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POLICY BRIEF

23-7 How an international agreement on methane emissions can pave the way for enhanced global cooperation on climate change

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INTRODUCTION

The Inflation Reduction Act (IRA) of 2022 dramatically increased US investments in the production and use of clean energy, supported by large, flexible, and sustained tax credits. Independent estimates (Bistline et al. 2022) found that the IRA will constitute a substantial step toward meeting US goals of reducing greenhouse gas (GHG) emissions by 50 percent or more below 2005 levels in 2030 and achieving a net-zero emissions economy by 2050.

But while the world will gain from this US commitment and the associated technological innovation in clean energy, as well as the benefits from increased scale and lower costs in clean energy industries, the law has created friction with key trading partners.[1] The United States and these partners must now resolve disputes among multiple jurisdictions with varying climate policies if the world is to succeed in collaborating on climate change mitigation.

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1 First, the law may give an advantage to US industries that are energy intensive relative to those in other countries, and it may also give US industries a lead in key clean energy industries such as electric vehicles or green hydrogen. Second, the use of national content provisions in electric vehicles and clean energy tax credits violates trade norms and tilts the playing field in favor of US production. Finally, there are concerns that the US law could spur a "subsidy race" that many countries would find expensive or infeasible, while rendering it more difficult for governments to pursue effective policies that impose costs (such as emissions trading systems or carbon pricing).

As an important step toward demonstrating broader gains from coordination, this Policy Brief proposes a coordinated US and EU methane border adjustment policy in oil and gas that will reduce methane emissions by an estimated 15 to 45 percent worldwide, while having an indiscernible effect on key energy prices faced by households in the United States and the European Union. This proposal for enhanced international cooperation on climate change could serve as a model for other efforts to reduce the frictions that result from diverse national climate mitigation policies and strategies, while simultaneously enhancing incentives for climate policy ambition.

Methane is a short-lived but potent greenhouse gas. One ton of methane contributes about 30 times more to warming the atmosphere than one ton of CO_2 over a 100-year period and over 80 times more over a 20-year period. Reducing methane emissions is imperative for limiting global temperature rise to the 1.5˚C target set by the Intergovernmental Panel on Climate Change. Among the primary sources of methane emissions (which include agriculture, fossil fuels, and waste), the oil and gas sectors have the greatest low-cost abatement potential.

Under the IRA, the United States has for the first time implemented a methane emissions fee as a backstop to new methane regulations in the oil and gas sectors. The European Union is also implementing new methane regulations on fossil energy, and the European Parliament proposal would penalize imports from countries that do not meet certain regulatory standards.

Building on these parallel approaches, this Policy Brief proposes transatlantic coordination that uses an import charge as a lever to seek similarly ambitious regulatory reforms in the oil and gas sectors abroad. Specifically, oil and gas exporters can be encouraged to adopt regulations comparable to those in the United States and the European Union or, if they fail to implement regulations, pay a border adjustment fee on exports to the two jurisdictions. With time, most major energy importers would ideally join the coalition of countries cooperating on both stringent domestic regulations on oil and gas production (if applicable) and border adjustments on any dirty, nonregulating exporters.

A coordinated approach on methane emissions would also help build environmental policy cooperation across the Atlantic, defusing recent frictions around divergent policy approaches and paving the way for alignment in other sectors, which would motivate further climate policy action worldwide.

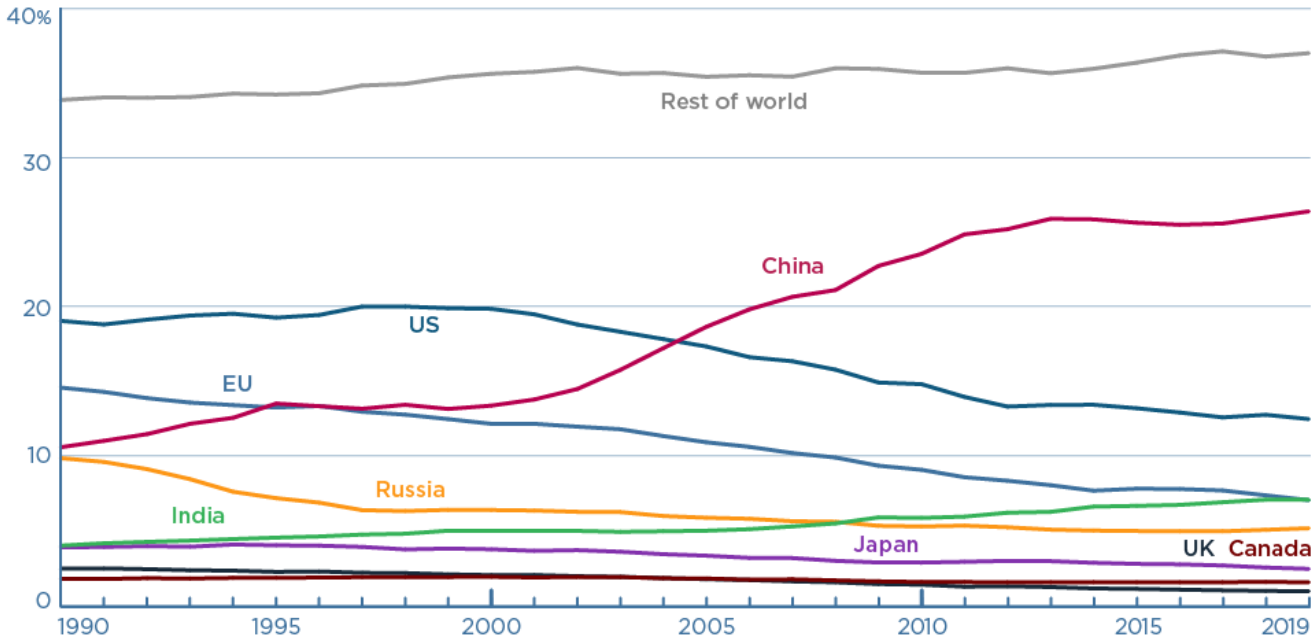
THE CHALLENGE

Figure 1 summarizes historical shares of GHG emissions in major jurisdictions. Some countries, including many in the European Union, have made significant progress in reducing GHG emissions, but the current pace is woefully inadequate for meeting international climate goals.[2] One key challenge is a lack of sufficient international incentives (sticks and carrots) to motivate policy change, given the global nature of the externality and the scope for large free-riding effects. A second key challenge has been addressing the competitiveness effects of divergent climate policies, which disadvantage producers in cost-imposing

