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Science, technology, the climate and peace: Canada's fall

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In its last [report \(https://www.axios.com/2023/03/20/ipcc-report-global-warming-narrow-window\)](https://www.axios.com/2023/03/20/ipcc-report-global-warming-narrow-window) before [2030](#) the Intergovernmental Panel on Climate Change underscored the urgency of replacing the global fossil fuel infrastructure by renewables. This replacement is not just a question of money. Such a radical energy transition requires both long term investments in science and technology combined with the [peaceful international cooperation](#) (<https://news.un.org/en/story/2022/11/1130247>) that is required for reducing global emissions. Beyond the transition, science is needed to improve people's health, education, welfare and prosperity. And beyond [emission reductions, peaceful cooperation](#) (<https://theconversation.com/as-the-ukraine-war-derails-efforts-to-solve-the-climate-crisis-a-new-one-looms-the-fight-for-peace-195049>) is needed if only to [avoid catastrophic nuclear war](#) (<https://apnews.com/article/russia-ukraine-covid-health-antonio-guterres-2871563e530f9a676d7884b3e2d871c3>). Both are incompatible with current Canadian policies.

Decades of stagnation... and a spectacular rise

Since 2000, Canada's spending on research and development (R+D) has declined from 2% to 1.5% of GDP. Canada is now vying for last place among the [G7 countries](#) (<https://data.oecd.org/chart/6atc>) and is suffering from a [growing brain drain](#) (<https://ledevoir.pressreader.com/article/281505050529322>). The decline was underscored by the Canada-wide "[support our science](#)" (<https://www.supportourscience.ca/>) grassroots mobilization on May 1st that highlighted the imperative to reverse Canada's [multi-decadal science decline](#) (<https://can-acn.org/science-funding-in-canada-statistics/>).

Effective R+D is underpinned by the National Science and Engineering Research Council (NSERC) whose [GDP fraction is also declining](#). (<https://can-acn.org/science-funding-in-canada-statistics/>).

Alarmed by the Harper era decline, the 2017 federal panel "[Investing in Canada's future – Strengthening the Foundations of Canadian Research](#)"

(<https://publications.gc.ca/site/eng/9.839290/publication.html>) called for large budget increases. Yet last March, [a new panel](https://ised-isde.canada.ca/site/panel-federal-research-support/en/report-advisory-panel-federal-research-support-system) (<https://ised-isde.canada.ca/site/panel-federal-research-support/en/report-advisory-panel-federal-research-support-system>) confirmed "[stagnating investment levels](https://evidencefordemocracy.ca/en/content/budget-2023)" (<https://evidencefordemocracy.ca/en/content/budget-2023>) and warned that "Canada will continue to fall behind". Unfortunately, since 2017, the most visible change is NSERC's instrumentalization of the prestigious [Canada Research Chairs](https://www.ledevoir.com/opinion/libre-opinion/600803/libre-opinion-la-nouvelle-bureaucratie-morale-des-universites) (<https://www.ledevoir.com/opinion/libre-opinion/600803/libre-opinion-la-nouvelle-bureaucratie-morale-des-universites>) to promote identity politics. Rather than increasing access to research from the lower social classes who are victims of rising inequality – by increasing the number of scholarships, [or even adjusting them for inflation](https://www.lapresse.ca/actualites/sciences/2022-08-11/des-scientifiques-reclament-plus-de-financement-dans-une-lettre-de-60-metres.php) (<https://www.lapresse.ca/actualites/sciences/2022-08-11/des-scientifiques-reclament-plus-de-financement-dans-une-lettre-de-60-metres.php>) - the [government instead created](https://www.nserc-crsng.gc.ca/students-etudiants/ug-pc/usra-brpc_eng.asp) (https://www.nserc-crsng.gc.ca/students-etudiants/ug-pc/usra-brpc_eng.asp). a programme for a unique identity group as an [adjunct for the otherwise highly competitive undergraduate summer research awards](https://www.ledevoir.com/opinion/idees/780734/point-de-vue-quand-le-gouvernement-federal-redefinit-l-excellence) (<https://www.ledevoir.com/opinion/idees/780734/point-de-vue-quand-le-gouvernement-federal-redefinit-l-excellence>). Ironically, without China offsetting the decline via increasing numbers of Chinese students and without [Sino-Canadian research partnerships](https://policyoptions.irpp.org/magazines/december-2022/education-reliance-china/), (<https://policyoptions.irpp.org/magazines/december-2022/education-reliance-china/>), the situation would be much worse.

