

**BEFORE THE PRESIDENT OF THE UNITED STATES
AND
THE UNITED STATES DEPARTMENT OF THE INTERIOR**

**PETITION TO REDUCE THE RATE OF OIL AND GAS
PRODUCTION ON PUBLIC LANDS AND WATERS
TO NEAR ZERO BY 2035**

January 19, 2022

Submitted By

**361 CLIMATE, CONSERVATION, ENVIRONMENTAL JUSTICE,
PUBLIC HEALTH, INDIGENOUS, FAITH-BASED, AND COMMUNITY
ORGANIZATIONS**

“No more drilling on federal lands.

No more drilling including offshore.

No ability for the oil industry to continue to drill, period, ends.”

-President Joe Biden

Biden-Sanders Debate, March 15, 2020

The Honorable Joseph R. Biden
President of the United States
The White House
1600 Pennsylvania Ave., N.W.
Washington, DC 20500

The Honorable Deb Haaland
Secretary
U.S. Department of the Interior
1849 C Street, N.W.
Washington, DC 20240

Dear President Biden and Secretary Haaland,

We hereby petition you to use your inherent authority to implement a steady and managed decline of all onshore and offshore oil and gas production on public lands and waters such that oil and gas production is reduced by 98% of current levels by the year 2035 in order to avoid disastrous climate change driven by fossil fuels.

Decades ago Congress gave the Secretary of the Interior authority to set the “quantity and rate of production” of oil and gas production on public lands under the Mineral Leasing Act of 1920. Similarly, it gave the President authority, under the Outer Continental Shelf Lands Act of 1953, to set the rate of production for oil and gas production on offshore waters. Using these authorities now to reduce the production of oil and gas is absolutely necessary to address the climate crisis and fully aligns with your “whole of government” directive that every federal agency “avoid the most catastrophic impacts of that crisis and to seize the opportunity that tackling climate change presents.”¹ These statutory provisions provide you with one of the most powerful tools to address the reckless and profoundly damaging environmental legacy of over 100 years of fossil fuel extraction on public lands and waters, and would finally put the public good above the profits of the oil and gas industries.

Implementing this managed decline now is absolutely imperative to finally stem the relentless and ever-increasing production of oil and gas on public lands and waters. Over the past 15 years, production of oil from public lands and waters has inexorably increased 57% to over 937 million barrels per year in 2020 and now accounts for 23% of total oil production in the United States.² Even worse, during the first six months of 2021 alone, the Department of the Interior approved more than 2,100 oil and gas permits to drill, a level of permit approvals not seen since the George W. Bush administration.³ If these approvals continue, it will be virtually impossible for the United States to meet its pledge under the Paris Agreement to limit global temperature rise to 1.5 degrees Celsius (°C) and avoid catastrophic damages from the climate emergency.

An overwhelming scientific consensus makes clear that limiting global temperature rise to 1.5°C requires governments to halt approval of new fossil fuel production and infrastructure *and* phase out existing fossil fuel production and infrastructure in developed fields and mines. Already developed oil and gas fields and coal mines contain enough carbon to exceed a 1.5°C limit, meaning that extraction in existing fields and mines must be shut down before their reserves are fully depleted. Globally at least 58% of oil reserves and 59% of gas reserves must be kept in the ground in order even to have a 50-50 chance of meeting a 1.5°C limit. Yet, as detailed in the

¹ *Tackling the Climate Crisis at Home and Abroad*, 86 Fed. Reg. 7,619 (Jan. 27, 2021).

² *Crude Oil Production*, Energy Information Administration (June 30, 2021); *see also*, Office of Natural Resources Revenue (2006 - 2020), <https://revenuedata.doi.gov/explore/> (last visited Nov. 29, 2021).

