As a result, NRCan has invested in initiatives to promote research, development and demonstration of innovative clean technologies that focus on the most pressing environmental issues and create a supportive environment that helps Canadian companies grow and position themselves as world leaders in the clean technology market. These initiatives have helped Canadian companies that are operating in emerging industries to take the essential first steps toward commercializing their novel technologies.

## Results: what we achieved

### Programs

#### **Program 1.1: Market Access and Diversification**

##### **Description**

Canada’s natural resource sectors face two key barriers to market access and diversification: 1) trade and policy barriers, and 2) lack of awareness of Canada’s natural resource products and public confidence. The objectives of this program are to break down those barriers and support the development and expansion of markets for Canadian natural resource products by making information available to Canadians, supporting negotiations to reduce trade barriers, and ensuring that regulations are up to date. This helps maintain natural resource sectors’ access to existing markets and increases their access to new market segments.

##### **Results**

In 2016-17, the Department delivered a range of policy and outreach activities to **make information available to Canadians** and **bolster public confidence** in Canada’s natural resource products in the mining, forestry and energy sectors.

In the **energy sector**, the Department:

- Collaborated closely with provincial and territorial counterparts to advance priorities under the **Canadian Energy Strategy (CES)** and to take actions supporting the [Pan-Canadian Framework on Clean Growth and Climate Change \(PCF\)](#), including joint initiatives on energy efficiency, electricity infrastructure and energy technology and innovation;
- Supported the annual [Energy and Mines Ministers’ Conference \(EMMC\)](#)<sup>viii</sup> on the theme, “Enhancing Public Confidence in Canada’s Natural Resource Sectors.” EMMC 2016 included ministerial discussions on Indigenous engagement, energy efficiency, innovation, oil and gas, electric reliability, international energy cooperation, regulatory modernization, and pan-Canadian collaboration under the CES; and
- Continued to offer a single window to Indigenous communities to engage with the Government of Canada on [west coast energy infrastructure development](#), recognizing that Indigenous communities are important partners in the development of natural resources.

##### **MANDATE LETTER COMMITMENT:**

##### **Develop a Canadian Energy Strategy**

- In 2016-17, we worked with the provincial and territorial governments to advance joint priorities under the Canadian Energy Strategy to enhance energy infrastructure, improve energy efficiency, expand new technology and innovation, and promote international collaboration.
- In December 2016, First Ministers received the joint energy action plan that was endorsed by federal, provincial and territorial Energy Ministers. Joint federal, provincial and territorial working groups were established to deliver on the plan.

The Department also participated in activities to **reduce trade and policy barriers** related to energy in order to increase access to existing and new markets, and support the **transition to a low-carbon economy while maintaining competitiveness**.

- Given the unique logistical and operational challenges of oil and gas development in the Arctic, NRCan is supporting the Department of Indigenous and Northern Affairs (INAC) to advance conservation in the Arctic offshore. NRCan and INAC began consultations with industry, territorial governments and northern Indigenous groups on the vision for the Arctic offshore and development prospects, including oil and gas, to inform future policy decisions.
- For a strengthened federally regulated pipeline system, NRCan worked to advance a number of new or updated regulations under the new Pipeline Safety Act that came into force in June 2016, including:
  - Supporting the National Energy Board by updating regulations to strengthen its ability to restrict high-risk activities, such as construction, near pipelines; and
  - Developing draft regulations, published in the Canada Gazette Part I in the fall of 2016, which set out absolute liability for classes of pipeline operator and associated financial requirements.<sup>2</sup>
- NRCan supported Transport Canada to advance legislation that will implement the Government's commitment to formalize a moratorium on crude oil tanker traffic on British Columbia's north coast.
- NRCan advanced discussions with stakeholders on modernizing the regulatory framework for oil and gas operations in Canada's frontier and offshore areas as well as developing and implementing Offshore Accords. NRCan also continued to advance the modernization of health and safety regulations through amendments to the Offshore Marine Installations and Structures Occupational Health and Safety Transitional Regulations, which were published in the Canada Gazette Part I in December 2016.
- NRCan also managed loan guarantees for the Lower Churchill projects to help provide a stable source of clean energy and economic growth for Atlantic Canada. In 2016-17, the federal government announced that it would guarantee up to an additional \$2.9 billion in debt, beyond the existing guarantee of \$6.3 billion. As part of its oversight responsibilities, NRCan monitored the release of this guaranteed debt through monthly reviews of project documents and participated in four site visits with the Independent Engineer to ensure projects were on track. NRCan also negotiated the provision of additional loan guarantee support to assist in financing the cost overruns experienced by the projects.<sup>3</sup>

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<sup>2</sup> Final regulations are expected in fall 2017.

<sup>3</sup> These additional loan guarantees took effect in May 2017.

In 2016-17, the Department also helped advance key areas of Canada’s **international energy cooperation** efforts, in collaboration with Canadian partners.

- NRCan implemented the 2016 Memorandum of Understanding (MOU) on the [Climate Change and Energy Collaboration](#),<sup>ix</sup> which expanded and deepened Canada’s energy relationship with the United States and Mexico on energy data, clean energy, infrastructure and [Mission Innovation](#).<sup>x</sup> Under this MOU, NRCan and our North American partners developed measures to reduce methane emissions; designed technology roadmaps; conducted infrastructure resilience workshops; launched a trilateral renewable energy integration study; and aligned regulations on energy efficiency. This trilateral cooperation provided a solid foundation for the North America Climate, Clean Energy, and Environment Partnership.
- Key energy partners in North America and Asia, the provinces, territories and Canadian industry were engaged to promote greater access to foreign markets and help build commercial relationships for Canadian business through ministerial dialogues, trade missions and working group meetings in China, India, Mexico and the United States. Ministerial missions, supported by trade delegations with representatives from Canada’s oil and gas, renewables and electricity sectors, have been successful in creating new business partnerships matching Canada’s expertise, technology and resources with the needs of foreign markets. The Department also led the Government of Canada’s international engagement on energy issues across multilateral fora, including the G7 and G20 and at the International Energy Agency, to promote global energy security through trade.
- The Department continued to **enhance critical energy infrastructure and cybersecurity** in partnership with industry and infrastructure stakeholders by sharing best practices for improved resiliency as well as partnering with Global Affairs Canada to participate in the G7 cybersecurity work stream on energy infrastructure. NRCan also finalized the [Joint United States-Canada Electric Grid Security and Resilience Strategy](#)<sup>xi</sup> in collaboration with the US Department of Energy, the US Department of Homeland Security and Public Safety Canada, which includes specific actions to mitigate cyber threats.

**MANDATE LETTER COMMITMENT:  
North American Energy Strategy**

- Canada signed the North America Climate, Clean Energy, and Environment Partnership with the United States and Mexico in June 2016.
- This trilateral partnership focuses on:
  - Advancing clean energy and integration of energy resources, including renewables;
  - Improving energy efficiency;
  - Accelerating clean energy innovation; and
  - Strengthening the reliability, resilience and security of the North American electricity grid.
- 18 collaborative projects were launched in 2016-17 to advance the goals of the Partnership.
  - 12 of these projects are now complete and the remaining are ongoing and are contributing to strengthening the North American energy relationship.

In the **mining sector**, NRCan:

- Supported global efforts to prevent trade and deter corruption in ‘conflict diamonds’ by ensuring Canada’s compliance with its international obligations under the [Kimberley Process Certification Scheme](#).<sup>xiii</sup> In 2016, NRCan issued 242 Kimberley Process Certificates for the export of certified conflict-free rough diamonds, worth more than US\$1.4 billion. The Department administered the Export and Import of Rough Diamonds Act (EIRDA) and associated regulations that control the export, import and transit of rough diamonds in Canada. The Department also conducted administrative audits of rough diamond importers and exporters, including one diamond mine, to ensure compliance with the EIRDA;
- Contributed to preserving the image of diamond mining as a socially responsible means to improve the well-being of populations, especially in developing countries. This included participation in the Central African Republic Monitoring Team, which oversaw the resumption of rough diamond exports from that country following a civil war;
- Promoted the Canadian mining industry through presentations and participation at global conferences such as Mining Indaba in South Africa; China Mining in Tianjin; and Prospectors and Developers Association of Canada in Toronto; and
- Expanded awareness of **Canada’s positive investment climate** through key publications including:
  - The [Mining Sector Performance Report for 2006-2015](#),<sup>xiii</sup> which provides Canadians with evidence-based analysis of the mineral industry’s economic, social and environmental performance to help inform the development of priorities and identify areas for improvement; and,
  - The [second edition of the Compendium of Case Studies](#),<sup>xiv</sup> which promotes good practices in community engagement and readiness for mineral development activities.

***Did you know?***

**Canada is one of 81 countries participating in the Kimberley Process.**

Conflict diamonds, also known as ‘blood diamonds,’ are rough diamonds that are used by rebel movements or their allies to finance armed conflicts aimed at undermining legitimate governments.

The Kimberley Process regulates trade in rough diamonds and helps protect legitimate trade by outlining the rules that govern it.

The Process is supported by administrations, civil society and industry. It is a collaboration that is implemented through the national legislations of each of its country participants.

Canada entered the Kimberley Process in 2003. NRCan is responsible for ensuring Canada’s interests in the export, import and transit of rough diamonds are met, in accordance with the Process.

In the **forest sector**:

- The National Forest Carbon Monitoring, Accounting and Reporting System was enhanced to provide updated forest-related estimates for Canada’s [2016 Greenhouse Gas \(GHG\) National Inventory Report](#)<sup>xv</sup> as part of Canada’s commitment to GHG emission reductions;

- NRCan participated in two international negotiating sessions to advance Canada’s forest sector interests under the [United Nations Framework Convention on Climate Change \(UNFCCC\)](#)<sup>xvi</sup> and contributed forest-related input to Canada’s Mid-Century, Long-Term, Low-Greenhouse Gas Development Strategy, which was submitted to the UNFCCC in November 2016 as required by the [Paris Agreement](#);<sup>xvii</sup>
- The Department supported **changes to building codes for midrise wood construction in Asia** to help expand global market potential for Canada’s forest sector;
  - In China, the new Tall Wood Building Code that was adopted in February 2017 broadened the scope of timber structures from three storeys to five storeys.
  - In Japan, approvals for fireproof standards permitted an increase in wood construction buildings from four storeys to six storeys. This equates to an estimated net incremental market potential of almost 1,000,000 m<sup>3</sup> of softwood annually, which is currently valued at about CAD \$335 million.<sup>4</sup>
- **Commercial uptake of tall wood construction** in Canada was fostered through the Tall Wood Building Demonstration Initiative (TWBDI). TWBDI supported the construction of the 18-storey Brock Commons Tallwood House, a student residence at the University of British Columbia, and the 13-storey Origine building in Quebec City, the tallest all-wood condominium in North America at this time. Experience gained through the Origine construction was applied to a technical guide that offers pre-approved design solutions for mass timber buildings in Quebec and to Montreal’s ARBORA for its residential, cross-laminated timber constructions;
- The Department promoted Canada’s sustainable forest management practices and **leadership in forest science**, through a summer social media campaign undertaken by Canadian embassies and consulates in the United States and Mexico. Over four months, the campaign distributed more than 1,636 tweets to approximately 459,900 Twitter subscribers; and
- NRCan produced scientific publications on the conservation of woodland caribou, wolverines, and the management of the boreal forest, and conducted outreach activities, primarily in Alberta, that increased collaboration among the oil and gas sector, forest companies, and Indigenous communities. This work supported the **sustainable development of Canada’s forests** as described in the Canadian Boreal Forest Agreement (CBFA).

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<sup>4</sup> Estimates from [FPInnovations](#), Canada’s national research and technology institute dedicated to supporting the global competitiveness of the Canadian forest sector.

## Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Natural resource sectors have increased access to existing markets	Natural resource sectors have access to markets as defined by exports of energy products, mineral and metal products and forest products	Meet or exceed baseline of ten-year average of Canada's share of United States and global imports	March 31, 2017	<p><b>Results: Achieved</b></p> <p>In 2016-17, Canada's share of American natural resource imports was <b>23.8%</b>, a <b>minor variation against the 10-year baseline average 23.7%</b>.</p> <p>There was a decline in the value of U.S. natural resource imports from Canada in 2016-17, largely a result of lower commodity prices. The overall value of American natural resource imports from Canada in 2016 was \$110.5 billion, below the 2007 value of \$151.8 billion.</p>	<p><b>Results: Achieved</b></p> <p>In 2015-16, Canada's share of American natural resource imports was <b>25.1% (1.5% above the 10-year 2005-14 baseline average of 23.6%)</b>. The overall value of American natural resource imports from Canada in 2015 was \$164.3 billion, above the 2006 figure of \$95.2 billion.</p>	<p><b>Results: Achieved</b></p> <p>In 2014, Canada's share of American natural resource imports was <b>26.3%, above the 10-year (2005-14) baseline average of 23.6%</b>. The overall value of US natural resource imports from Canada in 2014 was \$199.8 billion, above the 2005 figure of \$159.1 billion.</p>
Natural resource sectors have increased access to new market segments	Natural resource sectors have access to new market segments as defined by exports of energy products, mineral and metal products and forest products	Meet or exceed baseline of ten-year average of Canada's share of China and India's imports	March 31, 2017	<p><b>Results: Achieved</b></p> <p>In 2016-17, Canada's share of Chinese natural resource imports was <b>1.6%, close to the 10-year baseline average of 1.7% (2007-16)</b>. The overall value of Chinese natural resource imports from Canada in 2016 was \$7.7 billion, above the 2007 value of \$6.0 billion.</p>	<p><b>Results: Achieved</b></p> <p>In 2015-16, Canada's share of Chinese natural resources imports was <b>1.7%, stable against the 10-year (2005-14) baseline average</b>. The overall value of Chinese natural resource imports from Canada in 2015 was \$11.6 billion, nearly three times the 2006 figure of \$4.3 billion.</p>	<p><b>Results: Achieved</b></p> <p>In 2014, Canada's share of Chinese natural resources imports was <b>1.5%, close to the 10-year (2005-14) baseline average of 1.7%</b>. The overall value of Chinese natural resource imports from Canada in 2014 was \$11.9 billion, above the 2005 figure of \$4.3 billion.</p>

## Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
43,993,476	43,993,476	74,012,256	70,738,385	26,744,909

The increase between Planned spending and Actual spending is mainly attributed to additional funding received during the year through Supplementary Estimates for the modernization of the National Energy Board, funding to protect marine and coastal areas, and funding to settle Soldier Settlement Board mineral rights.

The increase is also explained by a realignment of real property expenditures related to special purpose buildings and the Federal Infrastructure Initiative which were planned under Internal Services while actual costs were incurred under the appropriate program, in line with TBS guidelines.

## Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
243	277	34

The increase between Planned FTEs and Actual FTEs is mainly attributed to the hiring related to the funding received through Supplementary Estimates for the modernization of the National Energy Board and marine protection as well as reallocation of resources from other program areas.

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xviii</sup>

## Program 1.2: Innovation for New Products and Processes

### Description

Optimizing the use of Canada's natural resources and the processes by which they are developed would improve the productivity and competitiveness of natural resource sectors. The objective of this program is to maximize productivity and competitiveness by encouraging the adoption of new technologies and processes and the development of new products. These objectives are achieved by conducting and supporting research and development and by delivering frameworks and policies for, and demonstrations of, new applications, technologies, processes, and products.

### Results

In 2016-17, NRCan engaged in several innovative projects to advance new technologies, processes and tools in the areas of mining, forestry and geospatial in order to enhance sustainability and productivity in natural resource sectors.