New data are quantifying Canada's fall. Science can only advance, when supported by a broad spectrum of abstract, theoretical, fundamental, experimental and applied research. [Nature's publication database](https://www.nature.com/nature-index/brief-guide#the-limitations) (<https://www.nature.com/nature-index/brief-guide#the-limitations>) includes a "share" index which "[is an indicator of global high-quality research output and collaboration](https://www.nature.com/nature-index/brief-guide#the-limitations)". (<https://www.nature.com/nature-index/brief-guide#the-limitations>). Starting in 2015, this critical indicator documents a dramatic 23% decline in Canadian science, comparable to that of Japan (-25%) or France (-20%) but much worse than other G7 countries such as Germany (-10%), Italy (-12%), Britain (-15%) or the US (-15%). In contrast, Russian and Indian publication rates have steadily grown (+16%, +29%). But the real stunner is China, whose whopping 149% increase, catapulted it over the US in 2022 to become the world's number one science superpower.

Western observers were astounded when on March 1st, in a [landmark report](https://www.aspi.org.au/report/critical-technology-tracker), (<https://www.aspi.org.au/report/critical-technology-tracker>), the Australian Strategic Policies Institute (ASPI) proclaimed: "China's global lead extends to **37 out of 44 technologies**" (emphasis in the original). Based on its massive "critical technology tracker" database, the report traces critical technologies that "underpin the global economy and our society". The conclusions concord with the Center for Strategic and International Studies (CSIS) [China Power project](https://chinapower.csis.org/china-research-and-development-rnd/) (<https://chinapower.csis.org/china-research-and-development-rnd/>) that found that 40% of global patent applications are now Chinese. Concerning the energy transition, China has huge leads in all relevant ASPI themes: Supercapacitors, Nuclear Waste Management and recycling, Nuclear Energy, Photovoltaics, Hydrogen and ammonia for power, Biofuels. In these areas it has 41.7% of the 10% top quality publications compared to 10.6% for the United States and 1.1% for Canada.

Strategic vision

China's spectacular rise is the consequence of decisions in its 12th and 13th five year plans (2010-2020) to invest massively in science and technology in accord with former president Hu Jintao's vision that "[scientific and technological innovation provides strategic support for raising the productive forces... we must give it top priority in overall national development.](https://www.aspi.org.au/report/critical-technology-tracker)" (<https://www.aspi.org.au/report/critical-technology-tracker>). China's rise is all the more impressive since it has occurred in the face of an increasingly vicious trade and sanctions war initiated under the Obama administration, accelerated under Trump, further escalated under Biden with Canada's subservient support throughout. While the sanctions include provisions aimed at crippling China's access to cutting edge technology, they apparently have had the contrary effect of encouraging critical investments.

While China was rising to become a leader in environmental science and technology, in 2018, the Trudeau government killed Canada's climate funding body, the Canadian Climate and Atmospheric Research fund (CCAR). Over these years, environmental and climate research priorities have been hijacked by the fossil fuel industry, squandering money on the [industry's fake solutions](https://www.treehugger.com/canadian-scientists-oppose-carbon-capture-credits-5216677) (<https://www.treehugger.com/canadian-scientists-oppose-carbon-capture-credits-5216677>) [such as carbon capture utilisation and storage](https://natural-resources.canada.ca/science-and-data/funding-partnerships/funding-opportunities/funding-grants-incentives/energy-innovation-program/energy-innovation-program-carbon-capture-utilization-and-storage-stream/23815) (<https://natural-resources.canada.ca/science-and-data/funding-partnerships/funding-opportunities/funding-grants-incentives/energy-innovation-program/energy-innovation-program-carbon-capture-utilization-and-storage-stream/23815>) and [green hydrogen](https://unearthed.greenpeace.org/2020/12/08/unearthed-today-why-oil-companies-want-you-to-love-hydrogen/) (<https://unearthed.greenpeace.org/2020/12/08/unearthed-today-why-oil-companies-want-you-to-love-hydrogen/>) [hydrogen](https://nrc.canada.ca/en/research-development/research-collaboration/programs/advanced-clean-energy-program-hydrogen) (<https://nrc.canada.ca/en/research-development/research-collaboration/programs/advanced-clean-energy-program-hydrogen>).

