



# The Politics of Short-Lived Climate Pollutants and North American Methane Policy

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*The NAC is part of an ongoing partnership between the Ford School's International Policy Center, the University of Toronto's Munk School of Global Affairs and Public Policy, and the National Autonomous University of Mexico's Centro de Investigaciones sobre América del Norte.*

## KEY FINDINGS:

1. Several features of methane suggest, at least in theory, that its mitigation in the energy sector could prove more politically amenable to rigorous and durable policy than carbon, including its intensive short-term climate impacts.
2. However, a 2016 North American Summit agreement to reduce methane emissions in the United States, Canada, and Mexico failed to produce a common continental approach, resulting in highly uneven policies and performance in these nations through 2020.
3. In the United States, methane mitigation policies remained very modest at the federal level and in most oil and gas production states through 2020, reflecting strong opposition from producing firms in an era of rapid production expansion.
4. Mexico took significant legislative steps toward methane policy adoption in 2018 but balked in the implementation stages once a new government demonstrated resurgent interest in maximizing oil production while ignoring significant methane emission increases.

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KEY FINDINGS: *(continued)*

5. Canada went the farthest in honoring a 2016 North American Summit agreement through negotiations with its largest energy producing provinces and by leavening the pacts with sizable transfer payments to producer provinces and firms.
6. The United States has taken some significant steps in 2021-22 toward a more active methane policy posture, reflecting some expanding state policy innovation and the launch of a series of new federal policy initiatives.
7. A new US-led international focus on methane, including the 2021 Global Methane Pledge, coincided with growing parallels between Canadian and American methane policy and could position the two nations for global leadership in this area.

There are many reasons to mitigate methane releases from energy production into the atmosphere.

Responsible for at least one-quarter of the global warming that has already occurred, methane is a “short-lived climate pollutant” with particularly intensive impacts during its first decades in the atmosphere. Active steps to mitigate methane releases could offer important near-term climate benefits, replicating major national and international policy development for other intensive, near-term contaminants such as hydrofluorocarbons (HFCs). Methane is also an environmental health threat through its contribution to the formation of toxic air pollutants. It may also be one of the technically easiest and most inexpensive greenhouse gases to mitigate. Technologies to measure, monitor, capture, and use released methane as natural gas are readily available, are maturing rapidly, and are often highly cost-effective. Captured methane has considerable commercial value if used as natural gas rather than wasted, offsetting capture costs. Given these complementary factors, methane is regularly characterized as “low-hanging fruit” of climate mitigation, much like HFCs but quite different than carbon dioxide.

Despite the numerous reasons to minimize releases, energy sector methane mitigation policies have evolved very slowly at the American federal level and in most production states, given strong opposition from producing firms and accommodating political regimes. Other major methane-producing sectors, particularly livestock and agriculture, have faced similar and perhaps greater political stumbling blocks (Fisher 2022). This paper places particular emphasis upstream near the point of onshore energy production, including all extraction and storage equipment operated at individual drilling sites, rather than offshore or in midstream stages such as transmission or refining. This is where a substantial portion of energy sector methane releases continentally appear to be concentrated (World Bank 2020). The analysis considers energy production from a life-cycle perspective, ranging from initial site exploration through various production stages and eventual site closure and remediation.

This paper examines the continued political challenge of developing a robust methane mitigation policy regime in most oil and gas producing jurisdictions in the United States and its North American neighbors. It invokes political scientist Matthew Crenson's classic characterization of "politically enforced neglect" to explore a political landscape in which climate, environmental health, resource protection, and economic development concerns can be linked to methane venting and flaring but often fail to reach political agendas or engage elected officials, thereby limiting the adoption and implementation of consequential mitigation policies.<sup>1</sup> Politically enforced neglect in methane is attributable to the formidable coalitions between oil and gas producers and accommodating legislatures and regulatory agencies, even when diverse opposition coalitions form to support new policy. This influence is compounded by the location of considerable oil and gas production in low-income rural or urban areas, suggesting potentially high local economic dependence on sustained production and low political capacity to seek higher methane mitigation standards. In turn, the opportunity to pursue intensive and immediate oil output from shale deposits can relegate the associated gas that increasingly emerges from many reservoirs into a costly nuisance that may prove most convenient to release. Negative impacts of methane have also been downplayed by aggressive industry and government efforts to characterize natural gas as an environmentally benign alternative to other more carbon-intensive energy sources such as coal and oil.

This paper focuses primarily on the United States between 2015 through 2020. Both state and federal policy have proven very timid in this period in addressing methane mitigation. There has been no systematic American federal or multi-state effort to devise reliable methods to measure releases or adopt regulatory or market-based policies designed to minimize emissions in accord with global best practices. Instead, individual states have largely maintained long-standing oil and gas production policies, proving highly reluctant to either pass

new legislation or take administrative steps to address methane more rigorously in an era of rapid production expansion. Such states have taken aggressive steps to thwart any federal encroachment on their domination of this area, including multi-state litigation, emphasizing their experience and unique understanding of local conditions. This has resulted in a stable and highly decentralized regulatory regime, retaining most authority in industry-oriented state agencies. One production state developed markedly different methane policies during this period and a few others began to follow suit by 2020. On the whole, American oil and gas production has increased markedly during these years, with annual methane releases appearing to have widely fluctuated by year and region.

The paper also considers two neighboring cases, Mexico and Canada, during the same time frame. Both nations also produce substantial oil and gas while remaining leading American cross-border energy trade partners. They joined the United States in a continental emissions reduction agreement formalized through a 2016 North American Summit involving the three national heads of state. They pledged to develop policies to achieve a 40-to-45 percent reduction of energy methane emissions from 2012 levels by 2025 but did not establish any common policies or create a continental entity to oversee implementation and compliance.

The United States disengaged from this process in 2017 and failed to achieve its planned reductions. Diverse outcomes emerge from the Mexican and Canadian cases. Initial Mexican enthusiasm for the continental agreement, and subsequent adoption of related methane legislation, reflected strong political interest in diversifying Mexican energy production and growing climate concern. However, new leadership following 2018 elections generated a renewed emphasis on "oil nationalism." This eschewed the development of more diverse and privately-generated energy sources in favor of maximizing oil output by a long-standing and deeply-indebted nationalized production firm. Ironically,

<sup>1</sup> I am grateful to Iza Ding for a suggestion at a 2019 seminar at the University of Pittsburgh to apply Crenson's work to the methane case.

Mexican oil and gas production declined greatly between 2015 and 2020, while its methane releases increased significantly. In Canada, however, federal commitment to the North American pact was reflected in new federal regulations offering to delegate authority to provinces that could demonstrate equivalency through their own programs. British Columbia emerged as a leading province in responding to this federal charge, whereas Alberta and Saskatchewan sought and secured far greater accommodation. Canada increased oil and gas production between 2015 and 2020 while its methane releases have consistently declined, putting it on track to meet 2025 reduction goals and positioning to achieve additional reductions in the future, unique among its North American neighbors.

This paper offers an analysis of policy to address a potent greenhouse gas that has generally been overlooked by the policy sciences in comparison to carbon dioxide. It

assumes that natural gas will be phased out in North America and globally due to climate concerns but that this transition will not be immediate, making stewardship of ongoing energy production an essential element of federal climate protection strategies. It asks why it has generally proven so hard politically to adopt and sustain rigorous mitigation policies. Finally, it considers whether methane politics and policy in North America may have entered a period of more fundamental transition since early 2021, reflected in expanding Canadian mitigation efforts, a series of new state and federal initiatives in the United States, and American leadership of a new global methane reduction pact.

These recent developments suggest considerable opportunities for greater Canadian and American collaboration in this arena than ever before, given these new steps and expressed interest by both current national leaders in providing global leadership on methane.

## THE UN-POLITICS OF METHANE

Methane releases are neither a new issue nor confined to climate deliberations. More than seven decades ago in Texas, public outcry over methane mounted in one of the world's leading oil-producing jurisdictions. Amid rapid oil production expansion, worries mounted about released gas produced alongside oil, including periodic spikes.

This reflected opposition to flaring, involving the placement of a torch at production points to convert escaping gas into carbon dioxide, as well as venting of pure methane. Farmers and ranchers lamented this waste of a non-renewable energy resource exempt from royalty payments from production firms. Texas responded by appointing an expert committee, drawn largely from the oil industry, to consider possible reforms. During the 1950s, two sets of reform provisions were approved by a key regulatory body, intended to force fuller disclosure

of methane releases and restrict the practice. These were heralded by Texas political leaders as national models of effective energy governance but were loaded with administrative loopholes and have never been fully implemented (Rabe, et al. 2020; Warner 2007).

Production fluctuated in subsequent decades but soared anew during the shale era. Texas has led all production states in oil and gas output since the mid-2000s. Methane emissions have persisted but methane governance dropped far down the Texas political agenda for prolonged periods of time. Legislative sessions have routinely featured extensive deliberations over various oil and gas industry issues, but the state's modest methane policy regime has remained largely in place. This has given enormous latitude to the Texas Railroad Commission, which is formally charged with industry oversight and production maximization, paving the way for routine approval of thousands of annual exemption requests from formal state flaring restrictions (Elliott 2018).



The last half-century of methane politics in Texas and many other production states features strong parallels to what Crenson characterized as “politically enforced neglect” concerning local air pollution. He examined the 1950s and 1960s when federal and state air quality policy was only beginning to emerge and cities retained primary regulatory authority. Crenson observed “the fact that some towns ignore their dirty air” and attributed this to the distribution of local power and the ability of public and private leaders to downplay environmental concerns in order to nurture abiding political economy considerations. Steel plants were unlikely to be moved physically to other jurisdictions but were owned by firms operating in national and international markets, leaving local political leaders, unions, churches, and other community groups reluctant to alienate dominant contributors to their local employment and economic base. “They are not politically random oversights, but instances of politically enforced neglect,” he wrote (Crenson 1971:184), pioneering the phrase of “un-

politics” in examining a political incapacity to address some immediate environmental challenges.