2 For a discussion of the status of mitigation efforts, see Climate Action Tracker.

jurisdictions and advantage those in cost-reducing jurisdictions. Unfortunately, without greater policy alignment, it is difficult for countries to manage these two policy spillovers with a single tool, as discussed in Clausing and Wolfram (2023).

Figure 1
Share of greenhouse gas emissions by major jurisdiction



Note: Data are for total emissions excluding land-use change and forestry.
Source: Climate Watch Data, Historical Greenhouse Gas Emissions.

Climate policy choices have been heterogeneous. As of mid-2023, 73 jurisdictions (including 39 national governments) rely on some form of carbon pricing regime, but prices and coverage vary substantially. Many countries also subsidize clean energy projects, but the scope and scale of such subsidies vary too.

The European Union, where GHG emissions reductions have been the steepest, employs a number of important clean energy policies, including a range of subsidies.[3] The central policy plank to tackle climate change in the European Union is a cap-and-trade system, the European Union Emissions Trading System (EU ETS), in place since the mid-1990s. In 2022, the ETS covered 40 percent of GHG emissions, and carbon prices exceeded €100/ton in February 2023. The crucial element that has made the ETS politically viable has been the establishment of a system of free allocations of emissions allowances to firms in the covered industrial sectors, to preserve the competitiveness of the industrial sector and to avoid "carbon leakage," which occurs when companies transfer production to countries

3 These include both EU-level policies and those of member states. For example, most countries subsidize the purchase of electric vehicles, clean-tech manufacturing is supported, and there are subsidies for clean energy production. For more details, see Kleimann et al. (2023).

with more lenient climate measures. According to the European Commission, industries received 80 percent of their allowances for free in 2013, and the share of free allowances was gradually reduced to 30 percent in 2020.

The European Union has proposed a carbon border adjustment mechanism (CBAM), scheduled for implementation on October 1, 2023, on key carbon-intensive commodities, including iron, steel, cement, aluminum, fertilizers, electricity, and hydrogen. A CBAM applies import charges based on the carbon content of imported goods; the amount of the border adjustment charge is based on the local carbon price, with adjustment for any carbon price paid in the country of origin.[4] The CBAM aims to eliminate the system of free allowances, while addressing concerns about leakage and loss of competitiveness by treating a producer located outside the Union similarly to one inside the Union.[5] The European Union has designed the CBAM intending to comply with World Trade Organization (WTO) rules.[6] Like the European Union, other countries considering CBAMs have implemented, or plan to implement, carbon pricing.[7]

In the United States, climate change mitigation efforts have been advanced in IRA. Official government estimates indicate more than $350 billion in spending on clean energy tax credits and related spending, although outside estimates suggest the fiscal costs could be substantially higher.[8] The IRA was part of a series of legislative efforts boosting spending on clean energy and innovation in 2020-2021.

Divergent policies could lead to sizable differences in production costs for energy-intensive traded goods. For example, the Boston Consulting Group projects that the cost of manufacturing green steel (i.e., steel with lower carbon emissions per ton) in 2030 will be 42 to 43 percent lower in the United States than in Germany, compared with a 7 percent US cost advantage for conventional, dirty steel.

4 For example, if the home market has a $110 carbon price and the foreign market has a $10 carbon price, the tariff would be $100 per unit of carbon embedded in the product. If one unit of the product contained the equivalent of 0.02 metric tons of carbon, that would imply a $2 fee per unit.

5 In addition to the EU ETS, a number of member states have individual GHG mitigation policies targeting sectors that are not covered by the EU ETS.

6 See Bown and Clausing (2023) for more details on the WTO consistency of the EU CBAM, which may be challenged by some trading partners, despite a nondiscriminatory design.

7 Canada has a federal carbon price, currently set at CA$65 per ton, with annual increases scheduled to raise the tax to CA$170 per ton by 2030. The Department of Finance Canada released a framing paper on CBAMs in August 2021 soliciting input from stakeholders. The United Kingdom established its own emissions trading system when it left the European Union, and prices there were above EU ETS prices for all of 2022, falling slightly below them in early 2023. The United Kingdom is also running a consultation process on CBAMs; this 2023 independent review of net-zero policies encouraged the government to advance the process. In response to the EU CBAM, Turkey, which sends almost half of its exports to the European Union, announced plans to develop its own carbon tax. Part of its rationale was to retain revenue its exporters would have otherwise paid to the European Union (Politico 2021).

8 Official estimates are from the Congressional Budget Office (2022). Bistline, Mehrotra, and Wolfram (2023) and Credit Suisse (2022) argue that US federal climate spending could be far higher than the baseline assumption due to high take-up of federal provisions where the total federal incentives are uncapped.