In the **mining sector**, NRCan:

- Developed a greener, more economical method for leaching processing mineral deposits that uses bacteria to recover nickel from mine waste and low-grade deposits, instead of using harmful or expensive chemicals;
- Designed a more economical approach for extracting rare earth elements (REE) important in clean, defence and high technology industries, which reduced capital and operating costs for the Canadian businesses by approximately \$50M;
- Completed testing at a demonstration project at Agnico Eagle in Val-d’Or, Quebec that revealed the potential of High-Performance Synthetic Ropes (HPSR) to replace heavier steel wire ropes in deep mine hoisting operations; and
- Assessed an approach to potentially reduce energy consumption and the operational costs of ore processing using a new 3D laser scanner prototype to measure ore size distribution at the primary crusher.

In the **forest sector**, NRCan:

- Funded the development of pulp refinement technology that can transform low quality wood into sugars and lignin for use in the biochemical industry and other sectors, such as for animal feedstock;
- Funded projects through the Investments in Forest Industry Transformation (IFIT) that will lead to the production of five new products made from wood fibre for commercial sale and the development of new applications of related technologies. Combined, these projects will create almost 20 new jobs and establish greater job security for more than 550 others;
- Supported **economic development for Indigenous peoples** by promoting greater participation in natural resource sectors through the Indigenous Forestry Initiative (IFI), which enabled:
  - Creation of a new Indigenous business that will employ members of four Lake Nipigon First Nations communities;
  - Installation of over 30 high-efficiency wood stoves and production of clean burning, long-lasting briquettes to reduce firewood consumption, smoke emissions and associated health risks for Nunatsiavut communities and provide a more secure source of heat for vulnerable residents;

***Did you know?***

**NRCan-funded innovation projects provide economic benefits for Indigenous populations in Canada.**

In 2016-17, the Indigenous Forestry Initiative (IFI) delivered a total of \$3.38 million\* in federal funding to 29 projects. Nine first time indigenous community partners were involved.

In 2016-17, the IFI worked with more than 50 Indigenous communities and leveraged more than \$7.22 million from 29 other partners, including federal departments, provincial and territorial governments, industry, academia and Indigenous organizations.

\* Of this amount, \$1 million was funded from NRCan’s reference level and the remainder was transferred to NRCan from Indigenous and Northern Affairs Canada under the Strategic Partnerships Initiative.

- Allocation of 200,000 m<sup>3</sup> of wood to the Long Lake 58 First Nation, which will allow community members to harvest wood on the Kenogami Forest; and
- Negotiation of a Power Purchase Agreement between the Independent Electricity System Operator (IESO) and Whitesand First Nation to supply up to 4 MW of biomass power from a proposed biomass power generating station that would create 50 full-time and 60 seasonal jobs;
- Collaborated on the **development and deployment of knowledge and tools** such as:
  - The Enhanced Forest Inventory (EFI), which captured over 30 million hectares of specific, detailed attributes of trees, forests and landscapes. EFI helps Canadian forestry companies plan their operations and maximize the value of each harvested tree through reduced costs, increased profits and long-term economic sustainability;
  - The web-based Biomass Inventory Mapping and Analysis Tool, which helps locate biomass suitable for fuel or other industrial processes, and supports provincial renewable natural gas (RNG) initiatives that foster sector innovation while mitigating GHG emissions; and
- Supported projects that demonstrated technology using short-rotation woody crops to maximize wood fibre and biomass production, and to clean up contaminated soil and groundwater. The technology is being deployed by provinces, municipalities, Indigenous communities and private industry.

In the area of **geospatial data**, NRCan:

- Provided **increased and more efficient access to geospatial data and tools** to Canadians, improving how data are updated and provided to clients and strengthening the alignment of web services. NRCan also worked with the provinces and territories under the National Elevation Data Strategy to prepare new accurate elevation data products and services, which are used to build high-resolution maps and geospatial analysis. Under the [North American Cooperation on Energy Information \(NACEI\)](#)<sup>xix</sup> initiative with the United States and Mexico, NRCan also added new data layers for energy infrastructure maps and updated web services. These initiatives are consistent with Federal Geospatial Platform (FGP) and Open Government initiatives aimed at providing access to the federal government's most relevant geospatial information;
- Provided **geospatial expert advice for decision-making and economic growth**, including for the University of Sherbrooke's Lake Pulse project on Canadian lakes, which is designed to help manage and conserve freshwater resources. NRCan also developed a multidimensional processing methodology for mapping ground deformations that is used by researchers around the world; and

- Expanded the Canadian Geospatial Data Infrastructure (CGDI) for increased connections across geospatial data sources and as well as improved data access and use. Through the GeoConnections program, NRCan:
  - Engaged with the Open Geospatial Consortium to help strengthen the availability of Arctic data and influence information management practices by the Arctic Council;
  - Supported the creation of GeoAlliance Canada to help strengthen Canada’s geomatics community and address strategic priorities for the geomatics sector; and
  - Funded Canadian companies like SensorUp Inc., Open North and AMITA Corporation to advance CGDI objectives in Smart City deployment.

NRCan’s ongoing efforts to encourage the adoption of new technologies and processes and the development of new products can be seen in a long-term trend of research and development expenditures in the natural resource sectors. Actual results from 2016-17 were impacted by a change in data collection methodology in 2014.

Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Natural resource sectors increase production of new products and processes	Number of new products and processes resulting from NRCan information	2 per year	March 31, 2017	<p><b>Results: Achieved</b></p> <p><b>Two new processes were developed</b> based on NRCan information, specifically:</p> <ul style="list-style-type: none"> <li>• One new Canadian Standards Association (CSA) standard on cellulose nanomaterials was developed to improve the quality of the end product.</li> <li>• One new regulatory standard for the International Movement of Wood was developed to help prevent the movement of pests.</li> </ul>	<p><b>Results: Achieved</b></p> <p><b>One new product and one new process were developed</b> based on NRCan information, specifically:</p> <ul style="list-style-type: none"> <li>• A database of Canada’s biomass feedstock characteristics and associated modeling tools, to which entrepreneurs and industry now have access; and,</li> <li>• An evidence-based process for forest managers to mitigate the effects of root rots on high-value timber.</li> </ul>	<p><b>Results: Achieved</b></p> <p><b>One new product and one new process were developed</b> based on NRCan information, namely:</p> <ul style="list-style-type: none"> <li>• A GHG calculator for a variety of forest bioenergy deployment scenarios in Canada for use within the bioenergy community; and</li> <li>• A new process for the handling and storage of woody biomass to reduce moisture uptake and risk of decomposition and combustion of large biomass storage piles.</li> </ul>

	R&D expenditures in natural resource sectors, specifically total intramural R&D expenditures in energy, mining and forest sectors	TBD Targets for this indicator will be revisited in future reporting. In the 2016-17 RPP, the target was originally set to “Favourable 10-year trend” and the target date was set to “March 31, 2017.” However, this target is no longer valid due to changes in the data collection methodology for this indicator. These changes have an impact on the accuracy of the 10-year baseline average used to assess whether or not the result was achieved.	TBD	<b>Results: Not Available</b> In 2016, business enterprise R&D expense intentions for the energy, mining and forest sectors were <b>\$1.7 billion, below the 2007 figure of \$2.1 billion.</b> These natural resource sector intentions accounted for <b>9.7% of total industry R&amp;D spending, which is lower than the 10-year baseline average of 12.6%.<sup>a</sup></b>	<b>Results: Achieved</b> In 2015, business enterprise R&D expense intentions for the energy, mining and forest sectors were <b>\$2.1 billion, slightly below the 2006 figure of \$2.3 billion.</b> However, these natural resource sector intentions accounted for <b>13.3% of total industry R&amp;D spending, slightly above the 10-year baseline average of 12.0%.<sup>a</sup></b>	<b>Results: Achieved</b> Business enterprise research and development expenses intentions in 2014 in the natural resource sectors were <b>\$2.1 billion, above the 2005 figure of \$1.4 billion.</b> Natural resource sector intentions accounted for <b>13.3% of total business enterprise research and development spending, slightly above the 10-year baseline average of 12.0%.<sup>a</sup></b>
Methodologies, policies, strategies, plans and standards are collaboratively used by governments and private sector organizations in the development of new innovative and value-added geospatial applications	Number of formally adopted methodologies, policies, strategies, plans and standards generated from collaborative activities and participation	Increase in the number of methodologies, policies, strategies, plans and standards generated from collaborative activities and participation in 2016-17 and compared to the 2015-16 baseline year	March 31, 2017	<b>Results: Achieved</b> Three new tools were developed. This number will be used as the baseline for future reporting years.	Not available: Performance indicator did not exist in 2015-16	Not available: Performance indicator did not exist in 2014-15

<sup>a</sup> Only the natural resource industries for which the R&D expenses were available for the full 2005-14 or 2006-15 periods, or for which they could be estimated using available information, have been included in the analysis. Natural resource industries for which estimates were suppressed due to confidentiality or data quality reasons for one or more years have been excluded from the analysis.

## Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
96,074,981	96,074,981	111,219,760	97,761,228	1,686,247

## Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
296	328	32

The increase between Planned FTEs and Actual FTEs is mainly attributed to the hiring of students and casual workers related the Rare Earth Elements and Chromite program and the hiring of additional staff needed to complete project deliverables.

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xvi</sup>

### Program 1.3: Investment in Natural Resource Sectors

#### Description

Investing in the development of natural resources is costly and risky due to inherent uncertainties in the potential economic viability of natural resource projects. Many factors must be considered when deciding whether to develop a natural resource project. In some cases, limited information may make it difficult for investors and/or companies to assess potential opportunities. The objective of this Program is to encourage investment in the natural resource sectors by increasing industry's knowledge of opportunities, regulations and obligations. This ensures that a more accurate assessment of the expected benefits of an investment can be made and subsequently compared to its costs and risks, thereby allowing for a more comprehensive investment decision. This objective is achieved by providing funding and information on the factors that determine the potential economic viability of natural resource projects.

#### Results

To help meet rising global demand for oil and gas, the Government of Canada is investing in [infrastructure projects](#)<sup>xx</sup> that will move Canada's energy to consumers.

In 2016-17 NRCan led government-wide efforts to **modernize the regulatory system** for major pipeline projects, as mandated by the Prime Minister and to **help restore confidence** in Canada's environmental assessment processes. These efforts complement the Pipeline Safety Act that came into force in June 2016. NRCan supported the creation and functioning of an Expert Panel to lead the National Energy Board (NEB) Modernization review.

Appointed by the Minister of NRCan, the Expert Panel used both online submissions and in-person meetings, organized and supported by NRCan, to seek the opinions of Canadians on the NEB. The Panel held engagement sessions across Canada, including with Indigenous peoples, travelling to 10 cities and hearing presentations from close to 200 individuals. Over 1,000 Canadians attended the sessions in person and the Panel received more than 200 detailed written inputs.

A specific plan for **engagement with Indigenous communities** was developed in cooperation with National Indigenous Organizations. As part of this Indigenous engagement, the Expert Panel heard presentations from 74 Indigenous groups and received 70 document submissions. In total, 326 individuals participated in the Panel's Indigenous engagement sessions.

The Panel is preparing a report that will inform policy and legislative changes to ensure that Canada remains competitive, that the review process for new projects is inclusive and that we advance the nation-to-nation relationship as well as reconciliation with Indigenous peoples.

**MANDATE LETTER COMMITMENT:  
Modernize the National Energy Board**

- In June 2016, the Government of Canada launched a review of federal environmental and regulatory processes, including NRCan's modernization of the National Energy Board (NEB).
- Appointed by the Minister of NRCan, an Expert Panel was announced in November 2016 to lead the review of the NEB, focussing on:
  - governance and structure;
  - mandate and future opportunities;
  - decision-making;
  - lifecycle regulation in the public interest, including compliance, enforcement and ongoing monitoring;
  - engagement with Indigenous peoples; and
  - public participation.

This review also considered alignment between NEB processes and the Aboriginal and treaty rights of Indigenous peoples as well as the principles outlined in the United Nations Declaration on the Rights of Indigenous Peoples.

NRCan's focused **engagement with Indigenous communities on energy infrastructure development** strives to facilitate increased involvement of Indigenous communities in the full life cycle of project development, from early project scoping, to environmental monitoring during construction, operation, and decommissioning. The Prime Minister committed to establishing Indigenous Advisory and Monitoring Committees for the Trans Mountain Expansion and the Line 3 Pipeline Replacement Program projects that were approved in November 2016. NRCan engaged with the majority of Indigenous communities potentially impacted by the projects to co-develop Terms of Reference for these Committees, including through joint Indigenous-Government Working Groups. These Committees support a new relationship between Indigenous communities, the federal government, the NEB and other federal regulators, and demonstrate the Government of Canada's commitment to reconciliation and a renewed relationship with Indigenous peoples.

**MANDATE LETTER COMMITMENT:**

**Interim Strategy for reviewing major natural resource projects**

- Under the interim principles, the Government of Canada approved four major pipeline projects: i) Nova Gas Transmission Expansion (October 2016); ii) Trans Mountain Expansion (November 2016); iii) Line 3 Pipeline Replacement (November 2016); and iv) Towerbirch Expansion (March 2017).
- Before deciding on these projects, and on the basis of the interim principles, the Government adopted a strategy that included:
  - deeper and more meaningful consultations with Indigenous peoples;
  - ensuring the views of the public and affected communities were sought and carefully considered;
  - assessing, for the first time, upstream greenhouse gases that could be linked to the project; and
  - making assessment information public.

Geoscience research helped **identify oil and gas production opportunities** for potential investors domestically and abroad:

- NRCan's marine geoscience surveys confirmed the availability of oil and gas in the deep waters of the Scotian Slope in Canada's Atlantic offshore;
- Resource assessments evaluated the potential for petroleum in the Canada Basin in Canada's Arctic offshore; for Macasty Shale oil in Quebec; and for unconventional oil<sup>5</sup> in southern Ontario;
- A Canada-United States project near the southern borders of Saskatchewan and Manitoba tested the use of carbon dioxide industry waste to increase oil production from shale rock;
- A Canada-Korea shale gas project examined geological properties of gas plays in the Liard and Horn River Basins and the Montney in British Columbia, reinforcing international investment and export opportunities;

<sup>5</sup> Conventional oil includes crude oil, natural gas and its condensates. Unconventional oil consists of a wider variety of liquid sources including oil sands, extra heavy oil, gas to liquids and other liquids.

- A Canada-China shale gas project assessed the properties of unconventional petroleum resources in Canada and China, promoting productive technology and science transfer internationally; and
- A \$3 billion investment by Japanese firms supported scientific collaboration on the characteristics of gas-producing shale in the Montney and Duvernay formations in Western Canada, providing public information that continues to build more efficient and successful exploration and production models for Canadian energy operators.

Information was made available to industry, potential investors and the general public to increase awareness and **allow for more comprehensive investment decisions:**

***Did you know?***

**The term “Extractive” industry or sector refers to any operations that extract raw materials from the earth for use by consumers. Extractive businesses active in Canada are required every year to publicly disclose specific payments made to all governments in Canada and abroad.**

- Canada is committed to increasing transparency and deterring corruption in the extractive sector. As part of this global effort, Canadians can access reports by approximately 650 extractive companies on NRCan’s website, under the Extractive Sector Transparency Measures Act (ESTMA).
- The ESTMA came into effect in June 2015. In 2016-17, as part of its role in managing the ESTMA, the Department focused on promoting compliance with the Act, including by developing guidance and tools to raise awareness within the extractive industry.
- Canada also works internationally to advance transparency and good governance by supporting the Extractive Industries Transparency Initiative (EITI). Under the EITI, more than 50 countries voluntarily agree to a multi-stakeholder reconciliation of payments made by oil, gas and mining companies with corresponding government revenues.

