



August 2022

# National Innovation Pathway Round-up

CANADA



# National Innovation Pathway Round up – Canada

## Introduction

Mission Innovation members agreed to develop **National Innovation Pathways (NIPs)** to describe and build collective understanding on how each member plans to pioneer clean energy technologies to meet their climate and energy goals.

Each member has their own approach to developing and identifying innovation needs and priorities, with some already having undertaken extensive strategy development. The Roundup provides a **single location of summary information on countries' innovation priorities** utilizing existing sources of information so members and interested stakeholders can easily find key information of interest.

All MI members were asked to provide answers to a survey (Annex A) providing as much information as possible, with some questions being optional. The survey asked questions relevant to each element of the National Innovation Pathway described in the Joint Launch Statement:

1. Energy transition scenarios and priority national-level energy innovation needs / priorities until at least 2030;
2. Strategies or national-level plans to address these energy innovation needs / priorities, including institutional design and working internationally
3. Information on how Members will measure innovation outcomes and innovation ecosystem developments;
4. Members' preferred modes and methods of collaboration; and
5. Any further supporting evidence that was used to identify the energy innovation needs / priorities, such as analysis of domestic competitiveness, economic opportunities or national level climate and clean energy plans.

Members will be asked to refresh this document annually if significant changes to national policy have taken place

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# 1. Clean Energy Innovation Strategy

## 1.1 Summary

Canada is working to address the threat of climate change by bringing together innovation from across the financial sector, businesses, and communities to exceed its current 2030 greenhouse gas reduction target and achieve net-zero emissions by 2050. In March 2022, the Government of Canada released the [2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy](#). This plan is an ambitious and achievable sector-by-sector approach for Canada to reach its new climate target of cutting emissions by 40% below 2005 levels by 2030, and to put it on a pathway to achieve net-zero emissions by 2050. The 2030 Emissions Reduction Plan includes \$9.1 billion in new investments to cut pollution and grow the economy, a number of which relate to clean energy innovation. For example, the Government of Canada is helping industries to adopt clean technology and transition to net zero emissions, including through historic investments to enable industries to be clean and competitive and creating greater incentives for clean technologies and fuels, including carbon capture, utilization and storage (CCUS). Other investments and activities highlighted through the 2030 Emissions Reduction Plan include support to make Canada's electricity grid even cleaner, through a regulated Clean Electricity Standard and investments of about \$850 million in clean energy projects, to develop a strategy to strengthen federal coordination of clean tech and climate innovation measures, as well as greening Canada's homes and buildings through a national net-zero buildings plan and investments of around \$1 billion.

In addition to the 2030 Emissions Reduction Plan, a range of supporting strategy and policy frameworks all recognize the important role that clean energy innovation will have in enabling Canada to reach its energy and climate targets. These include: Canada's Strengthened Climate Plan (SCP) – [A Healthy Environment and a Healthy Economy](#), Canada's [Greening Government Strategy](#), the [Hydrogen Strategy for Canada](#), and the [Small Modular Reactor \(SMR\) Action Plan](#). The Government of Canada's Budget 2022 provided funding to develop and implement additional strategies and measures that will contribute to energy innovation in Canada, including the Critical Minerals Strategy, the Green Buildings Strategy, and a federal innovation and investment agency. The Government of Canada is also developing a CCUS Strategy for the country.

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Clean energy innovation is a crosscutting priority that helps to underpin Canada's efforts to achieve climate and energy goals and influence the pace and direction of energy systems transformation. The Government of Canada will continue to drive innovation by providing additional funding to trial pre-commercial clean technologies and de-risk large-scale pilot projects critical to net-zero transitions. Strategic investments are already targeting CCUS, electrification, and clean fuels, like hydrogen. The Office of Energy Research and Development (OERD) leads the Government of Canada's efforts in energy research, development, and demonstrating (RD&D), including through the delivery of energy innovation and cleantech programming. In order to maximize environmental and economic outcomes, OERD targets four key "missions" to realize a clean energy future: 1) Improve energy efficiency and processes to reduce emissions from energy end-use; 2) Accelerate electrification and maximize benefits of low-emitting heat and power; 3) Develop cleaner fuels pathways; and 4) Maintain safe and resilient energy systems to protect Canadians in the changing energy landscape. These priorities guide Canada's domestic and international efforts in support of clean energy innovation.

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## 1.2 Methodology

The 2030 Emissions Reduction Plan uses economic modelling to show a pathway to achieving Canada's 2030 target, including the potential for each sector of the economy to reduce emissions by 2030. This modelling approach is widely used by other countries in charting their courses to net zero.

Broken down by sector, Canada's pathway to 2030 is based on today's understanding of the potential for each sector to reduce emissions by 2030. Given the economic interdependencies and interactions among sectors, the focus for further actions may shift in the future as Canada further decarbonizes, costs of abatement technologies change and other opportunities emerge.

The Government of Canada expects that the measures outlined in the 2030 Emissions Reduction Plan, together with complementary climate actions from the provinces and territories, municipalities, the financial community, Indigenous Peoples, innovators, and businesses—as well as with the acceleration of clean technology innovation and deployment—will lead to further emission reductions by 2030. Canada will continue to update its modelling projections, including in Canada's next Biennial Report in December 2022 and first 2030 Emissions Reduction Plan progress report expected in late 2023.

The *2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy* reflects submissions from over 30,000 Canadians, provinces and territories, Indigenous partners, industry, civil society, and the independent Net-Zero Advisory Body. The plan represents a whole-of-society approach with practical ways to achieve emission reductions across all parts of the economy.

