environmental defence

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In order for Canada to do its fair share under the Paris Agreement and limit global temperature increase to 1.5 °C, economy-wide rapid decarbonization is necessary. The necessary total transformation of our current industrial systems away from fossil fuels to renewable, non-emitting systems will require significant levels of public and private investment. It is critical that public financial expenditures do not lock Canada's industries into continued dependence on fossil fuels or violate Canada's commitment to eliminating fossil fuel subsidies.

Environmental Defence prioritizes ambitious climate mitigation and a managed phase-out of fossil fuel production to meet Canada's domestic and international targets under the Paris Agreement. Our vision for a safe climate centres on rapid and deep economy-wide decarbonization of all countries and a transition to a just, equitable, and sustainable future. The most important steps for decarbonizing our economy are increased electrification, wide-scale use of renewable energy and intensifying energy efficiency.

Carbon capture is not a climate solution. CCS technologies rely on the flawed premise that we can continue burning fuels indefinitely by capturing some of the production-related carbon emissions. CCS does not halt the core drivers of the climate crisis--fossil fuel production and consumption--or meaningfully reduce greenhouse gas emissions.

We are deeply concerned with the proposal to introduce a new investment tax credit for carbon capture and storage (CCS). Investments in CCS divert resources from the proven, cost effective solutions that are needed in the near-term to achieve deep emission reductions in the next decade along a pathway to zero emissions, including renewable energy, electrification and energy efficiency.

Environmental Defence does not support the creation of a CCUS investment tax credit. However, if the Government of Canada still decides to move forwards with this proposal, we have recommended conditions to mitigate the worst effects of the tax credit.

The proposed tax credit is the result of lobbying from oil and gas companies. Oil and gas executives have estimated that equipping the oil sands with CCS technology will cost $75 billion, and that they expect over $50 billion of that to come from government spending.[1] The Energy Future Forum — a partnership which includes most of the major oil companies in Canada — has been lobbying for a new federal tax equivalent to the 45Q tax credit in the United States,[2] which is helping to drum up investment in CCS. However, Canada already has in place a robust policy to incentivize carbon capture and storage that the United States lacks: a carbon price. However, the Canadian Institute for Climate Choices (CICC) found that the average cost signal in Canada is exceptionally low for large emitter programs, ranging from $1.80 to $25.60 per tonne, with an average price per tonne of $4.96. CICC concluded that with such low average prices, firms are unlikely to deploy the bulky investments in new technologies that

[1] Tuttle, R. (2021) Oil sands carbon cuts come with US$60-billion bill, loose ends. Bloomberg. Available: https://www.bnnbloomberg.ca/oil-sands-carbon-cuts-come-with-us-60-billion-bill-loose-ends-1.1626645
[2] Public Policy Forum (July 2020) Carbon Capture, Utilization and Storage: It's Time to Act. Available: https://www.newswire.ca/newsreleases/carbon-capture-utilization-and-storage-it-s-time-to-act-813263831.html

Canada's climate commitments require.[3] Rather than creating a CCUS-specific tax credit, the Government of Canada should ensure that companies have a real incentive to invest in carbon reductions by closing the loopholes in the design which currently allow for around 80% of oil and gas emissions to avoid paying the full carbon price.[4]

Earlier this summer, over 500 organizations from Canada and the United States expressed our collective concern about Canadian and US governments' support for CCS.[5] The letter outlined our concerns with CCS, summarized here. These concerns are shared by the International Climate Action Network - a global network of more than 1,500 civil society organisations in over 130 countries.[6]