³ Matthew Brown, *US drilling approvals increase despite Biden climate pledge*, AP (July 12, 2021).

landmark United Nations Production Gap Reports, fossil fuel producers are planning to extract *more than double* the amount of oil, gas and coal by 2030 than is consistent with limiting warming to 1.5°C,⁴ with U.S. oil and gas production projected to increase twice as much as any other country.⁵ Instead of increasing extraction, we must make steep reductions in fossil fuel production between 2020 and 2030 to limit warming to 1.5°C. The United States has a moral responsibility to lead the world in a rapid managed decline of fossil fuel production based on its role as the historic, dominant driver of the climate crisis, its capacity for a just transition to clean energy, and existing executive authority to accomplish this phaseout of fossil fuels.⁶

Four years after the signing of the Paris Agreement, the United Nations starkly warned that global emissions were still sharply higher than what is needed to achieve 2030 interim emission reduction targets.⁷ The UN report concluded that limiting warming to 1.5°C requires countries to strengthen their climate pledges *fivefold* to cut emissions by at least 7.6% per year through 2030, concluding that the United States “in particular” must ramp up climate action to meet global climate limits under the Paris Agreement. In 2021 the World Meteorological Organization warned that there is roughly a 40% chance of the average global temperature reaching 1.5°C above preindustrial levels within at least one of the next five years. And in August of this year, the UN secretary-general stated the latest IPCC climate report is a “code red for humanity” and that all countries must “end all new fossil fuel exploration and production, and shift fossil-fuel subsidies into renewable energy.”⁸

The extreme heat waves, hurricanes and megafires wreaking destruction across the United States, the deadly floods in Europe and Asia, record-breaking droughts across Africa and South America, and devastating fires in Australia and the Amazon rainforest just over the past two years provide more unequivocal proof that time has already run out. The climate emergency is here. Nearly every month of 2021 was the hottest in recorded history for the country. It is clear that the limited policy interventions by the Department of the Interior to address climate change have all been woefully inadequate to address the climate calamity unfolding now.

The extraction and burning of fossil fuels from public lands and waters is one of the main drivers of the climate crisis and continues to cause profound environmental injustice and burdens millions of people with debilitating health impacts. People who suffer from unhealthy levels of air pollution caused by fossil fuels are at risk of premature death, lung cancer, asthma attacks and cardiovascular problems, and face increased risks of stillbirths and developmental delays in children. In the United States, the burning of fossil fuels results in increased particulate matter, ground-level ozone, and smog causing over \$820 billion per year in health costs.⁹ While these

⁴ SEI, IISD, ODI, E3G, and UNEP, *The Production Gap: The discrepancy between countries’ planned fossil fuel production and global production levels consistent with limiting warming to 1.5°C or 2°C* (2020).

⁵ Ploy Achakulwisut & Peter Erickson, *Trends in fossil fuel extraction: Implications for a shared effort to align global fossil fuel production with climate limits*, Stockholm Environment Institute Working Paper (April 2021).

⁶ Greg Muttitt & Sivan Kartha, *Equity, climate justice and fossil fuel extraction: principles for a managed phase out*, 20 *Climate Policy* 1024 (2020).

⁷ *Emissions Gap Report 2019*, United Nations Environment Programme at xviii (2019).

⁸ *Secretary-General Calls Latest IPCC Climate Report ‘Code Red for Humanity’, Stressing ‘Irrefutable’ Evidence of Human Influence*, United Nations (Aug. 9, 2021), <https://www.un.org/press/en/2021/sgsm20847.doc.htm>.

⁹ *The Costs of Inaction: The Economic Burden of Fossil Fuels and Climate Change on Health in the United States*, Medical Society Consortium on Climate and Health at 5 (2021).

costs are shared by everyone across the United States, affected communities including children, low-wealth communities, and people of color bear a significantly higher burden.

Fortunately, implementing a managed decline of oil and gas on public lands can be accomplished quickly and effectively. First, the fossil fuel industry has already consented to the Department of the Interior's use of this authority. *Every single onshore lease* application form already required each company to abide by the inherent authority of the secretary "to alter or modify...the quantity and rate of production under" any lease. Likewise, for all offshore oil and gas operations, every fossil fuel company has already consented in each signed lease to only produce oil and gas only "at rates consistent with any rule or order issued" by the president.¹⁰

Second, the oil and gas industry has shown that it can alter its own rate of production when it wants to, as all it has to do is turn off the valves from producing wells — an exercise that occurs regularly every time a climate-change supercharged hurricane hits the Gulf of Mexico. Likewise, when oil and gas demand collapsed due to the Covid-19 pandemic, the fossil fuel industry slashed production by 9.7 million barrels per day, the largest decrease in production in history.¹¹ Likewise, when oil prices fell by over 55% in 2008, the Organization of the Petroleum Exporting Countries cut production by 1.5 million barrels per day.¹² These examples show that the oil and gas industry can easily adjust its rate of production to protect its profits. And it illustrates that industry could be required to steadily ratchet down its production to protect our climate for the public good and the survival of our planet.