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**Table 1: RELEVANT DOCUMENTS AND POLICIES**

Document or policy name	Description of the document or policy	Specific outcomes, goals or targets identified in the document or policy	Year	Web Link(s)
2030 Emissions Reduction Plan (ERP): Clean Air, Strong Economy	The 2030 Emissions Reduction Plan is an ambitious and achievable roadmap that outlines a sector-by-sector path for Canada to reach its emissions reduction target of 40 percent below 2005 levels by 2030 and net-zero emissions by 2050.	The 2030 Emissions Reduction Plan describes many of the actions that are already driving significant emission reductions as well as the new measures that will ensure Canada can meet its climate targets. The Plan includes \$9.1 billion in new investments, and reflects economy-wide measures such as carbon pricing and clean fuels, while also targeting actions sector by sector ranging from buildings to vehicles to industry and agriculture.	2022	<a href="https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html?utm_campaign=not-applicable&amp;utm_medium=vanity-url&amp;utm_source=canada-ca_emissions-reduction-plan">https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html?utm_campaign=not-applicable&amp;utm_medium=vanity-url&amp;utm_source=canada-ca_emissions-reduction-plan</a>
A Healthy Environment and Healthy Economy: Canada's Strengthened Climate Plan to Create Jobs and Support People, Communities, and the Planet	A Healthy Environment and a Healthy Economy is Canada's federal plan to build a better future with a healthier economy and environment. Canada's strengthened climate plan builds on continuing work with provinces and territories through the Pan-Canadian Framework on Clean Growth and Climate Change (PCF), which was released in 2016.	A Healthy Environment and a Healthy Economy is supported by an initial \$15 billion in investments across 64 new measures. The plan focuses on 5 pillars: making the places Canadians live and gather more affordable by cutting energy waste; making clean, affordable transportation and power available in every community; continuing to ensure pollution isn't free and households get more money back; and building Canada's clean industrial advantage.	2020	<a href="https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy.html">https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy.html</a>
Canada's Enhanced NDC	Canada's nationally determined contribution (NDC) under UNFCCC Paris Agreement	Sets a target of economy-wide greenhouse gas emissions reduction of 40-45% below 2005 levels by 2030, as well as Canada's commitment to net-zero emissions by 2050	2021	<a href="https://unfccc.int/sites/default/files/NDC/2022-06/Canada%27s%20Enhanced%20NDC.pdf">https://unfccc.int/sites/default/files/NDC/2022-06/Canada%27s%20Enhanced%</a>

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				<a href="#">20NDC%20Submission1_FINAL%20EN.pdf</a>
Pan-Canadian Framework on Clean Growth and Climate Change	The 2016 Pan-Canadian Framework on Clean Growth and Climate Change (PCF) is Canada's first-ever national climate plan that was developed with provinces and territories, and in consultation with Indigenous peoples. It is an important first step for Canada to achieve its Paris Agreement target, and is doing more to cut pollution in a practical and affordable way than any other climate plan in Canadian history.	The plan includes a pan-Canadian approach to pricing carbon pollution, and measures to achieve reductions across all sectors of the economy. It aims to drive innovation and growth by increasing technology development and adoption to ensure Canadian businesses are competitive in the global low-carbon economy.	2016	<a href="https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework/climate-change-plan.html">https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework/climate-change-plan.html</a>
Hydrogen Strategy for Canada	The Hydrogen Strategy for Canada is an ambitious framework that seeks to position Canada as a global hydrogen leader, cementing this low-carbon and zero-emission fuel technology as a key part of our path to net-zero carbon emissions by 2050.	The Strategy is underpinned by a federal investment of \$1.5 billion in a Low-carbon and Zero-emissions Fuels Fund to increase the production and use of low-carbon fuels, including hydrogen. The Strategy is designed to spur investment and partnerships to establish Canada as a global supplier of hydrogen, and to increase domestic production, which will transform our energy sector. The strategy will also be complemented by the Clean Fuel Standard, which will further drive investment and growth in Canada's fuels sector by incentivizing the development and adoption of clean fuels such as hydrogen.	2020	<a href="https://www.nrcan.gc.ca/sites/nrcan/files/environment/hydrogen/NRCan_Hydrogen%20Strategy%20for%20Canada%20Dec%2015%202200%20clean_low_accessible.pdf">https://www.nrcan.gc.ca/sites/nrcan/files/environment/hydrogen/NRCan_Hydrogen%20Strategy%20for%20Canada%20Dec%2015%202200%20clean_low_accessible.pdf</a>
Federal Sustainable Development Strategy 2022-2026	The draft 2022 to 2026 Federal Sustainable Development Strategy (FSDS, the draft strategy) is the first to be developed under a strengthened Federal Sustainable Development Act	It shows how 99 organizations across the Government of Canada will work together to promote a clean environment and tackle the crises of climate change and biodiversity loss, all while growing our economy and	2022	<a href="https://www.fdsd-sfdd.ca/en">https://www.fdsd-sfdd.ca/en</a>

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	(the Act). Taking a whole-of-government approach, it sets out Government of Canada sustainable development goals, targets, milestones and implementation strategies from an environmental perspective.	making sure that no one is left behind. It also shows how the Government of Canada is leading by example by transitioning to net-zero carbon and climate-resilient operations by 2050.  The Strategy focuses on the environmental aspects of the 17 Sustainable Development Goals of the 2030 Agenda for Sustainable Development.		
Small Modular Reactor Action Plan	Canada's Small Modular Reactor (SMR) Action Plan is Canada's plan for the development, demonstration and deployment of SMRs for multiple applications at home and abroad.	The SMR Action Plan provides concrete actions for the Government of Canada to: <ul style="list-style-type: none"> <li>• Ensure robust policy, regulatory and legislative frameworks are in place to protect people and the environment;</li> <li>• Accelerate innovation;</li> <li>• Continue meaningful engagement with Indigenous communities and all Canadians; and</li> <li>• Develop international partnerships and open up new markets.</li> </ul>	2020	<a href="https://smractionplan.ca/">https://smractionplan.ca/</a>



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## 2. Clean Energy Innovation Priorities