Crenson’s pioneering study of environmental politics might seem a relic from a long-gone era, and yet it squares with numerous dimensions of methane governance in more recent decades. It will inform this analysis, beginning with consideration of factors that seemingly would make methane policy reform politically compelling in nations such as the United States. This will be followed by a review of factors that have deterred consequential methane policy development, placing particular emphasis on the role of state legislatures and executive agencies in discouraging state policy reforms while fiercely opposing federal efforts to engage this area. It will lead to an examination of Mexican and Canadian methane politics, exploring whether American patterns are replicated in its neighboring federations and an initial effort to forge a continental partnership could endure.

## WHY METHANE SHOULD BE EASY POLITICAL PICKINGS

The common social science tendency to implicitly lump all greenhouse gases together into “climate policy” breaks down when comparing methane to carbon dioxide. This practice overlooks significant points of differentiation between respective gases, some of which could potentially make methane mitigation and subsequent policy adoption particularly promising politically. These features do not offer any easy path for methane policy in the United States or elsewhere. However, they suggest, at least in theory, that methane could prove more politically amenable to serious mitigation policy than carbon.

***Intensive Early Impacts and Climate Mitigation Benefits.*** One long-standing political challenge for climate policy involves building support for near-term actions that seek economic sacrifices or behavioral adjustments to achieve long-term climate benefits for future generations. Carbon prices, for example, impose immediate energy cost increases that may be highly visible to consumers. In contrast, actual climate benefits from such a policy may be difficult, if not impossible, to measure or experience within one’s lifetime (Rabe 2018). Methane and other “short-lived climate pollutants” such as HFCs alter that calculus given their immediate and intensive climate impacts, concentrated heavily within initial decades of atmospheric release. Over its first two decades in the atmosphere, a ton of methane warms the atmosphere at about 87 times the rate of a ton of carbon dioxide. Even over a full century, that rate of differentiation favors methane impact at 28 times that of carbon dioxide, leading to its frequent depiction as “carbon dioxide on steroids.”

Methane mitigation could translate into significant near-term climate protection. A 2021 United Nations report observes that a 45 percent reduction over the next decade from all global methane emission sources would deter 0.3 degrees (Celsius) of global warming by the 2040s (United Nations 2021). Additionally, a 2021 analysis of methane led by Environmental Defense Fund staff contends that “pursuing all mitigation measures now could slow the global-mean rate of near-term decadal warming by around 30%, avoid a quarter of a degree Centigrade of additional global-mean warming by midcentury, and set ourselves on a path to avoid more than half a degree Centigrade by end of century” (Ocko et al. 2021). No other greenhouse gas offers comparable near-term climate impact under similar reduction scenarios.<sup>2</sup> The near-term climate benefits of methane emission reductions could bolster the political case for early action, accentuating climate impacts within one’s own lifetime rather than for future generations (Victor et al. 2015).

**Protecting Producer Social License.** Consequential and verifiable methane mitigation could assist oil and gas producers in retaining their social licenses and bolster their efforts to market their product domestically or internationally. Given the aggressive industry efforts to depict natural gas as an environmentally and climate-friendly alternative to coal in recent decades, methane minimization could bolster arguments that it serves as a bridge fuel as renewables use expands. The credibility of the case for gas has been profoundly shaken by mounting evidence that methane releases far above reported levels are regularly lost during production and along supply chain movement. A 2022 International Energy Agency study confirms that this pattern shows no signs of slowing globally (IEA 2022). Any purported greenhouse gas advantage of natural gas over coal declines as methane loss as a percentage of total produced gas increases. One prominent study notes that a 3.2 percent loss rate eliminates the natural gas climate edge over coal

(Alvarez et al. 2012; Addison 2020; Carbon Disclosure Project 2020). Methane loss rates are also emerging as a growing issue among climate-focused nations seeking to prioritize gas imports from producers with strong methane mitigation records. The European Union is preparing to lead this effort, exploring options to leverage their purchasing power to minimize methane loss. Many production firms may increasingly welcome governmental pressures to pursue standardized methane mitigation efforts, bolstering their future ability to protect social license.

**Low-Hanging Fruit and the Abundance of Cost-Effective Mitigation Options.** Energy sector methane offers a large and expanding set of technological and policy options to mitigate releases. Preventing drilling at a particular site, or within a specific jurisdiction, can reduce potential methane loss in those areas to zero. Drilling moratoria or bans have been adopted in states like Maryland, New York, and Vermont, although these generally have not been driven by methane considerations. They likely lead firms to instead pursue production in friendlier regional settings and may have little, if any, national or international methane impact.<sup>3</sup> For jurisdictions that are not amenable to immediate production termination, there are numerous approaches to reduce, if not fully eliminate, methane emissions, reflecting a mixture of technologies and policies. Policy options include regulatory constraints on flaring or venting, performance standards that prohibit releases above specified levels, mandatory use of gas capture technology, or application of taxes, fees, fines, and royalties to incentivize reduced methane releases.

Norway has long pioneered the development of an across-the-board approach to mitigation. This began a half-century ago with tight regulatory limits on flaring and venting in non-emergency situations and formal requirements prohibiting energy production until

2 Other short-lived climate pollutants such as HFCs and black carbon also produce intensive near-term impacts but their overall climate consequences are less than methane due to its far greater volume of releases. Carbon dioxide would require a far deeper set of rapid emission reductions to achieve comparable near-term impact, since its climate consequences are more modest initially but persist much longer than methane.

3 Possible climate impacts from such steps obviously increase if the termination of production involves larger jurisdictions or multiple jurisdictions working in concert. Thus far, production moratoria or bans have involved relatively small producers and have not triggered a regional, national, or continental movement. Maryland and Vermont had only modest shale deposits for potential production. New York production is now confined to conventional drilling but output across its border in Pennsylvania has soared. The actions of these three states took place primarily before 2015 and were focused far more on non-methane concerns linked to fracking practices, including groundwater quality and public safety concerns. Efforts of some European Union member states to pursue this approach may represent a bigger test case, although the decision to phase down production in nations such as Denmark and the Netherlands has led the overall European Union to expand gas imports from such sources as Russia, Qatar, and the United States. An emerging test case involves implementation of a 2021 executive order by California Governor Gavin Newsom calling upon the state legislature to adopt legislation to begin phasing out new drilling permits and administrative steps to slow permit approval for new operations. However, state production has steadily declined in recent decades and it has increasingly imported most of the considerable oil and gas that it uses, thereby limiting the potential scope of future production reduction.

complete gas capture systems were operational. Norway has continued to push the edge in this area, including the extension of its sizable carbon tax to methane emissions from oil and gas production, subsequent tax rate increases, required electrification of production site equipment, use of sophisticated methane detection equipment, and frequent monitoring and inspection for leaks. As a result of these policies, Norway's methane releases across the entire supply chain consistently average far below one percent of total gas output. As a 2022 International Energy Agency report concluded, "if all countries were to perform as well as Norway, global methane emissions from oil and gas operations would fall by more than 90 percent" (IEA 2022).

Many options routinely employed in Norway frequently surface in literature addressing possible reforms of North American oil and gas production, including the transition from diesel-based to electronic pneumatic equipment at drilling sites and the expanded use of drones, sensors, and satellites for system monitoring. Frequent in-person inspections for leaks can achieve early loss detection, with a particularly large potential impact to deter or reduce "super-emitter" episodes that release prodigious methane quantities (Clean Air Task Force 2020; Gorski et al. 2020). Bonding requirements, royalties, or production taxes, fees, and fines can secure revenue from producers that can be designated for proper site closure and long-term drilling site stewardship to prevent ongoing methane seepage once production ends.

Many of these options are highly cost-effective, with estimated costs ranging from zero to twenty dollars per ton. Costs can be at least partially offset with expanded gas capture for sale rather than release. The International Energy Agency estimates that 40 percent of global methane emissions could be reduced without cost, and up to 75 percent can be reduced cost-effectively. Canada's plan to reduce methane releases by 45 percent from 2005 levels by 2025 included an economic analysis that found that such reductions would cost less than \$20 per ton (Canadian), for a total cost of \$1.7 billion (Government of Canada 2018; Tyner and Johnson 2018). This is broadly consistent with other studies focused on the United States (Ryerson 2021).

**Methane Contribution to Air Toxics.** Public officials skeptical of policies to reduce carbon dioxide releases often contend that it is ubiquitous, generally causes no direct health harm, and has not been historically deemed an air pollution threat. Methane, in contrast, is quite different. Its release represents a source of direct public health risk. Methane can contribute, under the right atmospheric circumstances, to formation of volatile organic compounds that convert into ground-level ozone. Ozone is the primary component of smog, which can contribute to asthma or other respiratory diseases.

Air quality challenges, such as smog, have posed long-standing air quality problems in states like California. This continues to involve heavily urbanized production areas that include Los Angeles County, exacerbating smog linked to other sources and long-term air quality attainment challenges (Vogel 2018). But these issues are hardly confined to just one state. For example, Colorado production is concentrated in its urbanized Northern Front Range corridor and Denver metropolitan area; at least nine Denver area counties regularly struggle with air quality issues and Clean Air Act compliance (Helmig 2020; Wiseman 2019). Less populated states with long histories of oil and gas production, such as Utah and Wyoming, also face particularly acute challenges in this regard, despite the fact that drilling remains generally concentrated in remote areas.

