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Discussion paper on the review of the Physical Activities Regulations

Submission to the Impact Agency of Canada

Recommendations in response to the Discussion paper on the review
of the Physical Activities Regulations

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Submission on behalf of:

Julia Levin
Associate Director, National Climate
Environmental Defence Canada
jlevin@environmentaldefence.ca

Summary of Recommendations:

1. The Impact Assessment Act must be amended to bring back climate, and specifically greenhouse gas emissions, as a federal effect and a factor to consider when making decisions. All high-carbon projects must get a federal impact assessment.
2. Do not remove in situ oil sands extraction facilities from the list
3. Do not remove fossil fuel-fired facilities from the list
4. Add unconventional natural gas development projects (i.e. fracking) to the list
5. Add hydrogen projects to the list, including storage, transportation, liquefaction and conversion into other commodities like ammonia.
6. Add carbon capture and storage projects to the list
7. Ensure carbon, hydrogen and ammonia pipelines, in addition to oil and gas pipelines, are captured
8. Return to a lower threshold for new and expansions of coal mining projects.
9. Lower the threshold for transportation projects and highways in particular.

1. Impact Assessment Must Include Climate Analysis

In June 2024, the federal government brought into force amendments to the *Impact Assessment Act* in response to the opinion released by the Supreme Court of Canada last October. Is it the view of Environmental Defence that the June 2024 amendments go beyond addressing the Court's opinion and instead renounce important federal roles in impact assessment.

Climate change is wreaking havoc across the country, with wildfires, floods, droughts, and extreme weather disasters from coast to coast to coast. Greenhouse gas emissions (GHGs) and the climate impacts of GHGs also clearly have national level effects that are not contained within any given province. Further, climate impacts lead directly to impacts in other areas of federal jurisdiction, such as migratory birds, fisheries, species at risk, and impacts on Indigenous peoples. Through the Paris Agreement and other instruments, Canada has committed to drastically reducing GHG emissions. Canadians are expecting strong action from the federal government on what the Supreme Court has acknowledged as an existential threat.

The federal government's renunciation of jurisdiction over nationally significant GHG emissions under the Act is a serious setback to climate action in Canada. Major projects captured by the *Impact Assessment Act* can cause extremely high levels of GHG emissions. Most obviously, oil and gas projects are massive contributors to national GHG emissions. While some projects' emissions may be regulated elsewhere, federal authorities can – and must – retain the ability to require impact assessments and place conditions on projects that could lead to GHG emissions at a scale that would hinder Canada's ability to meet the government's climate targets. Moreover, some projects' climate effects are not otherwise regulated, such as projects in the Ring of Fire area that could disturb peatlands that store more carbon than all of Canada's forests, releasing dangerous amounts of methane and carbon dioxide.

The Supreme Court said Canada should have explained when and how GHG emissions become a matter of national concern. The federal government should act on the court's suggestion, not abandon its responsibilities to Canadians and the environment.

We urge you the Government of Canada to amend the Impact Assessment Act to bring back climate, and specifically greenhouse gas emissions, as a federal effect and a factor to consider when making decisions. Furthermore, all high-carbon projects must get a federal impact assessment.

2. Do not remove in situ oil sands extraction facilities from the list

The oil and gas sector is responsible for nearly one third of Canada's GHG emissions and is also the fastest-growing source of emissions. Yet the discussion paper proposes to exempt some of the highest-carbon projects in the oil and gas sector.

In situ operations require more energy than oil sands mining to produce a barrel of bitumen. As a result, in situ operations generate two and half times as much greenhouse gas per barrel of bitumen compared to oil sands mines. In situ operations are some of the most emissions intensive projects globally. There are also serious adverse environmental effects of in situ oil sands development for species at risk. Although the geographic footprint from in situ development is smaller per unit of production of bitumen than oil sands mining, the disturbance impact from in situ development on species at risk such as woodland caribou is greater than the footprint from oil sands mining development due to its linear pattern and a large network of facilities, wells, roads, and pipelines. In situ developments therefore have the effect of reducing high value, intact and connected wildlife habitat to small, isolated islands. According to ECCO's assessment of disturbance within caribou habitat, linear disturbance is considered to have a disproportionately larger impact on woodland caribou and critical habitat

Part of the rationale for excluding in situ rests on the supposed existence of a provincial emissions cap. But a provincial cap is not an adequate rationale to exempt in situ oil sands projects. The Alberta cap is a particularly good example of why granting this exemption based on provincial emissions limits is problematic. Nearly a decade from when Alberta first introduced its cap, there has been no effort made to enforce the rules. The legislated cap has not been put into effect with subsequent regulations. Therefore, there is no actual provincial limit to the sector's emissions. This demonstrates why the existence of provincial or federal policies are not adequate rationale to exclude one of the highest emitting activities in the country. Considering the imperative of meeting national climate targets, the federal government must put in place a backstop to assess high-carbon projects that could put its targets out of reach.