### 2.1 Overview of Clean Energy Innovation Priorities

**Table 2: CLEAN ENERGY INNOVATION PRIORITIES**

Innovation priority	Focus of innovation activity (tick all that apply)	Targets/Goals (if applicable)	Technologies or topics of interest	Total RD&D funding allocated, (include budget years where applicable)	Planned demonstration Investments (include budget years and indicate if domestic or international spending where possible)	Links to relevant reports or plans
Buildings and Energy Efficiency	<input checked="" type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input checked="" type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Commercialisation Other:	<p>Develop a <a href="#">Canada Green Buildings Strategy</a>, to achieve net-zero buildings by 2050. Potential outcomes for the strategy could include building net-zero and climate resilient buildings from the start; accelerating climate-resilient, building retrofits; and transforming space and water heating.</p> <p>Ensure all new federal buildings are net-zero emissions and that major retrofits are low-carbon; ensure that, starting in 2030, 75% of domestic office new lease and lease renewal floor</p>	Various technologies for energy efficiency improvements; low-carbon construction materials.	<p>Total 2021-22 Budgeted Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$241,942,000</b></p> <p>Total 2022-23 Estimated Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$208,792,000</b></p> <p>Program Notes            RD&amp;D will be supported as a part of the \$874.5 million in support of the buildings sector</p>	<p>Total 2021-22 Budgeted Federal Demonstration spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$60,734,000</b></p> <p>Total 2022-23 Estimated Federal Demonstration spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$63,630,000</b></p> <p>Program Notes            \$33.2 million over 5 years for a Greener Neighbourhood Pilot</p>	<a href="https://www.canada.ca/en/services/environment/weathertech/climate-plan/climate-plan-overview/emissions-reduction-2030.html?utm_campaign=not-applicable&amp;utm_medium=vanity-url&amp;utm_source=canada-">https://www.canada.ca/en/services/environment/weathertech/climate-plan/climate-plan-overview/emissions-reduction-2030.html?utm_campaign=not-applicable&amp;utm_medium=vanity-url&amp;utm_source=canada-</a>

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		<p>space will be in net-zero carbon, climate resilient buildings; and supporting emerging clean technologies through procurement to reduce emissions from federal buildings.</p> <p><u>Emissions Estimates</u> Reduction of 37% from 2005 to 2030 levels in the buildings sector to achieve Canada's 2030 target.</p>		<p>announced as a part of Canada's 2030 Emissions Reduction Plan.</p> <p>RD&amp;D will be supported through NRCan's Office of Energy Research and Development's ongoing annual investments, including through the <a href="#">Energy Innovation Program</a>, <a href="#">Program for Energy R&amp;D</a>, <a href="#">Green Infrastructure Program – Energy Efficient Buildings</a> stream (\$48.4M), and others.</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada</a>, <a href="#">Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, and other federal funders may support RD&amp;D in this area.</p>	<p>Program (Federal Budget 2022)</p> <p>Demonstrations will be supported through the NRCan <a href="#">Green Infrastructure Program – Energy Efficient Buildings</a> stream (\$48.4M), which will continue to 2026, as well as NRCan–OERD's ongoing annual investments through the <a href="#">Energy Innovation Program</a>, and others.</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada</a>, <a href="#">Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, and other federal funders may support demonstrations in this area.</p>	<a href="#">ca_emissions-reduction-plan</a>
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Clean Electricity	<input checked="" type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input checked="" type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Commercialisation Other:	Net Zero Electricity Grid by 2035, aligned with G7 goals, through the development of a Clean Electricity Standard  Phase out unabated coal-fired electricity by 2030.  <u>Emissions Estimates</u> Reduction of 88% from 2005 to 2030 levels in the electricity sector to achieve Canada's 2030 target.	Renewable energy technologies; smart grid and grid modernization technologies; energy storage; geothermal; tidal.  Regulatory and market innovation; business and customer solutions.  Interoperability standards of smart grid components.	Total 2021-22 Budgeted Federal RD&D spending (from select data submitted to IEA RD&D Questionnaire): <b>\$126,065,000</b>  Total 2022-23 Estimated Federal RD&D spending (from select data submitted to IEA RD&D Questionnaire): <b>\$118,106,000</b>  <u>Program Notes</u> RD&D will be supported through NRCan's Office of Energy Research and Development's ongoing annual investments through the <a href="#">Energy Innovation Program</a> , <a href="#">Program for Energy R&amp;D</a> , <a href="#">Green Infrastructure Programs</a> , and others.  Additional funding from <a href="#">Sustainable Development Technology Canada</a> , <a href="#">Innovation, Science and Economic Development Canada</a> , the <a href="#">Business Development Bank of</a>	Total 2021-22 Budgeted Federal Demonstration spending (from select data submitted to IEA RD&D Questionnaire): <b>\$41,450,000</b>  Total 2022-23 Estimated Federal Demonstration Spending (from select data submitted to IEA RD&D Questionnaire): <b>\$37,336,000</b>  <u>Program Notes</u> Demonstrations will be supported through NRCan's Office of Energy Research and Development's ongoing annual investments through the <a href="#">Energy Innovation Program</a> , <a href="#">Green Infrastructure Programs</a> , and others.  Additional funding from <a href="#">Sustainable Development Technology Canada</a> , <a href="#">Innovation, Science and Economic Development Canada</a> , the <a href="#">Business Development Bank of</a>	<a href="https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html?utm_campaign=norot-applicable&amp;utm_medium=video&amp;utm_source=canada-ca_emissions-reduction-plan">https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html?utm_campaign=norot-applicable&amp;utm_medium=video&amp;utm_source=canada-ca_emissions-reduction-plan</a>
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				Canada, the <a href="#">National Research Council</a> , and other federal funders may support RD&D in this area.	Canada, the <a href="#">National Research Council</a> , and other federal funders may support demonstrations in this area.	
Heavy Industry	<input checked="" type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input checked="" type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Commercialisation	<p>Invest in industrial decarbonisation (e.g. CCUS RD&amp;D, Fuel Switching, clean fuels production, etc.) through key programs, including at Natural Resources Canada, Innovation, Science and Economic Development Canada, and others.</p> <p>Work with the Cement Association of Canada to support development of a <a href="#">roadmap to net-zero carbon concrete</a>.</p> <p>Cap oil and gas sector emissions at a pace and scale needed to achieve net-zero emissions by 2050.</p> <p><u>Emissions Estimates</u> Reduction of 39% from 2005 to 2030 levels in heavy industrial sectors to achieve Canada's 2030 target.</p>	<p>CCUS; fuel and feedstock switching in Industrial Processes; heat production and waste heat recovery, and increased resource efficiency.</p> <p>Data analytics and digital technologies to improve manufacturing processes, advance material use and development and enhance the industrial value chain.</p> <p>Advanced chemistry and separation technologies for lower energy use and GHG reduction.</p>	<p>Total 2021-22 Budgeted Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$118,679,000</b></p> <p>Total 2022-23 Estimated Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$107,180,000</b></p> <p><u>Program Notes</u> Announced in Budget 2021, the government is investing \$319M over 7 years for RD&amp;D to advance the feasibility &amp; commercial viability of CCUS technologies. This funding will be deployed through the <a href="#">Energy Innovation Program – Carbon Capture</a>,</p>	<p>Total 2021-22 Budgeted Federal Demonstration spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$58,729,000</b></p> <p>Total 2022-23 Estimated Federal Demonstration Spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$40,898,000</b></p> <p><u>Program Notes</u> Demonstration projects will be supported through the <a href="#">Energy Innovation Program – Carbon Capture, Utilization and Storage Stream</a> (\$319M/7 years).</p> <p>Demonstration projects supported through the Energy Innovation Program – <a href="#">Clean Fuels</a></p>	<a href="https://www.canada.ca/en/services/environment/energy/innovation/energy-innovation-program/energy-innovation-program-overview/emissions-reduction-2030.html?utm_campaign=net-zero-applicable&amp;utm_medium=video&amp;utm_source=canada-ca_emissions-reduction-plan">https://www.canada.ca/en/services/environment/energy/innovation/energy-innovation-program/energy-innovation-program-overview/emissions-reduction-2030.html?utm_campaign=net-zero-applicable&amp;utm_medium=video&amp;utm_source=canada-ca_emissions-reduction-plan</a>