In theory, flaring offers climate and air quality advantages over venting, as the latter directly releases methane. However, comparative benefit from flaring declines unless each flare functions at peak operational efficiency and completely converts methane into carbon dioxide. A 2021 study of Mexican practice found that low flaring production efficiency produces not only volatile organic compounds but also polycyclic aromatic hydrocarbons, carbon monoxide, nitrogen oxides, and sulfur oxides (Caseriro et al. 2020; Zavala-Araiza 2021). Flaring through incomplete combustion can also produce black carbon, another short-lived climate pollutant. Collectively, these multiple air pollution considerations indicate that methane represents a serious environmental health concern in addition to its climate impacts.

**Visibility.** Crenson noted more than a half-century ago that different kinds of air contaminants triggered varied public reactions as measured in opinion surveys. He found a “relative insensitivity of the public” to emissions that lacked color or odor, but greater sensitivity in cases where contaminants presented a “much more tangible form of pollution” that could be seen or smelled (Crenson 1971:13). Among climate pollutants, carbon dioxide falls largely into the former category, possibly triggering less public awareness and concern than would a more visible source.

Methane can, in some respects, be highly visible, most notably when flaring occurs. Flares sit atop tall stacks and can often be viewed from considerable distances. A history of Alaska energy production noted that Cook Inlet explosions and ongoing flaring in the 1960s could be viewed from more than 150 miles away in Anchorage (AOGCC 2008). This visual recognition expanded the scope of public concern, contributing to early Alaskan regulatory policies and financial penalties addressing flaring that went well beyond other production states. Much oil and gas production nationally occurs on relatively flat and open terrain, far removed from tall buildings or population centers, thereby creating the possibility of extended vistas cluttered with the sight of dozens, or even hundreds, of flaring operations that may run continually. Flaring can illuminate the night sky, visible from overhead airplanes or satellites. During a 2013 visit, General David Petraeus compared a vast North Dakota landscape of flared drilling rigs to a war zone.

Flaring visibility, of course, may perversely incentivize direct atmospheric methane venting. This likely heightens climate and public health risks but offers producers potential benefit from avoiding widespread flaring visibility. As Raphael Calel and Paasha Mahdavi (2019) have noted, flaring reduction may have the “unanticipated consequences” of encouraging venting. They observe that “Flares are highly visible both to the naked eye

and to remote sensing instruments, allowing low-cost identification of point sources and estimation of the quantity of gas flared. Vented gas, on the other hand, is invisible” (Calel and Mahdavi 2019). At times, however, atmospheric conditions can convert methane venting into smog clouds or plumes that can be viewed and photographed from considerable distance. California’s experience with such clouds is well known but they have also emerged in heavily publicized incidents in Colorado, Utah, Wyoming, and a few other states. Consequently, methane emissions may be harder to remove from human visualization than other climate contaminants such as carbon or HFCs, potentially accelerating policy to address environmental and public health concerns or protect industries such as tourism.

**Waste.** Methane loss can also underscore a concern that it represents the waste of a natural resource that is not renewable, lost permanently once squandered. This framing emerges repeatedly when concerns arise over methane loss in state political debates on proper government oversight of the oil and gas industry. Flaring opponents often compare the practice to “burning money,” whether that might involve lost royalties to landowners who host drilling operations, or lost tax revenues for state or local governments. Resource waste is also commonly reflected in estimates of the amount of methane that was flared or vented and how captured gas might have otherwise been used as energy. In 2019, for example, the North Dakota legislative research agency reported that the state lost twenty percent of its produced gas in March of that year, enough to heat every North Dakota home ten times over. Methane release visibility, largely through flaring, may provide an ongoing reminder of a commercial practice that is very wasteful, regardless of whether it is deemed a climate risk. Such arguments are routinely invoked in production states by ranchers, farmers, teachers, local government officials, and conservation groups.



## WHY METHANE POLICY ADOPTION HAS PROVEN SO HARD POLITICALLY IN THE UNITED STATES

These numerous factors largely failed to foster consequential advances in methane mitigation policy in most leading American production states or at the federal level through 2020.

Since the advent in the mid-2000s of hydraulic fracturing and horizontal drilling to access massive shale deposits, American oil and gas production has markedly increased, to the point where it regularly leads the world in annual output of both energy sources (Table 1). This pattern continued in 2015, when American federal methane policy appeared to be expanding and negotiations began over a North American reduction agreement that would be completed the following year. Alongside America's prodigious energy output, methane releases through flaring, venting, and leaks appear to have fluctuated according to Environmental Protection Agency (EPA) reports based on industry reports. However, exact release amounts remain unclear given a penchant for substantial downward bias among reporting producers that regularly underestimates total methane loss in the United States and many other producing nations.<sup>4</sup>

One alternative methane measurement system involves ongoing World Bank analysis of flaring volumes, measured by satellites and other advanced technologies, maintained on an annual basis across all leading production nations and reported in a clear and timely fashion. This system excludes non-flaring releases but nonetheless provides a credible metric for comparing a major methane emission source across jurisdictions. In 2020, the United States ranked fourth globally in total flaring volumes (Table 1). American methane releases under this metric fluctuated before registering major increases in 2018 and 2019. They declined in 2020 as production slowed amid the pandemic and global decline in oil and gas demand, and new gas capture technology was installed in some

major production regions (Table 2). This pattern of annual fluctuation reflects the unique political economy of a major energy-producing nation in which oil and gas production are steadily increasing while methane releases fluctuate considerably (Table 3). This reflects some pattern consistencies with federal emissions inventories. In many respects, a predominant characterization of American oil and gas policy during much of the last half-decade has been "energy dominance." This was the literal description used by President Donald Trump in executive orders and public pronouncements, echoed by his energy advisors in reversing Obama-era policies. These efforts were intended to minimize federal interference with private energy production and restore historic state domination of this policy area. This reflected Trump's strong desire to both foster American energy independence through increased production for domestic use and expand oil and gas exports. In these discussions, natural gas was heralded as a clean, reliable, and inexpensive energy source being cultivated under careful state government stewardship, with methane releases under control and not meriting federal policy engagement.

During the Obama presidency, any serious discussion of federal policy options concerning methane faced derision from most production states as well as many production firms and their state-level industry associations. There was minimal Congressional discussion of methane and few serious legislative proposals addressing it surfaced until 2021. Instead, Obama relied exclusively on administrative channels to expand federal oversight, focusing on energy production on private land through EPA and on federal land through the Bureau of Land Management (BLM) while also reforming Department of Interior oversight of offshore operations after the Deepwater Horizon disaster. The EPA and BLM steps were generally incremental in nature, focused principally on new, rather than established, drilling sites and emphasizing more frequent monitoring for leakage.

<sup>4</sup> Unlike the continental disclosure system for toxic chemical releases to air, water, and land that is overseen by the North American Commission on Environmental Cooperation, there has been no comprehensive plan to systematize and unify methane release databases produced by the United States, Canada, and Mexico. Serious reservations have been registered about the veracity of each individual national reporting system, which makes cross-national comparisons highly suspect. This is discussed further in later sections of this paper.

Much implementation was intended to be delegated to states without new federal funding to support expanded state engagement. Obama relied on these proposed executive actions to demonstrate American capacity to honor its share of the 2016 North American methane pact without new legislation, while the Canadian prime minister and Mexican president vowed their own new policy steps (Thompson et al. 2020).

States faced the possibility of being required to do more to address methane, after most had made little or no effort to pursue significant tightening of their own methane policies or expand their monitoring capacity. Nearly all production state legislatures eschewed methane-focused legislation between 2000 and 2020, delegating most policy decisions to executive branch units. In turn, most states remained very hesitant to complete significant administrative reforms of established

Table 1: National Rankings of Energy Production and Flaring, 2020

	Methane Flaring Volume	Oil Production	Natural Gas Production
USA	4	1	1
Canada	22	4	5
Mexico	8	14	24

Source: World Bank, 2021.

Table 2: Gas Flaring Volumes, 2015–2020 (billion cubic meters)

	2015	2016	2017	2018	2018	2020
Russia	23.21	22.37	19.92	21.28	23.21	24.88
Iraq	16.21	17.73	17.84	17.82	17.91	17.37
Iran	12.10	16.41	17.67	17.28	13.78	13.26
USA	11.85	8.86	9.48	14.07	17.29	11.81
Mexico	5.0	4.78	3.79	3.89	4.48	5.77
Canada	1.81	1.30	1.34	1.33	1.05	1.08
<b>Total</b>	<b>148</b>	<b>148</b>	<b>141</b>	<b>145</b>	<b>150</b>	<b>142</b>

Source: World Bank, 2021.

Table 3: Cross-National Comparison: Oil and Production vs. Methane Production, 2015–2020

		Oil and Gas Production 2015-2020	
		HIGHER	LOWER
Methane Production 2015-2020	HIGHER	USA	Mexico
	LOWER	Canada	EU

policies applicable to methane. Most leading production states in recent decades have remained under exclusive Republican Party control of both legislative chambers and all statewide elected executive officials. These states have been most active in simultaneously pursuing an external game of aggressive action to thwart potential federal encroachment while pursuing an internal game of minimizing policy change and fostering maximum production. The small set of more actively engaged states in methane policy have tended to feature some Democratic party control. This reflects a pattern of deepening partisan divides in state climate policy focused on carbon emissions (Bromley-Trujillo and Holman 2020).

**External Game: States Thwarting Possible Federal Encroachment.** Major production states with Republican attorneys general joined forces in attempting to block Obama-era methane regulations in federal court, part of a wider pattern to challenge presidential regulatory interpretation on climate change with coordinated multi-state litigation (Nolette 2015; Thompson et al. 2020). In EPA litigation, thirteen states led by West Virginia Attorney General Patrick Morrissey decried these efforts as “arbitrary, capricious, an abuse of discretion and not in accordance with law.” Morrissey was particularly visible in framing these federal efforts in federalism terms, denouncing them as assaults on state sovereignty in a policy area long delegated to state authority and respectful of expertise tailored to unique local conditions. He was joined by separate but complementary legal challenges from attorneys general of the two leading oil production states, Texas and North Dakota. They argued that federal intervention would violate the constitution and the intent of the Clean Air Act, contending that implementation of these policies could impose grave economic harm on production state citizens.

