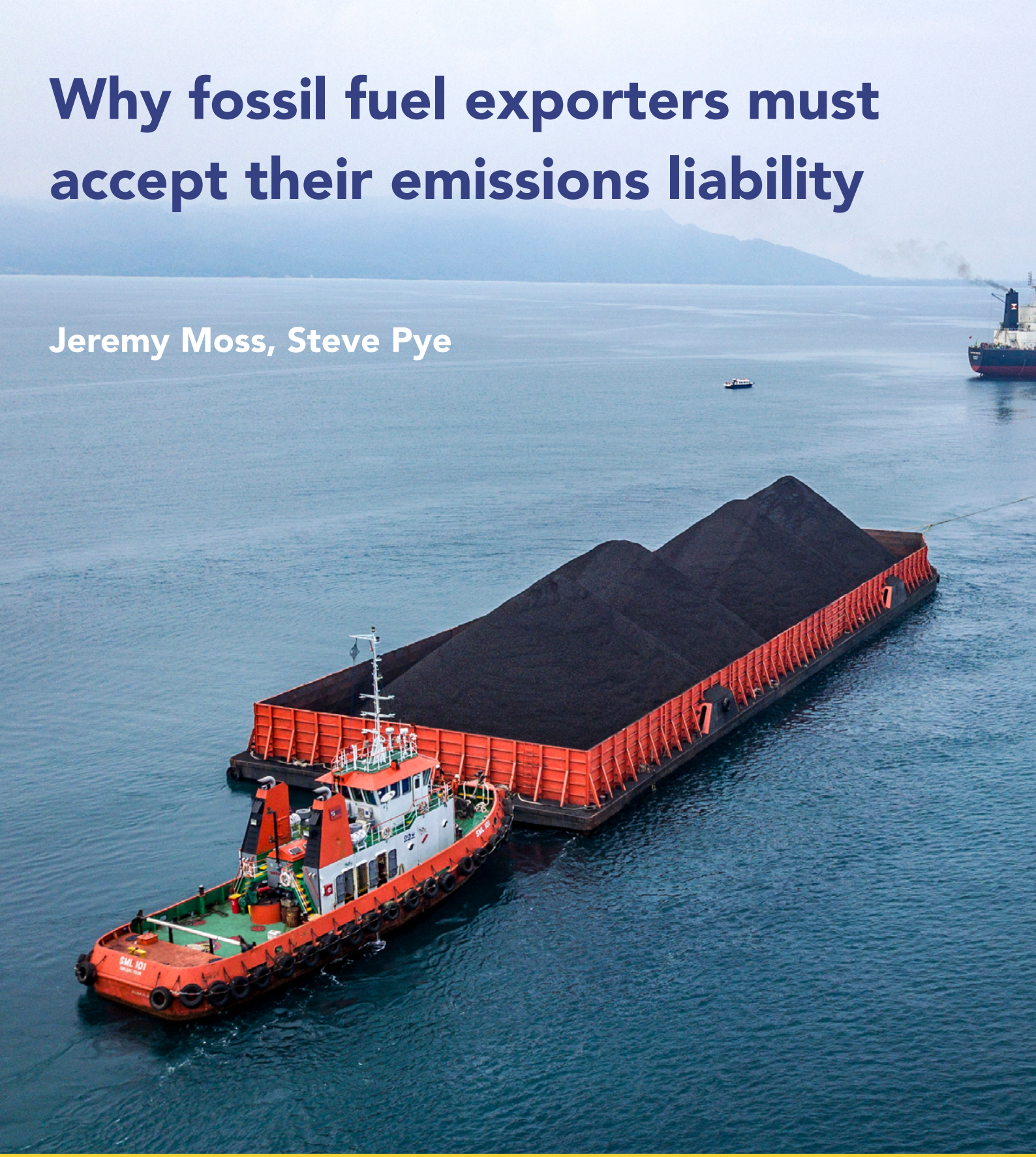
Why fossil fuel exporters must accept their emissions liability

Jeremy Moss, Steve Pye



UNSW SYDNEY

Authors

Jeremy Moss

Professor of Political Philosophy, University of New South Wales, Sydney Australia

Jeremy Moss is professor of political philosophy at the University of New South Wales, Sydney. He is the author or several books on climate change including: *Carbon Justice: the Scandal of Australia's Biggest Contribution to Climate Change; Climate Justice Beyond the State (with Lachlan Umbers), Climate Change and Justice* (Cambridge University Press).. He is the recipient of the Eureka Prize for Ethics and the Australasia Association of Philosophy Media Prize.

Steve Pye

UCL Energy Institute, University College London, UK

Steve Pye is Associate Professor of Energy Systems at University College London. He has published extensively on transitions to low carbon energy systems, with a particular interest in fossil fuel phase out. His widely read 2021 article in Nature titled "Unextractable fossil fuels in a 1.5°C world" argued for leaving the majority of fossil fuels in the ground. He is an author on UNEP's Production Gap report, and co-lead of the Redline database (redlinedatabase.org).