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		Reduction of 31% from 2005 to 2030 levels in the oil and gas sector to achieve Canada's 2030 target.		<p><a href="#">Utilization and Storage Stream</a>.</p> <p>RD&amp;D supported through the Energy Innovation Program – <a href="#">Clean Fuels and Industrial Fuel Switching Stream</a> (\$53M/5 years), as well as other <a href="#">ongoing programs</a> at NRCan's OERD.</p> <p>RD&amp;D will be supported as a part of the <a href="#">Strategic Innovation Fund's Net Zero Accelerator</a> (\$8B/5 years), supporting industrial transformation and emission reduction among large emitting industries.</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada, Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, <a href="#">Canada Infrastructure</a></p>	<p><a href="#">and Industrial Fuel Switching Stream</a> (\$53M/5 years), as well as other <a href="#">ongoing programs</a> at NRCan's OERD.</p> <p>Demonstration projects will be supported as a part of the <a href="#">Strategic Innovation Fund's Net Zero Accelerator</a> (\$8B/5 years).</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada, Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, <a href="#">Canada Infrastructure Bank</a> and other federal funders may support demonstrations in this area.</p>	
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				Bank and other federal funders may support RD&D in this area.		
Hydrogen and Fuel Cells	<input checked="" type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input checked="" type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Commercialisation	<p>Support GHG reductions of up to 45 Mt CO<sub>2</sub>e annually through production and use of low-carbon hydrogen by 2030; 190 Mt CO<sub>2</sub>e annually by 2050.</p> <p>Low-carbon hydrogen representing up to 6.2% of overall energy delivered in Canada; production of up to 4 Mt/year of low-carbon hydrogen by 2030; 30% of overall energy delivered in Canada; production of up to 20 Mt/year by 2050</p> <p>Achieve more than \$50 billion in direct hydrogen sector revenue for the domestic market and enable new industries as a result of low-cost hydrogen supply networks by 2050.</p> <p>Continue to advance technology development and innovation for core materials, end-use products, as well as</p>	<p>CCUS for steam-methane reformation and autothermal reforming; electrolysis and co-electrolysis; (physical &amp; chemical) hydrogen storage and distribution (i.e. Ammonia, or e.g. Methanol, Dimethyl Ether); fuel cells for medium and heavy duty vehicles; proton exchange membrane (PEM) technology; alternative catalysts for fuel cells; natural gas-hydrogen blending from 5% (up to 20%) hydrogen by volume in natural gas trunk lines/pipelines and high temperature water splitting.</p> <p>H<sub>2</sub> production for localized or centralized H<sub>2</sub> plants/utility units (cogeneration &amp; tri-generation of steam, power &amp; hydrogen).</p>	<p>Total 2021-22 Budgeted Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$22,030,000</b></p> <p>Total 2022-23 Estimated Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$22,002,000</b></p> <p><u>Program Notes</u> RD&amp;D supported through the Energy Innovation Program – <a href="#">Clean Fuels and Industrial Fuel Switching Stream</a> (\$53M/5 years); and as a part of <a href="#">the Program of Energy Research and Development (PERD)</a>.</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada, Innovation,</a></p>	<p>Total 2021-22 Budgeted Federal Demonstration spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$2,851,000</b></p> <p>Total 2022-23 Estimated Federal Demonstration Spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$971,000</b></p> <p><u>Program Notes</u> Demonstration projects supported through the <a href="#">Clean Fuels and Industrial Fuel Switching Stream of EIP</a> (\$53M/5 years).</p> <p>\$33.8 million for hydrogen trucking demonstration projects that address barriers to long-haul zero-emission trucking commercialization.</p>	<a href="https://www.nrcan.gc.ca/climate-change/adapting-impacts-and-reducing-emissions/canadas-green-future/the-hydrogen-strategy/23080">https://www.nrcan.gc.ca/climate-change/adapting-impacts-and-reducing-emissions/canadas-green-future/the-hydrogen-strategy/23080</a>