This aggressive step was matched by additional state executive branch efforts to thwart proposed federal regulations. Each stage of proposed federal rule development was actively challenged by state oil and gas commissions. In some instances, state officials acknowledged that some particular provision of the federal proposal might have merit, such as more frequent site monitoring, but advanced the overarching argument that these matters had long been decided by individual states and should remain that way. These states were

ultimately vindicated once it became clear that the Trump administration would embrace their position through a series of steps that would retract existing regulations and make it challenging for any subsequent administration to restore them (Thompson et al. 2020).

**Internal Game: State Regulatory Regimes.**

Most production states did not respond to possible federal encroachment on their terrain with their own expanded policy efforts to reduce methane releases that would demonstrate their capacity and commitment to environmental and public health protection and possibly ease compliance with new federal standards. State legislatures from these states addressed a wide range of oil and gas-related topics between 2015 and 2020 but most largely ignored methane. A far more common topic for legislatures was exploring new subsidies and support for expanded oil and gas production, including Wyoming and North Dakota efforts to increase state investment in carbon capture and sequestration systems. In turn, most state oil and gas commissions also moved very cautiously on methane, with most major production states standing pat with established policies. This reflected a long-standing tradition within such regulatory bodies to both partner with and accommodate industry, in many respects honoring formal statutory or constitutional charges which promote production while downplaying environmental or conservation considerations. Such bodies have also long been deemed highly susceptible to regulatory capture. This reflects strong state dependence on industry-generated revenue for the state economy and governmental functions and a revolving-door pattern whereby prominent officials routinely move back and forth between government and private industry roles (Cook 2014; Kear 2019; Millar 2020; National Academy of Public Administration 2018). These commissions also retain long-standing patterns of precluding local government involvement in policy decisions linked to production, staunchly protecting state domination from either federal or local encroachment.

State oil and gas commissions customarily have a single stakeholder who dominates policy deliberations, namely associations representing energy producers based in that state or region. Organizations such as the Texas Oil and Gas Association, the North Dakota Petroleum Council, the Marcellus Shale Coalition, and the New

Mexico Oil & Gas Association intensively represent industry interests in all legislative and executive branch deliberations and intra-state media coverage of the industry. They have considerable technical understanding of all aspects of the industry and are highly sensitive to any proposed state policy steps that lead them to threaten shifting investment for future exploration and production to friendlier states. They also maintain close relationships with commissioners and staff, including instances where commissioners are elected on a partisan basis, can accept campaign contributions, and may subsequently work for them. Consequently, state-based environmental and natural resource advocacy organizations are generally no political match for oil and gas associations, although national organizations such as the Environmental Defense Fund remain visible and offer technical and policy advice on methane matters in many state contexts. Environmental and natural resource organizations in most production states have very modest budgets and professional staff in comparison with industry associations and large member firms.

State oil and gas commissions routinely retain considerable discretion in the interpretation of long-established statutes and regulations overseeing energy production, including latitude to appeal or seek waivers from formal requirements. In North Dakota, mid-1980s legislation was designed to address public outcry over major flaring spikes and loss of potential royalty and severance tax revenue given exemption of methane from these calculations for natural gas. The state strategy combined formal regulatory restrictions on flaring and venting with application of state severance taxes on methane market value after a year of “free flaring.” The state has never actively implemented these provisions, however, inviting producers to submit compliance waivers that are routinely approved by the North Dakota Industrial Commission, headed by the elected governor, attorney general, and state agriculture commissioner (Rabe et al. 2020). North Dakota has long set methane release goals but routinely failed to meet them, usually with few, if any, consequences for producers. Annual methane

losses as a percentage of produced gas averaged 30.4 percent between 2010–2014 and 15.8 percent between 2015–2019, before beginning additional decline in late 2020. These measures reflect industry reports to the state and may reflect the same underestimation patterns seen nationally, signaling even greater methane release problem than indicated by official rates.

North Dakota and additional production state efforts to sustain an accommodational approach to energy industry oversight have continued to be supported by an interstate body, the Interstate Oil and Gas Compact Commission (IOGCC). This organization was formed in the 1930s to support state oil and gas commission work, including research and guidance to assist individual state regulatory bodies (Davis 2017). It has also defended state policy dominance during periods when a possible expansion of federal authority loomed. This was evident during the Obama administration, when the commission launched a “states’ first” posture that emphasized the attributes of state-centered oil and gas production governance.

As federal regulatory efforts were largely thwarted, widespread state legislative reluctance to address methane through new statutes further served to seal state executive agency dominance, sustaining an accommodational approach to industry oversight. Many states remained reluctant to mandate frequent site inspections for leaks or strict timelines to complete repairs after leak detection, enforce binding restrictions on flaring or venting, require the use of low-emission production equipment, or set fixed limits on methane volumes that can be released before state enforcement actions ensue. They have also proven averse to establishing financial consequences for methane releases, whether via fines or pricing the commercial value of wasted gas through royalties, fees, or severance taxes.

Production states have also moved haltingly in either deploying rapidly advancing state-of-the-art technology or requiring industry to use it for monitoring methane releases on a precise and continuous basis. This represents a missed opportunity to build public credibility given

mounting doubts about the accuracy of industry emission reports that lack third-party or governmental verification.<sup>5</sup> The cacophony of rigorous studies indicating consistent and significant underestimation of methane loss in official disclosure inventories may likely undermined public confidence but it has generally not motivated states to respond. Many states contend they lack sufficient resources and staff for such acquisition and deployment and remain unwilling to pressure industry to do so. Individual states are also reluctant to take such steps since heightened measurement accuracy might make them look poorly in comparison with rivals that continue to rely on traditional industry reports that generate lower numbers.

States have also proven highly reluctant to increase bonding levels or allocate severance tax revenue to address well closure and site remediation. Such trepidation has continued as most states lack a reliable inventory of the number of orphaned or abandoned well sites within their borders or financial plans to secure sufficient revenue for their long-term stewardship (Ho et al. 2018). The actual number of total sites nationally remains unclear, with official estimates ranging from

approximately 700,000 (IOGCC) to 3.2 million (EPA). New Mexico, for example, faced an estimated \$8 billion gap between anticipated bonding revenue and site remediation costs for drilling sites on private and state-held lands (Center for Applied Research 2021) and was not alone among producing states in facing shortfalls of this magnitude.<sup>6</sup>

At the same time, some states with particularly large shale basins and a producer focus on massive oil production opportunities, such as Texas and New Mexico in the Permian and North Dakota in the Bakken, have been reluctant to delay oil production in order to assure installation of gas capture equipment.<sup>7</sup> Eager to sustain maximum oil output and related royalties and tax revenue, states have found it politically inconvenient to either restrict drilling in areas lacking basic gas capture and transmission capacity or require its application before new rigs begin drilling. This may explain some basin-wide flaring spikes between 2015 and 2020 and some significant annual fluctuations in state and federal release reports, following surges of new drilling focused on oil without adequate preparedness for associated gas.

5 For an excellent overview of this issue in the United States, see R.A. Alvarez et al. 2018. "Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain." *Science* 361:186–188. This analysis estimates that energy system methane emissions in 2015 exceeded EPA estimates by approximately 60 percent. A growing array of advanced scholarship on this topic confirms this general underestimation pattern in the United States and among its North American neighbors. For a more recent analysis, see Z.R. Barkley et al. 2021. "Analysis of Oil and Gas Ethane and Methane Emissions in the Southcentral and Eastern United States Using Four Seasons of Continuous Aircraft Ethane Measurements." *Journal of Geophysical Research: Atmospheres* 126. For a useful overview of what is known about this issue in Canada, see Elizabeth O'Connell et al. 2019. "Methane Emissions from Contrasting Production Regions within Alberta, Canada: Implications under Incoming Federal Methane Regulations." *Elementa* 7. Globally, the International Energy Association finds comparable underestimation issues on a cross-national basis (IEA 2022).

6 Bonding inadequacy is also increasingly evident for energy production on federal lands. See U.S. Government Accountability Office. 2020. *Bureau of Land Management Needs to Improve Its Data and Oversight of Its Potential Liabilities*. It has also emerged as a major concern in Canada.

7 According to a 2020 International Energy Association blog, "each unconventional oil well produces relatively small volumes of associated natural gas, but there are a large number of these wells, and the associated gas (as with the oil) sees high initial flow rates followed by relatively rapid declines and a long tail of low production. Incidences of flaring occur because operators argue that it is uneconomic to bring this gas to market, because operators begin oil extraction prior to the development of a gas pipeline connection, or because gas infrastructure is not sized to handle the short periods of peak production." See Rebecca Schulz, Christophe McGlade, and Peter Zeniewski. 2020. "Putting Flaring Gas in the Spotlight" International Energy Agency (December 9). See also Spencer Jakab. 2020. "Billions of Dollars Up in Smoke." *Wall Street Journal* (January 11–12).



## WHEN EXCEPTIONAL STATE CASES EMERGE

Not all states were incapable of expanded methane policy development through 2020. Consistent with the national pattern of state climate policy addressing carbon dioxide, deep partisan cleavages remained evident.

**M**ost methane policy innovation occurred in states where Democrats either controlled the governorship (Pennsylvania) or both the executive and legislative branches (California, Colorado, and New Mexico). Political leadership in these cases usually involved a governor utilizing executive powers, as reflected in Pennsylvania, California, and New Mexico. In Colorado, however, a much broader base of support emerged, spanning two Democratic governorships and expanding under Democratic control of both legislative chambers in 2019–2020. This resulted in a major set of policy reforms that deviated markedly from production state norms.