- Mineral and mining information providing statistics, market analysis, industrial and regional development, fiscal incentives and tax, trade and tariff policies was provided through key publications, including:
  - The [2016 Production of Canada’s Leading Minerals](#);<sup>xxi</sup>
  - The Mineral Production Statistics ([preliminary](#)<sup>xxii</sup> and [annual](#)<sup>xxiii</sup>);
  - The Mineral Exploration statistics ([preliminary](#)<sup>xxiv</sup> and [annual](#)<sup>xxv</sup>); and
  - The [2016 Mineral Trade Statistics](#).<sup>xxvi</sup>
- Information on next generation geoscience knowledge and innovative techniques was made available to industry through 25 new publications and a mid-year synthesis of results, as part of the Targeted Geoscience Initiative (TGI).
- Nearly 330 maps, technical reports, and open files from 17 research activities in the Geo-Mapping for Energy and Minerals (GEM) program were made publicly available on-line.

Stakeholder support for Canada’s mining resources was strengthened through **increased collaboration and engagement with industry and communities**. For example:

- The TGI program formed a new Industry Advisory Group (IAG) representing major national mineral exploration associations like the Prospectors and Developers Association of Canada (PDAC), the Canada Mining Innovation Council (CMIC), and the Canadian Institute of



Mining, Metallurgy and Petroleum (CIM), which resulted in improved feedback and advice from industry experts, enhanced information sharing with key stakeholders, and higher visibility.

- GEM scientists and engagement officers visited 13 northern communities to discuss current GEM projects. The GEM program hosted a meeting with the Advisory Group of Northerners in Kluane, Yukon to ensure northerners, including Indigenous groups, are involved in project development processes.

NRCan supported the **development of the geoscience field, expertise and Canadian geoscientists** through targeted funding:

- The TGI program funded six post-doctoral research fellows and 29 post-secondary students under the federal government's Research Affiliate Program and awarded 13 academic two-year grants worth \$1.2M to address research gaps;
- The GEM program contributed to 10 academic multi-year grants worth \$605K in total and four multidisciplinary grants for a total of \$198K awarded to northern organizations to enable the use of GEM geoscience in their decision-making processes.

While NRCan supports investments in the development of natural resources, investment decisions are also influenced by external economic factors. When commodity prices are lower, for example, natural resource producers are less likely to invest. In 2016-17 these external factors impacted the degree to which the Department was able to deliver on its targeted results.

#### Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Natural resource sectors have increased investment	Growth of capital expenditures in the energy sector (average of past 5 years) compared to growth in overall capital expenditures in Canada (average of past 5 years)	The average 5-year growth rate of capital expenditures in the energy sector is equal to or higher than the average 5-year growth rate in capital expenditures in Canada	March 31, 2017	<b>Results: Not Achieved</b> In 2016, energy sector capital expenditures were \$74 billion. Over the past five years (2011-16), energy sector capital expenditure declined by an average annual rate of 1.6%. This is <b>below the average annual growth rate</b> of 0.3% in the	<b>Results: Achieved</b> In 2015, energy sector capital expenditures were \$89.5 billion. Over the past five years (2010-15), energy sector capital expenditures grew by an average annual rate of 5.7%. This is <b>above the average annual growth rate</b> of 3% in the Canadian economy as a whole.	<b>Results: Achieved</b> Capital expenditures in 2014 in the energy sector were \$108.3 billion. Over the past five years (2009-2014), capital expenditures in the energy sector grew by an average annual rate of 15.0%. This <b>compares to an average annual growth</b> of 6.6% in the Canadian economy as a whole.

				Canadian economy as a whole and is likely due, in part, to lower commodity prices which have led natural resource producers in Canada and globally to lower investment.		
Growth of capital expenditures in the forest sector (average of past 5 years) compared to growth in overall capital expenditures in Canada (average of past 5 years)	The average 5-year growth rate of capital expenditures in the forest sector is equal to or higher than the average 5-year growth rate in capital expenditures in Canada	March 31, 2017	<b>Results: Not Achieved</b> In 2016, forest sector capital expenditures were \$13 billion. Over the past five years (2011-16), forest sector capital expenditure declined by an average annual rate of 5.2%. This is <b>below the average annual growth rate</b> of 0.3% in the Canadian economy as a whole and is likely due, in part, to lower commodity prices which have led natural resource producers in Canada and globally to lower investment.	<b>Results: Achieved</b> In 2015, forest sector capital expenditures were \$2.7 billion. Over the past five years (2010-15), forest sector capital expenditures grew by an average annual rate of 14.8%. This is <b>above the average annual growth rate</b> of 3% in the Canadian economy as a whole.	<b>Results: Achieved</b> Capital expenditures in 2014 in the forest sector were \$2.6 billion. Over the past five years (2009-2014), capital expenditures in the forest sector grew by an average annual rate of 20.0%. This <b>compares to an average annual growth</b> of 6.6% in the Canadian economy as a whole.	
Growth of capital expenditures in the minerals and metals sector (average of past 5 years) compared to growth in overall capital expenditures in Canada (average of past 5 years)	The average 5-year growth rate of capital expenditures in the minerals and metals sector is equal to or higher than the average 5-year growth rate in capital expenditures in Canada	March 31, 2017	<b>Results: Achieved</b> In 2016, minerals and metals sector capital expenditures were \$13 billion. Over the past five years (2011-16), minerals and metals sector capital expenditure grew by an average annual rate of 6.7%. This is <b>above the average annual growth rate</b> of 0.3% in the Canadian economy as a whole.	<b>Results: Achieved</b> In 2015, minerals and metals sector capital expenditures were \$14.9 billion. Over the past five years (2010-15), minerals and metals capital expenditures grew by an average annual rate of 3.5%. This is <b>above the average annual growth rate</b> of 3% in the Canadian economy as a whole.	<b>Results: Achieved</b> Capital expenditures in 2014 in the minerals and metals sector were \$15.0 billion. Over the past five years (2009-2014), capital expenditures in the minerals and metals sector grew by an average annual rate of 12.1%. This <b>compares to an average annual growth</b> of 6.6% in the Canadian economy as a whole.	

## Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
62,900,219	62,900,219	74,761,684	74,593,181	11,692,962

The increase between Planned spending and Actual spending is mainly attributed to additional funding received during the year through Supplementary Estimates for the Interim Strategy for Pipelines. The increase is also explained by a realignment of real property expenditures related to special purpose buildings and the Federal Infrastructure Initiative which were planned under Internal Services while actual costs were incurred under the appropriate program, in line with TBS guidelines.

## Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
378	422	44

The increase between Planned FTEs and Actual FTEs is mainly attributed to the redistribution of the staff from other program areas.

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xvi</sup>

## Program 1.4: Statutory Programs – Atlantic Offshore

### Description

Through this Program, NRCan monitors and facilitates payment disbursement agreements and transfer payments under the Atlantic Offshore Accord Acts. The Program includes the following: Canada-Newfoundland and Labrador Offshore Petroleum Board; Payments to the Newfoundland Offshore Petroleum Resource Revenue Fund; Payments to the Nova Scotia Offshore Revenue Account; Nova Scotia Crown Share Adjustment Payment; and Canada-Nova Scotia Offshore Petroleum Board.

### Results

The Canada-Newfoundland and Labrador Atlantic Accord Implementation Act and the Canada-Nova Scotia Offshore Petroleum Accord Implementation Act provide that the benefits of revenues from the Canada-Newfoundland and Labrador and the Canada-Nova Scotia offshore areas flow to the provinces as if the resources were on land.

NRCan collects royalties, interests and penalties arising from production in the Canada-Newfoundland and Labrador offshore area and the Canada-Nova Scotia offshore area and

transfers equivalent sums as well as corporate income taxes and other required payments to the two provincial governments pursuant to the Canada-Newfoundland and Labrador Atlantic Accord Implementation Act and the Canada-Nova Scotia Offshore Petroleum Accord Implementation Act.

NRCan also administers the federal contributions to the operating budgets of the Canada-Newfoundland and Labrador Offshore Petroleum Board and the Canada-Nova Scotia Offshore Petroleum Board.

NRCan met its target relating to the timeliness and accuracy of offshore payments in 2016-17. The Department anticipated and prepared the necessary materials for payments to be processed within a 48-hour period to both Nova Scotia and Newfoundland and Labrador as required under the Canada-Newfoundland and Labrador Atlantic Accord Implementation Act and the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act. As a result, 100% of payments were made on time.

Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Statutory requirements relating to offshore petroleum payments in Nova Scotia and Newfoundland and Labrador are managed in a timely manner	Percentage of offshore payments processed in a timely manner	100%	Ongoing	<b>Results: Achieved</b> NRCan anticipated and pro-actively prepared the necessary materials for <b>100%</b> of payments to be processed in a timely manner	<b>Results: Achieved</b> NRCan anticipated and pro-actively prepared the necessary materials for <b>100%</b> of payments to be processed in a timely manner	<b>Results: Achieved</b> NRCan anticipated and pro-actively prepared the necessary materials for <b>100%</b> of payments to be processed in a timely manner
Statutory requirements relating to offshore petroleum payments in Nova Scotia and Newfoundland and Labrador are managed in an accurate manner	Percentage of offshore payments processed in an accurate manner	100%	Ongoing	<b>Results: Achieved</b> NRCan anticipated and pro-actively prepared the necessary materials for <b>100%</b> of payments to be processed in an accurate manner	<b>Results: Achieved</b> NRCan anticipated and pro-actively prepared the necessary materials for <b>100%</b> of payments to be processed in an accurate manner	<b>Results: Achieved</b> NRCan anticipated and pro-actively prepared the necessary materials for <b>100%</b> of payments to be processed in an accurate manner

## Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
743,336,158	743,336,158	473,430,813	473,430,813	(269,905,345)

The decrease between Planned spending and Actual spending is mainly attributed to lower royalties for the Newfoundland and Labrador Offshore Petroleum Resource Revenue Fund than planned as a result of reduced oil prices from the time of the royalty forecast which was done in the fall of 2015 to the time the actual royalties were received, as well as reduced cost recovery remittances received from the Canada-Newfoundland and Labrador Offshore Petroleum Board and the Nova Scotia Offshore Petroleum Board due to timing of the recovery.

## Human resources (full-time equivalents)

2016–17 Planned *	2016–17 Actual *	2016–17 Difference (actual minus planned)
0	0	0

\*While the program focuses on actual statutory transfer payments, the full-time equivalents (FTEs) assigned to process the payments are funded under sub-program 1.1.3, which these FTEs primarily support.

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xvi</sup>

## Program 2.1: Energy-Efficient Practices and Low-Carbon Energy Sources

### Description

Canada's energy markets are defined by the decisions of energy consumers and producers. However, there are multiple barriers to the adoption of energy-efficient practices and implementation of low-carbon energy sources, including a lack of awareness of available options and their benefits, insufficient capacity for adoption (e.g. regulatory frameworks, codes and standards), and financial risk. The objective of this Program is to address these barriers by encouraging and enabling energy consumers and producers to adopt cleaner and more energy-efficient technologies, products, services and practices. These objectives are achieved through education and outreach activities, targeted incentives, and regulatory interventions that keep pace with technological changes.

### Results

NRCan helped **improve energy efficiency across the Canadian economy** by developing and reinforcing a supportive policy framework. For example,

- Thirty-five organizations in Canada are now certified to ISO 50001 and four facilities in Canada participated in a North American Management Pilot Project in 2016-17 to implement ISO 50001.<sup>6</sup>
- Energy performance will increase for 20 categories of appliances and equipment in Canada through the release of the [Energy Efficiency Regulations, 2016](#).<sup>xxvii</sup> Cost-benefit analyses indicate that Canadian residents will save about \$1.8 billion in energy costs by 2030, while reducing greenhouse gas (GHG) emissions by about 0.7 megatonnes.
- Results from compliance testing conducted on three regulated energy-using product categories (electric water heaters, oil-fired furnaces, and traffic and pedestrian signals) indicated that all tested products met the requirements of the Energy Efficiency Regulations.
- Two marketplace audits for general service lamps and electric motors indicated that at least 95% of the product models assessed meet energy efficiency requirements. NRCan engaged with dealers of suspected non-compliant products to emphasize responsibilities under the regulations.
- NRCan administered SmartWay in Canada to save more than \$90 million in annual fuels costs for 40,500 Canadian trucks in 2016. SmartWay works with freight carriers and shippers to benchmark operations, track fuel consumption and improve annual performance in the clean and efficient transport of goods.

To support the **transition towards low-carbon** economy, NRCan:

- Improved the energy efficiency of homes and buildings through its ENERGY STAR program;
- Produced 12.3 TWh (terwatt-hour) in renewable electricity through its ecoENERGY for Renewable Power program (ecoERP) and the Wind Power Production Incentive (WPPI);<sup>7</sup>
- Contributed to the production of 106 million litres of ethanol and

***Did you know?***

**NRCan is working with industry partners through ENERGY STAR to help Canadians save money on energy bills, increase competitiveness in our commercial and institutional sectors, and increase energy efficiency to help fight climate change.**

- Canadians can identify energy-efficient products and new homes through the ENERGY STAR symbol. Commercial, institutional, and industrial sector organizations can use ENERGY STAR tools to benchmark and manage their energy performance.
- In 2016, there were over 1500 ENERGY STAR industry partners for products and homes. More than 70 types of products were eligible for ENERGY STAR certification in Canada in 2016 and over 11,000 new homes were issued an ENERGY STAR, EnerGuide or R-2000 label
- There was a 27% increase in awareness of ENERGY STAR and an increase in Twitter and Facebook followers for ENERGY STAR Canada by 2,400 and 4,450, respectively, among 30,000 Canadians participating in a loyalty points incentives pilot program.
- The ENERGY STAR Portfolio Manager benchmarked over 17,400 buildings, representing almost 200 million m<sup>2</sup> (or 23%) of commercial floor space in Canada that fall within energy efficiency standards.

<sup>6</sup> ISO 50001 is a specification created by the International Organization for Standardization (ISO) that supports organizations in all sectors to use energy more efficiently through the development of an energy management system (EnMS). Organizations that use energy efficiently can save money, conserve resources and contribute to addressing climate change impacts.

<sup>7</sup> The Wind Power Production Incentive ended in March 2017.

- 12 million litres of biodiesel through its programming in alternative transportation fuels;
- Developed a suite of actions that support the [Pan-Canadian Framework on Clean Growth and Climate Change \(PCF\)](#),<sup>xxviii</sup> under the [Canadian Energy Strategy \(CES\)](#). NRCan is leading or co-leading 30 of the 54 actions under the PCF and providing expert support for 10 other actions.
  - Advanced work on the development of three new federal programs to reduce GHG emissions from the Canadian electricity system. These programs target the development of smart grid technology, emerging renewable energy technologies and the deployment of renewable energy in remote communities;
  - Established two regional dialogues (Atlantic and Western) with energy ministries and utilities under NRCan’s Regional Electricity Cooperation and Strategic Infrastructure program to develop studies that identify the best electricity infrastructure projects for significantly reducing GHG emissions;
  - Supported the deployment of electric vehicle (EV) charging and alternative fuel refuelling stations that, once completed, will result in over 90 new Level-3 EV fast chargers, eight natural gas and three hydrogen stations, exceeding targets for all fuel types. To further support alternative fuel use, including for EV, NRCan also began developing nine codes and standards for electric and alternative fuelled vehicles and charging/refuelling infrastructure;
  - Joined four additional clean energy initiatives under the [Clean Energy Ministerial \(CEM\)](#)<sup>xxix</sup> to strengthen and advance Canada’s collaborative work on clean energy technologies;
  - In partnership with Environment and Climate Change Canada, produced the Report on Energy Supply and Demand in Canada, which informed analyses of Canada’s energy efficiency performance for 1990-2014 as well as contributed to the development of estimates of energy use by sector and province;
  - Advanced work on a policy framework for administering marine renewable energy projects in the federal offshore, in collaboration with federal partners, provinces, Indigenous peoples, industry and other stakeholders that will help advance Canada’s renewable energy development;
  - Contributed scientific and technical support that strengthened Canada’s advocacy efforts for a clear commitment from country partners to the Paris Agreement to advance its implementation, as part of our continued participation in the UNFCCC<sup>xxx</sup>; and
  - In collaboration with Statistics Canada, collected data for the Survey of Industrial Consumption of Energy; the Survey of Household Energy Use; the Survey of Commercial and Institutional Energy Use; and the Canadian Vehicle Use Survey with Transport Canada.

Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Energy consumers and producers adopt environmentally responsible products and practices related to energy use and production	Canada's total annual energy savings due to efficiency (difference between energy use without energy efficiency improvements and energy use with energy efficiency improvements; the units are petajoules (PJ))	TBD <sup>a</sup>	TBD <sup>a</sup>	<p><b>Results: Not available<sup>a</sup></b></p> <p>From 1990 to 2014, energy efficiency in Canada improved 25%, which saved 1,669.3 PJ or \$38.5 billion in energy and avoided 90.5 Mt of GHG emissions in 2014.</p> <p>Over the same period, total final energy demand in Canada increased 31%. It would have increased 55% without energy efficiency improvements.</p> <p>More details on energy savings and emission reduction from energy efficiency improvements can be found in the report of <a href="#">Energy Efficiency Trends in Canada 1990-2014</a>.<sup>xxxi</sup></p>	<p><b>Results: Achieved</b></p> <p>From 2008 to 2013, energy efficiency savings in Canada showed a favorable trend. While total energy used by final consumers increased by 28% between 1990 and 2013, the increase without energy efficiency improvements would have been 51%.</p> <p>From 1990 to 2013, energy efficiency in Canada improved 24%, a significant increase in energy savings which reduced energy use by 1,613.2 PJ, saved Canadians \$37.6 billion and decreased GHG emissions by 85.4Mt in 2013.<sup>b</sup></p>	<p><b>Results: Achieved</b></p> <p>From 2008 to 2012, energy savings due to energy efficiency in Canada showed a favorable trend. Over this time period, energy efficiency improvements reduced energy use by 353 PJ.</p> <p>From 1990 to 2012, energy efficiency in Canada improved 24.2% a significant increase in energy savings which reduced energy use by 1,642.8 PJ, saved Canadians \$37.4 billion and decreased GHG emissions by 86.6Mt in 2012.</p> <p>More details on energy efficiency improvement as well as information on trends in energy use and energy efficiency in the residential, commercial, institutional, industrial, and transportation sectors can be found in the report <a href="#">Energy Efficiency Trends in Canada 1990-2012</a>.</p>



	Renewable electricity generation capacity in megawatts (MW) across Canada	Favourable 5-year trend in MW, as per 2007 baseline of 6,753 MW of installed capacity (excluding large hydro)	Now and ongoing	<b>Results: On Track</b> Renewable electricity generation capacity increased from 17,435.5 MW <sup>c</sup> in 2014 to 19,996.5 MW in 2015 (including small hydro).	<b>Results: On Track</b> Renewable electricity generation capacity increased from 14,301 MW in 2013 to 17,236 MW in 2014 (including small hydro).	<b>Results: On Track</b> Existing data suggest this favourable 5-year trend is on track as renewable electricity generation capacity increased from 9,261 MW in 2010 to 14,301 MW in 2013, including 50 MW of small hydro. (Data source: Stats Canada - CANSIM)
	Biofuel production in Canada	Favourable 5-year trend as per 2007 baseline of 786.1 million litres of ethanol and 92.8 million litres of biodiesel	Now and ongoing	<b>Results: Achieved</b> There has been steady growth in domestic biofuel production. In 2016-17, the domestic biofuel industry produced <b>1,700 million litres of ethanol, and 430 million litres of biodiesel</b> , of which 106 million litres of ethanol and 12 million litres of biodiesel were produced with support from the ecoENERGY for Biofuels program. As this was the final year of the program, fewer domestic producers received direct program support, given many participants had completed their seven-year incentive period in 2015-16.	<b>Results: Achieved</b> The production capacity of biofuels in Canada increased steadily between 2007 and 2012. In 2015-16, NRCan's ecoENERGY for Biofuels program contributed to achieving the production of <b>342 million litres of ethanol and 18 million litres of biodiesel</b> .	<b>Results: Achieved</b> The production capacity of biofuels has increased steadily since 2007. In 2014-15, NRCan programs contributed to achieving production of <b>1,739 million litres of ethanol and 128 million litres of biodiesel</b> . The level of biofuels production has risen to meet Canadian and US mandates for renewable content in the fuel pool. Increased production of renewable fuels diversifies the energy mix in Canada.

<sup>a</sup> The target for 2016-17 will be set once program decisions are made in late 2017. As a result, an assessment of whether the target was met is not possible at this time.

<sup>b</sup> More details on energy efficiency improvement as well as information on trends in energy use and energy efficiency in the residential, commercial, institutional, industrial, and transportation sectors can be found in the [2013-15 Report to Parliament under the Energy Efficiency Act](#).<sup>xxvii</sup>

<sup>c</sup> The 2014 renewable electricity generation capacity in megawatts (MW) across Canada has been revised to 17435.5MW as based on NRCan's and Statistics Canada's most recent data.

## Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
183,336,817	183,336,817	213,996,763	177,431,795	(5,905,022)

The decrease between Planned spending and Actual spending is mainly attributed to the ecoENERGY for Biofuels, ecoENERGY for Renewable Power and Wind Power Production Incentive programs as payments under these contribution programs are based on production levels. In 2016-17, the recipients produced less and therefore claimed less than the maximum allowable under their contribution agreement, resulting in significant lapses for these programs. These lapses were offset by funding received during the year through Supplementary Estimates for the Clean Growth and Climate Change and the Green Infrastructure programs.

## Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
101	265	164

The increase between Planned FTEs and Actual FTEs is mainly attributed to the hiring related to the funding received through Supplementary Estimates.

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xvi</sup>

## Program 2.2: Technology Innovation

### Description

Science and Technology is key to overcoming challenges confronted by natural resource sectors in pursuing responsible development. Through this Program, NRCan encourages academia, industry and the public sector to research, develop and demonstrate innovative solutions. This objective is achieved through the generation and dissemination of scientific knowledge, and the development and demonstration of new technologies.

### Results

NRCan **advanced innovative energy science and technology** through three major mechanisms: federal research with laboratories in Varennes, Ottawa, Hamilton and Devon, projects with external partners and science-informed policy. In 2016-17, NRCan managed approximately 250 projects in partnership with industry, provincial and territorial governments, universities, associations, non-governmental organizations and other stakeholders. This work involved the development of new, cleaner and more efficient energy products, practices, production and

resource extraction. Through these partnerships, NRCan enhanced economic opportunities for innovation across the sector while leading the transition to a low-carbon economy.

In 2016-17, NRCan **supported the development of innovative and cleaner technology** through the ecoENERGY Innovation Initiative (ecoEII)<sup>8</sup>:

- Supporting Shell Canada’s Quest Carbon Capture and Storage Facility, a key large-scale project that successfully reached its target of capturing and storing over one million tons of carbon dioxide. The project continues to be one of the most successful large-scale carbon capture and storage demonstration projects in the world;
- Working with industry leader Lafarge to reduce greenhouse gas (GHG) emissions in heavy emitting industrial sectors by substituting low carbon fuels for coal in the cement-making processes; and
- Conducting a study in partnership with Canadian and American utilities and systems operators that will provide critical information as they develop plans to integrate additional renewable energy sources into their electricity grids, over the next decade.

***Did you know?***

**NRCan has an Office of the Chief Scientist that is responsible for positioning NRCan as a leader in the performance of science and technology.**

- The office works closely within the Department as well as with other science-based departments and agencies, both nationally and internationally, to ensure the excellent and relevance of our laboratories and science programs.
- The office administers the Green Jobs Science and Technology Internship Program (STIP), a component of the Government of Canada Youth Employment Strategy.
- The Green Jobs program provides valuable work experience to participants in natural resources fields. Each internship is linked to environmental benefits, allowing hiring companies to improve their environmental performance while building job skills for Canadian youth.
- In 2016-17, the Green Jobs program provided over 100 internship opportunities to college or university students. NRCan has received support to deliver 1200 internships over the next two years.

NRCan also supported research, development and demonstration (RD&D) energy projects through the Oil Spill Response Science, Energy Innovation, Green Infrastructure, and Oil and Gas Technology programs, as well as the Program of Energy Research and Development, including:

- Spearheading the transition to NetZero housing<sup>9</sup> in Canada, building 21 NetZero energy and five NetZero energy-ready homes in Calgary, Guelph, Ottawa, Montreal, and Halifax;
- Conducting simulations in collaboration with the Canadian Nuclear Safety Commission on materials used in the tubing of CANDU (CANada Deuterium Uranium) reactors;

<sup>8</sup> The ecoEII program ended in 2017. Budget 2016 announced additional funding under the Oil and Gas Clean Technology Program, the Electric Vehicle Infrastructure Demonstration program, and the Energy Innovation Program.

<sup>9</sup> A net-zero house is designed and built to reduce household energy needs to a minimum and includes onsite renewable energy systems so that the house may produce as much energy as it consumes on a yearly basis.

- Releasing a new version of RETScreen, a publicly available clean energy management software available in 36 languages with more than half a million users worldwide, and 1,000 new users each week;
- Implementing nine electric vehicle (EV) infrastructure demonstration projects, including:
  - product development for innovative fast charging and curbside charging stations that are expected to result in up to 1,000 additional charging stations across Canada, including 34 fast charging stations along the Trans-Canada Highway in northern Ontario and Manitoba; and
  - data collection from 85% of users on charging and EV use to inform future sites for EV charging stations and electric grid updates across Canada;
- Conducting pipeline safety research on the vulnerability of common pipeline coatings to external corrosion and cracking, which will help keep Canadians safe and protect the environment from pipeline-related incidents;
- Quantifying high-resolution solar photovoltaic (solar power) data to help address the issue of solar power fluctuations as stakeholders and utilities gear up to integrate solar power into their operations;
- Testing the use of carbon dioxide as a natural refrigerant/heat transfer fluid in order to eliminate the use of synthetic refrigerants and reduce energy required to heat buildings by up to 50%;
- Collaborating with international partners to develop cost-effective strategies that can minimize the environmental impacts of methane and black carbon emissions from the oil and gas sector; and
- Piloting research to develop a unique bitumen extraction process that could potentially reduce thermal energy demand and GHG emissions, while maintaining productivity and robustness of the current commercial ore mining process.

**MANDATE LETTER COMMITMENT:  
Clean Technology and Innovation**

- NRCan will continue to deliver significant investments announced by the Government in Budget 2016 and 2017 in order to support clean technology and innovation in natural resource sectors:
- \$1 billion over four years to support clean technology in the energy, mining, forestry, fisheries and agriculture sectors;
- \$200 million over four years in collaboration with Agriculture and Agri-Food Canada and Fisheries and Oceans Canada to support clean technology research, development, demonstration and adoption of clean technologies in Canada’s natural resource sectors;
- \$12 million over four years in collaboration with Innovation, Science and Economic Development to establish a Clean Growth Hub within the new Innovation Canada single-window service; and
- \$210 million over four years for NRCan’s Energy Innovation Program (EIP), aimed at continuing Research and Development activities through its core clean energy innovation programming.

In 2016-17, NRCan also successfully renewed the Memorandum of Understanding between the Governments of Canada and Alberta to ensure continued federal-provincial collaboration on climate change, clean energy technologies and more sustainable oil sands development.

NRCan helped solidify Canada’s leadership role in clean technology on the global stage as part of Mission Innovation, an initiative which aims to accelerate the pace of clean energy innovation internationally. Canada participated in the first Mission Innovation Ministerial held in June 2016, where Canada became a member of the Steering Committee and member countries established an Enabling Framework. Member countries also announced their energy RD&D investment baselines and doubling targets.<sup>10</sup>

In November 2016, during the [22nd Conference of the Parties to the United Nations Framework Convention on Climate Change \(COP22\)](#),<sup>xxxiii</sup> Mission Innovation Ministers launched seven Innovation Challenges, to encourage increased engagement in key energy technology areas by the global research community, industry, and investors, while also providing opportunities for new collaborations between Mission Innovation members.<sup>11</sup>

**Did you know?**

**NRCan engaged Canadians for their input on Clean Technology and Innovation through the Let’s Talk Clean Resources campaign.**

- The [Let’s Talk Clean Resources](#) website was launched in July 2016 to gather ideas and comments from Canadians on developing clean technology and meeting Canada’s Mission Innovation commitments.
- By the time the campaign ended in October 2016:
  - The website had over 40,000 hits and 315 registered participants (2/3 individuals, 1/3 organizations) that provided input.
  - Over 350 natural resource and clean technology stakeholders also provided input through 11 multi-sectoral ministerial roundtables across Canada.
  - Senior government officials also held over 30 meetings with international and intergovernmental partners, industry associations, companies, think tanks and funders.
  - This engagement supported the development of federal policy and program options to support the development of clean technology for Canada’s natural resource sectors.

Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Stakeholders invest in S&T to address environmental challenges	Dollar value of stakeholder investments in S&T to address environmental challenges	5% increase over the average of the previous 5 year period	March 31, 2017	<b>Results: Achieved</b> The target was achieved with <b>an 8% average growth</b> over the previous five-year period.	<b>Results: Achieved</b> The target was achieved with <b>an 11% average growth</b> over the previous five-year period.	<b>Results: Achieved</b> The target was achieved with <b>an 11% average growth</b> over the previous 5 years period.

<sup>10</sup> Canada will seek to double federal energy RD&D investments from a baseline of \$387M in 2014-15 to \$775M in 2019-20.

<sup>11</sup> Canada announced it will co-lead the Sustainable Biofuels Innovation Challenge, along with China, India and Brazil.

## Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
115,838,434	115,838,434	148,253,404	148,143,884	32,305,450

The increase between Planned spending and Actual spending is mainly attributed to additional funding received during the year through Supplementary Estimates for Clean Growth and Climate Change, Green Infrastructure and Cleaner Oil and Gas Technologies. Offsetting these increases is the funding transferred to Innovation, Science and Economic Development Canada related to the Sustainable Development Technology Fund.

The increase is also explained by a realignment of real property expenditures related to special purpose buildings and the Federal Infrastructure Initiative which were planned under Internal Services while actual costs were incurred under the appropriate program, in line with TBS guidelines.

## Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
516	653	137

The increase between Planned FTEs and Actual FTEs is mainly attributed to the hiring related to the funding received through Supplementary Estimates.

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xvi</sup>

## Program 2.3: Responsible Natural Resource Management

### Description

Greater knowledge of environmental risks and environmentally responsible practices help prevent and reduce the environmental impacts of past, present and future natural resource development. The objectives of this Program are to enable government departments, regulatory bodies and industry to assess these impacts and develop, monitor and maintain resources or clean up wastes responsibly. These objectives are achieved through the provision of assessments and knowledge rooted in sound science, and through waste management efforts that are undertaken in collaboration with provinces, federal agencies and municipalities.

