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The emissions we count and where we count them matters in the Strategic Assessment of Climate Change

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The cornerstone of the federal government's climate agenda is the commitment to achieve netzero greenhouse gas emissions by 2050 to help limit warming to 1.5 degrees Celsius to prevent the most catastrophic impacts of climate change. Implementing this commitment requires defining and operationalizing net-zero in legislation, programs and plans, and decision-making criteria. This was first done in the Strategic Assessment of Climate Change, a federal government policy document that sets out the parameters for assessing climate change in federal project reviews.

On the face of it, calculating net-zero emissions should be a simple matter of balancing a budget. Both sides of the ledger have to be equal: On one side we have the amount of carbon pollution we're still emitting, and on the other the amount of carbon pollution we're removing from the atmosphere through nature-based methods (managed forests, for example) or technology (carbon capture and storage, for example). The carbon pollution being removed "neutralizes" the carbon still being emitted.



The math seems simple. But it's not, because the equation Canada is working with is flawed. Simply put, Canada's definition of net-zero doesn't add up. Both sides of the ledger won't necessarily be equal. Here's why.

The emissions math is complicated by where we draw boundaries

It's complicated because of the distribution of pollution across time and space, and the range of actors — corporate, government, individual — that can be involved. This requires decisions about what pollution is counted, at what level, and who is responsible for it.

We might, for example, decide to count pollution at the facility level, the project level, corporate, sectoral, provincial or national level. The problem, however, is that the level at which the "boundary" around what is counted is drawn doesn't always neatly coincide with where, or at what stage, the pollution occurs.

Take for example an oil refinery. The project emissions include direct and indirect projectrelated emissions associated with processes at the facility and energy purchased for use at the facility (scope 1 and 2 emissions), upstream emissions that occur in producing and transporting inputs to the refinery (scope 3 emissions) and downstream emissions that are emitted from the use of the product (also scope 3 emissions). The life cycle emissions of the product produced in the facility includes all the direct, indirect, upstream and downstream emissions — including those associated with land use changes, construction and decommissioning of the facility, emissions from the production of the energy purchased and used by the refinery, and the emissions that result from burning the oil.



Because GHG emissions calculated at the facility or project level (scope 1 and 2) are within the control of the refinery owner, this is seen as a reasonable "boundary" for what emissions are counted. Drawing the boundary around the project, however, excludes the vast majority of emissions associated with the life cycle of the fuel produced in that refinery. Where, then, are those emissions being counted?

As Canada moves to put structures in place to achieve net-zero emissions by 2050, we have the difficult task of accounting for all emissions, regardless of where or when emitted. Only with clear and comprehensive accounting of the emissions new infrastructure will lock into place — at home and abroad, throughout the life cycle of the project — will we be able to ensure that infrastructure is compatible with our climate commitments.

This isn't just theoretical. We have very real decisions to make in the near future on energy and industrial infrastructure that will shape Canada's decarbonization options for decades to come. What we count matters.

What does the Strategic Assessment of Climate Change have to do with it?

Canada's Strategic Assessment of Climate Change (SACC) sets out the parameters for assessing a project's contribution to climate change in the federal review of major projects under the Impact Assessment Act and the Canadian Energy Regulator Act.¹ The definition of net-zero should ensure the ledger is balanced — but closer analysis reveals that won't necessarily be the case.

The Strategic Assessment of Climate Change includes a requirement for projects that extend beyond 2050 to demonstrate how they will achieve net-zero emissions by the year 2050. However, when deciding if future infrastructure and industrial development projects should go ahead or not, the federal government will only look at project-level emissions — what a particular project emits, and nothing else down the line.

The equation used by the government of Canada in the Strategic Assessment of Climate Change to determine net-zero is as follows:



Equation 1. Net GHG emissions at the project level equals direct GHG emissions plus acquired energy GHG emissions (e.g. emissions from purchased electricity, steam, heat or cooling), minus captured and stored CO₂, offset credits, and avoided domestic GHG emissions (e.g. if a project replaces a higher-emitting one, the difference between the amount of emissions).

¹ Government of Canada, *Strategic Assessment of Climate Change*, revised October 2020. https://www.canada.ca/en/services/environment/conservation/assessments/strategic-assessments/climate-change.html

Canada's net-zero emissions equation doesn't add up

Life cycle emissions are not fully included

Because Canada's net-zero emissions "definition" does not include a requirement to consider life cycle emissions, it fails to account for all of the greenhouse gas emissions that will be released into the atmosphere. Although upstream emissions may be calculated in the assessment if they exceed 500,000 tonnes (and not all projects have upstream emissions), they are not explicitly included in this calculation.

Limiting the definition to direct emissions is appropriate when considering mitigation options and conditions of approval that are placed on a project, since both must be within a proponent's control. It is not sufficient, however, when determining whether a project is in the public interest, since that requires a full understanding of the life cycle emissions related to a project over its lifetime.

At the very least, because we are not counting the vast majority of emissions, it is imperative we reduce project- or facility-level emissions as much as possible, ideally in the project design, and compensate for any emissions that are emitted.