**Unilateral Executive Action: Pennsylvania, California, and New Mexico.** Pennsylvania's partisan shift in gubernatorial control from Republican to Democratic hands in 2015, when Tom Wolf replaced incumbent Tom Corbett, resulted in significant energy policy shifts reflecting the use of gubernatorial powers over legislative objections. Its shale boom in natural gas production began prior to Corbett's 2010 election but exploded during his single term. Corbett actively championed maximum production expansion through close industry collaboration, characterizing this as a pathway to return Pennsylvania to its more robust energy-producing and industrial past. He championed new legislation providing an accommodating state regulatory framework tailored to fracking. This led to a far-reaching 2012 statute adopted largely along party lines with unified Republican and industry support over strong opposition from many Democrats and environmental groups. Best known as Act 13, this legislation provided a comprehensive blueprint for overseeing many dimensions of production on terms in close accord with industry preferences (Rabe and Borick 2013). Methane monitoring and minimization were not prioritized.

Wolf defeated Corbett in part on an energy policy reform platform, one that pledged to sustain production but revisit Act 13 and demand a higher standard of industry environmental performance. Wolf wanted to protect Pennsylvania's standing as a leading natural gas producer but sought to transform it into a "national leader" on related environmental stewardship, expressly including methane mitigation. However, Wolf has remained at loggerheads with a predominantly Republican legislature on energy legislation throughout his governorship and has instead relied on a protracted set of efforts to begin to tighten state oversight through regulatory reform. This included proposals to apply the state's far-reaching air quality legislation to methane. These efforts have met stiff objections from Republican legislators who have attempted to constrain gubernatorial powers and industry groups, such as the Marcellus Shale Coalition who have aggressively opposed most proposals and pursued litigation to block them. Thus far, new policy has largely been confined to regulations for new wells using fracking technology including increased site inspection requirements, while additional provisions for existing shale operations and conventional drilling have faced prolonged delay.

There are some strong parallels between Pennsylvania and California, although oil and gas production in the latter has declined steadily across recent decades. It continues to pursue production, however, in some heavily populated areas, including drill rigs operating in Los Angeles County. This is consistent with historic patterns of California authorizing production near significant population centers, a phenomenon that figures prominently in expanding state consideration of environmental justice concerns (Méndez 2020). Nonetheless, the California legislature has remained divided over proposals to tighten industry oversight and address methane emissions. Recent governors have attempted to adjust some existing regulations but faced intensive industry opposition and litigation throughout, slowing the pace of policy adoption and implementation feasible through executive action. Governor Gavin Newsom issued a 2020 executive order calling on the legislature to adopt a statute that would halt

new fracking permits by 2024 and phase out production by 2045, although the legislative path remains uncertain.

New Mexico began to take major administrative steps to reduce methane releases following the 2018 election of Democrat Michelle Lujan Grisham as governor. She actively campaigned on making New Mexico a national leader in methane mitigation and issued a pair of executive orders following her inauguration to begin to deliver on that promise. These included a focus on binding quantitative methane targets that would cap releases at two percent of total production by 2026 and concentrating state oversight more intensively on firms with poor performance records. New regulations began to be developed in 2019-20 by both the state's oil and gas commission and its lead environmental protection agency, moving beyond the traditional dominance in production states by the former. Methane has begun to be incorporated into statewide climate mitigation plans alongside carbon dioxide. As in California, New Mexico's Democratic-led legislature has not adopted major methane legislation and has struggled to reach consensus on some other climate issues. However, it has not attempted to thwart the governor's efforts, unlike Pennsylvania, and has supported expanded state agency capacity to raise revenue for expanded staffing through fee increases and restored its earlier authority to assess administrative penalties for non-compliance.

#### **Executive and Legislative Action: Colorado.**

State policy development in Pennsylvania, California, and New Mexico, however, pales against the sustained pace and breadth of methane policy adoption and implementation in Colorado. State mitigation efforts have expanded consistently during the past decade, intensifying since 2015 and showing no sign of slowing down. Methane has emerged as, and remains, a major state public policy issue, reflecting concerns about environmental health, public safety, and climate protection. Methane continues to contribute directly to major environmental health concerns given its role in air toxics formation and intensive local ozone problems in Colorado (Oltmans et al. 2021). It also emerged as a contributing factor in a tragic 2017 explosion of a

suburban home that killed two residents and seriously injured a third, resulting from failure to properly cap an abandoned gas line from a nearby well before residential construction (Duffy 2021). This put renewed emphasis on concerns about the safety of production operations, particularly since considerable Colorado drilling occurs in close proximity to heavily populated cities and suburbs, including many affluent residential areas. Colorado joins California with greater drilling emphasis placed near larger population centers as opposed to more common and remote siting patterns that predominate in many other states. The state has also experienced significant climate change impacts, including water scarcity, intense heat, and wildfires, adding to political pressure for new climate policy.

These concerns have persisted and propelled unusually far-reaching state methane policy adoption. Colorado has remained a leading energy production state, following a six-fold oil output increase between 2009 and 2019. In 2020, it ranked fifth among states in oil production and eighth in gas production, although its overall output might have been considerably higher had it maintained more accommodating regulations on methane and other aspects of drilling. These provisions have been actively supported by most Democratic elected officials but have failed generally in securing broader bipartisan support. The state has retained a Democratic governor and increasingly shifted toward Democratic legislature control. There is little evidence of any broad state political appetite to terminate all production but rather an ongoing focus on developing a far-reaching methane minimization system in concert with other climate policies.

Much of this regime was launched under former Governor John Hickenlooper, who was trained in geology, had considerable energy industry experience before entering politics, and made methane reduction a major focus during his two terms in office.<sup>8</sup> Amid numerous local conflicts over proposed drilling, Hickenlooper developed a multi-year task force that led to a sequence of administrative reforms taken between 2011 and 2016. These included new provisions for chemical disclosure and groundwater monitoring, increased setback distances

<sup>8</sup> In 2020, Hickenlooper became the first presidential candidate to reference methane during a national debate, pointing to Colorado's record as a model for the nation. His presidential bid fizzled but he now represents Colorado in the U.S. Senate. For a thorough assessment of the evolution of Colorado energy policy, see Kear 2020 and Duffy 2021.

between buildings and drilling operations, and new leak detection and reporting provisions for methane (Cook 2014; Heikkila and Weible 2018; Heikkila, Weible, and Oloffson 2017; Rabe 2017; You 2019).

Jared Polis, who succeeded Hickenlooper as Governor, continued to pursue methane policy in concert with an increasingly supportive legislature. He ultimately signed into law a sequence of 2019 bills that were more intensively focused on methane mitigation than any legislation adopted to date by an American state legislature. This included incorporating statutory methane reduction targets into its Climate Action Plan, including a 33 percent methane emissions reduction from 2005 levels by 2025 and 50 percent by 2030 despite significant energy output expansion from the baseline year. In some respects, Colorado has moved much more aggressively on methane reduction than other areas of its carbon reduction policies, including transportation. Colorado currently reports that statewide methane loss is considerably below one percent of total gas produced, comparable to performance scores registered in Norway. The oil and gas industry, represented by the Colorado Oil and Gas Association, has been less aggressive in attempting to thwart new state policy steps during the last decade than counterpart organizations in most other production states. In Colorado, industry appears generally more amenable to participation in active negotiation over policy terms and attempting to frame state producers as national and global methane mitigation leaders. This has been reflected in considerable new investment in the state by firms focused on “responsibly sourced gas” and eager to retain social license. This reflects the high saliency of methane in Colorado politics and the robust political base of support for active methane reduction policy compared to most other production states.

Colorado began phasing in required use of non-emitting pneumatic controllers on new sites and would later expand and accelerate this transition. Production firms are required to install continuous monitoring equipment on site for methane emissions, volatile organic compounds, and hazardous air pollutants. Findings must be reported and recorded in a statewide database designed to be

more rigorous and accurate than predominant models. The state is expanding its own monitoring capacities with purchases of advanced methane detection equipment for its own use from a trust fund established through a legal settlement with the firm responsible for the 2017 tragedy. This will provide state access to satellites and aerial surveys as well as a mobile air-monitoring van, optical gas imaging cameras, remote sensing technology, and portable methane leak detectors. Such technologies are increasingly deployed in scholarly research on methane releases, but rarely used by production state governments to monitor industry.

Colorado has also expanded local government authority to design its own policy beyond state standards on issues such as setback distances between well sites and buildings, as well as noise and dust limits and wildlife protection. Several cities or counties have begun to use these new powers, in some cases exploring ways to utilize them to dramatically reduce, or even halt, future production. At the same time, one large production county and a set of smaller communities remain opposed to many of the new provisions, including leak testing requirements for smaller wells. They contend that the state is placing future production and their economic well-being at risk.

Colorado is also moving actively into territory largely avoided by all other production states, namely bonding authority linked to orphan well stewardship. This is addressed in provisions in the 2019 legislation, building on a 2018 executive order, as the state attempts to shore up long-term funding to address future site closure and remediation costs. Colorado has additionally taken two steps to attempt to reduce the risks of state oil and gas commission capture by industry. First, it has expanded the role of the Colorado Air Quality Control Commission in matters of methane governance as a complement to the long-standing role of the Colorado Oil & Gas Conservation Commission. In turn, the state overhauled the latter body in 2020, maintaining its name but altering its formal mission in many ways, including an official change from “fostering” to “regulating” oil and gas development. This was designed to formally shift the commission’s focus and balance production with environmental stewardship.