As figure 1 indicates, the United States and the European Union together account for less than a quarter of worldwide emissions, so collaborating with other jurisdictions is also vital, especially large economies like China and India.[9]

PROPOSAL: A METHANE BORDER ADJUSTMENT AGREEMENT ON OIL AND GAS

As an important step toward constructive policy alignment between the United States and Europe, we propose a methane border adjustment agreement on oil and gas among the United States, the European Union, and other countries that are significant energy consumers. The agreement would address methane emissions in the oil and gas sectors, leaving aside agriculture and other sectors that emit methane. Building on current policies of the United States and the European Union, the methane border adjustment would encourage other oil and gas producers to adopt similarly tough regulatory mechanisms and levy import tariffs, at the level of the US IRA methane fee discussed below, on oil and gas from countries that fail to do so. The border adjustment would go into effect after a three-year period of implementation planning, which would allow time for improvements in measurement, technical assistance, policy adaptation by affected countries, and expected continued stabilization of world energy markets.

Such an agreement can promote the reduction of methane emissions from oil and gas production around the world. This proposal also aims to demonstrate the effectiveness of international trade policy cooperation in achieving substantial reductions in GHG emissions. Ideally, the methane border agreement will provide foundational principles and spur coalition building efforts for further collaboration on climate policies.

Motivation

Methane's short but potent life span in the atmosphere means that by including targeted methane measures in decarbonization strategies, short-term reduction in global warming may be more than doubled (UNEP Global Methane Assessment 2030 Baseline Report, page 5). The oil and gas sectors have substantial low-cost methane abatement potential. Further, deploying more clean energy resources will not easily alleviate methane emissions from the oil and natural gas sectors in the near term; the world is projected to continue consuming oil and natural gas for at least the next several decades (bp Energy Outlook 2023).

9 In addition to subsidizing clean energy industries, China has a national cap and trade system, called the Emissions Trading Scheme, which launched in 2021. It covers 2,000+ plants in the power sector, accounting for about 40 percent of China's emissions and 15 percent of world emissions. Unlike the EU ETS, China's scheme is based on emissions intensities, meaning that the overall cap goes up and companies are allocated more allowances if they produce more output. The price for trades was less than $10/ton at the end of 2022. China's ETS will help it achieve its commitment to reduce emissions intensity by over 65 percent relative to 2005 levels by 2030. India has made several commitments under the Paris Agreement on climate change, including to reduce the "emissions intensity" of its gross domestic product (GDP) to 45 percent below 2005 levels by 2030 and to be net-zero carbon emissions by 2070. It has not implemented a formal carbon pricing approach but has other climate mitigation programs including subsidies for clean energy such as solar photovoltaic manufacturing and installation as well as tax preferences for electric vehicles.

Methane is released in the extraction, processing, and transportation of oil and natural gas. We estimate that worldwide methane emissions associated with oil and gas are equivalent to about 3 to 7 percent of global GHG emissions. The UN Environment Programme estimates that 56 percent of available methane abatement measures in the oil and gas sectors have "low mitigation costs" and over 50 percent have negative cost, because unlike CO_2, captured methane has revenue-generating potential (UNEP Global Methane Assessment 2021, page 7).[10] Reducing emissions on the scale UNEP suggests is possible and would have a major impact on climate change, equivalent to the projected reductions from all the measures in the IRA.

Several conditions suggest an enforceable multilateral agreement could gain traction.

- First, the US oil and gas industry is taking major steps to reduce emissions, in large part due to updated Environmental Protection Agency (EPA) regulations and incentives embedded in the IRA, including the Methane Emissions Reduction Program.
- Second, the European Union and the United States are already partially aligned, as the former is pursuing similarly ambitious regulations on methane emissions from oil and gas, discussed below. Given the current status of the EU proposals, the approach will likely have an international reach.
- Third, major methane emitters such as Iran, Russia, Venezuela, and Turkmenistan are unlikely to impose substantial methane reduction policies absent external pressure due to lack of domestic prioritization and enforcement capacity, so the global community will need to leverage trade to incentivize verifiable emissions reductions.

Policy Parameters

Policymakers can adjust the enforcement, timing, and scope of the methane border adjustment agreement as needed, but possible design features are described below.

- The border adjustment charge would be levied on countries that do not implement sufficient oil and gas regulations to meet new US and EU methane standards in the oil and gas industry.
  - The IRA includes the Methane Emissions Reduction Program (Section 60113) to reduce emissions from the oil and gas sectors. It establishes a fee assessed on methane emissions from specific sources that are above a size and emissions threshold, and it includes an exemption from the fee

10 The UNEP Global Methane Assessment (2021) defines low mitigation costs to be less than $600 per metric ton of abated methane. Other organizations predict similar low-cost abatement potential in the oil and gas sectors, including the International Energy Agency, which we discuss below. For example, methane captured at the point of emission can generate additional revenue through on-site combustion for electricity or industrial process heat (EPA 2019, pages 5-6 to 5-9). In addition, equipment retrofitting and directed inspection measures that address methane leakage issues can also contribute to cost savings (EPA 2019, page 5-21).

for facilities in states that have approved and implemented forthcoming EPA regulations.[11]

  - A 2021 proposal from the European Commission has now been amended by the European Council and the European Parliament and will set, after the conclusion of the "Trilogue," a new regulatory framework for methane for the European Union as a whole. The policy would ban certain practices, including venting and flaring methane in the extraction of natural gas and oil. It would also require companies to implement active monitoring systems and repair detected leaks within a certain timeframe. The original policy of the Commission and Council notes the large emissions associated with imports but stops short of regulating them, instead suggesting continued monitoring in support of future regulations. The amendments introduced by the European Parliament go further than the original Commission proposals in that they require that member states ensure that importers comply with the regulation, imposing penalties for infringement including "the suspension of the authorization to place oil, gas and coal on the market."