@Jeremy Moss, Steve Pye

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Executive Summary

As the window of opportunity to limit climate change reduces, it is now morally and practically indefensible for states to advocate for domestic emissions reductions while simultaneously championing fossil fuel exports. The practice of exporting fossil fuels and its influence on global emissions must receive greater scrutiny.

A focus on fossil fuel exports is crucial if the world is to meet meaningful emissions reductions targets. Currently high-income exporters such as Australia, Canada, Norway and the United States do not accept any liability for the harms that their fossil fuel exports cause. The cumulative emissions associated with fossil fuel exports from just these four countries over the next 7 years (to 2030) is equivalent to around 11% of the remaining global carbon budget.

These states need to lead the way through a rapid phase out of fossil fuel exports. This phase out must also become a key focus of global climate negotiations at COP.

The cumulative emissions associated with fossil fuel exports from Australia, Canada, Noreway and the USA over the next 7 years (to 2030) is equivalent to around 11% of the remaining global carbon budget.

Key Recommendations

- States must accept that action on climate change must include reducing their direct domestic emissions as well as the emissions associated with their fossil fuel exports.
- Lack of consideration of the impact of export emissions is a significant roadblock to climate action.
- National (and ambitious) emissions targets should include targets to reduce export emissions as well as domestic emissions.
- The COP process needs to fully acknowledge the need for a plan to phase out all fossil fuels, including reductions in exports.
- States at COP should adopt an 'export net zero' target in addition to a domestic emissions reduction target.

Fossil fuel exporting countries must start to take responsibility for Greenhouse Gas emissions from exported oil and gas.

Why a focus on fossil fuel exports?

Since the Paris Agreement was signed in 2015, many states have increased their ambition to reduce domestic greenhouse gas (GHG) emissions and financing for overseas fossil fuel developments. Between December 2020 and June 2022, national net-zero targets have increased from 10% of total GHG coverage to 65% (Net Zero Tracker, 2022). At the same time, many of these states have continued to produce and export huge quantities of fossil fuels, in some cases *increasing* their exports and planned developments. Large exporters avoid responsibility for the emissions impacts of their fossil fuel exports because current global emissions accounting methods attribute emissions to importing countries, where the majority of the emissions associated with the resources are released.

Yet, it is now morally and practically indefensible for indefensible for countries to promise domestic GHG emissions reductions while simultaneously maintaining or increasing their fossil fuel exports. States, particularly those in the Organisation for Economic Co-operation and Development (OECD), must accept that action on climate change must include reducing their direct domestic emissions *as well as* the emissions associated with their fossil fuel exports.

It is morally and practically indefensible for countries to promise domestic Greenhouse Gas emissions reductions whilst maintaining or increasing their fossil fuel exports.

In this report we explain why states, especially high-income democracies should reduce their fossil fuel exports and how they can do so. Many countries are large exporters of fossil fuels, including Saudi Arabia, Russia, Indonesia, and Nigeria. However, we focus on four countries - Australia, Canada, Norway and the USA for reasons of fairness. There are key features that give them greater choices concerning their climate actions and greater capacity to make a positive difference.[1] First, they are all major exporters of fossil fuels, with emissions from their fossil fuel exports making up around 11 % of global emissions from energy use. Second, they are, to varying degrees, democracies that have (at least in theory) possibilities of public deliberation on their response to climate change.

Third, all have high GDP levels and standards of living relative to other states, meaning they have a high level of choice concerning whether to continue to support their fossil fuel industries.[2] If they choose to do so, phasing out their fossil fuel export industries would not dramatically decrease their standards of living with effective and just transition policies. Each state is different in this regard in that their fossil fuel exports make up a relatively high proportion of their GDP. Finally, most of these countries have made commitments to significantly reduce their domestic GHG emissions, though the ambition of commitments varies among these countries. Norway is committed to a 55% cent reduction in greenhouse gas emission compared to 1990 levels by 2030 while the United States has pledged to be 50-52% percent below 2005 levels in 2030.[3] Of course, other major exporters such as Saudi Arabia and Russia ought also to phase out their exports. However, fairness considerations are strongest in relation to the four countries discussed here.

Coal and gas exporting countries like Australia, Norway and Canada, who have made significant commitments to reduce domestic emissions, now need to commit to cut their export emissions - which are much higher than their domestic emissions.

Why should states reduce their fossil fuel exports?

There are both moral and practical imperatives for fossil fuel exports to be included in climate change discourse and policy discussions. Morally, there is an argument that countries should assume responsibility for the impacts of all of their contributions to climate change. Practically, not to consider export impacts creates roadblocks for development and implementation of effective climate policies, and increases exposure to risks posed by the climate transition.