## WHY METHANE POLICY IMPLEMENTATION HAS PROVEN SO HARD IN MEXICO

Much like the United States, Mexico entered the 2016 continental methane accord with strong support from a lame-duck president. Enrique Peña Nieto had nearly two years remaining in his term and lauded the North American methane agreement as part of a larger transformation of the Mexican energy system.

Proposing to move beyond a multi-generational Mexican energy preoccupation with oil production through conventional drilling dominated by two nationalized entities that controlled energy extraction and electricity production, Peña Nieto sought to diversify both the number of firms engaged in the energy sector and the sources tapped for energy production. This included receptivity to new, private players, including firms based in the United States and Canada, and an accelerated transition from staple energy sources such as coal and an unusually heavy form of Mexican crude oil that posed severe air toxic risks. Methane mitigation served multiple potential purposes, enabling Mexico to use it as a core plank in its evolving climate mitigation plan while lending it global credibility to lure external investment for both fossil fuel and renewable energy development.

Whereas the American President chose executive action to move toward compliance with the North American agreement, his Mexican counterpart secured a 2018 legislative endorsement for major methane policy reforms that were heralded as continental and global models. Under Mexican energy law, states have limited authority to develop their own energy policies, leaving enormous power in federal hands (Healy, VanNijnatten, and López-Vallejo 2014; López-Vallejo 2021). The new legislation established a national framework that included quarterly leak detection and repair provisions using advanced technology. It also provided detailed requirements for gas capture technology use and compressor technology transition, while outlining a more rigorous emissions

monitoring and reporting system. Energy production firms were required to develop annual progress evaluations and reports, and certified third-party entities were charged with monitoring and certifying compliance with regulatory provisions. At the same time, *Petróleos Mexicanos* (Pemex), the Mexican national oil production firm founded in the 1930s, pledged support for a pact among leading global oil producers to cap its methane releases at 0.2 to 0.25 percent of total marketed gas by 2025.

The Mexican government heralded these steps as indicators of its preparedness to play a lead role continentally and globally in responsible methane governance. Anaid Velasco of the Mexican Center for Environmental Law noted that “These regulations are important because they will help us to move forward in accomplishing the climate targets promised by Mexico” (Pickrell 2018). The celebratory chorus also included American-based entities such as the Clean Air Task Force, which noted that “Mexico took a huge step forward” through the new legislation and that, upon its implementation, Mexican energy-related methane emissions “will be reduced by 75% by 2025, far exceeding a pledge signed at the North American Leaders Summit in 2016 by President Obama, Premier Trudeau and President Peña Nieto. These reduction levels will place Mexico in the very forefront of the worldwide effort to address global climate change by reducing greenhouse gas emissions” (Clean Air Task Force 2018). Lauding both the new Mexican policy and Pemex commitment, Drew Nelson of the Environmental Defense Fund contended that this would “accelerate the modernization of Mexico’s energy industry. This concerted approach to tackling methane can lead to new economic development opportunities and boost the country’s position as a global climate leader” (Environmental Defense Fund 2018). In turn, Mexico continued to prohibit the use of hydraulic fracturing and horizontal drilling techniques for energy extraction. This was far more attributable to battles with agriculture and industry over water rights than environmental or climate concern but it seemed likely to further accelerate transition away from fossil fuels toward

alternative energy sources. Pemex remained hostile to fracking due to its limited expertise with the technology and fears of being crowded out of its long-dominant role in national production if it was allowed, suggesting that Mexico might accelerate transition toward renewables if conventional drilling output continued to ebb as expected.

Despite these seemingly pathbreaking steps, Mexico emerged from the 2015–2020 period with a remarkable combination of energy output decline alongside major upswing in flaring releases. In global terms, this recent record has some parallels with Syria and Venezuela (World Bank 2021). By 2020, Mexico ranked eighth globally in terms of flared gas volumes but 14<sup>th</sup> in oil production and 24<sup>th</sup> in natural gas production (Table 1). Flaring declined early in this period but soared in 2019 and 2020 (Table 2), despite ongoing production reductions throughout these years. Pemex acknowledged that its flaring rates had more than doubled between 2015 and 2020, with reported quarterly gas losses ranging from 8.6 percent to 14.9 percent of total produced gas between the first quarter of 2020 and the first quarter of 2021. A 2021 study confirmed exceptionally high methane release rates in Mexican onshore energy operations as opposed to offshore production, although there is less peer-reviewed literature on its methane performance than for either the United States or Canada (Zavala-Araiza et al. 2021). In 2020, Mexico produced about the same amount of oil as Norway but flared approximately 30 times more gas, according to World Bank data (World Bank 2021). Ironically, this expanded flaring and loss of associated gas helps explain Mexico's soaring reliance on American natural gas imports to replace its wasted gas during this period, including increases of 176 percent between 2014 and 2019 (U.S. Energy Information Administration 2020).

These dramatic shifts coincided with the election of a new president, Andrés Manuel López Obrador, in 2018, and a pivot back toward oil nationalism as the abiding focus of Mexican energy and economic development policy. This included restoration of a dominant Pemex role in energy production while marginalizing private producers. López Obrador did not reverse gears on fracking but invested heavily in Pemex production capacity through conventional drilling, including the

designation of 20 new priority fields as targets for major exploration in the 2020s. Many of these sites have very questionable production prospects but their development was backed with an all-out national commitment to produce as much oil as possible to both bolster total production and fulfill new “energy sovereignty” goals. As in the American pivot toward energy dominance through fossil fuels under Donald Trump, the Mexican shift under López Obrador prioritized development of indigenous fossil fuel sources and downplayed any environmental or climate risks linked to these efforts. Associated gas capture and use from this production did not emerge as a priority, eased by abundant American import availability. Methane governance appears to have fallen off the radar of governmental authorities, with little sign of transition toward active implementation of its heralded 2018 legislation. The Ministry of Environment and Natural Resources and related units focused on oil and gas industry oversight lack presidential support and have faced steep budget and staff cuts, with resources transferred to Pemex. Third-party monitoring capacity was essential to legislative implementation and has proven very slow to develop (Baker 2020)

Mexico has also expanded public investment in oil refinery capacity, including the development of an \$8 billion refinery in the president's home state of Tabasco, upgrades of other major refineries, and the purchase of a dominant share of a refinery based in Houston with unique capacity to process Mexico's distinctive crude oil. These steps are framed as further contributing to Mexico's goal of energy self-sufficiency by 2023. Oil also continues to provide approximately 10 percent of Mexican electricity and additional reforms have returned the nationalized electric utility, the Comisión Federal de Electricidad (CFE), to its earlier dominance and restored the nation's historic reliance on oil and gas for electricity. As historian Lorenzo Meyer has noted, “Oil is a fundamental national symbol in Mexico. To think of clean energy policies like in Europe is a luxury Mexicans can't give themselves” (Bello 2019). Any earlier focus on methane mitigation clearly was eclipsed by the return to the historically powerful emphasis of energy policy as oil nationalism (Bridge and LeBillon 2017:43–47; Carreon-Rodríguez and Rosellón 2012; Mahdavi 2020; Colgan 2021).



## WHY METHANE POLICY HAS PROVEN MORE POLITICALLY FEASIBLE IN CANADA

Canada experienced none of the federal methane policy jolts that undermined American and Mexican presidential commitments after the North American Leaders Summit. Justin Trudeau remained Prime Minister between 2015 and 2020 and prioritized regulatory development for methane under the Canadian Environmental Protection Act, with some parallels to Obama's attempted application of the American Clean Air Act.

This led to the release of finalized federal standards for energy sector methane by Environment and Climate Change Minister Catherine McKenna in 2018. These standards included a tri-annual leak detection and repair requirement, restrictions on venting and flaring practices, and a transition to low-emission pneumatic devices. They built upon some early examples of best practices from parts of Canada (World Bank 2008:2).

This new methane policy addressed Canada's continental pledge while also complementing other policies such as its Pan-Canadian Framework for carbon pricing and vehicle emission standards that were designed to meet its broader greenhouse gas reduction commitments under the Paris Agreement. There was also strong federal government emphasis upon framing a Canadian commitment to lower methane releases in order to bolster the social license of future oil and gas exports and enhance their export potential, particularly given Alberta and British Columbia's efforts to promote Pacific shipments of liquefied natural gas (LNG) as "clean energy." The federal government, however, lacked authority to simply impose new policies on producing jurisdictions, given the highly decentralized nature of Canadian climate and energy governance (Macdonald 2020). Instead, federal methane policy implementation

had to be negotiated with provinces and territories alongside large intergovernmental funding packages on climate and economic recovery during the pandemic.

Despite a consistent federal position, the path to policy implementation was complicated by sub-federal resistance, with some parallels to the American case. Energy-producing provinces had generally moved very cautiously in establishing rigorous regulatory or pricing regimes for methane, reflecting considerable similarities with many American production states. Intergovernmental battle lines were drawn between two dominant provincial oil and gas producers, Alberta and Saskatchewan, and Ottawa over the terms whereby provinces could seek "equivalency" status and attempt to secure federal approval of their policies. British Columbia also entered into equivalency negotiations but its experience was far easier given its earlier Colorado-like shift toward expanded methane oversight. Other provinces and territories either lacked consequential oil and gas resources, were focused on offshore production, or had restricted production before 2015 given opposition to hydraulic fracturing (Millar 2020).

British Columbia was the first province to submit an equivalency proposal to Ottawa and the first to be approved in April 2020. According to one analysis, "BC regulations have strong elements, representing best practices and in some cases exceeding the federal rules" (Pembina Institute 2020). British Columbia's proposal included thrice-annual inspections, non-emission pneumatic compressor transition, and revised guidelines to tighten limits on flaring and venting. A number of these were already in place or under advanced development in the province before its equivalency submission, including proactive steps to address its growing backlog of abandoned or orphaned wells. These emerged from legislation passed in 2018 and 2019 to take a series of administrative steps regarding these drilling sites, including a new orphan well levy on production to provide essential remediation resources. These policies treated

orphan wells as a responsibility of producing industries rather than general taxpayers, with the new levy based on “forecast annual site restoration costs for all orphan sites in the province” rather than a more common and modest fixed rate that failed to produce adequate remediation revenue. In turn, British Columbia is also unique in North America in its attempts to link methane mitigation in oil and gas production with efforts in other sectors such as agriculture and livestock (Fisher 2022).