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		hydrogen production, storage, and distribution value chains.	Methane splitting (Methane Pyrolysis or Decomposition) that produces turquoise or grey hydrogen & <a href="#">carbon black</a> from biogas or natural gas at small scales	<a href="#">Science and Economic Development Canada</a> , the <a href="#">Business Development Bank of Canada</a> , the <a href="#">National Research Council</a> , and other federal funders may support RD&D in this area.	Additional funding from <a href="#">Sustainable Development Technology Canada</a> , <a href="#">Innovation, Science and Economic Development Canada</a> , the <a href="#">Business Development Bank of Canada</a> , the <a href="#">National Research Council</a> , and other federal funders may support demonstrations in this area.	
Bioenergy	<input checked="" type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input checked="" type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Commercialisation	Advance utilisation of Canadian biomass resources, agricultural, forestry and municipal waste, towards net-zero in industrial (such as cement, steel, chemicals, oil & gas) and non-industrial (such as transportation, buildings) sectors in the medium and long term.	Biomass conversion technologies such as gasification; anaerobic digestion; second generation biofuels; pyrolysis; biorefinery; industrial and community applications of bioenergy	<p>Total 2021-22 Budgeted Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$37,423,000</b></p> <p>Total 2022-23 Estimated Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$27,151,000</b></p> <p><u>Program Notes</u>            RD&amp;D supported through the <a href="#">Forest Innovation Program</a> (\$5 million from 2017-23) and</p>	<p>Total 2021-22 Budgeted Federal Demonstration spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$5,197,000</b></p> <p>Total 2022-23 Estimated Federal Demonstration Spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$2,050,000</b></p> <p><u>Program Notes</u>            Demonstration projects supported through the <a href="#">Forest Innovation Program</a>, <a href="#">Clean Growth</a></p>	<a href="https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/renewable-energy/bioenergy-systems/7311">https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/renewable-energy/bioenergy-systems/7311</a>

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				<p>Investments in Forest Industry Transformation (IFIT) program. Other investments in RD&amp;D for bioenergy, biogas, and biorefining come through the <a href="#">Clean Growth Program</a>, <a href="#">Energy Innovation Program</a>, and <a href="#">Program on Energy research and Development</a>.</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada</a>, <a href="#">Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, and other federal funders may support RD&amp;D in this area.</p>	<p><a href="#">Program</a>, and <a href="#">Energy Innovation Program</a>.</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada</a>, <a href="#">Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, and other federal funders may support demonstrations in this area.</p>	
Transportation	<input checked="" type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input checked="" type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Commercialisation	Mandatory target for 100% of new light-duty cars and passenger truck sales to be zero-emissions by 2035, with interim targets of at least 20% by 2026 and at least 60% by 2030.	Light, medium, and heavy duty zero-emission vehicles; zero-emission locomotives; sustainable aviation fuel; and marine sector technologies.	Total 2021-22 Budgeted Federal RD&D spending (from select data submitted to IEA RD&D Questionnaire): <b>\$96,631,000</b>	Total 2021-22 Budgeted Federal Demonstration spending (from select data submitted to IEA RD&D Questionnaire): <b>\$25,711,000</b>	<a href="https://www.canada.ca/en/services/environment/weat-her/climatechange/climate-plan/climate-">https://www.c anada.ca/en/ services/envir onment/weat her/climatech ange/climate- plan/climate-</a>



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		<p>35% of total medium and heavy duty vehicle sales to be zero emission vehicles by 2030, 100% by 2040 for a subset of vehicle types based on feasibility (a regulation will be developed to support the achievement of this target).</p> <p>Add 50000 EV chargers to Canada's charging network.</p> <p><u>Emissions Estimates</u> Reduction of 11% from 2005 to 2030 levels in transportation sectors to achieve Canada's 2030 target.</p>	<p>Electric vehicle infrastructure, including curbside charging; charging infrastructure for autonomous vehicles; bi-directional charging with energy storage; fast charging in the North; infrastructure standards and interoperability for electric bus overhead charging; repurposing used batteries for fast charging; grid impacts and vehicle-to-grid applications; and innovative charging hardware and software.</p>	<p>Total 2022-23 Estimated Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$86,540,000</b></p> <p><u>Program Notes</u> RD&amp;D supported through the <a href="#">Green Infrastructure Program - Electric Vehicle Infrastructure Demonstration Program</a> (\$76 million); Transport Canada's <a href="#">Clean Transportation System R&amp;D Program</a>, which invests in clean aviation, rail, and marine R&amp;D; and other <a href="#">ongoing programs</a> at NRCan's OERD.</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada</a>, <a href="#">Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, and other federal funders</p>	<p>Total 2022-23 Estimated Federal Demonstration Spending (from select data submitted to IEA RD&amp;D Questionnaire): <b>\$19,818,000</b></p> <p><u>Program Notes</u> \$33.8 million for hydrogen trucking demonstration projects that address barriers to long-haul zero-emission trucking commercialization.</p> <p>Demonstration projects supported through the <a href="#">Green Infrastructure Program - Electric Vehicle Infrastructure Demonstration Program</a> (\$76 million), Transport Canada's <a href="#">Clean Transportation System R&amp;D Program</a>; and other <a href="#">ongoing programs</a> at NRCan's OERD.</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada</a>, <a href="#">Innovation, Science and Economic</a></p>	<p><a href="#">plan-overview/emissions-reduction-2030.html?utm_campaign=not-applicable&amp;utm_medium=video&amp;utm_source=canada-ca_emissions-reduction-plan</a></p>
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				may support RD&D in this area.	<a href="#">Development Canada</a> , the <a href="#">Business Development Bank of Canada</a> , the <a href="#">National Research Council</a> , and other federal funders may support demonstrations in this area.	
CCUS	<input checked="" type="checkbox"/> Early-stage research <input checked="" type="checkbox"/> Applied research <input checked="" type="checkbox"/> product development <input checked="" type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Commercialisation	Develop a comprehensive CCUS Strategy to guide the development and deployment of CCUS technologies to mitigate GHG emissions from a range of industrial sectors, such as steel, cement, chemicals, and oil and gas.	<p>Carbon Capture, Utilization, and Storage/Sequestration (CCUS) including a range of emerging or mature separation processes in CO<sub>2</sub> applications</p> <p>Carbon Dioxide Removal (CDR)/ Negative Emission technologies (NET) such as Direct Air Capture (DAC); Biomass Carbon Removal and Storage (BiCRS); and Enhanced Mineralization (EM).</p>	<p>Total 2021-22 Budgeted Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$33,562,000</b></p> <p>Total 2022-23 Estimated Federal RD&amp;D spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$28,055,000</b></p> <p><u>Program Notes</u>            Announced in Budget 2021, the government is investing \$319M over 7 years for RD&amp;D to advance the feasibility &amp; commercial viability of CCUS technologies. This funding will be deployed through the <a href="#">Energy Innovation Program –</a></p>	<p>Total 2021-22 Budgeted Federal Demonstration spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$9,768,000</b></p> <p>Total 2022-23 Estimated Federal Demonstration Spending (from select data submitted to IEA RD&amp;D Questionnaire):  <b>\$4,238,000</b></p> <p><u>Program Notes</u>            Demonstration projects to be supported through the <a href="#">Energy Innovation Program – Carbon Capture, Utilization and Storage Stream</a>. FEED Studies for CCUS projects are covered by this investment, supporting</p>	<a href="https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/carbon-capture-utilization-and-storage/4275">https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/carbon-capture-utilization-and-storage/4275</a>