There is a strong moral case for exporting states to take responsibility for at least part of the harms caused by their exported emissions, and to stop causing those harms.

Moral responsibility

Current global emissions accounting conventions allocate responsibility for emissions produced by fossil fuel exports to the state where those emissions are produced, the bulk of which are in the country importing and consuming them. There is a moral case for exporting states to take responsibility for at least part of the harms caused by their exported emissions, and to stop causing those harms.

The Greenhouse Gas Protocol, widely referenced by governments and businesses, classifies emissions under three scopes. In a country context, Scope 1 and Scope 2 emissions are those generated within a state's borders, and Scope 3 emissions include all other indirect emissions occurring outside the country's borders in the value chain of products imported and exported from that country (WRI & WBCSD, 2021).

A territorial-focused approach, including Scope 1 and Scope 2 emissions only, is utilised by the United Nations Framework Convention on Climate Change (UNFCCC) when determining national (domestic) GHG emissions inventories (Eggleston et al., 2006). For example, for a coal producer, the emissions produced within its territorial boundaries from extracting coal and transporting it to a port will be included in its emissions account, but the emissions generated when that coal is consumed overseas, which form the bulk of the emissions associated with the product, will be counted in that importing state (Moss, 2020).

Other exported commodities that could give rise to harm when used by the importing country are not treated in the same way as fossil fuels. For example,

some states, including the United States, are bound by the Nuclear Non-Proliferation Treaty to only sell uranium for peaceful uses.[4] There are restrictions on the sale of uranium to certain countries because of risks including weapons proliferation, accidents at reactors, and storage issues. Should a state knowingly export uranium to another state, it could rightly be accused of being irresponsible and having a share in the blame if an accident were to happen. Similar arguments can be applied to exporting medical waste, tobacco, or weapons.

The language of complicity can be used to explain an exporter's involvement in the impacts of fossil fuel exports. Typically, in legal and moral theory, a secondary agent is complicit and can be considered liable for the harms done by primary or principal agents if they knowingly assist in or encourage conduct of a harm done by primary or principal agents (Hart & Honoré, 1985; Kutz, 2000; Lepora & Goodin, 2013). Though exporting countries are not emitting the fossil fuels directly, their actions to extract, process, and transport the fuels are all necessary conditions for those emissions to occur, and, under these theories, might be considered 'complicit' in the harms caused.

While complicity can capture the real responsibility of states, it is important to note that it can arise in different ways. For example, a state could be complicit through directly *supplying* fossil fuels (being an "upstream producer"). The second way is through the various types of *support*. Support might take the form of providing the physical infrastructure that allows gas and other fossil fuels to be sold: the ports, roads, rail lines, and so on. Or support may be through the financing and subsidies that supports production.

While countries currently do not have any obligations regarding the emissions associated with use of their exports, a Dutch court recently questioned this limit to responsibility as it related to Shell, a global group of energy and petrochemical companies (Milieudefensie, 2023). The court ruled against Shell, stating that the company must reduce its emissions by 45% by 2030, compared to 2019 figures, including Scope 3 emissions, being the emissions from use of its products. This case highlights and sets precedent for recognition of harms associated with use of the products supplied (Scope 3) by companies (and countries), not just their emissions from the production process (Scope 1 and 2). In a similar development California is now suing oil companies for exacerbating climate change.[5]

We note that some major fossil fuel producers do measure their exported or Scope 3 emissions. For example, mining giant BHP reports its scope 3 emissions for 2019 at 565 Mt CO-2e, an amount larger than Australia's annual domestic emissions (BHP, 2018). However, most of these companies do little to address their Scope 3 emissions, and a lack of consistency in measurement and reporting of these emissions limits the value of this information. For oil and gas companies, only a small proportion of the majors include scope 3 emissions on an absolute emission reduction basis as opposed to one based on carbon intensity (Carbon Tracker, 2022).

Phase out of coal exports and subsidies must start immediately.

Climate action roadblocks

Lack of consideration of the impact of export emissions is a significant roadblock to climate action. Domestically, countries with large and powerful export industries also typically have influential lobby groups seeking to stymie meaningful action on climate change (Oreskes & Conway, 2011; Pulver, 2011).

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The influence of the big fossil fuel producers is not confined to the domestic sphere. Countries that have large export industries also often exert a negative influence on global climate negotiations. At the 2021 United Nations Climate Change Conference (COP26) negotiations, several fossil fuel producing and exporting states such as Australia, Russia and Saudi Arabia were influential in altering key sections of the final COP text to change the plan for coal from 'phase out' to 'phase down' (Farand, 2022). Such actions by fossil fuel producing states to water down the ambitions of global climate negotiations are a major cause of the lack of action on climate change. The number of delegates with links to the fossil fuel industry at the recent COP27 negotiations was over 600, more than the number of delegates from the USA and China combined (McGrath, 2022).