Over the last decade, Canada has doubled down with massive investments in fossil fuel infrastructure, most famously by buying the Trans Mountain pipeline (whose [development costs are now \\$30 billion](https://financialpost.com/commodities/energy/oil-gas/tmx-costs-skyrocket-what-need-know-trans-mountain-pipeline) (<https://financialpost.com/commodities/energy/oil-gas/tmx-costs-skyrocket-what-need-know-trans-mountain-pipeline>)), and via massive [\\$15 billion/year fossil fuel subsidies](https://www.readthemaple.com/canadas-fossil-fuel-subsidies-surpass-15-6-billion-this-year-environmental-group/) (<https://www.readthemaple.com/canadas-fossil-fuel-subsidies-surpass-15-6-billion-this-year-environmental-group/>) - ten times the NSERC budget. Since ratifying the 1997 Kyoto accords, Canada's petroleum production has [more than doubled](https://www.statista.com/statistics/265182/oil-production-in-canada-in-barrels-per-day/) (<https://www.statista.com/statistics/265182/oil-production-in-canada-in-barrels-per-day/>) and its greenhouse gas emissions are [14% above its 2020 Kyoto target](https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html) (<https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html>). Meanwhile, China has become the world leader in renewable energy with global capacity shares [of 40% of wind and 36% of solar power](https://www.irena.org/Data/View-data-by-topic/Capacity-and-Generation/Statistics-Time-Series) (<https://www.irena.org/Data/View-data-by-topic/Capacity-and-Generation/Statistics-Time-Series>).

While Canada's science, development and economic policies have been locking-in climate failure, with its allies, it has adopted bellicose anti-China cold war policies that include [NATO's policy](file:///papersfolder/Research.future/promoting%20NATO's%20policy) ([file:///papersfolder/Research.future/promoting NATO's policy](file:///papersfolder/Research.future/promoting%20NATO's%20policy)) of [China "containment"](https://www.nato.int/strategic-concept/) (<https://www.nato.int/strategic-concept/>), and its [provocative arming of Taiwan](https://japantoday.com/category/world/us-approves-selling-taiwan-munitions-worth-619-million) (<https://japantoday.com/category/world/us-approves-selling-taiwan-munitions-worth-619-million>). In Canada, there has been a concomitant rise in anti - [Chinese racism and hate crimes](https://www.cbc.ca/news/canada/british-columbia/anti-asian-hate-in-metro-vancouver-2023-1.6725671), (<https://www.cbc.ca/news/canada/british-columbia/anti-asian-hate-in-metro-vancouver-2023-1.6725671>), while internationally Canada's carefully crafted image as a force for peace is being ruined. In the

meantime, notably via its belt and road initiative, China has become a [champion of peaceful economic development and a broker for peace](https://www.cnn.com/2023/03/13/middleeast/saudi-iran-regional-impact-mime-intl/index.html), (https://www.cnn.com/2023/03/13/middleeast/saudi-iran-regional-impact-mime-intl/index.html), underscored by its spectacular [rapprochement of Iran and Saudi Arabia](https://www.politico.com/news/2023/03/12/iran-saudi-arabia-reaction-00086666) (https://www.politico.com/news/2023/03/12/iran-saudi-arabia-reaction-00086666).

Canada should take the path of peaceful economic cooperation, development and climate collaboration. It could follow German chancellor Olaf Scholz and recognize that "...new centers of power are emerging in a multipolar world" and his aim "[to establish and expand partnerships with all of them.](https://www.politico.eu/article/olaf-scholz-we-dont-want-to-decouple-from-china-but-cant-be-overreliant/)" (https://www.politico.eu/article/olaf-scholz-we-dont-want-to-decouple-from-china-but-cant-be-overreliant/).

If we are to leave a decent world to our children, Canada must learn from policies that work rather than persisting in ones that fail and that put our common future at risk.