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				<p><a href="#">Carbon Capture, Utilization and Storage Stream</a>.</p> <p>RD&amp;D will be supported as a part of the <a href="#">Strategic Innovation Fund's Net Zero Accelerator</a> (\$8B/5 years)</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada, Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, <a href="#">Canada Infrastructure Bank</a> and other federal funders may support RD&amp;D in this area.</p>	<p>commercialization of CCUS technologies.</p> <p>A <a href="#">CCUS Investment Tax Credit</a> was also announced as a part of Budget 2021. This measure can help to enable large-scale demonstration and commercialization projects.</p> <p>Demonstration projects will be supported as a part of the <a href="#">Strategic Innovation Fund's Net Zero Accelerator</a> (\$8B/5 years)</p> <p>Additional funding from <a href="#">Sustainable Development Technology Canada, Innovation, Science and Economic Development Canada</a>, the <a href="#">Business Development Bank of Canada</a>, the <a href="#">National Research Council</a>, <a href="#">Canada Infrastructure Bank</a> and other federal funders may support</p>	
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					demonstrations in this area.	
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## 2.2 Tracking Progress

The [Canadian Net-Zero Emissions Accountability Act](#) enshrines in legislation the Government of Canada's commitment to achieve net-zero greenhouse gas emissions by 2050, and provides a framework of accountability and transparency to deliver on it. The Act establishes a legally binding process to set five-year national emissions-reduction targets as well as develop credible, science-based emissions-reduction plans to achieve each target. The 2030 Emissions Reduction Plan is the first released under this Act.

As part of Canadian Federal Government accountability requirements, Natural Resources Canada's energy innovation programs are required to report publicly on progress and results through a variety of mechanisms, including annual Departmental Results Reports and Departmental Results Framework indicators, horizontal initiatives such as, the Federal Sustainable Development Strategy, Canada's 2030 Emissions Reduction Plan, Strengthened Climate Plan, Clean Tech Data Strategy, Business Innovation and Growth Support (BIGS Review), as well as, reporting on international commitments such as Sustainable Development Goals. These reports generally require departments to report on progress towards pre-defined goals and targets using a combination of qualitative and quantitative data.

The Office of Energy Research and Development monitors the progress of energy innovation RD&D programs at multiple levels and units of analysis, including individual projects, individual technologies, technology areas, and by specific programs. OERD applies nested performance measurement frameworks that ensure that individual project and program objectives and outcomes align with key departmental and Government of Canada priorities. At the project level OERD energy innovation and clean growth RD&D projects submit annual project performance reports, a final project reports, and report on project outcomes for five years post project funding. Reporting requirements include financial information; narrative descriptions; supporting evidence such as technical reports; and reporting against project-specific indicators and common key performance indicators such as, development of intellectual property, advances in technological readiness levels (TRLs). Demonstration projects also required to report on actual and/or projected GHG emissions reductions. Data from project reports is analyzed and synthesized to help monitor technological advancement, inform planning and design of programs, and for reporting against performance measurement frameworks. Summary results are included in NRCan's annual Departmental Results Reports. For example, OERD's:

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- [Energy Innovation Program](#) is demonstrating early results, with 50% of project having advanced one or more levels, 27 patents or other IP, created 9 platforms or data tools, and influenced 28 codes, standards or regulations and reduced 2.21 Mt of GHG emissions in 2021-21.
- [Clean Growth Program](#) projects were successful in advancing innovation with 58% advancing one or more innovation levels. Projects also resulted in 1063 job years of employment per year and 42% projects had already achieved progress towards their 2027 economic goals. In 2021-22 projects had already reduced 14,131/ tonnes of CO<sub>2</sub>/year, 13,712,426 m<sup>3</sup> water/per year, and reduced waste by 70,896 tonnes/year and were on track for meeting or surpassing 2027 program targets.

OERD recently integrated mission-oriented and outcomes-based approaches to measurement to allow for more precise tracking of specific advances towards addressing concrete challenges or specific gaps in clean energy innovation technologies. For example, programs such as Impact Canada Clean Tech Initiative used prize-based challenges and outcomes-based approaches where innovators were awarded based on the results such as solutions to reduce GHG emissions in mines by 20% or production of the greenest and most cost-effective made-in Canada biojet fuel. Additionally, OERD piloted new tools for measuring the impact of RD&D investments. This included innovation system analysis and technological maturity analysis to inform program design, project selection and monitor progress towards addressing specific innovation gaps; measuring uptake, diffusion and use of knowledge, IP, new codes and standards, and technologies; exploring the use of taxation data for tracking economic, employment, and diversity outcomes; and longitudinal impact studies of investments in specific portfolio areas. Recent impact studies on investments in Carbon Capture, Use and Storage RD&D and energy efficiency standards and RD&D for new residential buildings found that, in addition to advancing new technologies, federal investments in energy RD&D play a critical role in convening expertise, supporting energy innovation eco-system development, and addressing non-technical barriers to the advancement and adoption of new technologies. These new approaches were identified as best practices in International Energy Association in 2022 In-Depth Review of Canada's Energy Policies.

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### 3. Private Sector Engagement (Optional).

NRCan leverages public and private financing and expertise to support the advancement of Canadian clean tech while tackling difficult to solve problems and accelerating step-change reductions in GHG emissions. In one such example, NRCan partnered with Breakthrough Energy and the Business Development Bank of Canada (BDC) to deliver an initiative under the Energy Innovation Program, which provides Canadian companies with the support they need to bring their technologies to the global market. The Breakthrough Energy Solutions Canada (BESC) initiative selected 10 winning projects across electricity, transportation, buildings, and manufacturing sectors that are each targeting 500MT of annual GHG emissions reductions by 2050. In collaboration with the partners, NRCan provided other support to the companies to facilitate their growth and technology commercialization, including technical and business advice, annual accelerator sessions, and investor review.