In addition to the role of key actors, the structure of the climate convention (UNFCCC) also makes it difficult to start addressing question of energy governance, and exploring how supply side considerations could be integrated in the future (Aykut & Castro, 2017). It was only at COP26 when the first explicit mention of fossil fuels was included in the agreed text of the Glasgow Climate Pact.[6]

Finally, it should be realised that export levels have a material impact on mitigation, through well-understood price effects, based on the dynamics of supply and demand (Caldara et al., 2019; Hamilton, 2009). Increasing exports would have the effect of decreasing price, due to a loosening of supply, with a resulting increase in demand due to price response. While some of the increase in supply would be offset by other producers reducing their export level, this 'substitution' is generally not 100% replacement (or perfect substitution), resulting in an overall increase in demand, and therefore in emissions. The evidence base suggests therefore that exporters impact emissions levels based on their export strategy, and conversely therefore that reductions in supply could have climate benefits (Dennis and Green, 2019; Erickson et al., 2018, 2022; Erickson & Lazarus, 2014).

Transition costs and risks

Many of the fossil fuel operations that generate the coal, oil and gas for export create environmental hazards that will be very costly to remediate.

A third reason to be concerned about large fossil fuel export industries is the risks such industries pose as the world moves away from fossil fuel consumption. For example, many of the fossil fuel operations that generate the coal, oil and gas for export create environmental hazards that will be very costly to remediate. For instance, a study produced for the oil and gas industry in Australia estimated that over A$60 billion will be required to decommission offshore oil and gas infrastructure alone (Wood Mackenzie, 2020). While this a concern for all fossil fuel production in general, in the case of the countries here under discussion (except for the USA), their production is mainly for export.

As the world moves away from fossil fuel consumption towards other forms of energy, potentially even greater costs are associated with risks that fossil fuel assets will become 'stranded', which in turn might lead to more financial shocks. Assessments have estimated that $1 trillion in assets, if not more, could become stranded as a result of policy action on climate and the rise in alternative energy sources (Caldecott et al., 2016; Mercure et al., 2018; Semieniuk et al., 2022). A further practical reason to closely oversee the phase-out of exports and fossil fuel production in general is that there is mounting evidence that when the decline in fossil fuels really accelerates, the fossil fuel producers and their backers will start to face huge financial losses, and it will be imperative that these losses do not spill over into the broader economy. There is the potential for what is termed 'green swan' events with non-linear flow-on effects. The Bank for International Settlements (BIS) released a report in 2020 arguing that central banks such as the Reserve Bank of Australia ought to be prepared to buy up the stranded assets of fossil fuel companies. Failure to do so will, the report notes, pose a real risk of triggering a financial collapse (Bolton et al., 2020).

The analogy that the BIS report draws on is the Global Financial Crisis; just as a failure in mortgage lending led to a generalised financial crisis (a black swan event) with impacts across the whole economy, the collapse in asset prices of fossil fuel industries could trigger a similar effect (a green swan event). The report notes that integrating these risks into economic models is difficult because of the uncertainty of impact. Moreover, the impacts will be far-reaching and non-linear. The risk of a financial collapse alerts us to an important point: climate change poses not only physical risks but what are called 'transition risks' – risks to financial and other systems.

The impact of fossil fuel exports

Despite commitments to reduce their domestic emission levels all these states have increased their level of fossil fuel exports, and therefore the CO2 emissions related to the eventual combustion of those fossil fuels. These export-related emissions (called 'export emissions' hereon in) of these countries from 1980 to 2020 rose from 0.5 GtCO2 in 1980 to 3.4 GtCO2 in 2020 (Figure 1a). This equates to a 4.4% average annual growth in export emissions from these countries, compared to 0% growth in reported domestic territorial emissions over the same period. The export emissions of these countries equate to over 11% of global emissions in 2020 from fossil fuel combustion, and almost 40% of emissions from non-OECD countries (excluding China).

Figure 1b shows the percentage of fossil fuel produced in each country that was exported, again in terms of embedded emissions, with Canada almost at 70% and Australia and Norway at over 80%. Norway has always been at this export level, while Australia and Canada have built up their export businesses over the last 40 years. The USA primarily uses the fossil fuels it produces, although its exports have seen a sharp increase in the last 5 years (driven by LNG).