During the 2020 presidential election, then-candidate Joe Biden promised "[n]o more drilling on federal lands. No more drilling, including offshore. No ability for the oil industry to continue to drill, period, ends, number one."¹³ It is now time for the Department of the Interior to make real the administration's promise and vision by implementing a program to reduce the rate of production of oil and gas on public lands and waters.

To make substantive progress toward the administration's vision and U.S. goals under the Paris Agreement, the proposed regulation will implement a controlled phasedown of oil and gas production on public lands. Using 2020 as a baseline, beginning in 2022 the total maximum rates of oil and gas production will decrease by 10% annually for 8 years and then 3% annually for each year thereafter. These reductions will apply across the oil and gas sector, gradually decreasing the maximum production rates for every oil and gas lease on public lands until production is reduced 98% by 2035.

Implementing a managed decline of oil and gas production through control of the rate of production represents the most significant action you could take to protect our climate, protect our wildlife, protect frontline communities, and ensure that the planet remains livable for future generations. This managed decline should be taken in conjunction with other critical policy actions, including permanently ending new federal fossil fuel leasing and ending the approval of

¹⁰ See Appendix.

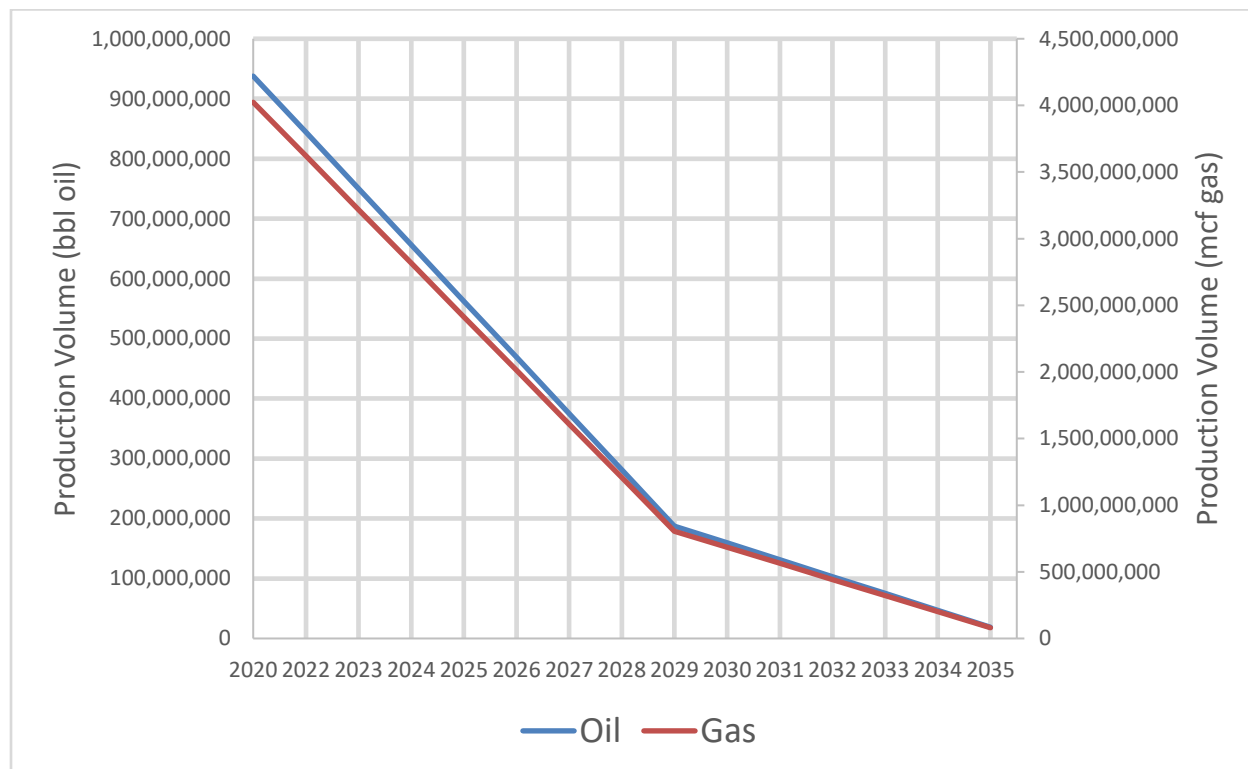
¹¹ *OPEC and allies finalize record oil production cut after days of discussion*, CNBC (Apr. 12, 2020), <https://www.cnbc.com/2020/04/12/opec-and-allies-finalize-record-oil-production-cut-after-days-of-discussion.html>.