### Results

NRCan contributed to the **increase of scientific knowledge of forest ecosystems** by providing foundational, evidence-based knowledge for industry stakeholders to make environmentally responsible decisions on natural resource development. For example, NRCan:

- Made its Carbon Budget Model available to forest managers of boreal peatlands and improved models for greenhouse gas (GHG) emissions and removals to direct operational decisions toward sustainable forest management;
- Developed a forest floor recovery index manual and application on assessing the recovery of reclaimed oil sands sites to support better management practices in the restoration of natural forest ecosystems;
- Conducted assessments on the impact of industrial disturbances for forest ecosystems;
- Completed new research on airborne and waterborne oilsands-related contaminants to distinguish between natural contaminants and those made by humans;
- Created the Digital Elevation Model for the North, providing the data to countries active in the Arctic region;
- Developed guidebooks for the oil sands region to transfer knowledge from forestry practices to the energy sector;
- Developed estimates for [Canada's 2016 Greenhouse Gas Inventory Report](#),<sup>xii</sup> as required by the UNFCCC; and
- Supported the preparation of the [State of Canada's Forests](#)<sup>xxxiv</sup> report, as required by the Department of Natural Resources Act.

NRCan contributed to **sustainable land-use decision-making and groundwater management** through its work in groundwater geoscience, such as:

- Research in Quebec suggested that cap rock in the intermediate zone is an effective barrier for protecting aquifers from contamination originating from deep shale oil and gas fracking. This is being further investigated through a federal-provincial collaboration with New Brunswick;
- Completion of a 3D geological model representing the fractured bedrock aquifers in southern Ontario, continued input of groundwater monitoring data from Saskatchewan, British Columbia and Nova Scotia, and collecting additional data from 10 locations across Canada to support 3D regional hydrogeological models.

***Did you know?***

**Groundwater provides up to 80% of rural Canada's drinking water and is an essential component of ecosystem health.**

NRCan conducts groundwater mapping and assessment activities to better understand and monitor groundwater systems.

The Department's data standard for characterizing and assessing groundwater resources was officially accepted in 2016 as an International Standard by the Open Geospatial Consortium and is being considered by the World Meteorological Organization.

NRCan contributed scientific expertise and advice to aid in the planning of natural resource development and the **identification and mitigation of environmental impacts** related to major resource projects. For example, NRCan:

- Assessed the impact of resource development on Bathurst caribou in the Northwest Territories, including using satellite remote sensing to map the impact of air pollution such as road dust and airborne fine particulates on vegetation and habitat conditions. Results from this study directly contributed to the Government of the Northwest Territories’ range plan to preserve the Bathurst caribou herd and an environmental assessment report by the Dominion Diamond Ekati Corporation, a Canadian company operating the Ekati Diamond Mine in the Northwest Territories;
- Developed, applied, and promoted the use of low-cost Unmanned Aerial Vehicle mapping techniques for the North to conduct detailed surveys of tundra vegetation and landscape disturbances, including permafrost thaw slumps and fire damage in the boreal forest;
- Supported the Government of Canada’s review of federal environmental assessment processes associated with the 2012 Canadian Environmental Assessment Act (CEAA). The review, led by the Minister of Environment and Climate Change, aimed at developing new, fair processes that are robust, incorporate scientific evidence, protect our environment, respect the rights of Indigenous peoples, and support economic growth; and
- Assessed 57 development projects, as required by the CEAA and northern regimes.

The Department also continued to take action to establish **long-term management solutions for radioactive waste**. In 2016-17, NRCan discontinued routine medical isotope<sup>12</sup> production at the

Atomic Energy of Canada Limited’s (AECL) National Research Universal reactor (NRU) in Chalk River, Ontario. The reactor produced the majority of Canada’s medical isotope supply. A “NRU Contingency Plan” was launched for November 1, 2016 to March 31, 2018, positioning Canada as an isotope ‘supplier of last resort’ in the event of a global shortage. Canada continues to work with isotope-producing countries to identify and implement sustainable solutions for a secure medical isotope supply, including through NRCan’s leadership at the High-Level Group on Security of Supply of Medical

***Did you know?***

**NRCan science has helped find solutions to important environmental and economic challenges. For example, in 2016-17 NRCan science has helped achieve:**

- Savings totalling about \$1.8 billion for Canadians by 2030 and \$34 million annually for Canadian trucks due to science that led to new energy efficiency regulations and the SmartWay program. In addition to savings, this work reduces GHG emissions and helps the transition to a low-carbon economy.
- Over 1 million tons of carbon dioxide captured and stored because of a key large-scale carbon capture and storage project. This prevents carbon dioxide to enter the atmosphere.
- 755 inspections of explosives facilities across Canada, ensuring compliance with legislation and protection Canadians.
- Vital data on fire risks and locations of fires, supporting management of events such as the fire in Fort McMurray.
- Upgrades to the seismic hazard model for Canada, which was subsequently integrated in the National Building Code of Canada.

<sup>12</sup> Medical isotopes are safe, radioactive substances used by health professionals as part of medical diagnostics. They are primarily sourced from nuclear reactors in Europe, Australia and South Africa.



Radioisotopes, a forum of the Organisation for Economic Cooperation and Development's Nuclear Energy Agency.

NRCan has oversight responsibilities for the Nuclear Waste Management Organization (NWMO), which is responsible for implementing Canada's long-term plan for managing nuclear fuel waste. In 2016-17, NRCan ensured that the NWMO and nuclear energy organizations continued to meet their obligations under the Nuclear Fuel Waste Act.

### Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Public and private sectors establish practices to mitigate the environmental impacts to natural resources	Number of public and private sector new or updated policies, regulations or other decision-making tools completed annually	3 per year	March 31, 2017	<p><b>Results: Achieved</b></p> <p>1. NRCan's Canadian Forest Service continued to update its version of the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3), improved guidance for using the model, and provided it to stakeholders. It also held two training workshops.</p> <p>2. A synthesis of scientific information and research results from the Ecosystem Management Emulating Natural Disturbance (EMEND) experiment formed the basis for 2 symposia. New insights about ecosystem-based forestry management were shared with researchers, including concrete examples of ecosystem attributes that responded positively or recovered more quickly at higher retention levels, resulting in a better understanding of the</p>	<p><b>Results: Achieved</b></p> <p>1. NRCan's Canadian Forest Service updated its operational-scale version of Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) and provided it to stakeholders.</p> <p>2. A synthesis of 15 years of scientific information from the Ecosystem Management Emulating Natural Disturbance (EMEND) experiment is nearing completion. EMEND's research focuses on the effectiveness of ecosystem-based management in the western boreal. Lessons learned from this research are being applied to improve management practices on the surrounding operational landscape, and to inform development of Alberta's provincial forest policies, especially concerning ecosystem health,</p>	<p><b>Results: Achieved</b></p> <p>1. NRCan's Canadian Forest Service updated its operational-scale version of Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) and provided it to stakeholders.</p> <p>2. A synthesis of 15 years of scientific information from the Ecosystem Management Emulating Natural Disturbance (EMEND) experiment is nearing completion. EMEND's research focuses on the effectiveness of ecosystem-based management in the western boreal. Lessons learned from this research are being applied to improve management practices on the surrounding operational landscape, and to inform development of Alberta's provincial forest policies, especially concerning ecosystem health,</p>

				<p>benefits of retention harvesting.<sup>13</sup></p> <p>3. NRCan's Groundwater Geoscience program has signed an MOU with the BC Ministry of the Environment to provide scientific support in the implementation of their new Water Sustainability Act.</p> <p>4. NRCan's Environmental Geoscience Program's work on background seismicity is mentioned in the Strategic Environmental Assessment of Quebec hydrocarbon, report specifically on Île d'Anticosti (May 2016). In addition, scientists from the Environmental Geoscience Program (EGP) continue providing expertise and sharing knowledge to help the Government of the Northwest Territories (NWT) identify health related issues due to arsenic in the environment after new data was acquired on arsenic in soils, water and sediments in the Yellowknife area, including meeting with the Chief Medical Officer of Health for the NWT to get a better understand of the EGP findings.</p>	<p>productivity, and biodiversity. The EMEND science management model is recognized nationally and internationally as a best practice for implementing integrated science in an adaptive management framework to improve natural resource management.</p> <p>3. NRCan and provincial partners contributed to hold the first groundwater knowledge transfer workshop in Montérégie East, Quebec, which is providing decision-making tools to groundwater decision-makers.</p> <p>4. NRCan's Environmental Geoscience Program's work on background seismicity is mentioned in the Strategic Environmental Assessment of Quebec hydrocarbon report which is one of the province's decision-making tools in relation to its global energy policy. In addition, scientists from the Environmental Geoscience Program are providing expertise and sharing knowledge to help the Government of the Northwest Territories identify health related issues due to arsenic in the environment after new data was acquired on arsenic in soils, water and sediments in the Yellowknife area.</p>	<p>productivity, and biodiversity. The EMEND science management model is recognized nationally and internationally as a best practice for implementing integrated science in an adaptive management framework to improve natural resource management.</p> <p>3. NRCan and provincial partners contributed to hold the first groundwater knowledge transfer workshop in Montérégie East, Quebec, which is providing decision-making tools to groundwater decision-makers.</p> <p>4. The Environmental Geoscience Program played a critical role in Nova Scotia by providing guidelines to remediate gold mine tailings, which allowed the province to update its policies. In addition, three scientists from the Environmental Geoscience Program were requested to testify before the Bureau d'audiences publiques sur l'environnement (BAPE) on the development of shale gas in Quebec, thus contributing to policy decision-making in the province on that unconventional resource.</p>
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### Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
29,619,508	29,619,508	37,951,209	35,319,980	5,700,472

The increase between Planned spending and Actual spending is mainly explained by a realignment of real property expenditures related to special purpose buildings and the Federal Infrastructure Initiative which were planned under Internal Services while actual costs were incurred under the appropriate program, in line with TBS guidelines, as well as additional funding received during the year through Supplementary Estimates for Marine Conservation Targets. Offsetting these increases is funding being moved to future years for the Gunnar mine remediation.

### Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
242	223	(19)

The decrease between Planned FTEs and Actual FTEs is mainly attributed to attritions and the reallocation of resources to other program areas.

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xvi</sup>

## Program 3.1: Protection for Canadians and Natural Resources

### Description

Natural resource development and changes in the environment pose risks to human, natural resource and infrastructure health. The objective of this Program is to enable other government departments, communities and the private sector to manage these risks and to ensure the appropriate capacity is in place. NRCan achieves this objective by providing regulation, knowledge, tools and services and by fulfilling legislated responsibilities.

### Results

In 2016-17, NRCan advanced several initiatives to help enable key stakeholders to manage risks against potential hazards. To support the Government's broader climate change agenda, NRCan

<sup>13</sup> Retention harvesting leaves behind residual forest structure and is used to mitigate negative effects of forestry on forests and biodiversity. It is a method that emulates patterns of boreal wildfires, as part of a forest's normal life cycle. EMEND, is a collaborative forest research program that studies the effects of various retention scenarios. NRCan is one of 15 contributing partners.

focused efforts on building **capacity for hazards prevention** and **protection of natural resources**. Specifically, NRCan:

- Continued the development and operation of the Canadian Wildland Fire Information System, providing vital data on fire risks and locations of fires to strengthen protection from wildfire hazards and strengthen decision-making during major events;
- In collaboration with Parks Canada and provincial and territorial governments, updated the 2016 [Canadian Wildland Fire Strategy \(CWFS\)](#),<sup>xxxv</sup> which in turn supports the Wildland Fire Management Working Group, assists the implementation of a Canadian Wildland Fire Preparedness and Response Plan, and expands prevention and mitigation programming such as [FireSmart Canada](#),<sup>xxxvi</sup>
- Ensured that Canada’s seismic monitoring network will remain one of the most advanced in the world through a \$16 million investment in upgrades to existing seismometers and Global Positioning System instruments across the Canadian Seismograph Network and upgraded Canada’s seismic hazard model for inclusion in the 2015 National Building Code of Canada;
- Advanced landslide monitoring experiments and natural hazard risk assessments across the country through strong collaborations with key federal partners and industry associations;
- Launched a national assessment of climate change impacts and adaptation to provide Canadians and developed and disseminated [Forest Change Adaptation tools and indicators](#)<sup>xxxvii</sup> on climate change vulnerability in the forest sector;
- Ensured highest quality standard of reliable, safe and secure metal and material inspections through successfully obtaining international ISO certifications (ISO 9001:2015 and ISO 17024:2012) for NRCan’s National Non-Destructive Testing Certification Body (NDTCB);
- Led the development of Adaptation Platform State of Play reports on climate change adaptation and activities needed to advance adaptation action. Four-year work plans were developed on coastal management, economics, energy, forestry, infrastructure and buildings and mining;
- Provided advice on recommendations to enhance leadership and intergovernmental coordination for improved engagement and emergency response to invasive alien species, accepted by federal, provincial and territorial conservation, wildlife and biodiversity ministers in February 2017; and

***Did you know?***

**NRCan officials provided extensive support to decision-makers and first responders during the Fort McMurray forest fires in 2016.**

Departmental scientists provided satellite imagery, fire growth modelling, digital maps and energy supply forecasts. Massive amounts of valuable data were produced, often updated several times a day to deliver essential, timely and accurate wildfire science information. NRCan also responded to over 100 media calls over 10 days to share expertise on fire science with Canadian and international audiences.

- Led research on an early intervention strategy for spruce budworm outbreaks in Eastern Canada and helped develop a strategy to slow the spread of the mountain pine beetle across Canada.

The Department also ensured the **safe and secure handling of explosives** by:

- Conducting 755 compliance inspections of explosives facilities across Canada for which over 70% received ratings of satisfactory or better, as the administrator of the Explosives Act and Regulations;
- Advancing important progress on the Department's [Electronic Licence Management System](#),<sup>xxxviii</sup> an innovative, secure, online portal for Canadians to apply, renew, amend, pay for, or check the application status of their explosives licences; and
- Completing NRCan's commitment to the federal government's [Single Window Initiative](#)<sup>xxxix</sup> to enhance our security and accelerate the legitimate flow of people, goods and services at the border, as identified in the Beyond the Border Declaration. Canadians are now able to provide information to demonstrate compliance with explosives regulatory requirements in a more stream-lined, efficient manner.

### Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Governments, communities and the private sector manage risks or opportunities to natural resources, infrastructure, and human health	Number of risk assessments (climate change, geohazards, other), policies, regulations, plans, standards (codes) or guidelines developed using NRCan information or services	5 per year	March 31, 2017	<b>Results: Achieved</b> <b>A substantial upgrade of the seismic hazard model for Canada</b> was completed and incorporated into the National Building Code of Canada 2015, released in June 2016. NRCan worked with Public Safety Canada to release <b>a forward-looking guidance document</b> on risk assessment needs in Canada. In addition, a <b>guidance document on critical infrastructure and flood mapping</b> was completed. NRCan is actively	<b>Results: Achieved</b> NRCan expertise was used to develop <b>three new risk assessments</b> on climate change adaptation, including a risk assessment for the oil and gas sector of Northeastern British Columbia, and a risk and opportunity assessment of climate change on British Columbia electricity demand.  NRCan geohazard knowledge products contributed to <b>five standards and guidelines</b> developed by public and private	<b>Results: Achieved</b> NRCan information was used to develop <b>three new risk assessments</b> and <b>one guideline</b> . The risk assessments delivered through the Adaptation Platform included an assessment of risks to Prince Edward Island's coastal residences, infrastructure and heritage from rising sea levels and coastal erosion.  NRCan provided ongoing geohazard expertise in support of environmental assessments for major

				involved with the North American Electric Reliability Corporation (NERC) on developing <b>new guidelines for electric power utilities to manage geomagnetic disturbances.</b>	sector organizations. NRCAN also developed seismic hazard models that were used to inform the National Research Council Canada's 2015-2020 update of National Building Code of Canada.	projects. NRCAN provided hazard scenarios and quantitative risk assessments in support of earthquake disaster preparedness studies carried out by the Province of British Columbia. NRCAN participated in the development and revision of a number of GC emergency management plans, <b>exercised four plans and participated in a full-scale exercise</b> with federal and provincial agencies to test the Federal Nuclear Emergency Plan. Lessons learned from these exercises were used to improve plans.
Number of active collaborations with the public and private sector that manage risks or opportunities to human population, natural resources and infrastructure health	6 collaboration agreements	March 31, 2017	<b>Results: Achieved</b> NRCAN initiated <b>three new collaborative research agreements</b> with the Canadian Food Inspection Agency to enhance surveillance techniques for damaging invasive alien species in order to mitigate risks of introduction and spread in Canada. Signed <b>four new 'Regional Adaptation Collaborative' agreements</b> to increase the dissemination of program results and to help engage new groups in managing adaptation risks in British Columbia, the Prairie provinces, Ontario, and Quebec	<b>Results: Achieved</b> Maintained existing networks through delivery of Canada's Adaptation Platform, including a new initiative with Chartered Professional Accountants to inform their membership to address climate change adaptation in their work. New collaboration agreements were established with provinces, territories and other federal departments to enhance forest disturbance management across Canada. For example, a collaborative project with the Northwest Territories provided aerial survey training to forest health specialists. A collaborative agreement was also established with Ontario to develop	<b>Results: Achieved</b> NRCAN collaboration with provinces and territories in the area of forest fires and pests continued under the Canadian Council of Forest Ministers. Examples of collaboration agreements include a new governance model for Canadian wildland fire management cooperation, and the publication of two risk analyses on the management of pests affecting Canada's forests. Three new collaborations on climate change were established through the Adaptation Platform including a new collaborative project initiated by the Platform's Energy Working Group to estimate changes in demand for heating and cooling over the next 30 years in response to projected temperature changes in Canada. The results will inform energy supply management and planning.	

					<p>tools for the early detection and management of emerald ash borer, a pest threatening ash trees in urban areas of southern Ontario and Quebec.</p> <p>The Ontario Centre for Climate Adaptation Research, Ouranos, and NRCan collaborated on a national conference (Adaptation Canada 2016) to showcase results of the federal adaptation programming, the first collaboration of its kind in 10 years.</p>	
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#### Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
57,808,743	57,808,743	79,900,579	79,879,094	22,070,351

The increase between Planned spending and Actual spending is mainly explained by a realignment of real property expenditures related to special purpose buildings and the Federal Infrastructure Initiative which were planned under Internal Services while actual costs were incurred under the appropriate program, in line with TBS guidelines

#### Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
427	435	8

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xvi</sup>

## Program 3.2: Landmass Information

### Description

Public, academic and private sectors as well as Canadians rely on up-to-date, comprehensive and accessible landmass information to make sound socio-economic and environmental decisions. This Program provides open access to Canada’s fundamental geomatics framework and information system, including accurate three-dimensional positioning, high-resolution satellite imagery and other remote sensing products, legal (boundary) surveys, mapping and other analysis applications. In addition, it delivers logistics support in the North and regulatory oversight for a robust property system framework on Canada Lands.

### Results

In 2016-17 NRCan supported effective management of Canada Lands and collaboration across jurisdictions to advance interests of Canada’s natural resource sectors and respond to potential risks for Canadians. The Department accomplished this through the **provision of expertise and information** on Canada’s landmass in the following ways:

- Developing the Compact Polarimetry simulation software that is being used by the Canada Space Agency to help prepare for the 2018 RADARSAT Constellation Mission (RCM)<sup>14</sup>. The software will allow scientists to assess the ability of new programs to use data collected from the satellite, support training and evaluation of the satellite data system (during pre-launch activities) to ensure the satellite will be capturing relevant geographical information;
- Modernizing the [Canada Lands Survey](#)<sup>x1</sup> System through the digitization of over 100,000 documents in the Canada Lands Survey Records and shifting to electronic processes to reduce wait times for Canadians seeking regulatory approvals of legal survey documents;
- Digitizing 200,000 aerial photographs of Canada’s landmass currently housed in NRCan’s National Air Photo Library (NAPL). These original photographs provide historic value and support

#### Did you know?

**NRCan’s Canada Lands Surveys help to establish property rights for Canada Lands and private lands in the North.**

Canada Lands include our three territories, 2600+ Indian Reserves, our National Parks and the areas off our ocean shores. Canada Lands Surveys help meet land-related reconciliation initiatives and contributes to certainty and accuracy around boundary issues for First Nations and other Canadians living in those areas.

Under Canada’s Legal Boundaries Program, NRCan completed all of its planned and scheduled surveys for 2016-17, as defined in land claim legislation and agreements. This work contributed to protecting the rights of all Canadians and supporting the Minister’s commitment to renew relationships with Indigenous peoples.

<sup>14</sup> The RCM ensures continuity of satellite data, improved operational use of Synthetic Aperture Radar to create images of objects like landscapes, and improved system reliability to collect data for maritime surveillance, disaster management and ecosystem monitoring.



information requirements on historical land use for litigation, emergency response and environmental protection; and

- Creating approximately 70 satellite image products to help monitor river ice, in collaboration with the Ontario Ministry of Natural Resources and Indigenous and Northern Affairs Canada.

NRCan also advanced its objective through the [Polar Continental Shelf Program](#),<sup>xli</sup> and the United Nations Convention on the Law of the Sea (UNCLOS)<sup>15</sup> by **facilitating scientific research in the Arctic region**, where the harsher climates and remote locations present significant challenges, and **contributing to the exercise of Canada’s sovereignty**. In 2016-17, NRCan:

- Provided logistics coordination assistance to 145 projects in Canada’s Arctic and delivered over 1,400 requests for field equipment in support of science and federal government operations across the Canadian landmass.
- Participated in the 2016 Canada-Sweden Polar Expedition, a collaboration of scientists from Sweden, Denmark and the United States and Canadian scientists from NRCan, Fisheries and Oceans Canada, and Environment and Climate Change Canada, to map Canada’s Arctic extended continental shelf under UNCLOS. The UNCLOS program is on track to file a submission to the UN Commission on the Limits of the Continental Shelf by 2019. In addition to fulfilling Canada’s requirements as a party to UNCLOS and establishing jurisdiction over the natural resources in the area, this research provides scientific data and samples that will increase our knowledge about the history of the Arctic Ocean and its evolution.

#### Did you know?

**The 2016 Canada-Sweden Polar Expedition was Canada’s final UNCLOS survey in the Arctic Ocean, the world’s least explored ocean. The mission was 47 days long.**

Two heavy-duty icebreakers acquired data and geological samples as scientific evidence to support the proposed outer limits of Canada’s extended continental shelf.

The expedition was the first, single-season, shipboard geophysical survey across the Arctic Ocean from Amundsen Basin to Canada Basin and the first to collect geological samples from Alpha Ridge, one of the major ridges dividing the Arctic Ocean.

The survey was also the first to conduct long offset wide-angle refraction experiments in the Arctic Ocean and deploy seismometers from research vessels on ice floes. Scientists collected more data of different types and from more areas than any of Canada’s previous surveys.

<sup>15</sup> Canada is required to delineate the outer limits of its extended continental shelf beyond 200 nautical miles using scientific survey data, and to submit this information to the UN Commission on the Limits of the Continental Shelf. International recognition of Canada’s new offshore boundaries will establish our jurisdiction over the natural resources on the seabed and in the subsoil.

Results achieved

Expected results	Performance indicators	Target	Date to achieve target	2016–17 Actual results	2015–16 Actual results	2014–15 Actual results
Stakeholders discover and access geospatial assets to inform decision-making, reporting, operations and research*	Satisfaction with discoverability and access to geospatial assets	Improvement over previous reporting period on satisfaction with overall discovery and access	March 31, 2018	<b>Results: On Track</b> Assessment tool development began in March 2017. On track to establish baseline in 2017-18.	Not available: Performance indicator did not exist in 2015-16	Not available: Performance indicator did not exist in 2014-15
Public, private sector and academia use accurate, Government of Canada geo-information for decision-making	Evidence identifying that Canada Lands Survey System activities are meeting stakeholder needs	At least one source of evidence from First Nations, other government departments and industry for the Canada Lands Survey System	March 31, 2018	<b>Results: On track</b> Evidence collected for 2016-17 indicated that stakeholder needs were met.  The new Yukon Land Titles Act officially recognizes the Surveyor General as the Survey Authority. This has resulted in increased business integration with improved service delivery.  A study on cadastral datasets in the North showed their widespread usage within the three territorial governments and found the data to be reliable and current.  The study recommended improved communications about Canada Lands Survey System services in the North.  An industry-focused cost study demonstrated the Canada Lands Survey System to be comparable with survey systems on private or provincial lands. The study recommended more education for surveyors and lands administrators on the process and tools available to further reduce costs.	<b>Results: On Track</b> Evidence collected for 2015-16 indicates that stakeholder needs were met and benefits from modernization of the Canada Lands Survey System were realized by stakeholders. Stakeholders identified areas for improvement including increased alignment with the Yukon Land Titles System.	Not available: Performance indicator did not exist in 2014-15

Polar Continental Shelf Program (PCSP) clients receive cost-effective logistics support needed to conduct field work safely in Canada's Arctic and Subarctic regions	Level of client satisfaction with mix, quality and cost of support received	85% of clients are either satisfied or very satisfied	March 31, 2017	<b>Results: Not available</b> The client satisfaction survey is administered every three years. No survey was conducted in 2016-17. The next survey is planned for 2018-19.	<b>Results: 90%</b> Through a client satisfaction questionnaire administered in 2015-16, <b>90% of respondents</b> indicated they were either satisfied or very satisfied with the mix and quality of logistics support provided by the PCSP.	Not available: Performance indicator did not exist in 2014-15
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\*In the 2016-17 RPP, the performance indicator, "Percentage of clients who are satisfied with Canada's legal boundary framework for effective governance, economic and social development" was determined not relevant to this Expected Result and has been removed.

#### Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
75,092,662	75,092,662	93,523,442	74,793,210	(299,452)

#### Human resources (full-time equivalents)

2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
408	387	(21)

The decrease between Planned FTEs and Actual FTEs is mainly attributed to the reallocation of resources and staff departures.

Supporting information on results, financial and human resources relating to NRCan's lower-level programs is available on [InfoBase](#).<sup>xvi</sup>

## Internal Services

### Description

Internal Services are those groups of related activities and resources that the federal government considers to be services in support of programs and/or required to meet corporate obligations of an organization. Internal Services refers to the activities and resources of the 10 distinct service categories that support Program delivery in the organization, regardless of the Internal Services delivery model in a department. The 10 service categories are: Management and Oversight Services; Communications Services; Legal Services; Human Resources Management Services; Financial Management Services; Information Management Services; Information Technology Services; Real Property Services; Materiel Services; and Acquisition Services.

### Results

In 2016-17, NRCan continued its efforts to support the Department in advancing the Minister's mandate letter commitments and Government of Canada priorities, including in the following areas:

#### Openness and transparency

As part of its efforts to increase capacity to engage with stakeholders, foster greater transparency and accountability, share knowledge and report on performance, NRCan:

- Revitalized NRCan's public engagement function through the creation of a **Stakeholder Engagement Unit** that:
  - Increased and expanded use of existing departmental social media channels, including Twitter, LinkedIn and Instagram, and enhanced the use of web consultation platforms to complement in-person engagement. This helped to obtain views from over 40,000 Canadians that fed into policy and program development.
  - Supported public engagement on all mandate priority areas, including facilitating dialogue between experts, scientists and other stakeholders to inform advice provided to the Minister on mandate letter commitments.
- Made significant progress in advancing **Open Government Initiative**,<sup>xliii</sup> by:
  - Contributing to the Government of Canada's (GC) **open data**<sup>xliiii</sup> portal by providing data sets that account for 90% of all data on the Portal.
  - Leading the **Federal Geospatial Platform (FGP)**,<sup>xliv</sup> interface with the GC portal, including the **open maps**<sup>xlv</sup>
  - Launching the **Federal Science Library (FSL)**,<sup>xlvi</sup> a one-stop, self-serve web portal that allows for sharing of scientific knowledge, and makes government research and data resources available to all Canadians.

### **Increasing operational efficiency**

In 2016-17, NRCan invested in modernizing Departmental infrastructure and processes to increase efficiency. Specifically, the Department:

- Invested over \$43.2M under the Federal Infrastructure Initiative (II) and \$25.2M under the Federal Infrastructure Initiative (III) to:
  - Support laboratory modernizations in NRCan’s research facilities to keep in step with the requirements of sophisticated scientific research; and
  - Upgrade its real property holdings with energy-efficient systems, such as heat recovery systems and LED lighting, which boost future energy savings and contribute to a reduced carbon footprint for the Department;
- Implemented a new staffing approach, aligned with the Public Service Commission’s New Direction in Staffing, to reduce administrative processes and increase added value to managers;
- Launched a Classification Renewal project to replace the aged Broadband Work Descriptions with standardized job descriptions (SJDs). SJDs will streamline classification and staffing activities; and
- Improved Information Technology (IT) security by successfully completing Phase 2 of NRCan’s Cyber Security Action Plan. This phase included the implementation of additional security measures, such as formal documentation of IT security processes and procedures, development of a vulnerability management program, and cybersecurity training for NRCan employees.

### **Policy, science and management excellence**

NRCan set the foundation for future policy, science and management excellence by:

- Completing a rigorous exercise for executive positions to make targeted staffing decisions in support of Departmental priorities, as part of the Department’s talent and performance management;
- Developing and implementing the Mental Health and Wellness in the Workplace Strategy to reduce stigma, increase awareness and support for employees. As part of the strategy, NRCan:
  - Identified champions for Mental Health and Fitness and Wellness;
  - Created a Mental Health Joint Working Group with bargaining agents; and
  - Delivered practical mental health and workplace wellness training to executives and employees;

- Developing a cross-sectoral Medium- to Long-Term Economic and Policy Research Agenda to support evidence-based decision-making;
- Contracting nine research papers with external experts that addressed knowledge gaps on NRCan priorities and supported evidence-based decision-making:
  - Four papers were produced under the theme of “Supporting the Transition to a Low-Carbon Economy”; the other five under the theme of “Deepening Knowledge on Canada’s Priority Trade Relations”; and
- Launching three Action Learning Teams (ALTs) as part of the NRCan Science and Policy Integration Leadership Bootcamp, bringing together cross-sectoral science and policy professionals who conducted analysis and developed recommendations on complex topics using new policy instruments, such as the Federal Geospatial Platform. ALT reports provided evidence-based content that fed into NRCan science and policy planning, as well as recommendations on the use of new policy instruments.

#### Budgetary financial resources (dollars)

2016–17 Main Estimates	2016–17 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2016–17 Difference (actual minus planned)
184,517,755	184,517,755	167,923,770	125,907,344	(58,610,411)

The decrease between Planned spending and Actual spending is mainly attributable to the realignment of the Federal Infrastructure Initiative (FII) and real property expenditures related to special purpose buildings which were planned under Internal Services while actual costs were incurred under the appropriate program, in line with TBS guidelines. Furthermore, the FII reported a surplus to be carried forward to next year. Other factors offsetting these decreases include additional funding received through Supplementary Estimates for the FII and various other programs.