- **Rather than replacing fossil fuels, carbon capture technology prolongs our dependence on them**. Putting carbon capture technology on greenhouse-gas emitting facilities enables those facilities to continue operating, effectively providing those emitters with a license to pollute. Furthermore, CCS does not address environmental, social and health impacts associated with the mining, extraction, and transport of fossil fuels,[7] faced primarily by Indigenous and front-line communities.[8] These include exposure to harmful air and water pollution, which have been linked to increased rates of cancer in First Nations in Alberta[9], as well as the destruction of ecosystems and impacts on species.
- **Carbon capture is not a zero emissions solution**. At best, CCS captures only a fraction of carbon emissions from the production and use of fossil fuels.[10] Many of the proposed projects in Canada are in the upstream oil and gas sector. In this context, applying CCS doesn't address downstream emissions - the emissions that come when the fossils are burnt - which is where 80% of emissions come from. Similarly, it does not address the significant methane leakage from the production and distribution of oil and gas. Methane is 80 times more powerful a greenhouse gas than carbon dioxide - and the gas is responsible for about a quarter of global warming - so this is a huge omission.
- Five decades on from the first carbon capture project, **the technology remains riddled with problems, unproven at scale and not fit for purpose**. Current global carbon capture capacity is 39 MT, or about 0.1% of annual emissions from fossil fuels.[11]

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[3] Canadian Institute for Climate Choices (2021) 2020 expert assessment of carbon pricing systems. Available: https://publications.gc.ca/site/eng/9.900084/publication.html

[4] Environmental Defence (2018) Canada's oil & gas challenge. Available: https://environmentaldefence.ca/report/canadas-oil-and-gas-challenge/

[5] Environmental Defence (2021) Letter to Government: Carbon capture is not a climate solution. Available: https://environmentaldefence.ca/report/ccs_letter/

[6] Climate Action Network International (2021) CAN Position: Carbon Capture, Storage and Utilisation. Available: https://climatenetwork.org/resource/can-position-carbon-capture-storage-and-utilisation/

[7] Climate Action Network International (2021) CAN Position: Carbon Capture, Storage and Utilisation. Available: https://climatenetwork.org/resource/can-position-carbon-capture-storage-and-utilisation/

[8] Donaghy, T. & Jiang, C. (2021) Fossil Fuel Racism: How phasing out oil, gas and coal can protect communities. Greenpeace. Available: https://www.greenpeace.org/usa/reports/fossil-fuel-racism/

[9] Bennett, D. (2014) Study links oilsands pollution to higher cancer rates. Toronto Star. Available: https://www.thestar.com/news/canada/2014/07/07/student_links_oilsands_pollution_to_higher_cancer_rates.html

[10] Schlissel, D. (2019). IEEFA op-ed: Reality of carbon capture not even close to proponents' wishful thinking. Guest editorial in Denver Post. Available: https://ieefa.org/reality-of-carbon-capture-not-even-close-to-proponentswishful-thinking/

[11] In 2010 ~10 Mt of CO2/year CCS capacity was operational, with a further 150 Mt CO2/year in some form of development, yet by 2020 only 39 Mt CO2/year was in operation, with ~75 Mt CO2/year capacity in some form of

However, even that low number is likely an overestimate, since most CCS operations don't actually capture as much carbon as proponents state.[12] For CCS to play a significant role in achieving the Paris Agreement goal, gigatonnes (Gt) of CO2 would need to be captured and permanently stored. All of these ongoing impacts exist while the costs of renewables and other more affordable and robust climate solutions have plummeted, especially when contrasted with carbon capture technologies.

- **The buildout of CCS infrastructure presents serious health, safety, and environmental risks**, particularly for marginalized frontline communities, already overburdened by industrial hazards. Since these dangers are systematically overlooked in discussion on carbon capture, it is essential that these communities be involved in the design of any policies that impact them.
- **A suite of strategies and technologies already exist to cut emissions in the industrial sector, without CCS**. A focus on CCS will delay the decarbonization of these sectors.
- **Safe, permanent, and verifiable storage of CO2 is difficult to guarantee**. The financial and liability risks related to carbon storage are highly likely to be transferred from the private sector to the public.

It is conceivable that CCS *migh*t play a modest role in sectors that are extremely difficult to decarbonize, such as cement, once all real decarbonization options are exhausted. But the limited potential benefits of doing so would need to be weighed against the enormous costs and massive impacts of building carbon capture and transport infrastructure required to do so. Moreover, most sectors have alternatives, such as direct electrification. CICC has warned that if Canada relies too heavily on engineered forms of negative emissions technology that fail to prove viable, it could significantly increase the costs of reaching our climate commitments, or cause us to miss these targets altogether.[13]

Simply put, carbon capture is a dangerous distraction. To avoid catastrophic climate change, we need to deploy resources to replace the fossil fuel industry, not prop it up. **Environmental Defence does not support the creation of a CCUS investment tax credit. If the Government of Canada proceeds with the tax credit, the following conditions will mitigate some of the worst impacts.** Here are our recommendations:

- Enhanced oil recovery projects should not be eligible for the tax credit. Only 'permanent' storage projects should be considered
- The tax credit should only be made available for sectors for which there are no decarbonization options. Oil and gas projects, including fossil or blue hydrogen, as well as plastics and petrochemical production, should not be eligible for the credit.