The math on "avoided emissions" is especially problematic

The SACC net-zero equation includes a variable called "avoided emissions." This is an attempt to recognize that a new project (such as a gas-fired electricity generating station) may replace an existing facility (such as a coal-fired plant) that had higher emissions — in other words, according to the SACC, avoided domestic emissions are those "that are reduced or eliminated in Canada as a result of the [new] project," when the emissions reduction results "from the replacement of a high-emitting facility with a lower-emitting facility."²

The inclusion of "avoided domestic GHG emissions" may seem fair and reasonable — at first glance. But let's do the math all the way through.

Imagine a new facility has 1.5 million tonnes (Mt) of direct GHG emissions per year, 0.5 Mt per year of emissions from acquired energy, and does zero carbon capture and purchases zero carbon offsets. Those 2 Mt of emissions mean it would not be a net-zero emissions facility. Now imagine this facility replaces an older one emitting 6 Mt annually. Because the net-zero equation allows for the subtraction of "avoided domestic GHG emissions," suddenly this facility that emits 2 Mt of GHG emissions is calculated on paper as having -2 Mt of annual GHG emissions:

² Strategic Assessment of Climate Change, revised October 2020, 6.



Under the federal government's flawed definition of net-zero, this facility could claim to have net-negative emissions.

What about those two million tonnes of very real GHG emissions — where are they counted? The problem here is that creative accounting does not work on the atmosphere. "Avoided" emissions cannot cancel out actual emissions, which still need to be counted in project decision-making with a clear plan for mitigation.

Offsets are not equal to mitigation

To limit warming to 1.5 degrees Celsius, high-carbon projects will have to achieve immediate, continuous, deep emissions reductions in line with interim targets and budgets.

While carbon removal will be critical to achieving net-zero emissions, there are limits to the degree to which we can rely on removal to safely limit warming. The priority should always be on mitigation and, in particular, minimizing absolute project emissions. Even when offset credits and carbon capture and storage are used, careful attention is needed to the economics, availability, and reliability of such subtractions. Offsets should be reserved for the most needed and difficult to decarbonize sectors. This requires a process for not only verifying offsets but also allocating them to activities that are both essential and difficult to decarbonize.

How can we get it right?

Fix the math

Rather than the single, net-zero equation in the SACC, we recommend two equations. First, we need a net-zero equation calculated annually that omits avoided domestic emissions. This would be used to determine mitigation obligations for the proponent and, to be deemed credible, it would need to decline in line with Canada's climate change targets. This equation would look like this:



Equation 2. Net GHG emissions at the project level equals direct GHG emissions plus the balance of emissions from acquired/exported energy, minus captured and stored CO₂, and offset credits.

Second, we need a calculation showing all of the emissions over the lifetime of the project which should be used in determining whether a project is in the public interest. This second equation would look like this:



Equation 3. Lifetime GHG emissions equals lifetime direct emissions, plus lifetime balance of emissions from acquired/exported energy plus direct and indirect construction and decommissioning emissions plus lifetime upstream, and downstream emissions minus lifetime emissions captured and stored, and lifetime emissions offset credits.

Recommendations for science-based climate change assessment

To maximize our chances of avoiding catastrophic climate change, the following seven conditions are essential when implementing the Strategic Assessment of Climate Change:

- 1. All high-carbon projects proposed in Canada must be assessed under the Impact Assessment Act.
- 2. All high-carbon projects, including and especially those not required to create a netzero plan, must commit to continuously reduce emissions throughout their lifetime in line with government interim targets and budgets.
- 3. Canada's net-zero calculation should not include avoided emissions.
- 4. Lifetime emissions must be considered when deciding whether a project is in the public interest.

- 5. Mitigation requirements on projects should result in absolute emissions reductions.
- 6. The need for, and alternatives to, specific projects should always be assessed, even if projects can achieve the goal of net-zero emissions by 2050.
- 7. Where appropriate, projects should strive to reach net-negative emissions.

Keeping an eye on the prize

Achieving net-zero GHG emissions will be the result of myriad policies and commitments for multiple organizations and levels of government. The federal government will not be able to dictate the terms of all these commitments. However, it has an important role to play in setting its own standards and, in doing so, setting the bar for the rest of the country.

The federal government recently announced its plan to get Canada to net-zero by 2050.³ If that plan rests on a faulty definition of net-zero it could create loopholes that dilute the effectiveness of climate policy, signal a lack of seriousness regarding meaningful climate action, and ultimately foster cynicism toward the government's climate agenda. A robust definition of net-zero, on the other hand, will not only ensure we are doing our fair share to limit global warming by 2050, but also that we are on an achievable path toward that goal.

More importantly, achieving net-zero by 2050 should not be the only climate test applied to projects when determining if they are in the public interest. It is critical that all high-carbon projects be assessed on whether they can credibly achieve emissions reductions in line with interim targets and budgets.

Why is this so important? Reaching net-zero emissions by 2050 is not the actual goal — it's the method by which we'll reach the real goal of limiting warming to 1.5 degrees Celsius. A climate-safe world is only possible with a commitment to immediate, deep emissions reductions for all new and existing high-carbon projects in Canada and around the world.

³ Environment Canada, *A Healthy Environment and a Healthy Economy: Canada's Strengthening Climate Plan to Create Jobs and Support People, Communities, and the Planet* (2020). https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/climate-plan/healthy environment healthy economy plan.pdf