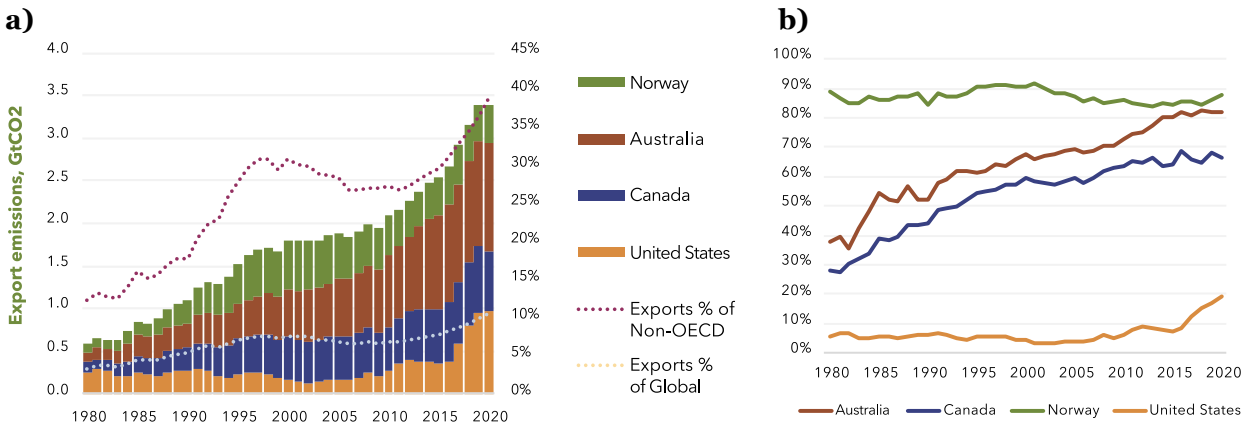

Figure 1. a) CO2 emissions associated with fossil fuel exports by country (bars), compared to global and non-OECD total emissions from fossil fuel combustion (line), and b) % of fossil fuel production exported in emission terms. 1980-2020.

The trendline in Figure 2 shows that all countries except the USA have export emissions that are higher than domestic (territorial) emissions. For Australia, with its large coal exports, for every one unit of CO2 emitted in country, over three units are exported. For Norway, the gap between domestic emissions and export emissions is even higher, given the limited domestic consumption of fossil fuels; for every unit emitted in country, almost 13 units are exported. Canada also exports more emissions than it emits domestically, while the USA has much higher domestic emissions than export emissions.

However, due to its size, the absolute contribution of the USA to the aggregate export emissions from these four countries is large.

For every unit of CO_2 emitted in country Australia exports over three units and Norway exports almost 13 units.