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development: Garcia Freites, S. & Jones, C. (2020) A Review of the Role of Fossil FuelBased Carbon Capture and Storage in the Energy System. Friends of the Earth Scotland. Online: https://foe.scot/wp-content/uploads/2021/01/CCS_REPORT_FINAL.pdf

[12] Schlissel, D. (2019). IEEFA op-ed: Reality of carbon capture not even close to proponents' wishful thinking. Guest editorial in Denver Post. 8 August 2019. Available at: https://ieefa.org/reality-of-carbon-capture-not-even-close-to-proponentswishful-thinking/

[13] Canadian Institute for Climate Choices (2021) Canada's Net Zero Future: Finding Our Way in the Global Transition. Available: https://climatechoices.ca/reports/canadas-net-zero-future/

- The implementation of a tax credit must be contingent on the development of a robust governance framework for carbon storage as well as strong monitoring, reporting, verification and enforcement requirements.
- Companies receiving tax credits must be held accountable to mitigate harmful impacts on frontline communities, and provide compensation where mitigation isn't possible. These communities must be involved in the design and implementation of the tax credit.

Deploying CCS at any climate-relevant scale, carried out within the short timeframe we have to avert climate catastrophe and done without posing substantial risks to communities on the frontlines of the buildout, is a pipe dream. Despite the billions of taxpayer dollars spent by governments on CCS over the last two decades, the technology has not made a dent in C02 emissions. Continuing to sink federal funds into technological carbon capture is choosing to chase a fossil-fueled fantasy rather than deal with the root of the problem. We must move forwards with the climate solutions that will contribute the most to emissions reductions: increased electrification, wide-scale use of renewable energy and intensifying energy efficiency.

Enhanced Oil Recovery

Enhanced oil recovery projects should not be eligible for the tax credit. Only permanent storage projects should be considered

Globally, 80% of captured carbon is actually being used for enhanced oil recovery, whereby CO_2 is injected into depleted underground oil reservoirs to boost oil production - extraction that otherwise wouldn't have been possible.[14] EOR is disastrous for the climate, as it results in more oil extraction and more carbon emissions when that oil is burned. A 2020 review of scientific research found that popular carbon capture methods have actually put more CO2 into the atmosphere than they have removed.[15] The injection of CO2 into aging oil fields to increase production has helped extend the life of some fields by more than 25 years.[16]

It is critical that the tax credit only be applicable for carbon that is permanently stored. The use of captured carbon for energy and petrochemical projects is an energy-intensive process that only serves to prolong the use of fossil fuels. Earlier this year, 47 organisations representing 2 million people across Canada sent a letter to the federal Cabinet expressing our collective opposition to the introduction of tax policy that would incentivize enhanced oil recovery (EOR).[17] The Government of Canada has been clear that the tax credit will not be applicable towards

[14] Garcia Freites, S. & Jones, C. (2021) A Review of the Role of Fossil Fuel-Based Carbon Capture and Storage in the Energy System, Tyndall Centre. Online: https://www.research.manchester.ac.uk/portal/files/184755890/CCS_REPORT_FINAL_v2_UPLOAD.pdf
[15] Sekera, J. & Lichtenberger, A. (2020) Assessing Carbon Capture: Public Policy, Science, and Societal Need: A Review of the Literature on Industrial Carbon Removal. Biophysical Economics and Sustainability. Available: https://link.springer.com/article/10.1007/s41247-020-00080-5
[16] IHS Energy (2016) CO2 EOR Potential in North Dakota. Online: https://www.legis.nd.gov/files/committees/64-2014%20appendices/IHS%20Energy%20-%20Final%20Report.pdf
[17] Environmental Defence (2021) Letter from civil society demanding no subsidies for enhanced oil recovery. Available: https://environmentaldefence.ca/report/oil-production-subsidies-letter/

enhanced oil recovery. This is a move we have applauded, and urge the government to stay firm on this commitment.