- Analogous to the EU CBAM, our proposal would impose a charge on oil and gas imports equal to the US methane fee multiplied by the emissions intensity of oil and gas production in the exporting jurisdiction. Aligning the border adjustment with the US methane fee implies a charge of ~$1 to $3 per barrel of oil and <$1 per MMBtu of natural gas for most exporters—substantial enough to deliver a meaningful methane reduction incentive, without disrupting global energy markets (see the Likely Impacts section below). This methane charge could be assessed only on emissions above a certain threshold, like the approach taken on domestic oil and gas emissions under the US IRA methane fee.[12]
- Delayed implementation of the charge should help address any concerns regarding energy prices in Europe. Delayed implementation also allows oil and gas exporting countries several years to adjust their domestic policies, clean up methane emissions from state-owned companies, and establish effective methane measurement, monitoring, reporting, and verification systems to accurately assess methane emissions content of fossil fuel production.
- We recommend assessing the charge at the level of the exporting country to incentivize exporting countries to undertake policies to reduce methane emissions. Assessing the charge at a finer geographic scale (basin or site) runs the risk of incentivizing reshuffling, where clean oil and gas are directed to countries imposing border adjustment charges and dirtier sources are directed to countries that are not part of the border adjustment coalition.

11 The fee begins at $900 per ton of methane and increases to $1,500 after two years. This fee equates to about $36 and $60 per metric ton of CO_2 equivalent, although the precise number depends on the assumed CO_2-equivalence of methane. The Department of Energy is also reportedly developing standards for clean natural gas, a move seen as helping US companies gain a competitive advantage with EU buyers.

12 While a border adjustment charge would be the best match given the methane fee, an alternative policy would ban imports from countries that fail to implement regulations to reduce methane emissions; market access would then be tied to measurable progress in reducing emissions.

- The policy could accommodate allowing individual firms to "prove out" so that border adjustments do not apply to firms that can show sufficiently low methane emissions. We recommend not allowing prove outs at a lower level of aggregation (e.g., site) to incentivize firms to clean up emissions at all their operations within a country. If a firm proves out, the country-level border adjustment could then be adjusted to reflect the emissions intensity of the remaining methane emitters.[13]
- Ideally, the methane border adjustment policy would be adopted by legislation in coalition countries, although there may also be executive branch authorities that can enable action.

Measurement and Enforcement

Measurement of methane emissions from the oil and gas sector has been haphazard historically, but scientists and nongovernmental organizations have made great strides in recent years. Until recently, many estimates of methane emissions relied on bottom-up approaches, which use data on infrastructure (e.g., counts of wells) alongside assumed emissions intensities. Scientists prefer a top-down approach, using satellite imaging, as these data are deemed to be more accurate. It will be important to ensure that the methane border adjustment agreement is based on robust and internationally aligned measurement approaches.

Implementation of methane emissions regulations would be verified by external measurement, monitoring, reporting, and verification (MMRV). Countries may object to a policy that penalizes them based on one data source if another suggests they are clean, but improvements in measurement technology and development of consistent MMRV requirements alongside some safe harbor margins can address these concerns. Similarly, charges for countries that do not implement methane emissions regulations would be based on emissions factors derived by following an agreed-on methodology.

We recommend that policymakers work with scientific experts to define an MMRV approach incorporating best practices and best available technology. Since measurement technology is advancing on a month-to-month basis, policymakers would ideally establish a framework that can adapt to innovations in measurement techniques. For example, policymakers could agree on establishing an external scientific body, either independent or convened through an existing international organization, such as the United Nations or the International Energy Agency (IEA), that periodically reviews measurement techniques, recommends best practices for assessing compliance with regulations and assigning emissions factors, and recommends requirements for a "prove out."

This external scientific body would also help reduce disputes associated with measurement disparities. For example, jurisdictions facing border adjustments might argue that their own measurements of methane emissions are lower than those found with more sophisticated techniques. If an independent scientific body establishes the ideal measurement approach, this will lessen such measurement conflicts.

13 This mechanism has been suggested by Cicala et al. (2022).

Dirtiest Emitters

Figure 2 summarizes methane emissions from the oil and gas sectors by country for some of the largest energy producers. The right panel plots total methane emissions, measured in gigagrams, and the left plots methane emissions intensity, dividing the total methane emissions by the total oil and natural gas production, measured in gigajoules.[14] Methane emissions intensities in Venezuela and Turkmenistan are higher than other countries (more than six and three times higher, respectively, than the third highest emitter), so the scale is truncated for those two countries. Data on methane emissions are from Shen (2022) and Chen et al. (2023).[15]

Likely Impacts

We assess the likely impacts of a methane border adjustment agreement in several steps. First, we project ranges of methane emissions reductions in response to the border adjustment agreement using data from the IEA on estimated methane abatement costs. Second, we calculate representative methane border adjustment charges that would be assessed if countries did not adopt regulations and achieve the reductions measured in the first step. Finally, we simulate several scenarios with more and less disruption to oil and gas trade and calculate the estimated impacts on world energy prices. We focus on the countries listed in figure 2, which account for over 80 percent of total oil and gas methane emissions. Overall, we find that the abatement potential is high and the impact on world energy prices is very small.