#### Human resources (full-time equivalents)

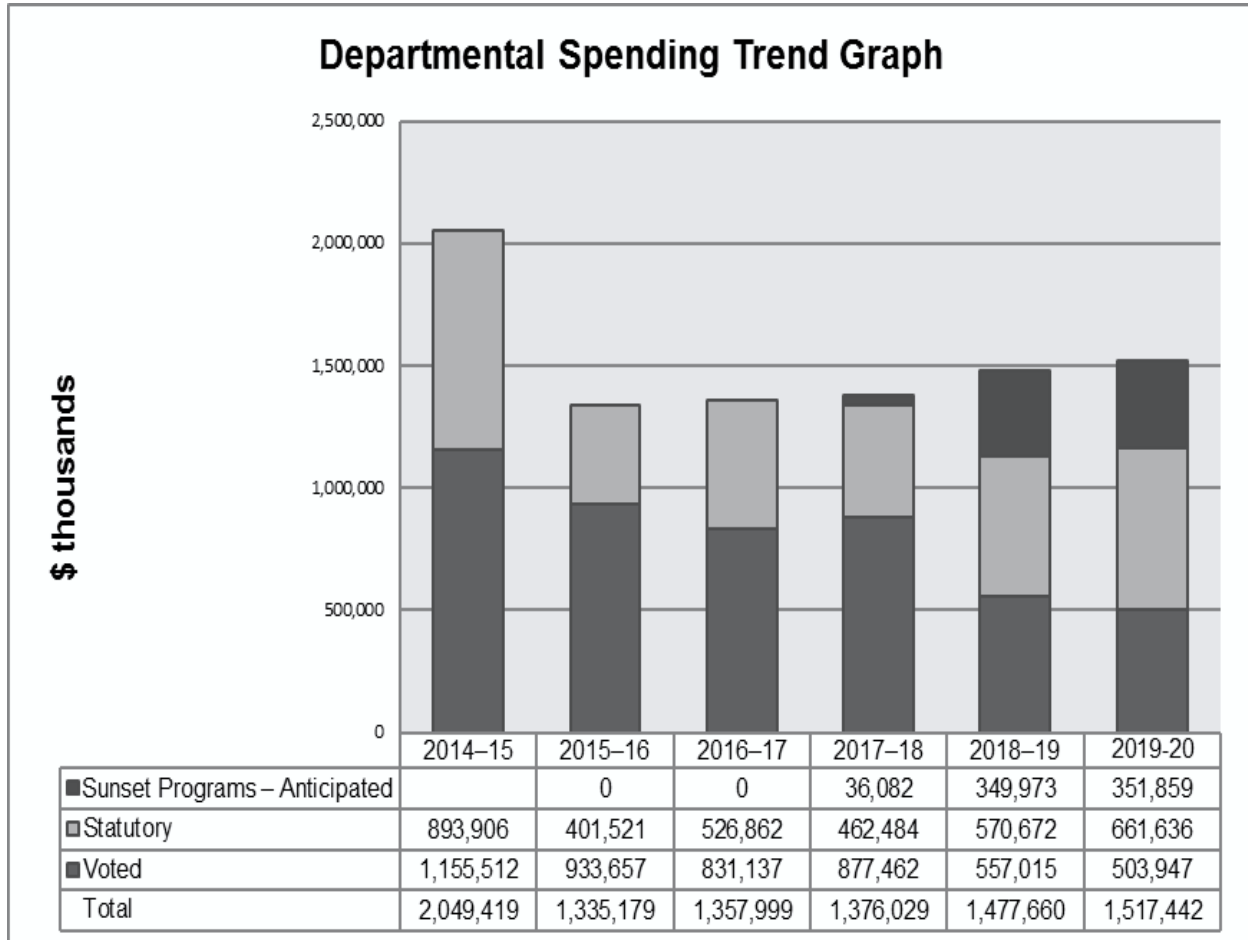
2016–17 Planned	2016–17 Actual	2016–17 Difference (actual minus planned)
936	906	(30)

The decrease between Planned FTEs and Actual FTEs is mainly attributed to the reallocation of resources and staff departures.

## Analysis of trends in spending and human resources

### Actual expenditures

Departmental spending trend graph<sup>16</sup>



<sup>16</sup> The Sunset Programs – Anticipated for 2017-18 to 2018-19 mainly reflect announcements in Budget 2017 that are not yet reflected in the Voted level for those years and are subject to Parliamentary approval, and programs that are set to expire for which no Government decision on the program's future has been made. These are provided to give a more reasonable picture of the future of the Department.

## Budgetary performance summary for Programs and Internal Services (dollars)

Programs and Internal Services	2016–17 Main Estimates	2016–17 Planned spending	2017–18 Planned spending	2018–19 Planned spending	2016–17 Total authorities available for use	2016–17 Actual spending (authorities used)	2015–16 Actual spending (authorities used)	2014–15 Actual spending (authorities used)
1.1 Market Access and Diversification	43,993,476	43,993,476	60,190,597	35,202,474	74,012,256	70,738,385	75,927,073	61,566,240
1.2 Innovation for New Products and Processes	96,074,981	96,074,981	109,154,844	39,171,754	111,219,760	97,761,228	93,375,233	71,707,214
1.3 Investments in Natural Resource Sectors	62,900,219	62,900,219	73,163,653	67,873,990	74,761,684	74,593,181	68,270,162	60,589,504
1.4 Statutory Programs – Atlantic Offshore <sup>a</sup>	743,336,158	743,336,158	408,998,253	521,471,910	473,430,813	473,430,813	347,989,273	837,746,067
2.1 Energy-Efficient Practices and Low-Carbon Energy Sources	183,336,817	183,336,817	183,461,546	137,174,523	213,996,763	177,431,795	211,012,423	291,745,439
2.2 Technology Innovation	115,838,434	115,838,434	219,965,182	81,401,428	148,253,404	148,143,884	143,620,407	151,832,220
2.3 Responsible Natural Resource Management	29,619,508	29,619,508	27,437,623	27,055,064	37,951,209	35,319,980	121,598,627	267,570,932
3.1 Protection for Canadians and Natural Resources	57,808,743	57,808,743	70,418,079	59,079,852	79,900,579	79,879,094	73,709,947	65,692,439
3.2 Landmass Information	75,092,662	75,092,662	49,150,177	45,914,237	93,523,442	74,793,210	74,110,670	78,469,116
<b>Subtotal</b>	<b>1,408,000,998</b>	<b>1,408,000,998</b>	<b>1,201,939,954</b>	<b>1,014,345,232</b>	<b>1,307,049,910</b>	<b>1,232,091,570</b>	<b>1,209,613,815</b>	<b>1,886,919,171</b>
Internal Services	184,517,755	184,517,755	138,006,496	113,341,893	167,923,770	125,907,344	125,564,854	162,499,616
<b>Total</b>	<b>1,592,518,753</b>	<b>1,592,518,753</b>	<b>1,339,946,450</b>	<b>1,127,687,125</b>	<b>1,474,973,680</b>	<b>1,357,998,914</b>	<b>1,335,178,669</b>	<b>2,049,418,787</b>

<sup>a</sup> Statutory Programs – Atlantic Offshore: As per the various Atlantic Offshore Accords, the Government of Canada receives royalties for offshore oil and gas production and subsequently pays an equal amount to the provinces of Nova Scotia and Newfoundland and Labrador.



The overall \$235 million difference between the 2016-17 Planned spending of \$1,593 million and Actual spending of \$1,358 million is attributed to a \$118 million reduction in authorities and \$117 million in unspent funding.

The \$118 million reduction in authorities is explained by the following:

Decreases due to:

- Reduced authority for statutory payments under the Atlantic Offshore Accord Acts due to reduced oil prices from the time of forecasts which were done in the fall of 2015; and
- A transfer to Innovation, Science and Economic Development Canada related to the Sustainable Development Technology Fund.

Increases due to:

- Funding received through Supplementary Estimates mainly for Clean Growth and Climate Change, Federal Infrastructure Initiative (FII), Green Infrastructure, Soldier Settlement Board mineral rights, modernization of the National Energy Board, and marine protection program; and
- The receipt of the operating budget carry forward.

The \$117 million in unspent funding is explained by the following:

- Funds frozen and not available for spending, as per Budget 2016, related to Professional Services, Advertising and Travel;
- Funding being moved into future years for Investments in Forest Industry Transformation, Oil Spill Response Science Program, UNCLOS, Gunnar Mine Remediation and Soldier Settlement Board;
- Unspent funds being carried forward to next year, mainly to cover unfunded collective bargaining increases and to support FII projects; and
- Unspent funds pertaining to the ecoENERGY for Biofuels program (due to lower than anticipated production by biofuel companies) and the ecoENERGY Renewable Power program (due to lower incentive payouts based on lower production levels).

Although there are differences, both the preceding graph and table show that 2017-18 Planned spending is similar to 2016-17 Actual expenditures.

For 2017-18 to 2019-20, both the graph and table show lower planned spending than 2016-17 actual expenditures. This is the result of fluctuations in the economic modeling for the Atlantic Offshore Accounts and the scheduled ending, or sunseting, of existing programs (i.e. Clean Growth and Climate Change, FII, Green Infrastructure, Investments in Forest Industry Transformation, Forest Innovation Program and Expanding Market Opportunities). However, as reflected in the graph, the Department anticipates that some of these programs will be renewed or replaced and spending levels will be more comparable to past years.

For 2014-15, 2015-16 and 2016-17 the figures represent actual expenditures as reported in the Public Accounts. NRCan's spending profile shows a significant drop in 2015-16 and 2016-17 compared to 2014-15, mainly as a result of the Statutory Atlantic Offshore Accounts, the transfer of responsibility over the Nuclear Legacy Liabilities Program and the Port Hope Area Initiative to Atomic Energy of Canada Limited, and reduced spending pertaining to the ecoENERGY for Biofuels and the ecoENERGY for Renewable Power programs. These reductions were slightly offset by the implementation of the FII.

## Actual human resources

Human resources summary for Programs and Internal Services  
(full-time equivalents)

Programs and Internal Services	2014–15 Actual	2015–16 Actual	2016–17 Forecast	2016–17 Actual	2017–18 Planned	2018–19 Planned
1.1 Market Access and Diversification	250	254	243	277	267	242
1.2 Innovation for New Products and Processes	296	313	296	328	289	255
1.3 Investments in Natural Resource Sectors	398	399	378	422	395	394
1.4 Statutory Programs – Atlantic Offshore*	0	0	0	0	0	0
2.1 Energy-Efficient Practices and Low-Carbon Energy Sources	278	264	101	265	252	162
2.2 Technology Innovation	635	665	516	653	646	539
2.3 Responsible Natural Resource Management	247	244	242	223	186	184
3.1 Protection for Canadians and Natural Resources	478	474	427	435	414	404
3.2 Landmass Information	385	383	408	387	386	378
<b>Subtotal</b>	2,967	2,996	2,611	2,990	2,835	2,558
Internal Services	946	940	936	906	922	882
<b>Total</b>	3,913	3,936	3,547	3,896	3,757	3,440

For 2014-15 and 2015-16, the figures represent actual FTEs as reported in their respective Departmental Results Reports. For 2016-17, the planned FTEs are as per the [2016-17 Departmental Plan](#)<sup>xlvii</sup> and the 2016-17 actual FTEs reflect the actual FTEs for 2016-17.

For 2017-18 and 2018-19, the figures represent total planned FTEs to support NRCan program activities, approved by Treasury Board to support the Departmental strategic outcomes.

The decrease between 2016-17 and 2018-19 is mainly explained by the sunsetting of a number of major initiatives, which were explained in the Budgetary Performance Summary section.

As new initiatives are undertaken, plans for future FTE requirements will be adjusted accordingly.

## Expenditures by vote

For information on the Department of Natural Resources Canada's organizational voted and statutory expenditures, consult the [Public Accounts of Canada 2017](#).<sup>xlvi</sup>

## Alignment of spending with the whole-of-government framework

Alignment of 2016–17 actual spending with the [whole-of-government framework](#)<sup>xli</sup> (dollars)

Program	Spending area	Government of Canada activity	2016–17 Actual spending
1.1 Market Access and Diversification	Economic Affairs	Strong Economic Growth	70,738,385
1.2 Innovation for New Products and Processes	Economic Affairs	Strong Economic Growth	97,761,228
1.3 Investment in Natural Resource Sectors	Economic Affairs	Strong Economic Growth	74,593,181
1.4 Statutory Programs – Atlantic Offshore	Economic Affairs	Strong Economic Growth	473,430,813
2.1 Energy-Efficient Practices and Low-Carbon Energy Sources	Economic Affairs	A Clean and Healthy Environment	177,431,795
2.2 Technology Innovation	Economic Affairs	A Clean and Healthy Environment	148,143,884
2.3 Responsible Natural Resource Management	Economic Affairs	A Clean and Healthy Environment	35,319,980
3.1 Protection for Canadians and Natural Resources	Social Affairs	A Safe and Secure Canada	79,879,094
3.2 Landmass Information	Social Affairs	A Safe and Secure Canada	74,793,210

Total spending by spending area (dollars)<sup>a</sup>

Spending area	Total planned spending	Total actual spending
Economic affairs	1,275,099,593	1,077,419,266
Social affairs	132,901,405	154,672,304
International affairs	--	--
Government affairs	--	--

<sup>a</sup> Spending (Planned and Actual) related to the Internal Services are not included in this table.

## Financial statements and financial statements highlights

### Financial statements

NRCan's consolidated financial statements (unaudited) for the year ended March 31, 2017, are available on the [Departmental website](#).<sup>1</sup>

### Financial statements — highlights

The consolidated financial statements are intended to provide a general overview of the Department's financial position and operations and should be read in conjunction with NRCan's consolidated financial statements.

The consolidated financial statements were prepared using the Government's accounting policies which are based on Canadian public sector accounting standards and are therefore different from reporting on the use of authorities in other sections. Reconciliation between authorities used and the net cost of operations is set out in Note 3 of the Department's consolidated financial statements.

Condensed Consolidated Statement of Operations (unaudited) for the year ending March 31, 2017 (dollars)

Financial information	2016–17 Planned results <sup>a</sup>	2016–17 Actual	2015–16 Actual	Difference (2016–17 actual minus 2016–17 planned)	Difference (2016–17 actual minus 2015–16 actual)
Total expenses <sup>b</sup>	1,637,636,823	1,349,957,088	1,368,087,269	(287,679,735)	(18,130,181)
Total revenues	38,870,446	29,410,248	30,836,347	(9,460,198)	(1,426,099)
Net cost of operations before Government funding and transfers	1,598,766,377	1,320,546,840	1,337,250,922	(278,219,537)	(16,704,082)

<sup>a</sup> The 2016-17 Planned Results are derived from the amounts presented in the [2016-17 Consolidated Future-Oriented Statement of Operations](#)<sup>li</sup> and included in NRCan's [2016-17 Departmental Plan](#).<sup>xlvi</sup>

<sup>b</sup> Transferred operations are included in the 2015-16 total actual expenses, which comprise of \$1,243,617,036 in total expense and \$124,470,233 in net cost of transferred operations, as it relates to the transferred responsibilities of the Nuclear Legacy Liabilities Program and the Historic Waste Program to Atomic Energy of Canada Limited (AECL), which became effective on September 13, 2015.

### Difference between 2016-17 Actual and Planned

For 2016-17, the difference in total actual expenses (\$1,350 million) and planned results (\$1,638 million) is \$288 million, or 18% of overestimated expenses. This is mostly attributable to a \$270 million decrease in Atlantic Offshore Statutory programs mainly due to lower offshore royalties than forecasted for the Newfoundland Offshore Petroleum Resource Revenue Fund (largely due to decreased oil prices), which resulted in lower transfer payments to other levels of government.

### Difference between 2016-17 and 2015-16 Actuals

Total actual expenses were \$1,350 million in 2016-17 compared to \$1,368 million in 2015-16 for a net decrease of \$18 million, or 1%. This net decrease is mainly explained by:

- A \$141 million increase in Atlantic Offshore Statutory programs mainly due to an increase in oil production levels compared to 2015-16 actual spending therefore increasing transfer payments to other levels of government; offset by
- A \$124 million decrease in total expenses for transferred operations from \$124 million in 2015-16 to nil in 2016-17 due to the transfer of responsibilities from the Nuclear Legacy Liabilities Program and the Historic Waste Program to the AECL as of September 2015.