Analysis done on the American 45Q tax credit - which allows for enhanced oil recovery projects - found it could result in at least an additional 400,000 barrels per day of CO2-enhanced oil production in the United States in 2035, which would directly lead to as much as 50.7 million metric tons of net CO2 emissions annually – and possibly far more.[18]

Sector Eligibility

> *The tax credit should only be made available for sectors for which there are no decarbonization options.*

The push to deploy CCS in the industrial sector ignores the suite of existing strategies and technologies which already exist to cut emissions,[19] the limited feasibility of CCS for many sources of industrial emissions, and risks delaying the development and deployment of zero carbon alternatives. Emissions in the industrial sector can be more rapidly and more effectively reduced by: increasing process efficiency, replacing fossil fuels with non-carbon emitting renewable energy to supply power and heat, reusing materials in manufacturing to reduce the production of virgin material. A focus on CCS in these sectors will delay their decarbonization.

> *Oil and gas projects, including fossil or blue hydrogen, should not be eligible for the credit.*

Carbon capture offers fossil fuel interests a new technology through which to solicit public funding while allowing them to continue extracting and burning dirty fuels. Allowing oil and gas companies to claim tax credits for their projects lowers their cost of doing business, with the result of increased company profits which can then be reinvested into expanding production - or simply enriching shareholders - at the expense of the public.

The oil and gas sector is pushing for governments to invest in fossil fuel derived hydrogen as a way to create new markets for their products. However, a recent study, the first ever peer-reviewed study on the life cycle emissions of blue hydrogen, found that blue hydrogen is even worse for the climate than coal or natural gas, and concludes there is no role for blue hydrogen in a carbon free future.[20]

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[18] Oil Change International (2017) Expanding Subsidies for CO2-Enhanced Oil Recovery: A Net Loss for Communities, Taxpayers, and the Climate. Online: http://priceofoil.org/content/uploads/2017/10/45q-analysis-oct-2017-final.pdf

[19] Climate Action Network International (2021) CAN Position: Carbon Capture, Storage and Utilisation. Available: https://climatenetwork.org/resource/can-position-carbon-capture-storage-and-utilisation/

[20] Howarth, R. & Jacobson, M. (2021) How green is blue hydrogen? Energy Science and Engineering. Available: https://www.actu-environnement.com/media/pdf/news-38015-etude-energy-science-engineering-hydrogene-bleu.pdf

The biggest beneficiaries of Section 45Q in the United States are oil companies.[21] Canada is already falling short on its commitment to eliminate inefficient fossil fuel subsidies. If oil and gas projects were eligible, including blue hydrogen, the tax credit would add yet another taxpayer subsidy for the oil and gas industry.

Plastic and petrochemical production should not be eligible for the credit.

Carbon capture and utilization for plastics and petrochemicals has been estimated to require between 126 and 222 per cent of the world's renewable energy targets for 2030 in order to eliminate 3.5 billion tons of CO2 or equivalent, roughly the amount that the industry is estimated to produce each year.[22] Above and beyond the problem of colonizing the world's foreseeable supply of renewable energy, CCU would also not address the significant problem of pollution that results from the use and disposal of plastics once manufactured, which the federal government has recognized and for which it has begun implementing an integrated management approach.[23]

A Carbon Storage Governance Framework

The implementation of a tax credit must be contingent on the development of a robust governance framework for carbon storage as well as strong monitoring, reporting, verification and enforcement requirements.

Aside from compromising climate mitigation efforts, depending on volume and concentration, CO2 leakage also has the potential to contaminate ground and surface waters, impact soil ecology and the marine environment, and harm human health.[24]

There are long term concerns for who is responsible for the carbon once it is stored underground, including monitoring storage sites, remediating CO2 leaks to the extent possible, providing financial security, and paying for any "harm" to the climate, environment, human health, etc. in the event something goes wrong. Moreover, storing CO2 in saline aquifers can require that enormous amounts of produced water (brines) be pumped to the surface to maintain reservoir pressure, creating yet another massive and potentially hazardous waste stream to be managed.