In addition to recommending that in situ oil sands extraction facilities not be removed from the list, Environmental Defence supports suggestions mentioned in the Discussion Paper to capture more oil and gas projects because of their contribution to greenhouse gas emissions and potential impacts on Indigenous peoples.

3. Do no remove fossil fuel-fired facilities from the list

The Discussion Paper includes as an option for consideration removal of fossil fuel-fired power generating facilities from the Project List. Environmental Defence opposes this option. Fossil fuel-fired facilities are large emitters of GHGs. In keeping with our arguments laid out above, they should be captured by the projects list and their impacts should be reviewed by the Impact Assessment Agency.

The Discussion paper notes that 3 of 5 fossil fuel-fired facilities have been screened out, but failed to mention that at least one, the “Hydrogen Ready Power Plant Project,” received a great deal of interest from a number of stakeholders, who supported a thorough federal review of the project.

That particular project raised major concerns relating to migratory birds and endangered species. For instance, the property in question is located within the Clay Creek Woodland Area of Natural and Scientific Interest (“ANSI”) and the Bickford Oak Woods Wetland Complex, which is a Provincially Significant Wetland. The southern end of the property itself contains 6.1 hectares of the Clay Creek Woodland ANSI. Given the proximity of the project’s footprint and of the property itself to such valuable ecological features, as well as the application of the precautionary principle, there are significant risks of adverse impacts and current data related to migratory birds and species at risk is required. While the above is in reference to a specific project, it is safe to assume that similar federal impacts could be caused by other fossil fuel-fired facilities.

The “Hydrogen Ready” project is also located near multiple First Nations. It is essential that all Indigenous rights and interests be respected. Potential impacts to First Nations and Indigenous people were articulated in submissions from the Metis Nation of Ontario, the Chippewas of Kettle and Stony Point First Nation, Caldwell First Nation, Chippewas of the Thames First Nation, in regards to this facility. Again, while this is in reference to one particular project, it is safe to assume that similar conditions may well be present in relation to other, like facilities.

The argument that many fossil fuel-fired facilities were screened out is not a sound rationale for removing this project type from the project list. Stakeholders are clearly concerned about potential climate, species and Indigenous impacts from these types of facilities. They should remain on the project list.

4. Add unconventional natural gas development projects (i.e. fracking) to the list

Notably absent from the Project List is unconventional natural gas development, in particular hydraulic fracturing, or “fracking”. Occurring mostly in British Columbia, Alberta and Saskatchewan, fracking uses massive amounts of fresh water, is linked to contamination of groundwater, increases the risk of asthma, birth defects and cancer, and even triggers earthquakes. These environmental concerns have led several jurisdictions in Canada to ban fracking, including moratoriums in New Brunswick, Nova Scotia, Prince Edward Island, Quebec, Newfoundland and Labrador, and the Yukon.

These risks alone should be enough to justify the inclusion of fracking projects on the Project List. But fracking’s inclusion becomes undeniable when one considers the carbon-intensity and absolute emissions associated with projects. Fracking emits significant amounts of methane, a GHG 84 times more potent than carbon dioxide over the short-term. Fracking accounts for most domestic natural gas production in Canada.

5. Add hydrogen projects to the list, including storage, transportation, liquefaction and conversion into other commodities like ammonia.

Hydrogen production, especially from fossil fuels, is another emissions intensive activity that should be added to the project list. Although hydrogen is not a greenhouse gas, it does have an indirect global warming effect: its presence in the atmosphere causes a series of reactions that increase the concentrations of methane and ozone. These combined effects cause hydrogen to have a global warming effect over a twenty-year timeline that is over 30-40 times as strong as that of CO₂^{1,2} and 100 times stronger over a ten year period.³ Hydrogen molecules last only a few years in the atmosphere, so they exert a substantial near-term warming effect. As one of the smallest molecules – hydrogen is around 1/8th of the size of methane⁴ – it is extremely prone to leakage.⁵ In addition to carbon emissions, the process of Steam Methane Reforming (SMR), which is most commonly used to produce hydrogen from natural gas, also emits numerous local pollutants, such as nitrogen oxides, fine particulate matter, carbon monoxide, and volatile organic compounds, which pose health risks to people living close to production

¹ Warwick, N. *et al.* (2022). Atmospheric implications of increased Hydrogen use. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1067144/atmospheric-implications-of-increased-hydrogen-use.pdf