The British Columbia approach not only contributed to straightforward compliance with federal standards, but also built on an evolving provincial strategy to characterize its production and export of low-methane natural gas as a climate-friendly alternative to gas produced in other jurisdictions. This reflected framing of natural gas as a “global bridge fuel,” offering the dual benefit of reducing production-related methane emissions while claiming climate credit for potential shifts from coal or oil to “clean” gas by importing nations (Janzwood and Millar 2022). This emphasis was connected to considerable provincial financial and regulatory support for expanded gas production for export to Asia via LNG tankers. However, the British Columbia approach faced renewed scrutiny when a sophisticated analysis of provincial releases indicated that they are “1.6–2.2 times current federal inventory estimates” (Tyner and Johnson 2021). Government officials noted that these measurements for this study occurred before implementation of most of the new policies but acknowledged that this represented a sobering finding that warranted careful review of provincial oversight.

In contrast, Alberta and Saskatchewan produced equivalency proposals that were far more varied from federal expectations, raising questions about whether they would ultimately achieve mid-decade emission reduction targets if approved (Johnson and Tyner 2020; Pembina

Institute 2019). This led to intensive intergovernmental negotiations during 2020, at the very time the federal government allocated substantial amounts of pandemic relief for methane-related purposes to energy-producing provinces. This included \$1.7 billion (Canadian) in orphan well remediation assistance as well as loans and grants to sub-federal governments and energy-producing firms to assist with costs linked to carbon and methane mitigation (Bratt 2021). This federal transfer funding may have eased the path to final methane equivalency agreements between the federal government and Alberta and Saskatchewan in late 2020, although it was likely not determinative in the British Columbia case (Boyd forthcoming). However, questions remained as to whether federal willingness to allow some significant provincial policy variation would lead to varied methane emission outcomes across provinces as implementation ensued.

Canada emerged from the 2015–2020 period combining increased oil and gas production in most years with steady and significant declines in flaring volumes (Table 2). In 2020, it ranked fourth globally in oil production and fifth in gas production but only 22<sup>nd</sup> in total flaring volume, suggesting a far better match of energy output versus flaring waste than Mexico or the United States. Government reports indicated declining overall methane release levels during this period, although numerous studies emerged to suggest a pattern of Canadian provincial underreporting of emissions quite comparable to the American experience (Jordaan and Konschnik 2019; O’Connell et al. 2019; Tyner and Johnson 2021). Concerns also arose over delays in the possible extension of carbon pricing to methane until at least 2023 (Dobson, Winter, and Boyd 2019). If applied fully to methane, the proposed increase in the Canadian carbon price from \$50 per ton (Canadian) by 2025 to \$170 per ton by 2030 could significantly impact oil and gas consumption in Canada and further reduce methane emissions.

## TOWARD A NEW POLITICS OF METHANE? 2021 AND BEYOND

The case of hydrofluorocarbons (HFCs) offers insights into the conditions under which major policy change can foster rapid phase down in the production and release of another short-lived climate pollutant, a greenhouse gas like methane with particularly intensive near-term climate impacts.

**H**FCs emerged in the 1980s and 90s to facilitate implementation of the Montreal Protocol, a global treaty seeking rapid transition from ozone-depleting chemicals that have been used widely as coolants in refrigeration and air conditioning systems. The treaty involved more than 120 nations, alongside considerable domestic policy development in Europe, Canada, Mexico, and many other nations. HFC's were far superior to their predecessors in terms of reduced ozone impact but continued to pose intensive short-term climate impacts. This led to a 2016 supplement to the Montreal agreement, known as the Kigali Amendment. Both Canada and Mexico ratified Kigali, with Canada taking early and active steps to transition toward post-HFC chemical alternatives that would be far friendlier to both the ozone layer and the climate. The United States lagged in this area of climate policy but passed legislation in December 2020 with unusually broad bipartisan support that aligned it with global phase down commitments. American Senate ratification of the Kigali treaty, however, remained uncertain in early 2022.

The American HFC case demonstrates how climate policy can pivot when certain factors converge, moving from its own form of politically enforced neglect to policy adoption and implementation. First, commercially viable chemical alternatives to HFCs with far fewer greenhouse gas impacts were developing rapidly, including many advances involving American firms. This increasingly split original industry opposition to policy change into two divided camps, depending on whether they stood

to gain from HFC transition. It opened a legislative path that had considerable, if not unanimous, industry support. Second, bottom-up pressures from states mounted and propelled a federal policy response. Six states developed far-reaching phase down policies of their own between 2018 and 2020, while nine others had legislation pending at the time of Congressional action, representing a type of horizontal diffusion that helped trigger vertical diffusion as industry lamented the prospect of addressing increasingly diverse state requirements (Posner 2010). Third, external forces prodded the United States into action as it faced increasing threats of losing its ability to export products related to this area under Kigali rules unless it acted. American concerns over potential HFC transition were tempered by the reality that global markets for HFC exports were beginning to collapse and would be formally closed by 2033 for treaty-compliant countries. These factors converged in late 2020 with the rare step of bipartisan Congressional action on climate change, bringing the United States into accord with its continental partners and much of the rest of the world that had already endorsed an international agreement. In 2021, Americans were treated to the rare sight of watching new environmental legislation be swiftly translated into implementation through an EPA rule making process for HFC transition.

Comparable converging factors have not been evident in the American case of methane from oil and gas production, even after an ambitious North American methane reduction agreement was struck by the heads of state of the United States, Mexico, and Canada in 2016. Politically enforced neglect has largely persisted in the American methane case, given political challenges reflected in very slow and modest development of expanded state or federal policy. However, some signs of an HFC-type pattern for energy methane policy have begun to emerge in the United States, accelerating markedly since early 2021 and potentially leading to greater collaboration with Canada and other national methane mitigation leaders. American oil and gas

production firms demonstrated increasing divides over methane, including a growing number of large firms that invested heavily in mitigation technologies and began to position themselves as more environmentally responsible producers of gas. Such firms were far less likely to oppose new policies, in some cases encouraging governments to set broad industry standards and challenge their rivals to invest and keep pace with industry leaders. A small but growing set of production states continued to push the edge of policy innovation, adopting a range of methane mitigation policies as a cornerstone of their statewide greenhouse gas reduction efforts.

There were indications of significant methane reductions in two major American oil basins in 2021, greater than attributable to pandemic-driven decline in oil and gas demand (Rystad Energy 2021). These appear to reflect major corporate investments in technology to capture gas in some portions of the Permian and Bakken Basins, although questions about performance consistency and measurement accuracy across states and various firms persist in the absence of a reliable federal inventory system. Finally, more nations began to focus on methane emissions as they considered their future reliance on natural gas as a primary energy source, with some exploring expanded emphasis on industry methane emissions performance in making future energy import decisions. This was most notable in the case of the European Union, following early steps by nations such as France and Ireland. The EU has increasingly indicated that it will factor methane emissions into future purchasing decisions for as long as it imports significant quantities of gas, possibly through standards, excise duties, or import taxes applied to methane releases (Schrems et al. 2021).

These steps could potentially be linked to proposed carbon border adjustments, whereby Europe's internal emissions trading system would be complemented with fees on imported goods produced in nations lacking comparable climate provisions. They could be formally linked with other nations with serious carbon pricing regimes such as Canada, potentially placing governments without any pricing system such as the United States in jeopardy. Some observers have contended that conditions

are auspicious for growing trans-Atlantic coordination on climate change and related energy policy issues (McKean and Szewczyk 2021). However, the European Union appeared more cautious in operationalizing these steps in early 2022, amid panic over natural gas import availability and cost given uncertainties over reliability of future Russian imports amid its deepening tensions with Ukraine. Some European production nations such as Denmark and the Netherlands established tighter methane restrictions on their own oil and gas output, and, in some instances, began formal phase down of production, although in some instances this likely fueled demand for expanded imports rather than reduced net gas use. More than 85 percent of total natural gas used in the EU is imported, primarily from Russia, Norway, Algeria, Qatar, Nigeria, the United Kingdom, and the United States (Schrems et al. 2021). At the same time, many EU nations also began to explore possible increases in North American LNG imports as alternatives to Russian supplies, further opening the question of climate standards given Russia's dismal methane records. Indeed, American LNG exports to Europe exceeded Russian pipeline gas exports for the first time in January 2022.

Even in the hyper-partisan United States, Congress in early 2021 took the unusual step of using the Congressional Review Act to restore Obama-era methane regulations for new drilling operations under the Clean Air Act. This reflected a 12-vote margin in the Senate and a 39-vote margin in the House, involving some Republicans alongside most Democrats. This was followed by Congressional approval of a major infrastructure package that included \$4.6 billion in a series of formula and performance grants to assist states and industry in remediating abandoned and orphaned well sites. In turn, legislation to establish a steep fee on methane releases that had been introduced early in the 117<sup>th</sup> Congress was modified and passed the House after incorporation into a massive legislative package that included climate-focused investments (Agerton, Gilbert, and Krane 2021). This remained faced a very uncertain political future in the Senate but served to further splinter industry, with many firms with strong methane performance records likely to avoid any payments under such a system.