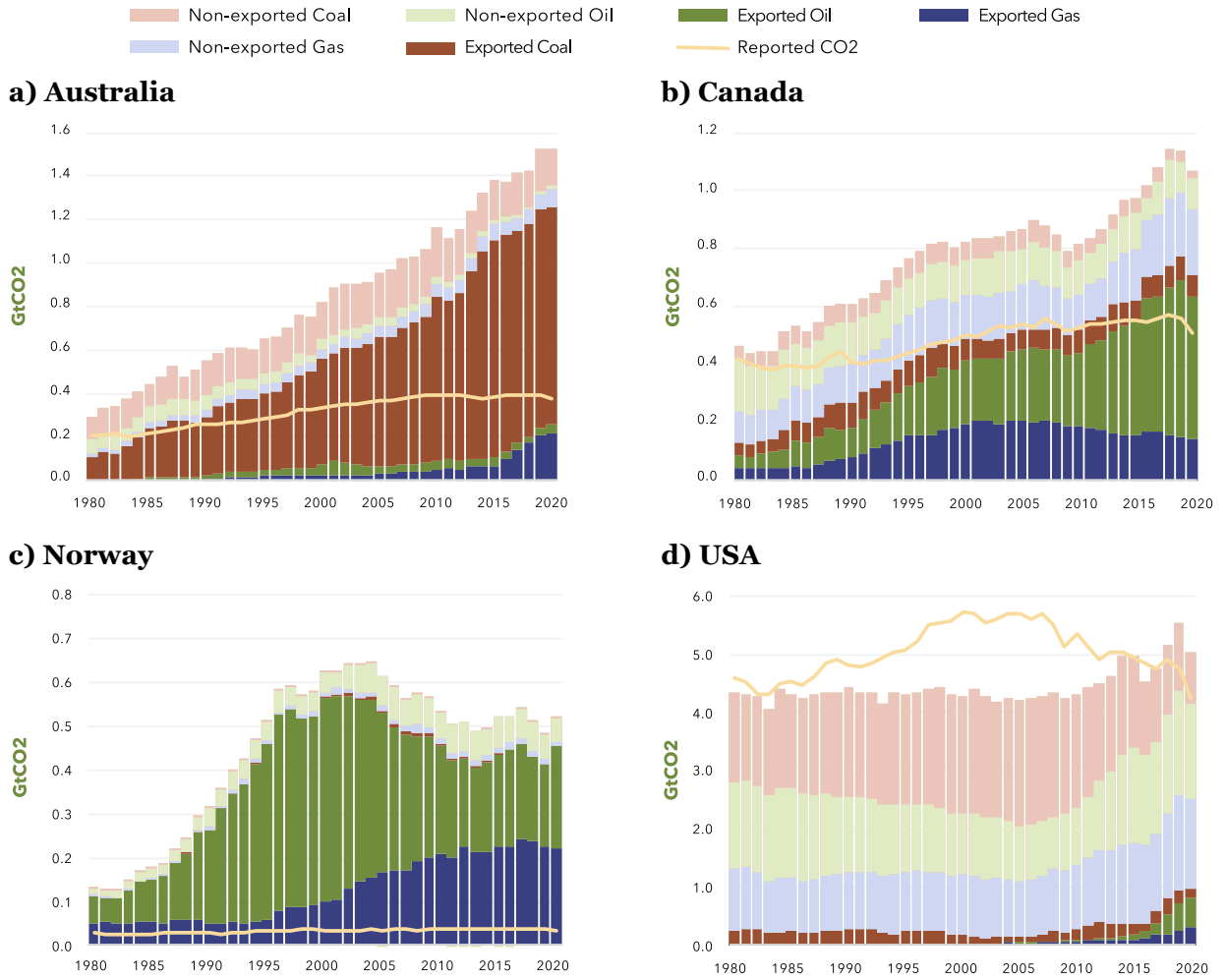

Figure 2. CO2 emissions associated with fossil fuel produced, split by type and into export and non-export (bars), and compared against territorial CO2 from fossil fuel combustion (line), 1980-2020. Note the different scales in each panel graph.

Based on estimates of planned growth in fossil fuel production from the Production Gap Report (PGR) (Stockholm Environment Institute et al., 2023), export emissions are likely to continue rising, and the gap between domestic and export emissions is set to increase. As shown in Figure 3, in the period of 2023-2030, cumulative export emissions from the group of four countries is set to reach 27 GtCO2, which is equivalent to 11% of the remaining global CO2 budget (of 250 GtCO2) (Lamboll et al., 2023), consistent with limiting average global temperature rise to 1.5°C (50% probability). This is significant, given that this is only emissions from exports of four countries.

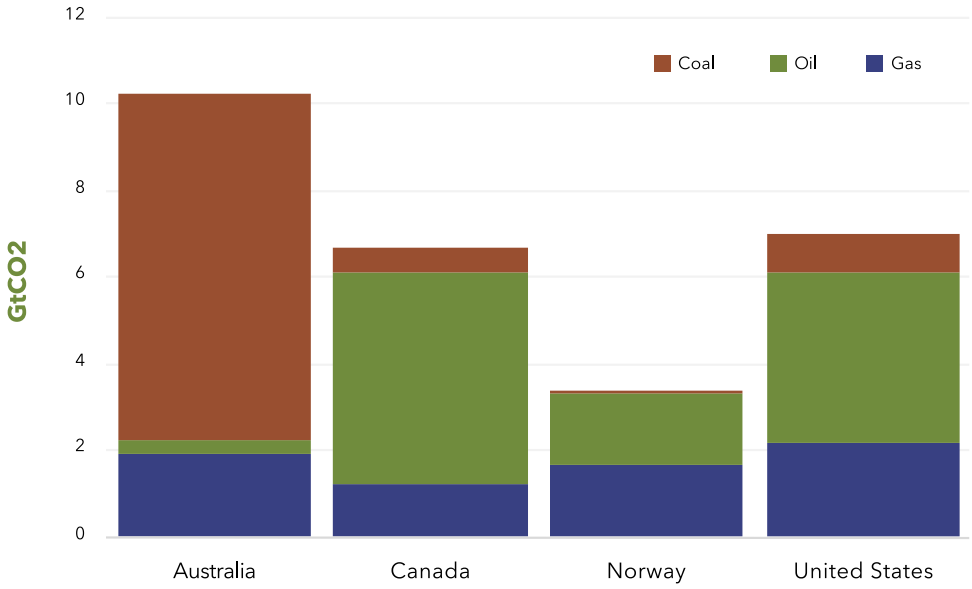

Figure 3. Cumulative export emissions of CO2 by country for the period 2023-2030

The approach to estimating export emissions can be found in Appendix 1.

Proposals for phasing out of exports

Given the arguments for reducing exports (section 2) and the level of export associated emissions (section 3), here we outline some proposals that would be key elements of a more comprehensive plan for phasing out fossil fuel exports.

Accepting liability

One crucial step that states ought to take is accepting a degree of liability for their contribution to climate change from the emissions produced by exports. Even being responsible for half of their Scope 3 emissions would leave states with considerable liabilities for funding the response to global climate harms. What is also crucial is establishing the date these liabilities started. One obvious date to start liabilities is 1990 when the IPCC released its first assessment report. The report marked a turning point in responsibility for climate change. After this date states could no longer feign ignorance of the consequences of their actions. As we know, many of them not only continued to produce fossil fuels but *increased* their production. Of course, they are not wholly responsible for the costs of their products' emissions. Those who consumed the products also need to bear their share of the liability.