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[21] CIEL (2021) Confronting the Myth of Carbon-Free Fossil Fuels: Why Carbon Capture Is Not a Climate Solution. Available: https://www.ciel.org/reports/carbon-capture-is-not-a-climate-solution/

[22] Tasoff, Harrison, "Turning emissions into plastics," University of California Santa Barbara. Available: https://www.edhat.com/news/turning-emissions-into-plastics

[23] Government of Canada, *A proposed integrated management approach to plastic products: a discussion paper*. Available: https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/plastics-proposed-integrated-management-approach.html

[24] Climate Action Network International (January 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

Some proponents of CCS have sought to relieve private sector parties engaged in CCS of financial and legal liability by transferring risk to governments and/or incorporating liability limits into law.[25] Even with strong financial security mechanisms in place, there is a risk that governments will ultimately be responsible for the long-term monitoring, management, and remediation of CO2 storage sites.

Governments in Canada are already struggling to deal with the financial liabilities of the oil and gas sector. A lack of robust governance framework for dealing with the waste created by the sector - including tailings ponds and closure of oil and gas wells - has resulted in the current situation of staggering liabilities, which are estimated to be as high as $260 billion.[26]

The implementation of a CCS tax credit should not happen before the development of a governance structure to maintain and ensure the long-term fiscal integrity of CO2 storage sites.

Robust monitoring and verification of claimed credits

> *The implementation of a tax credit must be contingent on the development of strong monitoring, reporting, verification and enforcement requirements.*

The issue of companies claiming credits for unverified tons of captured carbon is rampant in the United States under Section 45Q. In fact, an investigation by the US Internal Revenue Service found that 87% of the total credits claimed, amounting to nearly US $1 billion, were not in compliance with the Environmental Protection Agency.[27] In addition, a lack of transparency makes it impossible to know which companies have claimed credits and to what extent.[28]

Companies cannot be allowed to claim credits without demonstrating compliance with robust monitoring, reporting and verification requirements.

Accountability for potential impacts on frontline communities

> *Companies receiving tax credits must be held accountable to mitigate harmful impacts on frontline communities, and provide compensation where mitigation isn't possible. These communities must be involved in the design and implementation of the tax credit.*

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[25] Havercroft, I. and Macrory, R. (2014). Legal Liability and Carbon Capture and Storage: A Comparative Perspective. October 2014. Available at: https://sequestration.mit.edu/pdf/GHGT8_deFigueiredo.pdf.
[26] De Souza, M. (2018) Cleaning up Alberta's oilpatch could cost $260 billion, internal documents warn. Global News. Available: https://globalnews.ca/news/4617664/cleaning-up-albertas-oilpatch-could-cost-260-billion-regulatory-documents-warn/
[27] Inspector General for Tax Administration (April 2020) Department of Treasury Letter. Online: https://www.eenews.net/assets/2020/04/30/document_gw_07.pdf
[28] Kusnetz, N. (September 2020) Exxon Touts Carbon Capture as Climate Fix, but Uses it to Maximize Profit and Keep Oil Flowing. Inside Climate News. Online: https://insideclimatenews.org/news/27092020/exxon-carbon-capture/

The buildout of CCS infrastructure presents serious health, safety, and environmental risks, particularly for marginalized frontline communities, already overburdened by industrial hazards.

CCS does not address the hazardous air and water pollutants that come from the combustion of fossil fuels, such as fine particulate matter. The additional energy required to power the carbon capture process generates even greater amounts of these pollutants, if supplied by fossil fuels, with real health and safety implications for frontline communities. If no additional air pollution control investments are made, widespread adoption of CCS could lead to increases in air pollution related mortality and higher social costs.[29]

Furthermore, implementing CCS at scale would require an enormous system of pipelines to transport the carbon. Pipelines can leak or rupture; compressed CO_2 is highly hazardous upon release and can result in asphyxiation of humans and animals. For example, when a CO2 pipeline ruptured in Mississippi in 2020, 300 people were evacuated and 45 people had to be hospitalized.[30]

Since these dangers are systematically overlooked in discussion on carbon capture, it is essential that these communities be involved in the design of any policies that impact them, including this tax credit.