The chart presenting NRCan's actual expenses by type for 2016-17 is available on the [Departmental website](#).<sup>lii</sup>

Condensed Consolidated Statement of Financial Position (unaudited) as at March 31, 2017 (dollars)

Financial Information	2016–17	2015–16	Difference (2016–17 minus 2015–16)
Total net liabilities	405,786,013	432,291,969	(26,505,956)
Total net financial assets	244,655,407	257,773,468	(13,118,061)
Departmental net debt	161,130,606	174,518,501	(13,387,895)
Total non-financial assets	334,766,837	272,387,642	62,379,195
Departmental net financial position	173,636,231	97,869,141	75,767,090

Total net liabilities were \$406 million in 2016-17, compared to \$432 million in 2015-16, for a net decrease of \$26 million or 6%. This variance is mainly attributable to a decrease of \$29 million in accounts payable and accrued liabilities due to a \$13.1 million decrease related to a

payment to settle the Soldier Settlement Board mineral rights and a \$12 million decrease in holdbacks under various contribution programs.

Total net financial assets were \$245 million in 2016-17, compared to \$258 million in 2015-16, for a net decrease of \$13 million or 5%. This variance is attributable to the decrease in the Due from Consolidated Revenue Fund (CRF) of \$14 million, which is related to the decrease in accounts payable at year-end.

The overall difference between the Total net liabilities and Total net financial assets are then reflected in the Departmental net debt.

Total non-financial assets, which include prepayments, inventory and tangible capital assets were \$334 million in 2016-17, compared to \$272 million in 2015-16 for a net increase of \$62 million. This variance is mainly due to the increase in tangible capital assets due to betterments to buildings across Canada under the Federal Infrastructure Initiative.

The Total non-financial assets are then subtracted from the Departmental net debt to reflect the Departmental net financial position.

## Supplementary information

### Corporate information

#### Organizational profile

**Appropriate minister:** The Honourable James Gordon Carr, P.C., M.P.

**Institutional head:** Christyne Tremblay

#### Ministerial portfolio<sup>17</sup>:

- [Atomic Energy of Canada Limited](#)<sup>liii</sup> (AECL);
- [National Energy Board](#)<sup>liv</sup> (NEB);
- [Canadian Nuclear Safety Commission](#)<sup>lv</sup> (CNSC);
- [Canada-Newfoundland and Labrador Offshore Petroleum Board](#)<sup>lvi</sup> (CNLOPB);
- [Canada-Nova Scotia Offshore Petroleum Board](#)<sup>lvii</sup> (CNSOPB);
- [Northern Pipeline Agency](#)<sup>lviii</sup> (NPA); and
- Energy Supplies Allocation Board (ESAB) (inactive).

**Year of incorporation / commencement:** 1994

#### Main legislative authorities:

- [Department of Natural Resources Act](#),<sup>iii</sup> S.C. 1994, c. 41
- [Forestry Act](#),<sup>v</sup> R.S.C., 1985, c. F-30
- [Resources and Technical Surveys Act](#),<sup>iv</sup> R.S.C., 1985, c. R-7
- [Energy Efficiency Act](#),<sup>vi</sup> S.C. 1992, c. 36
- [Extractive Sector Transparency Measures Act](#),<sup>vii</sup> S.C. 2014, c. 39, s. 376

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<sup>17</sup> On November 4, 2015, an Order-in-Council designated the Minister of Industry (now the Minister of Innovation, Science and Economic Development (ISED)) as the Minister for the purposes of the Canada Foundation for Sustainable Development Technology Act. As a result, resources allocated to this organization were transferred to ISED, thereby reducing NRCan financial resources. Until the transfer was complete in June 2016, NRCan continued to disburse funds from its reference levels toward SDTC. These disbursements were equally shared between NRCan and Environment and Climate Change Canada, with each department reporting its shares in its DRRs.



## Reporting framework

Natural Resources Canada's Strategic Outcomes and Program Alignment Architecture of Record for 2016–17 are shown below.

### 1. Strategic Outcome: Canada's Natural Resource Sectors are Globally Competitive

#### 1.1 Program: Market Access and Diversification

1.1.1 Sub-Program: Mineral and Metal Markets Access and Diversification

1.1.2 Sub-Program: Forest Products Market Access and Diversification

1.1.3 Sub-Program: Energy Market Access and Diversification

#### 1.2 Program: Innovation for New Products and Processes

1.2.1 Sub-Program: Mining Innovation

1.2.2 Sub-Program: Forest Sector Innovation

1.2.3 Sub-Program: Geospatial Innovation

#### 1.3 Program: Investment in Natural Resource Sectors

1.3.1 Sub-Program: Mineral Investment

1.3.2 Sub-Program: Targeted Geoscience Initiative

1.3.3 Sub-program: Geo-Mapping for Energy and Minerals

1.3.4 Sub-program: Geoscience for New Energy Supply

1.3.5 Sub-program: Major Projects Management Office Initiative

#### 1.4 Program: Statutory Programs – Atlantic Offshore

### 2. Strategic Outcome: Natural Resource Sectors and Consumers are Environmentally Responsible

#### 2.1 Program: Energy-Efficient Practices and Low-Carbon Energy Sources

2.1.1 Sub-Program: Renewable Energy Deployment

2.1.2 Sub-Program: Support for Clean Energy Decision-Making

2.1.3 Sub-Program: Alternative Transportation Fuels

2.1.4 Sub-Program: Energy Efficiency

#### 2.2 Program: Technology Innovation

2.2.1 Sub-Program: Materials for Energy

2.2.2 Sub-Program: Green Mining

2.2.3 Sub-Program: Clean Energy Science and Technology

#### 2.3 Program: Responsible Natural Resource Management

2.3.1 Sub-Program: Forest Ecosystem Science and Application

2.3.2 Sub-Program: Groundwater Geoscience

2.3.3 Sub-program: Environmental Studies and Assessments

2.3.4 Sub-program: Radioactive Waste Management

2.3.5 Sub-program: Geospatial Information for Responsible Natural Resource Management

### **3. Strategic Outcome: Canadians have Information to Manage their Lands and Natural Resources, and are Protected from Related Risks**

#### **3.1 Program: Protection for Canadians and Natural Resources**

##### **3.1.1 Sub-Program: Explosives Safety and Security**

##### **3.1.2 Sub-Program: Materials and Certification for Safety and Security**

##### **3.1.3 Sub-Program: Forest Disturbances Science and Application**

##### **3.1.4 Sub-Program: Climate Change Adaptation**

##### **3.1.5 Sub-Program: Geohazards and Public Safety**

#### **3.2 Program: Landmass Information**

##### **3.2.1 Sub-Program: Essential Geographic Information**

##### **3.2.2 Sub-Program: Canada's Legal Boundaries**

##### **3.2.3 Sub-Program: Polar Continental Shelf Logistics Support**

##### **3.2.4 Sub-Program: United Nations Convention on the Law of the Sea**

#### **4.1 Program: Internal Services**

### Supporting information on lower-level programs

Supporting information on lower-level programs is available on [TBS' InfoBase](#).<sup>xvi</sup>

### Supplementary information tables

The following supplementary information tables are available on the [NRCan website](#).<sup>lix</sup>

- ▶ Departmental Sustainable Development Strategy
- ▶ Details on Transfer Payment Programs of \$5 Million or More
- ▶ Horizontal Initiatives
- ▶ Internal Audits and Evaluations
- ▶ Response to Parliamentary Committees and External Audits
- ▶ Up-Front Multi-Year Funding
- ▶ User Fees, Regulatory Charges and External Fees

## Federal tax expenditures

The tax system can be used to achieve public policy objectives through the application of special measures such as low tax rates, exemptions, deductions, deferrals and credits. The Department of Finance Canada publishes cost estimates and projections for these measures each year in the [Report on Federal Tax Expenditures](#).<sup>ix</sup> This report also provides detailed background information on tax expenditures, including descriptions, objectives, historical information and references to related federal spending programs. The tax measures presented in this report are the responsibility of the Minister of Finance.

## Organizational contact information

Natural Resources Canada  
580 Booth Street  
Ottawa, Ontario  
K1A 0E4  
Canada

## Appendix: Definitions

### **appropriation (crédit)**

Any authority of Parliament to pay money out of the Consolidated Revenue Fund.

### **budgetary expenditures (dépenses budgétaires)**

Operating and capital expenditures; transfer payments to other levels of government, organizations or individuals; and payments to Crown corporations.

### **Core Responsibility (responsabilité essentielle)**

An enduring function or role performed by a department. The intentions of the department with respect to a Core Responsibility are reflected in one or more related Departmental Results that the department seeks to contribute to or influence.

### **Departmental Plan (Plan ministériel)**

Provides information on the plans and expected performance of appropriated departments over a three-year period. Departmental Plans are tabled in Parliament each spring.

### **Departmental Result (résultat ministériel)**

A Departmental Result represents the change or changes that the department seeks to influence. A Departmental Result is often outside departments' immediate control, but it should be influenced by program-level outcomes.

### **Departmental Result Indicator (indicateur de résultat ministériel)**

A factor or variable that provides a valid and reliable means to measure or describe progress on a Departmental Result.

### **Departmental Results Framework (cadre ministériel des résultats)**

Consists of the department's Core Responsibilities, Departmental Results and Departmental Result Indicators.

### **Departmental Results Report (Rapport sur les résultats ministériels)**

Provides information on the actual accomplishments against the plans, priorities and expected results set out in the corresponding Departmental Plan.

### **Evaluation (évaluation)**

In the Government of Canada, the systematic and neutral collection and analysis of evidence to judge merit, worth or value. Evaluation informs decision making, improvements, innovation and accountability. Evaluations typically focus on programs, policies and priorities and examine

questions related to relevance, effectiveness and efficiency. Depending on user needs, however, evaluations can also examine other units, themes and issues, including alternatives to existing interventions. Evaluations generally employ social science research methods.

**full-time equivalent (équivalent temps plein)**

A measure of the extent to which an employee represents a full person-year charge against a departmental budget. Full-time equivalents are calculated as a ratio of assigned hours of work to scheduled hours of work. Scheduled hours of work are set out in collective agreements.

**government-wide priorities (priorités pangouvernementales)**

For the purpose of the 2016–17 Departmental Results Report, government-wide priorities refers to those high-level themes outlining the government’s agenda in the 2015 Speech from the Throne, namely: Growth for the Middle Class; Open and Transparent Government; A Clean Environment and a Strong Economy; Diversity is Canada's Strength; and Security and Opportunity.

**horizontal initiatives (initiative horizontale)**

An initiative where two or more federal organizations, through an approved funding agreement, work toward achieving clearly defined shared outcomes, and which has been designated (for example, by Cabinet or a central agency) as a horizontal initiative for managing and reporting purposes.

**Management, Resources and Results Structure (Structure de la gestion, des ressources et des résultats)**

A comprehensive framework that consists of an organization’s inventory of programs, resources, results, performance indicators and governance information. Programs and results are depicted in their hierarchical relationship to each other and to the Strategic Outcome(s) to which they contribute. The Management, Resources and Results Structure is developed from the Program Alignment Architecture.

**non-budgetary expenditures (dépenses non budgétaires)**

Net outlays and receipts related to loans, investments and advances, which change the composition of the financial assets of the Government of Canada.

**performance (rendement)**

What an organization did with its resources to achieve its results, how well those results compare to what the organization intended to achieve, and how well lessons learned have been identified.

**performance indicator (indicateur de rendement)**

A qualitative or quantitative means of measuring an output or outcome, with the intention of gauging the performance of an organization, program, policy or initiative respecting expected results.

**performance reporting (production de rapports sur le rendement)**

The process of communicating evidence-based performance information. Performance reporting supports decision making, accountability and transparency.

**planned spending (dépenses prévues)**

For Departmental Plans and Departmental Results Reports, planned spending refers to those amounts that receive Treasury Board approval by February 1. Therefore, planned spending may include amounts incremental to planned expenditures presented in the Main Estimates.

A department is expected to be aware of the authorities that it has sought and received. The determination of planned spending is a departmental responsibility, and departments must be able to defend the expenditure and accrual numbers presented in their Departmental Plans and Departmental Results Reports.

**plans (plans)**

The articulation of strategic choices, which provides information on how an organization intends to achieve its priorities and associated results. Generally a plan will explain the logic behind the strategies chosen and tend to focus on actions that lead up to the expected result.

**priorities (priorité)**

Plans or projects that an organization has chosen to focus and report on during the planning period. Priorities represent the things that are most important or what must be done first to support the achievement of the desired Strategic Outcome(s).

**program (programme)**

A group of related resource inputs and activities that are managed to meet specific needs and to achieve intended results and that are treated as a budgetary unit.

**Program Alignment Architecture (architecture d'alignement des programmes)**

A structured inventory of an organization's programs depicting the hierarchical relationship between programs and the Strategic Outcome(s) to which they contribute.

**results (résultat)**

An external consequence attributed, in part, to an organization, policy, program or initiative. Results are not within the control of a single organization, policy, program or initiative; instead they are within the area of the organization's influence.

**statutory expenditures (dépenses législatives)**

Expenditures that Parliament has approved through legislation other than appropriation acts. The legislation sets out the purpose of the expenditures and the terms and conditions under which they may be made.

**Strategic Outcome (résultat stratégique)**

A long-term and enduring benefit to Canadians that is linked to the organization's mandate, vision and core functions.

**sunset program (programme temporisé)**

A time-limited program that does not have an ongoing funding and policy authority. When the program is set to expire, a decision must be made whether to continue the program. In the case of a renewal, the decision specifies the scope, funding level and duration.

**target (cible)**

A measurable performance or success level that an organization, program or initiative plans to achieve within a specified time period. Targets can be either quantitative or qualitative.

**voted expenditures (dépenses votées)**

Expenditures that Parliament approves annually through an Appropriation Act. The Vote wording becomes the governing conditions under which these expenditures may be made.





## Endnotes

- i The Minister’s mandate letter, <http://pm.gc.ca/eng/mandate-letters>
- ii List of acts and regulations for which the Minister of Natural Resources is responsible, <http://www.nrcan.gc.ca/acts-regulations/59>
- iii Department of Natural Resources Act, <http://laws-lois.justice.gc.ca/eng/acts/N-20.8/>
- iv Resources and Technical Surveys Act, <http://laws-lois.justice.gc.ca/eng/acts/R-7/>
- v Forestry Act, <http://laws-lois.justice.gc.ca/eng/acts/F-30/>
- vi Energy Efficiency Act, <http://laws-lois.justice.gc.ca/eng/acts/e-6.4/>
- vii Extractive Sector Transparency Measures Act, <http://laws-lois.justice.gc.ca/eng/acts/E-22.7/page-1.html>
- viii Energy and Mines Ministers’ Conference, <http://www.nrcan.gc.ca/publications/11102>
- ix Climate Change and Energy Collaboration, <https://www.nrcan.gc.ca/energy/international/nacei/18102>
- x Mission Innovation, <http://www.nrcan.gc.ca/energy/resources/mission-innovation/18612>
- xi Joint United States–Canada Electric Grid Security and Resilience Strategy, [https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/JOINT%20GRID%20SECURITY%20AND%20RESILIENCE-Strategy\\_en.pdf](https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/JOINT%20GRID%20SECURITY%20AND%20RESILIENCE-Strategy_en.pdf)
- xii Kimberley Process Scheme, <https://www.kimberleyprocess.com/en>
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