Projected Emissions Abatement

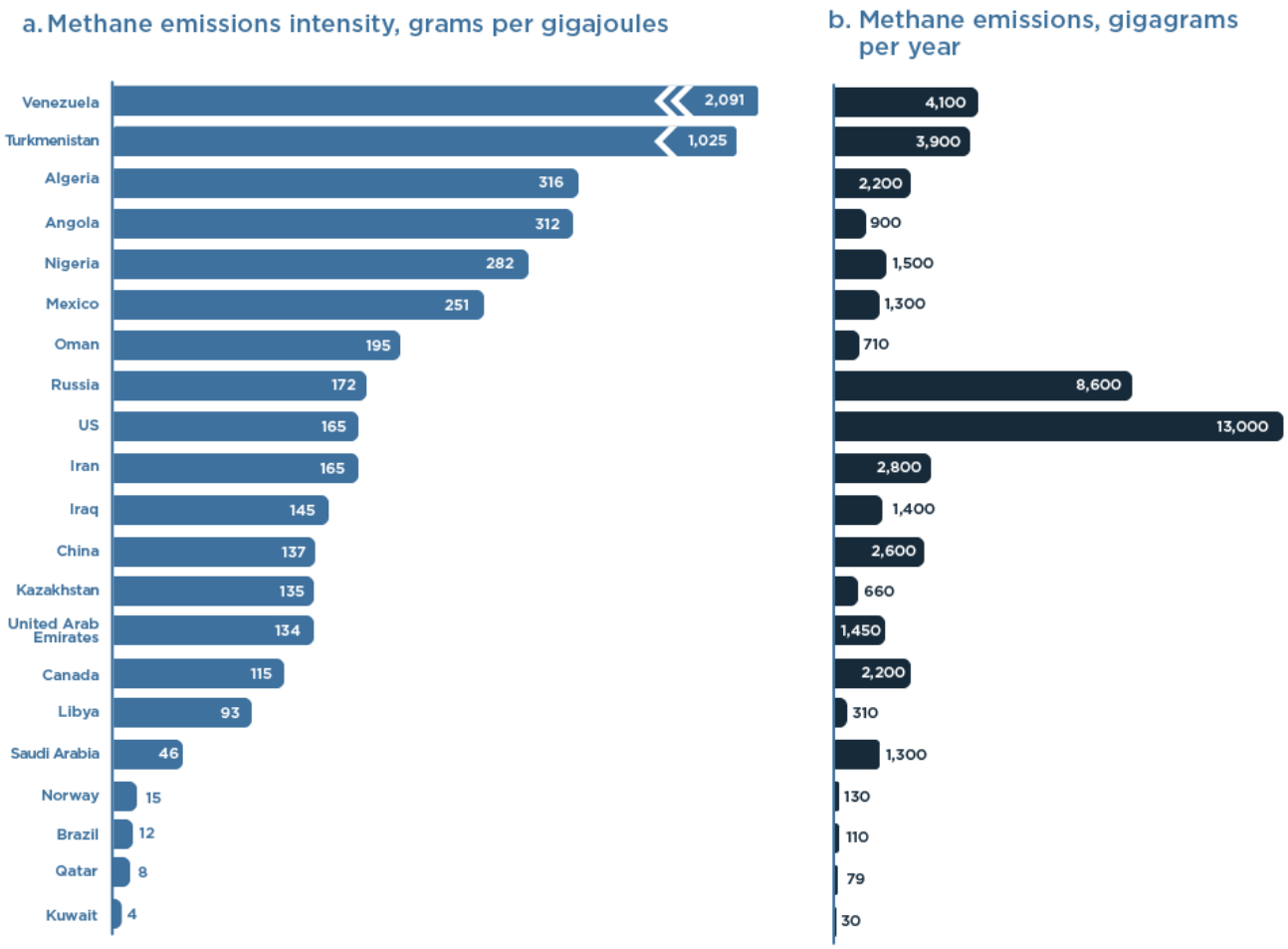
The IEA's Global Methane Tracker includes country-level estimates of the marginal cost of abating methane from the oil and gas sectors. The IEA's estimates account for country-specific benefits of reselling the captured methane (using average prices in 2017–21), and many of the measures have negative abatement costs. For example, in the world abatement cost curve about half of methane emissions have negative abatement costs.[16]

14 Emissions intensity measures how much methane is emitted for a given amount of oil and gas production, capturing how dirty (in terms of methane emissions) a country's production is.

15 As noted, different approaches have been used to measure methane emissions and estimates vary considerably.

16 A natural question is why firms have not taken advantage of negative abatement cost opportunities. Industry observers offer several possible explanations, including that the managers are not rewarded for investing in abatement (e.g., if shareholders focus on metrics such as new wells, they may undervalue investments in abatement). It is also possible that the estimated marginal costs of abatement are too low. The IEA's tracker plots the worldwide abatement cost curve here: https://www.iea.org/data-and-statistics/data-tools/methane-tracker-data-explorer (click on Abatement tab).

Figure 2
Methane emissions from the oil and gas sectors and emissions intensity by country, 2021



Source: Authors' calculations. Methane emissions are from Shen (2022) and Chen et al. (2023), who analyze satellite data. Emissions intensities normalized by gigajoules of oil and natural gas production in 2021, both collected by the US Energy Information Administration (oil and natural gas).

We develop both low- and high-end projections of country-level emissions abatement that would result from a US-EU border adjustment agreement. For the high-end projection, we assume that major energy exporters will abate all emissions with negative marginal costs of abatement. This is still a somewhat conservative estimate as the proposed border adjustment charge would be above zero, and some of the technologies with positive marginal abatement costs (e.g., eliminating emissions from pneumatic devices) are likely to be covered by the US regulations, so countries adopting equivalent regulations would also capture those emissions. On the other hand, our projected abatement will be too high if some countries (for example, Venezuela or Iran) do not respond to the economic incentives created by the potential border adjustment. For the low-end projection, we assume that exporters abate emissions with negative marginal costs only in proportion to their exports to the United States and the European Union. For example, over 95 percent of Turkmenistan's oil and gas exports are to China, so we assume that their emissions reductions are small in the low-end projection.

In sum, we project that 15 to 45 percent of methane emissions from the countries in figure 2 would be abated. The low end corresponds to a scenario where companies that export to the United States or the European Union abate negative-cost emissions and then prove out to avoid the country-level charge. The high end corresponds to a scenario where the proposed border adjustment incentivizes each country in figure 2 to adopt regulations equivalent to those in the United States and the European Union, which we approximate with the IEA estimates of negative cost abatement. In this latter case, there is no impact on oil and gas trade, and none of the exporters pay the border adjustment charge.