² <https://www.nature.com/articles/s43247-023-00857-8#Sec2> - though the study focuses on a 100 year time scale, the supplementary information looks at a 20 year time scale and finds a GWP20 of 37

³ Ocko, I. & Hamburg, S. (2022) Climate consequences of hydrogen emissions. Environmental Defense Fund. Available: <https://acp.copernicus.org/articles/22/9349/2022/>

⁴ Xue, Q. *et al.* (2018) Co-mixing Hydrogen and Methane May Double the Energy Storage Capacity. Journal of Materials Chemistry. Available: <https://pubs.rsc.org/en/content/getauthorversionpdf/c8ta01909f#>

⁵ Frazer-Nash Consultancy (2022) Fugitive Hydrogen Emissions in a Future Hydrogen Economy. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1067137/fugitive-hydrogen-emissions-future-hydrogen-economy.pdf

plants.⁶ The production of hydrogen from renewable energy sources should also be included, given this is a novel technology and its environmental impacts, if deployed at scale, are unknown. The amount of water required to produce renewable hydrogen – ~9 liters per kilogram hydrogen⁷ – is a concern, especially for geographies which are already facing water scarcity,⁸ such as Alberta.

The transportation and storage of hydrogen and its derivatives, such as ammonia, are likewise risky and uncertain. There are currently few pipelines that can transport pure hydrogen. For example, Alberta only has around 100 km of pipelines, used in industrial settings. There are no large, high pressure pipelines in Canada that deliver pure hydrogen to major demand centres. Transporting hydrogen long distances increases the risk of hydrogen leaks along the way, which can be deeply environmentally damaging given hydrogen's global warming potential. Hydrogen is highly flammable – more so than fossil gas – and requires special handling procedures during transportation to prevent accidental ignition. Ammonia carries its own risks, including toxic clouds, and leaks can be fatal.⁹

Hydrogen activities should be added to the list, including the production, transportation and storage of the hydrogen.

⁶ Sun, P. *et al.* (2019) Criteria air pollutants and greenhouse gas emissions from hydrogen production in US steam methane reforming facilities. *Environmental science & technology*, 53(12), 7103-7113. Available: <https://www.osti.gov/pages/servlets/purl/1546962/>

⁷ Gaster, R. (2024) Let's be realistic about green hydrogen. Utility Dive. Available: <https://www.utilitydive.com/news/green-hydrogen-production-scale-economies-clean-energy/709262/>

⁸ Gaster, R. (2024) A Realist Approach to Hydrogen. Information Technology & Innovation Foundation. Available: <https://itif.org/publications/2024/01/16/a-realist-approach-to-hydrogen/>

⁹ Collins, L. (2023) Hydrogen 'nightmare' | Dutch agency expresses fears of toxic clouds and deaths from large-scale ammonia imports. Hydrogen Insight. Available: <https://www.hydrogeninsight.com/transport/hydrogen-nightmare-dutch-agency-expresses-fears-of-toxic-clouds-and-deaths-from-large-scale-ammonia-imports/2-1-1409047>

6. Add carbon capture and storage as well as direct air capture projects to the list

Carbon capture and storage (CCS) refers to technologies and equipment that are designed to collect or “capture” carbon dioxide generated by high-emitting activities (such as oil refineries, cement plants, fossil fuel power plants) and then transport the captured carbon to sites where they are used for industrial processes or stored underground.

To date, the heavy environmental footprint and safety and health hazards associated with CCS infrastructure have been largely overlooked.¹⁰ Carbon dioxide leaks can pose a serious public health risk. Carbon dioxide is an asphyxiant - meaning that it displaces the oxygen in the air. At low concentrations, it can cause disorientation, confusion or mental clouding, and difficulty breathing. At high concentrations, CO₂ can cause rapid loss of consciousness and can be lethal. A large, sudden influx of CO₂, such as a pipeline leak, can be catastrophic for the people who live nearby. CO₂ pipeline ruptures have a greater potential to endanger the public than hydrocarbon pipelines.¹¹

Carbon leakage can contaminate ground and surface waters, impact soil ecology and the marine environment, impact agriculture and harm human and animal health.¹² An increase in CO₂ in aquifers may leach lead and arsenic contained in rocks, creating an environmental hazard if drinking water sources are affected.¹³ It is for this reason that the Government of Queensland has banned carbon sequestration in the country’s largest groundwater aquifer. Injection of CO₂ in subsurface reservoirs may trigger earthquakes (monitoring at existing sequestration sites has shown thousands of induced, small scale earthquakes per year).¹⁴