In addition to NRCan and BDC funding, four of the companies within the cohort successfully raised funding through Series A funding rounds.

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## 4. International Collaboration (Optional)

Natural Resources Canada engages with key bilateral partners and within multilateral fora such as the G7, G20, Glasgow Breakthroughs, the International Energy Agency, Clean Energy Ministerial, Mission Innovation, and the International Renewable Energy Agency to strengthen energy relationships and promote cooperation on key issues related to clean energy innovation. Canada's international collaboration on energy research, development and demonstration (RD&D) is mainly advanced through participation in the International Energy Agency's (IEA) Energy Technology Network, which includes the Committee on Energy Research and Technology (CERT), CERT Working Parties, and Technology Collaboration Programmes (TCPs).

Environment and Climate Change Canada engages internationally under existing multilateral and bilateral cooperation mechanisms, including Environmental Cooperation Agreements and environmental chapters of Free Trade Agreements, to advance clean technology innovation, deployment and scale up.



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## 5. National Energy Innovation Ecosystem (Optional)

The Office of Energy Research and Development (OERD) at Natural Resources Canada leads the Government of Canada's efforts in energy research, development and demonstration, including delivery of energy innovation and cleantech programming. Focusing on influencing the pace and direction of energy system transformation, OERD targets the most impactful technologies and pays particular attention to program design and levers in order to maximize environmental and economic outcomes. All activities accord with one of four outcomes-oriented missions:

- Improve energy efficiency and processes to reduce emissions from energy end use;
- Accelerate electrification and maximize benefits of low-emitting heat and power;
- Develop cleaner fuels pathways; and
- Maintain safe and resilient energy systems to protect Canadians in the changing energy landscape.

Table 3 below details the roles of select clean energy innovation institutions within the Government of Canada, and particularly those within Natural Resources Canada. Other federal government institutions are also supporting clean energy research, development and demonstration, as are provincial and territorial governments and academic institutions. Other major federal organizations (including federal departments and crown corporations) that fund clean energy research, development and demonstration include, but are not limited to:

- [Innovation, Science and Economic Development Canada](#);
- [Sustainable Development Technology Canada](#);
- [Business Development Bank of Canada](#);
- [Export Development Canada](#); and
- [National Research Council of Canada](#).

Alongside OERD, these organizations represent the largest public funders of clean energy innovation in Canada. However, other federal organizations play a role. The [Clean Growth Hub](#), the Government of Canada's main source of information, resources and

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advice on federal supports for clean technology in Canada, is an interdepartmental initiative of 17 federal government departments and agencies supporting clean technology innovation.

More information on research facilities in Canada, including those focused on clean energy, can be [found here](#).

**Table 3: CLEAN ENERGY INNOVATION INSTITUTIONS**

Institution name	Description of role	Innovation priority(ies) that they contribute to (taken from Table 2)	Description of funding modalities (e.g. grants, co-investment, where in tech development cycle focused)	Links
Natural Resources Canada – Office of Energy Research and Development	The Office of Energy Research and Development (OERD) leads the Government of Canada’s efforts in advancing energy research, development, and demonstration (RD&D), and is responsible for several funding programs in this space. With a focus on influencing the pace and direction of energy system transformation, OERD targets the most impactful technologies to maximize environmental and economic outcomes.	All	Grants and contributions to external projects, as well as co-investments with trusted partners, who focus on critical stages of technology development as well as specific industries/sectors of focus, enabling aligned priorities, shared risk, and minimized impact. OERD also coordinates energy R&D funding to federal laboratories, through the Program of Energy Research and Development (PERD) and the internal stream of Energy Innovation Program (EIP).	<a href="https://www.nrcan.gc.ca/science-and-data/funding-partnerships/funding-opportunities/office-energy-research-development-oerd/5711">https://www.nrcan.gc.ca/science-and-data/funding-partnerships/funding-opportunities/office-energy-research-development-oerd/5711</a>
Natural Resources Canada – CanmetENERGY-Devon	CanmetENERGY-Devon brings together scientists, engineers and technologists in a state-of-the-art research and development facility for innovation in energy technology. This research centre provides fundamental knowledge and innovative solutions that extract valuable hydrocarbon resources and reduce the	Heavy Industry, Hydrogen, Bioenergy, CCUS	Primarily an R&D organization focused on mid TRL levels.  Generates knowledge to provide solutions to industry, advice to government policy makers and regulators, and provides Canadians with relevant information on oil sands and heavy oil issues.	<a href="https://www.nrcan.gc.ca/science-and-data/research-centres-and-labs/canmetmaterials/22096">https://www.nrcan.gc.ca/science-and-data/research-centres-and-labs/canmetmaterials/22096</a>

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	environmental impacts of resource development.		Collaborates with industry, provincial/territorial governments, academic institutions and international organizations to develop and demonstrate new technologies	
Natural Resources Canada – CanmetMATERIALS	CanmetMATERIALS is a materials science laboratory which deploys unique expertise, equipment, and pilot-scale facilities to support the competitiveness and low carbon transition of Canadian industry. With research programs in energy transportation, production and end-use, this research centre focusses on developing and deploying the necessary materials technologies to enable the clean energy transition.	Clean electricity, Heavy Industry, Hydrogen, Bioenergy, Transportation, CCUS	<p>Primarily an R&amp;D organization focused on mid TRL levels.</p> <p>Generates knowledge to provide solutions to industry, advice to government policy makers and regulators.</p> <p>Collaborates with industry, provincial/territorial governments, academic institutions and international organizations to develop and deploy new technologies</p>	<a href="https://www.nrcan.gc.ca/science-and-data/research-centres-and-labs/canmetmaterials/canmetmaterials/8234">https://www.nrcan.gc.ca/science-and-data/research-centres-and-labs/canmetmaterials/canmetmaterials/8234</a>
TerraCanada Hamilton/Mississauga a Centre of Expertise (Natural Resources Canada & National Research Council of Canada)	The TerraCanada Hamilton/Mississauga Centre of Expertise is a world-class collaborative research facility, co-located in Canada's southwest Ontario industrial heartland, focused on substantially accelerating discovery and innovation in disruptive new materials that will underpin the nation's future net-zero carbon economy. This facility is the home of MI Innovation Platform Initiative: Materials For Energy (Collaborate Module).	Hydrogen, CCUS, Transportation	Leverages in-kind program, facility space, and infrastructure, this institution focuses on early-mid TRL scale research, in collaboration with national & international partners.	<a href="https://www.science.gc.ca/eic/site/063.nsf/eng/h_98241.html">https://www.science.gc.ca/eic/site/063.nsf/eng/h_98241.html</a>
Natural resources Canada – CanmetENERGY- Varennes	CanmetENERGY- Varennes is a science and technology leader in conducting innovative science and research activities to develop and implement different solution pathways for a sustainable energy future for Canada.	Industry, Buildings, Clean Electricity (particular focus on smart grid, remote microgrids)	<p>Primarily an R&amp;D organization focused on mid TRL levels.</p> <p>Generates knowledge to provide solutions to industry, advice to government policy makers and regulators, and provides Canadians with relevant</p>	<a href="https://www.nrcan.gc.ca/energy/energy-offices-and-labs/canmetenergy/canmetenergy-varennes/5761">https://www.nrcan.gc.ca/energy/energy-offices-and-labs/canmetenergy/canmetenergy-varennes/5761</a>