Representative Methane Border Adjustment Charges

Table 1 summarizes the methane border adjustment charges implied by the US methane fee of $1,500 per metric ton for the countries listed in figure 2. Since these fees are assessed only if countries do not abate, they are based on the emissions intensities reflected in figure 2. Specifically, we take the total methane emissions attributable to oil and gas production (in gigagrams) in 2021 and divide by total oil and gas production per country (measured in gigajoules) in the same year and convert this intensity figure to border adjustment charges expressed both in terms of US dollars per barrel and US dollars per MMBtu.

Potential Impacts on Energy Trade and Market Prices

Projecting the impact of a border adjustment agreement on energy trade involves assumptions about what exporters will do when faced with a potential border adjustment charge. Exporters face several options:

(1) abate emissions and face no charge,
(2) continue selling to the United States and the European Union without abating and face the border adjustment charge (we assume the exporter would not pass the charge on to consumers—i.e., bear the incidence of the charge—since they compete with "clean" sources from the United States and the European Union, and since the adjustment charges are close to zero for major producers, including Saudi Arabia, Qatar, and Kuwait),
(3) reroute sales that previously went to the United States or the European Union to countries that do not impose border adjustment charges, or
(4) export less oil and natural gas.

As noted above, option (1) implies substantial reductions in emissions and no associated impact on oil and gas trade or prices. If the proposed border adjustments are enacted with enough lead time and countries are offered assistance in developing and implementing regulations, we view this outcome as likely. The extent to which exporters prefer option (3) to option (2) depends on shipping costs. As a benchmark, we identified countries that typically export oil or gas to the United States or the European Union and for whom the methane charge listed in table 1 would be higher than $5 per barrel or $2 per MMBtu, where $5 and $2 are estimated costs of shipping oil and gas 5,000 miles; these countries would be incentivized to divert trade.[17] We assume that the remaining countries

17 Estimated costs of shipping crude oil based on recent price difference between Brent and West Texas Intermediate (WTI) crude oils. Estimated costs of shipping liquefied natural gas (LNG) based on Ripple (2016), adjusted for more recent day rates.

Table 1
Representative methane border adjustment charges

Country	Oil (US dollars per barrel)	Natural gas (US dollars per MMbtu)
Venezuela	19.13	3.31
Turkmenistan	9.38	1.62
Algeria	2.89	0.50
Angola	2.86	0.49
Nigeria	2.58	0.45
Mexico	2.30	0.40
Oman	1.78	0.31
Russia	1.57	0.27
United States	n.a.	n.a.
Iran	1.51	0.26
Iraq	1.33	0.23
China	1.25	0.22
Kazakhstan	1.23	0.21
United Arab Emirates	1.23	0.21
Canada	1.05	0.18
Libya	0.85	0.15
Saudi Arabia	0.42	0.07
Norway	0.13	0.02
Brazil	0.11	0.02
Qatar	0.07	0.01
Kuwait	0.04	0.01

n.a. = not applicable

Note: Charges based on 2026 US methane fee of $1,500/ton.
Sources: Authors' calculations based on Chen et al. (2023); Shen (2022); US Energy Information Administration; US Environmental Protection Agency.

listed in table 1 would continue to sell to the United States or the European Union, paying the border adjustment charge. For shipments from countries with border adjustment charges above shipping costs that typically export to the United States or the European Union, we then assume (as benchmark scenarios) that 15 percent, 5 percent, or 0 percent (none) of each fuel would be taken off the world market entirely (option 4). This last option is unlikely to be attractive if only the European Union and the United States agree to enact border adjustments, so the upper end of the withdrawals is possible only if a very broad coalition of energy importers participate in the agreement. Further, in the long run, we would expect most of these energy flows to come back into the market.

Table 2 summarizes energy market impacts under these three assumptions about the share of oil or gas that is removed from the world market. We assume a combined demand and supply elasticity of 0.1 in both oil and natural gas markets (consistent with the prior literature) and convert to dollars per gallon of gasoline using the fact that each barrel of oil contains 42 gallons. We assume benchmark oil prices of $70 per barrel. We also represent an abatement scenario, corresponding to major exporters adopting regulations that exempt them from the border adjustment charge (as discussed under option 1 above). The impact on oil and gas trade is very small and zero for several likely scenarios.[18]

In general, the policy could be nonbinding if noncoalition oil and gas importers can absorb all the exports from the dirtiest countries (option 3). For example, neither China nor India is currently a signatory to the Global Methane Pledge. (See below for more detail on the pledge.) But if major importers see the value of incentivizing low-cost reductions of a potent greenhouse gas, they can opt into the agreement. The more countries are included in the agreement, the more effective it will be.

A related concern is that countries with large methane emissions may not respond to incentives. Even though estimates of abatement costs are low, they may not account for local contexts or other barriers to implementation. Still, a policy tool that discourages exports from countries that fail to reduce emissions will be valuable.

Additional Considerations

In addition to the market impacts, there are also important political economy dynamics to consider with a methane border adjustment agreement. One benefit is that it may lessen domestic opposition to tougher regulations in the United States or the European Union, since foreign competitors would be subject to similarly stringent regulations. The effectiveness of these methane regulations will depend on implementation details, and a border adjustment may allow more rigorous implementation. For example, the IRA includes an offramp that waives the methane emissions fee if emissions were caused by unreasonable delays building infrastructure to transport the captured methane. We are assuming that the EPA administrator will implement regulations in a manner that is effective at reducing methane emissions, but this area should be continuously monitored.

18 Table 2 reflects trade flows in 2020, when Venezuela shipped small amounts of oil to the United States and the European Union. Even reflecting recent trade between Venezuela and the United States (reportedly up to 100,000 barrels per day), the oil price impact would be about 1 percent and US gasoline price impact would be less than $0.02.