The Biden administration also pursued an executive-based policy path in November 2021 under the framework of its new Methane Emissions Reduction Action Plan. This included EPA's proposed rule to expand Clean Air Act application to energy sector methane, including coverage of existing drilling operations. This used the foundation of the 2021 Congressional Review Act for methane to make the case for more far-reaching regulatory standards and was complemented by overlapping efforts for production on federal lands and offshore by Department of Interior units. Industry appeared somewhat subdued and divided in response to these new steps, contrary to its earlier stances of aggressive and unified opposition. Many production states immediately contended that any new federal regulation should give them considerable latitude in interpretation, while also requesting supplemental funding to support implementation. The Biden administration also rolled out new methane mitigation efforts for interstate natural gas pipelines and storage under existing legislative authority.

Several production states also picked up the pace in 2021-22, intensifying their methane mitigation efforts and providing new models to inform possible diffusion to other states or federal policy design. California moved in 2021 toward formalized reduction of new drilling approvals and its second largest production county (Los Angeles) announced plans in 2022 to phase out drilling entirely. The Department of Conservation's Geologic Energy Management Division began to reject new proposals for drilling with hydraulic fracturing at a much higher rate than in previous years. It also began work on a rule to phase down production linked to fracking, while elevating methane mitigation from energy and other sources in statewide climate policy.

Other states such as New Mexico did not attempt to halt drilling in 2021-22 but rather finalize and launch newly-adopted methane policies through separate agencies focused on energy production and environmental protection. The state looms increasingly large in national energy production given much-expanded Permian Basin output, having moved into second place in 2021 among states in oil production and sixth in gas production,

making its methane policy evolution particularly noteworthy nationally. This reflected continued strong support from its first-term governor, despite limited tangible signs of legislative support. Governor Lujan Grisham and her leadership team regularly argued that they were attempting to establish a "national model" through these administrative steps and sought first-mover advantages in influencing the design of future federal policy on private land via EPA or on federal land via BLM. Lujan Grisham wrote President Biden shortly after he took office in 2021 that "We ask that our state-level efforts to combat climate change and ensure more responsible oil and gas development be considered and that New Mexico be granted energy transition credit as you chart a path forward on climate change and oil and gas in particular."

The Oil Conservation Division of the Department of Energy, Minerals and Natural Resources Development introduced new rules in May 2021 under its state energy law authority that closed previous loopholes to allow venting and flaring and establish methane emission reduction requirements for production firms, thereby reducing gas waste. These would establish baselines for performance standards that reduced gas loss rates over a five-year period and required that at least 98 percent of produced gas be captured by all firms by 2026. They also included possible penalties for failure to hit specified targets, including denial of operational permits. In complementary fashion, the New Mexico Environment Department moved toward release of final methane rules under its air quality law authority in Spring 2022. These new provisions are expected to address leak detection and inspection provisions that include storage tanks and incentivize transition toward zero- and low-emission pneumatic controllers to control emissions of ozone precursors. They will apply to all oil and gas producing activity, including small drilling operations that often have high methane losses proportional to production. One lingering concern reflects unclear legislative support, reflected in 2022 failure to adopt new climate and energy bills and budget allocations that fell far below requested amounts for expanded program implementation (Redfern 2022).



In turn, Colorado's redefinition of state agency duties led to a series of new methane steps in 2021-22. The Air Quality Control Commission unanimously endorsed the nation's first statewide greenhouse gas intensity standards for oil and gas producers in 2021, including broadened coverage of smaller firms. The state also combined its expanding emphasis on collaboration with local governments and the citizenry with a new environmental justice focus on "disproportionately impacted communities" that expands community engagement throughout facility siting and operation. This new emphasis was particularly evident in the new statewide intensity standards. The Commission also adopted rules during the year to require use of zero-emission pneumatic controllers in drilling operations, including retrofits of existing equipment. These controllers govern pressure, temperature and liquid levels at drilling sites and have traditionally operated on gas produced by wells, leading often to leaks and contributing the second largest methane source from energy production in Colorado. Finally, the Oil & Gas Conservation Commission released in 2022 its first annual report on the cumulative climate and environmental impacts of state oil and gas production, setting "the foundation for future reports" that will expand the use of sophisticated measurement technologies (COGCC 2022). The Colorado approach continues to go considerably beyond any other American production state as well as most energy-producing nations, reflecting a decade-long emphasis on methane as a central climate, environmental, public health, and public safety concern.

Canada continued to fulfill its earlier commitments while also beginning to weigh additional methane mitigation steps linked to its broader climate strategy. Following the 2021 election, the Liberal Party announced plans to prepare to deliver on campaign commitments to reduce energy sector methane emissions by 75 percent from 2012 levels by 2030. Provincial reporting indicated that they were largely on track to meet earlier commitments and production firms seemed generally open to these expanded reduction targets, particularly given federal funding support linked to implementation. The federal government also announced plans to require the oil

and gas sector to reduce its carbon emissions at a pace to achieve net-zero releases by 2050, with five-year reduction targets set to initiate in 2025. These steps served to further demonstrate Canadian leadership within North America on methane, as it continued to pursue implementation of earlier policies while weighing these subsequent steps. They suggested that Canada might more closely partner with the United States if the latter ultimately delivered on its new methane vows.

Steps taken by Quebec in 2021 could preclude the future ability of producing provinces to export LNG from the Atlantic coast. After prolonged negotiations, Quebec denied approval for proposed pipelines and terminal development on environmental grounds. Alongside the previous collapse of a Nova Scotia terminal proposal, this potentially closed the door on Canadian LNG exports from its East Coast to Europe, unlike the United States where eastern exports from multiple LNG terminals located in the Gulf of Mexico increased in 2021-22. Pacific LNG exports to Asia from British Columbia terminals remained the most plausible likely future route for Canadian gas, albeit with uncertainties about financing and siting in some cases (Pickford 2021).

Among the three North American neighbors, only Mexico backtracked on methane, amid flaring numbers that continued to soar, representing some of the higher methane loss percentages seen globally in recent years. Its government continued to focus on ways to expand its oil production, refining capacity, and use as a primary energy and economic development strategy while cutting ties to proposed renewable energy projects linked to firms outside Mexico. López Obrador's failure to secure legislative super-majorities through 2021 mid-term elections to pursue constitutional changes and further complete his shift toward oil nationalism did not deter his continued emphases from prior years.

As methane continued to gain media and political attention during 2021 in the lead-up to the November global climate summit in Glasgow (COP 26), the United States took the unexpected step of launching with the European Union an international effort to curb

methane releases from energy as well as from other major contributing sectors such as agriculture, livestock, and landfills. Biden unveiled a Global Methane Pledge through a digital summit with other national leaders, a Paris-like framework seeking national pledges to achieve a 30 percent reduction in global methane releases from 2020 levels by 2030. “We believe the collective goal is both ambitious but realistic and we urge you to join in announcing this pledge at COP 26,” said Biden in launching the initiative. The White House and European Union estimated that full Global Methane Pledge implementation would reduce global warming by at least 0.2 degree Celsius by 2050.

Canada and Mexico joined five other nations and the European Union in signing on immediately and 110 nations joined the pact by early 2020. However, this new agreement was very loosely structured, even more so than the Paris Agreement. National participation did not include any commitment to take specific policy steps, achieve verifiable domestic reductions to match global targets, or share financial or technological resources, but rather contribute in some way to a new global reduction effort that cut across multiple sectors. Canada played a unique role, the first nation to back its pledge with a formal reduction plan and a commitment to exceed 30 percent cuts in energy sector methane. The Global Methane Pledge remained in very preliminary stages of development in early 2022 but represented the first significant global effort to coordinate methane mitigation

to date. This effort also hoped to benefit from the expanding participation of production firms in voluntary methane governance initiatives, such as the Oil and Gas Methane Partnership 2.0, initiated by the Climate and Clean Air Coalition to improve transparency on methane emissions reporting and advance reduction strategies.

The COP 26 summit was followed by Biden’s unexpected announcement to convene the first summit of North American leaders since 2016. A series of meetings between the three heads of state at the White House in November 2021 focused largely on issues of trade and cross-border migration but they did conclude with a pledge to create a “North American strategy on methane and black carbon” that was designed “to reduce methane emissions from all sectors, especially oil and gas.” There were no immediate signs by the North American leaders of formal consideration of new cross-national policy steps to achieve these goals or develop a reliable continental inventory to report and measure emissions. None of this indicates an easy political transition whereby CH<sub>4</sub> rapidly emulates the HFC policy path, whether the geographic scale is American, North American, or global in nature (VanNijnatten and McWhinney 2022). However, the possibilities for active and sustained collaboration on methane mitigation appeared far greater in 2021-22 than ever before in North America, particularly in the Canadian and American cases.

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# The Politics of Short-Lived Climate Pollutants and North American Methane Policy

The authors are grateful to Leigh Raymond (Purdue University), Heather Millar (University of New Brunswick), and Brendan Boyd (MacEwan University) for reviewing the NAC climate policy reports and to Emma Frankham for copyediting services.

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## ACKNOWLEDGMENTS

I am grateful to Madeline Cohen, Rebecca Mendelsohn, Katie Rourke, Noah Rothstein, and Hannah Smith for research assistance and to colleagues from the North American Colloquium on Climate Change and a panel at the 2021 Annual Meeting of the American Political Science Association for their very thoughtful comments on earlier versions of this paper. I am particularly very thankful for thorough and thoughtful comments by Brendan Boyd, Michael Méndez, Heather Millar, and Leigh Raymond.



## THE NORTH AMERICAN COLLOQUIUM

The North American Colloquium (NAC) is a collaborative venture between the Autonomous National University of Mexico, University of Toronto, and University of Michigan. Established in 2018, the NAC brings together leading academic analysts and practitioners from Mexico, Canada and the United States to address key social and policy issues facing all three countries. Each year, the three partner universities select a theme, and one serves as the host to convene joint activities throughout the year.