A crucial step that states ought to take is accepting a degree of liability for their contribution to climate change from the emissions produced by exports… and establishing the date these liabilities started.

A plausible default method of calculating the division of responsibility is to allocate half the costs to the supplier and half to the consumer. But the liabilities are not just for the recent past. While the major exporting states continue to extract and sell fossil fuels as their operations are phased out, they also ought to be assessed for any new liabilities. Nor should states avoid paying their liabilities simply because they or the companies who produce the fuels have sold on some or all of their fossil fuel operations. Calculating liabilities back to 1990 would capture what companies are responsible for even if those businesses have changed hands. Australia,

Canada and the USA have all increased production since 1990. Here we focus on the liabilities of states as that is how the current UNFCCC and COP process allocates liabilities and emission rights. However, this is not to say that the predominantly private companies that extract and sell the fossil fuels should escape liability, merely that that liability should be discharged within the state that they are extracted from.[7] Private companies can ideally be made to contribute to liability by the governments of the states in which they operate.

New emissions reduction targets

National (and ambitious) emissions targets should include targets to reduce export emissions and domestic emissions. Just as a net zero domestic target ought to be ambitious and reflect a state's high level of past emissions, so an exported emissions target should be appropriately ambitious. It should follow the same timetable and global warming goals as an ambitious domestic target. This aim ought to be reflected in future rounds of COP climate negotiations.

National, ambitious emissions targets should include targets to reduce export emissions as well as domestic emissions.

A global agreement that restricts supply and pursued through COP or another institutional setting, is something that states ought to try to achieve (Piggot et al., 2018). Instead of just focusing on reducing demand, the COP process needs to function so that exporting countries are given phase-out targets for their fossil fuel exports.[8] A consequence of any such agreement is that it might help prevent the 'leakage' of carbon extraction from countries that restrict supply to countries that do not. Leakage occurs where one country bans or restricts carbon extraction only for another country to increase its production. If all or most exporting countries sign on, the less leakage there is likely to be.

While an exported emissions target should also be part of global climate negotiations, there are a number of possible unilateral initiatives that might be good models of climate leadership. For example, if all or a combination of the wealthier states we have discussed here phased out exports without substantially reversing their standard of living, that would provide significant climate leadership. A global agreement to limit the supply and export of fossil fuels would enable a consistent and coordinated response to regulate and restrict their supply, manage their decline, share new technologies with less developed countries, and so on.[9] One example of this kind of leadership is the Beyond Oil and Gas Alliance (BOGA) an alliance of around almost two dozen states and sub-state entities. BOGA aims to raise the issues of reducing supply as part of global negations while also encouraging first movers to provide leadership in phasing out their production.[10]

As the name suggests, a phase-out can occur over time and need not be immediate – indeed, it is highly unlikely to be in many cases. To prevent further climate harms, the quicker a phase-out gets underway the better. However, many countries cannot stop using exported fossil fuels overnight. For instance, phasing out thermal coal will be much quicker than phasing out metallurgical coal because of the ready availability of renewable energy. It is much easier to replace thermal coal power plants with renewable alternatives than it is to replace the steel-making process that relies on metallurgical coal. Lest this be taken as a kind of backdoor excuse for business-as-usual, it is important to be clear that any phase-out policy has to be a real and urgent goal because of the harms these fuels contribute to. Adopting phase-out targets that stretch far into the future and relegating emissions cuts to the end of a phase-out plan suggests a dubious commitment to harm reduction. Rather, the goal here ought to align export emissions reductions with domestic emissions reduction to achieve an 'export net zero'. It is important to note that achieving an export net zero ought also to include activities that lead to exports such as subsidizing production, approving new fossil fuel operations or providing finance for production elsewhere. The enormous level of fossil fuel export indicates why supply – not just demand – ought to be the target of climate action.

The Beyond Oil and Gas Alliance BOGA, aims to raise the issues of reducing supply of oil and gas as part of global negotiations, while encouraging first movers to provide leadership in phasing out their production.

Impact

To give a sense of how much of an impact such an agreement could have, we only need to look at the countries focused on in this report, being large fossil fuel exporting nations and democracies with high standards of living with economic alternatives to fossil fuel production. Their emissions from domestic consumption account for around 16% of global emissions, with exported emissions accounting for around 11%. Australia, Norway and Canada are, in many ways, the perfect candidates to take action on fossil fuel exports. While some economic impacts are likely to arise, each has a compelling moral duty to take action based on their historical and continuing role in contributing to climate change, and they are in a position to show significant leadership. There are obviously entrenched fossil fuel interests that would oppose any kind of agreement between these countries. However, setting that aside, an agreement between these nations to cut drastically their export and consumption of fossil fuels would be hugely significant and send a clear signal to the carbon majors, investors and consumers that the phase-out of fossil fuels was imminent.