Table 2
Energy price scenarios with different supply assumptions

Scenario	Oil removed from market (percent)	Increase in oil price (percent)	Increase in US gasoline price (US dollars/ gallon)	EU natural gas removed from market (percent)	Increase in EU natural gas price (percent)
15% supply reduction	0.015%	0.148%	$0.002	0	0
5% supply reduction	0.005%	0.049%	$0.001	0	0
0% supply reduction	0	0	0	0	0
Abatement	0	0	0	0	0

Source: Authors' calculations.

Steps for International Coordination

We recommend that the US Congress and the Biden administration work together on next steps for implementing a US methane border adjustment that would work in concert with similar measures in the European Union and abroad. Ideally, once international agreement has progressed, Congress would include a methane border adjustment in legislation, parallel to similar steps abroad. In the meantime, the Biden administration should do preparatory work to facilitate international coordination on methane emissions reductions.[19] We recommend that the administration simultaneously lead efforts to coordinate work with the European Union, Group of Seven (G7), and other potential coalition members to develop a framework for a multilateral agreement on methane border policies, targeting release of a framework paper at the 28th Conference of the Parties to the UN Framework Convention on Climate Change (COP28) in Dubai in late 2023.

The framework should address the timeframe for implementing border adjustment policies, MMRV techniques that would be used, exemptions for trade within coalition members, support for heavy emitters, and other issues identified by participating countries. While this timeline is ambitious, policy commitment and leadership from the United States could drive swift action, using the upcoming COP28 as a motivating force. We also recommend engaging with the United Arab Emirates, which, as both the host country of COP28 and a relatively clean producer, may be interested in pushing this agreement forward.

Our recommended US approach fits well with the European Union's proposed methane emissions regulation noted earlier.[20] The EU proposal introduces new requirements for the oil, gas, and coal sectors to measure, report, and verify

19 For example, the administration should convene an Interagency Policy Committee (IPC) on Multilateral Methane Agreements. This IPC could bring together existing work streams that are developing approaches to monitoring and measuring methane intensities in the oil and gas sectors, evaluating whether these methane intensity metrics could be used to support border adjustment policies as well as other implementation issues.

20 As mentioned earlier, the proposal has been approved in a first reading by the Parliament and Council and is currently undergoing interinstitutional negotiations.

methane emissions at the highest standard. Operators will be obliged to detect and repair leaks starting no later than five days after detection and complete the repairs within 30 days. Venting and flaring will be forbidden except in narrowly defined exceptions.[21] The rules also put forward new *global* monitoring tools that will increase transparency of methane emissions from imports of oil, gas, and coal into the European Union, allowing the European Commission to consider further actions in the future. The creation of these two tools will show the performance and reduction efforts of countries and energy companies across the globe in curbing methane emissions. As a first step, we suggest prioritizing the timely development of this monitoring system and accompanying work toward extending a CBAM-type framework to methane emissions.

There is also the question of how to organize collective action in this space. One key issue is whether the formation of the methane agreement should proceed on a multilateral basis or among a few key leading countries. The United States and, particularly, the European Union are important first movers given their importance as oil and gas consumers and their global economic leadership. The G7 may serve as a vehicle to expand the coalition, or it may be equally effective for the United States and the European Union to approach large energy-consuming countries that have made their own commitments to reduce emissions individually.

To date, beyond the UN Framework Convention on Climate Change, the International Monetary Fund (IMF) and the World Bank have been engaged in this space. The Organization for Economic Cooperation and Development (OECD) is also eager to address climate policy, though its membership includes only rich countries. It would be useful to have a convening organization that helps organize these efforts.[22]

CHALLENGES AND POSSIBLE RESPONSES

We addressed two key challenges: the issue of measurement and enforcement and the possibility of trade reshuffling. There are three additional concerns about the merits of our proposal.

1. How can any possible adverse effects on European energy markets be addressed?

Particularly in the short run, policymakers will need to address any possible adverse effects on energy consumers who have suffered from dramatic increases in energy costs. The delayed implementation of the proposed methane border adjustment should help in several respects. First, it will allow time for energy markets to stabilize. Second, even more important, it will allow nonagreement

21 See Council of the EU, "Member States agree on new rules to slash methane emissions," press release, December 19, 2022.

22 One model of such coordination was the recent international tax agreement. The OECD was the convening organization and helped facilitate progress among both smaller and larger groups, including early discussion among leading countries, expanding to G20 countries, and eventually to the "Inclusive Framework," which included about 140 jurisdictions.

countries the time to adopt regulations and undertake abatement measures to avoid the border charge. Ideally, the charges would never be levied but instead motivate upward policy harmonization.

Nonetheless, domestic politics may make it difficult for the European Union to intervene in markets for natural gas since it may face supply shortages given the large reductions in imports from Russia. Given the ongoing war in Ukraine, any adverse effects on household energy bills should be avoided. One possible option is to use any revenue collected from border charges to help affected households (although we project that in practice price effects will be indiscernible).

Still, some in the European Union may perceive the policy as "unfair"—the criticism being that US producers benefit while the EU consumer pays. We believe, however, that delaying implementation and insulating consumers can alleviate these concerns. Moreover, our calculations above show that the social benefits from this measure would far exceed the economic costs; we expect to see large environmental benefits with minimal price effects.

In addition, from the European perspective, a methane agreement is a crucial step toward cooperating with the United States by better aligning climate mitigation policy approaches.

2. Are border adjustments fair to poor countries?

Any border adjustment raises important fairness concerns for poor countries. Rich countries are responsible for creating the vast majority of the stock of GHG emissions in the atmosphere. Poor countries may have difficulty spending scarce resources on mitigation, and risking export earnings can generate large economic burdens. These important concerns can be addressed in several ways. First, technical assistance should be provided to help countries with their mitigation efforts. For example, the potential US deal with Turkmenistan could be a useful model.[23] As described above, methane mitigation can be very cost-effective, so that should help incentivize action in this area. Second, countries imposing border adjustments could direct all or a portion of the levies collected toward a fund for additional mitigation assistance in poor countries. Third, the transition period could be adjusted to address country-specific circumstances, especially for countries that lack adequate capacity or face economic hardship.