Carbon capture aggravated local air and water pollutants. CCS technology captures carbon dioxide from refineries, but does not capture other air pollutants from the facilities. CCS technology is very energy intensive, leading to greater overall fuel use and increased emissions of non-CO₂ air and water pollutants, such as fine particulate matter.¹⁵

¹⁰ Center for International Environmental Law (2021) Confronting the Myth of Carbon-Free Fossil Fuels: Why Carbon Capture is not a Climate Solution. Available: <https://www.ciel.org/wp-content/uploads/2021/07/Confronting-the-Myth-of-Carbon-Free-Fossil-Fuels.pdf>

¹¹ Kuprewicz, R. (2022) Accufacts’ Perspectives on the State of Federal Carbon Dioxide Transmission Pipeline Safety Regulations as it Relates to Carbon Capture, Utilization, and Sequestration within the U.S. Pipeline Safety Trust Available: <https://pstrust.org/carbon-dioxide-pipelines-dangerous-and-under-regulated/>

¹² Climate Action Network International (2021) Position: Carbon Capture, Storage and Utilisation. Online: https://climatenetwork.org/wp-content/uploads/2021/01/can_position_carbon_capture_storage_and_utilisation_january_2021.pdf

¹³ Kelemen, P. et al. (2019) An Overview of the Status and Challenges of CO₂ Storage in Minerals and Geological Formations. *Frontiers in Climate*. Available: <https://doi.org/10.3389/fclim.2019.00009>

¹⁴ Kelemen, P. et al. (2019) An Overview of the Status and Challenges of CO₂ Storage in Minerals and Geological Formations. *Frontiers in Climate*. Available: <https://doi.org/10.3389/fclim.2019.00009>

¹⁵ Jacobson, M. (2019) The health and climate impacts of carbon capture and direct air capture, *Energy & Environmental Science*. Available: <https://pubs.rsc.org/en/content/articlelanding/2019/EE/C9EE02709B>

Compressing captured carbon is an energy-intensive process that generates a lot of heat and requires large amounts of water to cool the equipment.¹⁶ Studies suggest that CCS increases water withdrawals at power plants between 25% and 200%.¹⁷

Direct air capture (DAC) refers to a suite of new technologies, largely untested at scale, which claim to filter CO₂ directly from the ambient air. Scientists and academics have raised concerns about additional resources used for DAC, including water and toxic chemicals.¹⁸ The leading DAC technology requires between five and thirteen tonnes of water per tonne of carbon captured.¹⁹ Scientists and academics have raised concerns about additional resources used for DAC, including water and toxic chemicals.²⁰

Carbon capture and storage as well as direct air capture activities should be added to the Project List.

7. Ensure carbon, hydrogen and ammonia pipelines, in addition to oil and gas pipelines, are captured

Environmental Defence recommends that the definition of pipeline is consistent across entries to capture a range of commodities.

This should include capturing projects which aim to repurpose a pipeline to transport a different commodity than originally designed. For example, there are proposals to repurpose fossil gas pipelines for hydrogen. However, given the different physical properties, this cannot be done safely. Hydrogen and fossil fuels have different properties which require different infrastructure. Hydrogen has fundamentally different physical and chemical properties to natural gas, with major consequences for safety, energy supply, climate, and cost.²¹ Hydrogen accelerated fatigue cracking (HAFC) is the primary concern in converting existing natural gas pipelines for hydrogen.²² In other words, hydrogen can cause steel pipelines to crack, leak or burst. Hydrogen embrittlement will require new storage tanks, piping, pumps, and valves.

¹⁶ Rosa, L. et al. (2021) The water footprint of carbon capture and storage technologies, *Renewable and Sustainable Energy Reviews* 138, Available: <https://www.sciencedirect.com/science/article/abs/pii/S1364032120307978>

¹⁷ Sneath, S. (2022) The cost to capture carbon? More water and electricity, *The Guardian*. Available: <https://www.theguardian.com/environment/2022/oct/15/emissions-capture-carbon-cost-water-electricity>

¹⁸ US Department of Energy (2021) Life Cycle Greenhouse Gas Analysis of Direct Air Capture Systems. Available: https://netl.doe.gov/sites/default/files/netl-file/21DAC_Skone.pdf

¹⁹ Realmonte G. et al (2019) An inter-model assessment of the role of direct air capture in deep mitigation pathways, *Nature Communications*. Available: <https://www.nature.com/articles/s41467-019-10842-5#ref-CR18> ; Chatterjee, S. & Huang K. (2020) Unrealistic energy and materials requirement for direct air capture in deep mitigation pathways, *Nature Communications*. Available: <https://www.nature.com/articles/s41467-020-17203-7>.