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	Over 200 research staff undertake applied R&D in industry energy systems optimisation, renewable energy integration into the grid,, resilient remote and northern distributed energy systems, affordable heating and cooling solutions in buildings, intelligent building controls and RETScreen clean energy decision making software.		information on industrial process optimisation, value chain in natural resource sector, smart grids, flexible and resilient buildings and affordable heating and cooling solutions for building stock.  Collaborates with industry, provincial/territorial governments, academic institutions and international organizations to develop and demonstrate new technologies	
Natural Resources Canada CanmetENERGY-Ottawa	The CanmetENERGY-Ottawa research complex conducts RD&D on a wide array of clean energy technologies; working to improve existing technologies and methods, while pioneering novel ones, with the goal of reducing greenhouse gas emissions, improving energy efficiency, and making clean energy technologies economically competitive. With over 200 scientists, engineers, technologists, managers, and support staff, CanmetENERGY-Ottawa leverages its unique pilot-scale facilities to accelerate the advancement of clean energy technologies, from the initial research stage through to commercialization.	All – Buildings, Clean Electricity, Heavy Industry, Hydrogen, Bioenergy, Transportation, CCUS	Primarily an R&D organization focused on mid TRL levels.  Generates knowledge to provide solutions to industry, advice to government policy makers and regulators.  Collaborates with industry, provincial/territorial governments, academic institutions and international organizations to develop, demonstrate and deploy new technologies.	<a href="https://www.nrcan.gc.ca/energy/offices-labs/canmet/ottawa-research-centre/5753">https://www.nrcan.gc.ca/energy/offices-labs/canmet/ottawa-research-centre/5753</a>

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## 6. Further Supporting Evidence (Optional)

Natural Resources Canada's OERD delivers grants and contributions to energy RD&D projects, focusing on maximizing the leveraged impact of funds. This includes through **innovative program design**, such as the [Impact Canada prize-based cleantech innovation challenges](#). It also includes collaborative program delivery models such as [Breakthrough Energy Solutions Canada](#) (in partnership with Breakthrough Energy Ventures and the Business Development Bank of Canada), or the Science and Technology Assistance for Cleantech (STAC) program, that promote innovators' access to unique state-of-the-art national laboratory infrastructure.

Further, In January 2022, the International Energy Agency (IEA) released an In-Depth Review of Canada's energy policies that highlighted Natural Resources Canada's energy innovation activities as supporting global best practices, recognized OERD's efforts for innovative program design, and further recommended increased federal investment in energy RD&D to build on this success and accelerate innovation.

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**Annex A – National Innovation Pathway Roundup Survey Questions**

**1.1 Summary:** Please provide a summary of your national clean energy innovation strategy i.e. the overall policies, framework and/or goals that help to define the innovation priorities you will describe in Section 2. We recommend including information about your national climate or energy targets (such as NDCs or renewable energy targets) as well as national innovation strategies and policies. You can share links to relevant documents in Table 1.

**1.2 Methodology:** Please describe the methodology to develop your national clean energy innovation strategy such as analysis, modelling or stakeholder engagement and include any links to relevant documents in Table 1. This will be used to help share learning between members.

**2.1 Overview of Clean Energy Innovation Priorities:** Please provide a list of your national clean energy innovation priorities (i.e. specific technologies, sectors or needs). Please complete Table 2 to provide information about where you are focusing in the innovation cycle for each priority; any targets or goals; RD&D interests; current allocated budgets (including specific demonstration funding) and links to relevant strategies or reports. In the text box following please provide a brief description of how you plan to respond to each innovation priority in the coming years, such as through future plans over the next 3-10 years to mobilise further investments for innovation, launch new major programmes and timelines for major demonstration projects.

**2.2 Tracking Progress:** Please describe how you plan to measure progress towards addressing your identified energy innovation priorities. Please describe any governance processes to manage and review energy innovation efforts and, where able, please list

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tracking indicators that are commonly used (e.g. such as patents, publications, rates of company formation, follow-on capital and private co-investment, technology performance upgrades).

**3. Private Sector Engagement:** Please can you describe your strategic approach and priorities to engagement with the private sector to address the clean energy innovation priorities identified in section 2. This could include for instance prioritising co-funding of RD&D initiatives; incubator/accelerator programs that are funded (in part or fully) by the private sector; tax credits and other fiscal incentives; initiatives that the private sector can engage with, grants, de-risking instruments such as loan guarantees etc.

**4. International Collaborations:** Please describe your strategic approach to international collaboration to tackle your clean energy innovation priorities (e.g. do you have an international strategy, or particular types of collaboration you are prioritising).

**5. National Energy innovation Ecosystem:** Please provide an overview of your national institutions, funders and organisations and describe how they contribute to tackling the innovation priorities identified in Section 2. Please either provide this information in the box or complete Table 3.

**6. Further Supporting Information:** Please add below any further information about your national energy innovation needs or approaches to tackling these that has not been covered above.



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