3. Would it make more sense to pursue a voluntary agreement?

In the Global Methane Pledge, 150 countries have committed to a 30 percent reduction (from 2020 levels) in anthropogenic methane emissions by 2030. Participants commit to taking comprehensive domestic actions to achieve that global target, including greater transparency and reporting standards. While the pledge is useful in terms of transparency and technical work, its targets are not sufficiently detailed for the oil and gas sectors, nor are they tied to particular country-level actions or policies. In addition, China, India, and Russia (three of the largest emitters) have not joined the pledge, although China did commit to methane reduction as part of a US-China Joint Glasgow Declaration on Enhancing Climate Action in the 2020s.

23 "Turkmenistan in Talks With US to Tackle Giant Methane Leaks," Bloomberg, May 31, 2023.

Another policy suggestion calls for a Montreal Protocol-type initiative to reduce methane emissions. Just as the Montreal Protocol successfully coordinated international action on chlorofluorocarbons (and other refrigerants) that were harming the ozone layer, a similar framework on methane could reduce large harms at modest costs. One possibility would be to move from the Global Methane Pledge to a series of sectoral commitments on methane, with separate frameworks for oil and gas, waste, and agriculture, as suggested by Zaelke, Bledsoe, and Dreyfus (2022). Our proposal complements this approach. A methane border adjustment is a useful way to motivate enhanced cooperation in methane reduction in the oil and gas sectors, but more policy actions will be needed in other sectors.

Possible Extensions

The idea of basing a border adjustment policy on regulations, backstopped by a fee, could be applied in other contexts. For example, the EPA's proposed regulations (proposed rule) on GHG emissions from fossil-fuel-fired power plants effectively mandates carbon capture and storage systems for coal- and natural gas-fired power plants that meet certain criteria. The agency proposes allowing power plant operators to trade compliance requirements. A tradeable allowance system could mean that one plant could overcomply with the regulations (e.g., by installing the equipment earlier than required) and sell allowances to another plant, which could use the allowances as a means of complying with the regulations.

A border adjustment policy based on the EPA's proposed regulations could target electricity-intensive goods, such as aluminum, and require that US imports either use electricity where coal- and natural-gas fired plants were subject to regulations equivalent to the EPA's proposed rule or pay a border adjustment charge equal to the US tradable allowance price. For example, if allowances under the EPA's proposed rule traded for \$20/ton of CO_2 in a given year, and if China decided not to impose regulations requiring carbon capture and storage in fossil fuel-fired plants equivalent to the EPA's proposed rule, US imports of Chinese aluminum would have to pay a border adjustment of \$20/ton times a measure of the carbon intensity of the electricity used to produce the imported Chinese aluminum. US imports from countries that have carbon pricing policies that result in prices above a certain level could be treated as equivalent to having EPA-like regulations and therefore would be exempt from the border adjustment.

Another possible extension would focus on carbon emissions in the oil and gas sectors in addition to methane emissions. For example, if the United States were to legislate a fee proportional to the direct and indirect carbon emissions associated with producing and processing oil and natural gas, this fee could be used as the basis for a carbon border adjustment. A recent report (Climate Leadership Council 2020) suggests that US energy extraction and refining is less carbon-intensive than production in many key trading partner countries.

CONCLUSION

This Policy Brief proposes a strategy for international cooperation on climate that aims to both reduce frictions caused by heterogeneous policies and increase incentives for ambitious global climate policy. As a first step, the United States, the European Union, and partner countries should work to coordinate their methane emissions reduction policies, with an eye toward the eventual imposition of border adjustments on imports from countries that fail to raise their standards. We view this as a useful way to incentivize full international participation in reducing methane emissions while demonstrating the value of a coordinated approach.

Increased international policy coordination on border adjustment approaches writ large is particularly valuable at the present time. The European Union is grappling with how to respond to the clean energy subsidies in the US Inflation Reduction Act and is particularly concerned about the national content provisions. This has raised fears that the IRA could not only damage EU industry but also weaken state aid rules, undermining the internal market, a key achievement of the European Union.

While asymmetric approaches of key jurisdictions may stymie policy alignment, the evolving fiscal environment could help spur greater coordination. For example, many countries—most definitely including the United States—face fiscal pressures from rising interest rates, an aging population, large structural budget deficits, and high stocks of public debt. In the United States, these budget pressures could help create policy incentives to move toward greater reliance on GHG pricing. In addition, the prospect of CBAMs in the European Union, the United Kingdom, and Canada could increase the US incentive to adopt a cost-imposing approach, at least for energy-intensive industries that are heavily traded. If the United States adopts a more aligned approach in the years ahead, that could allow coordination with partners on a joint CBAM regime. This coordination could in turn create incentives for countries throughout the world to adopt more ambitious climate mitigation policies.[24]

The international trade elements of countries' climate policy choices present both enormous opportunities and substantial risks. While the Paris Agreement provides a global "conscience" with respect to the urgency of climate change, it does not provide sufficient impetus to real policy action. With careful coordination, governments can use trade incentives to help drive additional policy ambition, including sticks (that will hopefully be rarely used), carrots (including market and investment access), and financial assistance or special rules to address the transition needs of poor countries.

However, without careful coordination, trade issues can erode cooperation and reduce policy ambition. Countries could pursue protectionism under a green veneer, embark on trade wars in response to border adjustments, or unravel well-designed policies due to competitiveness fears. We put forward this proposal to facilitate greater international conversation and coordination around climate policy, with the hope of enabling trade tools to better serve global climate goals in the years ahead.

24 These policy dynamics are discussed more fully in Clausing and Wolfram (2023).

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