²⁰ US Department of Energy (2021) Life Cycle Greenhouse Gas Analysis of Direct Air Capture Systems. Available: https://netl.doe.gov/sites/default/files/netl-file/21DAC_Skone.pdf

²¹ Martin, P. et al. (2024) A review of challenges with using the natural gas system for hydrogen. *Energy Science & Engineering*. Available: <https://doi.org/10.1002/ese3.1861>

²² Martin, P. et al. (2024) A review of challenges with using the natural gas system for hydrogen. *Energy Science & Engineering*. Available: <https://doi.org/10.1002/ese3.1861>

8. Return to a lower threshold for new and expansions of coal mining projects

We support the proposal to return to a lower threshold for new and expansions of coal mining projects. Our recommendation would be to adopt an even lower threshold of 500 t/day, given the environmental impacts of coal mining. This threshold should be lowered to 0 t/day by 2030. In addition to the emissions associated with producing, transporting and burning coal, coal mines release toxic metals such as selenium that are harmful to fish and their habitat, as well as numerous migratory bird species at risk.

9. Lower the threshold for transportation projects and highways in particular.

The discussion paper notes that the Minister has received a total of 9 designation requests for transportation projects including roads, aerodromes, and railway yards. Of these, one was designated by the Minister, but that designation was later set aside by the Federal Court of Appeal. For those that were not designated, it was determined that the IAA would not add value for these projects on the basis that the potential for adverse effects would be limited.

The project that was designated was the proposed Highway 413. First off, Environmental Defence does not agree that the project should have been set aside by the federal court of appeal. The appeal suffered from a number of deficiencies. But more importantly, it is our assertion that the project should be designated once again, given its far-reaching environmental impacts, many of which are clearly matters of federal concern.

The 413 Project would cause significant adverse environmental effects because of its location and environmental setting. The highway will develop a rural area including a number of areas protected under the Greenbelt Plan. It would bisect a number of features such as significant woodlands, **federally listed endangered species** habitat and wetlands which are designated as protected “natural heritage features”. It will bisect and seriously compromise a number of major river corridors in and outside of the Greenbelt Plan that provide critical wildlife connections north to the major natural areas of the Oak Ridges Moraine and the Niagara Escarpment. These include two major crossings of the Humber River and the adjacent East Humber River valleys, another three crossings of East Humber valleys, four crossings of West Humber valleys, two crossings of Etobicoke Creek and a major crossing of the main Credit River valley. The 413 Project would have “extensive and widespread impacts on the natural heritage system,” including significant loss in the number, form and function of natural features and species. There will be significant fragmentation of valley lands, conservation lands, and the few remaining natural corridors in the eastern portion of the project area.

The proposed highway and its corridor will destroy a combined 5.95 km length of forests that support many sensitive forest bird species, and other wildlife and plants. This includes destroying seven entire woodlots, portions of other woodlots, and bisecting numerous forested valleys. The single biggest loss will be a 1.5 km stretch of forests around the twin valleys of the Humber and East Humber Rivers in Vaughan.

Over 1,000 ha of land identified as important for local wildlife movement, some of which is also important at a regional scale, will either be removed or intersected by the proposed highway. Of note is the section located to the east of Bramalea Road, through an area classified as important for regional wildlife movement.

The exact number of affected stream crossings involved in the 413 Project is indicated by the proponent to be 95 of which 24 are classified as navigable. The Toronto Region Conservation Authority (TRCA) has estimated 85 crossings are required within its jurisdiction. Of these crossings, TRCA ranks 10 as “high priority” locations ecologically, as they are in deep valleys with relatively high quality existing or potential habitat, high regional connectivity, or high local connectivity. Of the remaining crossings, 58 are ranked as “medium priority” locations located in shallow valleys that have high quality existing or potential habitat, high regional connectivity, or high local connectivity. Details are not known for crossings in Credit Valley Conservation Authority (CVCA) or Halton Conservation (HC) jurisdiction.

Multiple federally listed endangered species have been found in the project area. The project will certainly have deleterious effects on fish and fish habitat. Multiple First Nations have also voiced support for a federal review of this project.

Finally, though the Minister decided not to designate other projects such as the Bradford Bypass, strong arguments were made in this case as well about potential severe federal impacts to endangered species, fisheries, and navigable waters, in addition to Indigenous Impacts as highlighted by First Nations themselves.

All of which suggests that not only should the 413 project be designated once again, but it, and similar projects, should have been captured on the project list in the first place.

Lower the threshold to capture highways with 50 km or more of new right of way.