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Conclusion

Considering the impact of countries' export emissions has profound implications for how we conceive of countries' responsibilities for GHG emissions and climate harms. Though large fossil fuel exporting high-income states are not currently responsible for their export emissions, it is morally and practically untenable for states to maintain a rigid distinction between their domestic and exported emissions. Yet, if such a state that exports fossil fuels is responsible for the harms that those fuels do when consumed because they are complicit, they ought to accept some of the duties that come with contributing to climate harms in that way. That means increasing their mitigation ambitions, assisting with adaptation, and possibly compensating those harmed through loss and damage provisions.

With export emissions accounting for around 11% of global emissions, Australia, Norway and Canada are perfect candidates to take action on fossil fuel exports. Each has a compelling moral duty to take action based on their historical and continuing role in contributing to climate change.

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Appendix 1. Approach to estimating export emissions

Export emissions are derived from the export field of the IEA's Extended Energy balances.[11] Coal includes 5 categories – 'anthracite', 'coking coal', 'lignite', 'Sub-bituminous coal' and 'other bituminous coal'; gas includes 'natural gas'; and oil includes 'crude oil' and 'natural gas liquids'. Total production values, used for comparison in Figure 1b, are also sourced from the same Extended Energy Balances. Once exports values have been identified for each of the four countries of interest, they are multiplied by the CO2 emission factors (Table 1) to derived export emissions.

Table 1. CO2 emission factors (Source: IEA)[12]

Fossil fuel type	C	CO^2
Anthracite	26.8	98.3
Coking coal	25.8	94.6
Other Bituminous Coal	25.8	94.6
Sub-Bituminous Coal	26.2	96.1
Lignite	27.6	101.2
Natural gas	15.3	56.1
Crude oil	20	73.3
Natural gas liquids	17.2	63.1

To estimate future export emissions to 2030 (as shown in Figure 3), we made a number of assumptions, based on estimates of production change from the PGR 2023 report. The PGR estimates the change in total production by fossil fuel in the year 2030, relative to 2021. We used this estimate, and assumed that the share of exports relative to production in 2020 would remain the same over the period, to 2030. This allowed us to estimate future export levels, and therefore export emissions.

Domestic (or territorial) emissions are sourced from the IEA dataset providing CO2 emissions from energy combustion, as used for comparison in Figures 1a and 2.[13]

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[1] The United Kingdon was not included as its fossil fuel exports are relatively small. For a study that does include them see F. Daley, 'The Fossil Fuelled Five', https://fossilfueltreaty.org/fossil-fuel-5

[2] *GDP per capita (current US$, 2020)*: Australia $USD 60,443; Canada 51,987; Norway 89,154; USA 70,248; compared to China $10,408; India $1,913 , World Bank https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?view=chart (accessed 13th February 2023)

[3] As reported on Climate Tracker, https://climateactiontracker.org/ (accessed 10th October 2023)

[4] *Treaty on the non-proliferation of nuclear weapons* (1968) 729 UNTS 161, adopted 1 July 1968, entered into force 5 March 1970.

[5] PBS Newshour, 'California sues oil companies for exacerbating climate change'Sept 20,2023. https://www.pbs.org/newshour/show/california-sues-oil-companies-for-exacerbating-climate-change

[6] Glasgow Climate Pact, https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf

[7] Ric Heede, Tracing anthropogenic carbon dioxide and methane emissions to fossil fuel and cement producers, 1854–2010. *Climatic Change* **122**, 229–241 (2014); Henry Shue, 'Responsible for what? Carbon producer CO2 contributions and the energy transition' *Climatic Change*, Vol. 144 (4). 2017.

[8] This is a different approach to 'consumption based accounting' which seeks to determine and or tax embedded emissions in consumer products. See Davis & Caldeira, ' Consumption-based accounting of CO2 emissions', PNAS, Vol.107/2, 2010. See also Robyn Eckersley, 'The politics of carbon leakage and the fairness of border measures' *Ethics and International Affairs*, Vol 24 (4), 2010.

[9] In response to the inadequacies of the Paris Agreement, some states have called for a fossil fuel non-proliferation treaty (FFNPT) to regulate governments. See Newell, P. and Simms, A. (2019) 'Towards a fossil fuel non-proliferation treaty', 20(8) *Climate Policy* 1043.

[10] See BOGA website at https://beyondoilandgasalliance.org

[11] International Energy Agency: World Energy Balances (2021 Edition) UK Data Service. https://doi.org/10.5257/iea/web/2021

[12] International Energy Agency: CO2 Emissions From Fuel Combustion (2021 Edition). UK Data Service. https://doi.org/10.5257/iea/co2/2021

[13] International Energy Agency: Greenhouse Gas Emissions from Energy (2022 Edition) UK Data Service. https://doi.org/10.5257/iea/co2/2022