Carbon Capture and Utilisation (CCU)

CCU covers a variety of processes which involve the absorption or conversion of CO2 during the manufacture of usable products (e.g., plastic, petrochemicals, and carbon fibers as a substitute for steel). It is energy-intensive and covers a range of technologies at differing levels of maturity, cost, and market size, with many applications still in the research and development phase.[31] The volume of CO2 that would need to be captured to make CCU a significant tool to tackle the climate crisis far outpaces potential uses in industrial and other applications.[32] In 2018, the world emitted more than 37 billion tonnes of CO2 and other greenhouse gases from fossil fuel combustion for energy and industry. By contrast, only 20 million tonnes were used for commercial and industrial uses (apart from enhanced oil recovery and fertilizer production).[33] At present, without additional mitigation incentives, further research, and a comprehensive review

[29] Donaghy, T. & Jiang, C. (2021) Fossil Fuel Racism: How phasing out oil, gas and coal can protect communities. Greenpeace. Available: https://www.greenpeace.org/usa/reports/fossil-fuel-racism/
[30] Zegart, D. (2021) Gassing Satartia: Carbon Dioxide Pipeline Linked To Mass Poisoning. The Huffington Post. Available: https://www.huffpost.com/entry/gassing-satartia-mississippi-co2-pipeline_n_60ddea9fe4b0ddef8b0ddc8f
[31] IOGP (2019). The potential for CCS and CCU in Europe. Report to the 32nd meeting of the European Gas Regulatory Forum 5- 6 June 2019. Available at: https://ec.europa.eu/info/sites/info/files/iogp_-_report_-_ccs_ccu.pdf.
[32] Group of Chief Scientific Advisors (2018). Novel carbon capture and utilization technologies. European Commission Directorate-General for Research and Innovation. May 2018. Available at: https://ec.europa.eu/research/sam/pdf/sam_ccu_report.pdf
[33] Drugmand, D. & Muffett, C. (2021) Confronting the myth of carbon-free fossil fuels: Why carbon capture is not a climate solution. EWG. Online: https://www.ewg.org/news-insights/news/confronting-myth-carbon-free-fossil-fuels-why-carbon-capture-not-climate

of potential environmental impacts, CCU is highly unlikely to deliver mitigation in the order needed to address climate change.[34]

Direct Air Carbon Capture (DAC)

DAC involves filtering CO2 from ambient air. DAC poses significant challenges for energy use and there is currently insufficient evidence that it provides a feasible climate mitigation solution. Since CO2 represents 0.04% of air by volume, massive volumes of air must be filtered to capture any reasonable amount of CO2. DAC is in its infancy and is very costly (the range of costs for DAC vary between USD $250-600 per tonne of CO2 captured[35]) and energy intensive, with serious doubts about its effectiveness.[36] One study examining the potential of DAC to help meet the Paris Agreement goal found that wide scale deployment of DAC would account for a full one quarter of global energy demand for heat and power by the end of this century.[37] The buildout of DAC would significantly delay efforts to achieve and maintain a 100% renewable energy system. Another concern with wide scale DAC deployment are the impacts associated with the manufacture of the chemical sorbent required to capture CO2 from the atmosphere.[38]

[34] Climate Action Network International (January 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
[35] Lebling, K. et al. (2021) Direct Air Capture: Resource Considerations and Costs for Carbon Removal. World Resources Institute. Online: https://www.wri.org/insights/direct-air-capture-resource-considerations-and-costs-carbon-removal
[36] Climate Action Network International (January 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
[37] Realmonte, G., Drouet, L., Gambhir, A. et al. An inter-model assessment of the role of direct air capture in deep mitigation pathways. Nature Communications 10, 3277 (2019). https://doi.org/10.1038/s41467-019-10842-5.
[38] Realmonte, G., Drouet, L., Gambhir, A. et al. An inter-model assessment of the role of direct air capture in deep mitigation pathways. Nature Communications 10, 3277 (2019). https://doi.org/10.1038/s41467-019-10842-5.