¹² Nelson D. Schwartz and Jad Mouawad, *OPEC Says It Will Cut Oil Output*, N.Y. Times (Oct. 24, 2008).

¹³ *CNN Democratic Presidential Primary Debate*, CNN (Mar. 15, 2020).

new fossil fuel infrastructure projects on all lands managed by the Department of the Interior. These efforts should align with a larger set of actions by the Biden administration to tackle the climate crisis, including declaring a climate emergency, reinstating the crude oil export ban, and limiting gas exports to the full extent allowed by the Natural Gas Act.

Figure 1. Managed Phaseout of Oil and Gas on Public Lands and Waters



Accordingly, pursuant to the right to petition provided in the First Amendment to the U.S. Constitution and the Administrative Procedure Act,¹⁴ we hereby petition you, as Secretary of the Interior,¹⁵ to promulgate regulations that (1) establish the maximum production rate and phasedown of existing onshore oil and gas wells under Section 17 of the Mineral Leasing Act and (2) establishes the maximum production rate and phasedown of existing offshore oil and gas wells under Section 107 of the Naval Petroleum Reserves Production Act.

Additionally, pursuant to Section 5 of the Outer Continental Shelf Lands Act, the commitments made by the United States under the Paris Agreement and the authority within the National Emergencies Act, we hereby petition you, as the President of the United States, to promulgate an executive order or rule that establish the maximum production rate and phasedown of existing offshore oil and gas wells. For both requests, we petition that any existing regulations under the Mineral Leasing Act, the Naval Petroleum Reserves Production Act and the Outer Continental Shelf Lands Act that conflict with the objectives and text of our proposed regulations be rescinded.

¹⁴ Our organizations and their members are “interested persons” within the meaning of the APA. 5 U.S.C. § 553(e).

¹⁵ See 43 C.F.R. § 14.2.

Text of Proposed Regulations:¹⁶

**PHASE-DOWN OF OIL AND GAS PRODUCTION UNDER THE MINERAL LEASING ACT,
THE OUTER CONTINENTAL SHELF LANDS ACT, AND OTHER AUTHORITIES**

**Subpart A – Setting Rates of Production Through Establishment of a Program to Reduce
the Rate of Production of Fossil Fuels.**

§ 101.1 Policy and Purpose.

(a) Policy. The policy objective of this part is to establish a rate of production of oil and gas that is compatible with maintaining a stable climate below 1.5°C.

(b) Purpose. The purpose of this part is to establish a Program to Reduce the Rate of Production of Fossil Fuel on lands and waters under the jurisdiction of the Department of the Interior. The regulations set forth in this part establish the requirements and procedures for allocating the share of production for each covered lease that is producing oil or gas or both, the establishment of an anti-backsliding requirement to further reduce the rate of production to address any excess production, and the establishment of a system to track each share of production including the transfer of shares.

§ 101.2 Establishment of Baseline Year and Rate of Production.

(a) The baseline year for all federal onshore and offshore oil and gas shall be calendar year 2020.

(b) For calendar year 2020, the nationwide onshore and offshore aggregate federal production was 937,722,926 bbl of oil and 4,023,455,328 mcf of gas.

(c) In setting the rate of production, total production of onshore and offshore aggregate federal production per year from all wells subject to federal leases, shall not exceed the limits set forth in Table 1.

Table 1. Maximum Rate of Production of Oil and Gas Per Year

Year	Oil Percentage of Baseline	Oil Production Limit (bbl)	Gas Percentage of Baseline	Gas Production Limit (mcf)
2022	90%	843,950,633	90%	3,621,109,795
2023	80%	750,178,341	80%	3,218,764,262
2024	70%	656,406,048	70%	2,816,418,730
2025	60%	562,633,756	60%	2,414,073,197
2026	50%	468,861,463	50%	2,011,727,664
2027	40%	375,089,170	40%	1,609,382,131

¹⁶ Petitioners believe the text for the proposed regulations is applicable to both the onshore and National Petroleum Reserve in Alaska oil and gas programs, and that such language applies equally for submitting a petition under the APA. Furthermore, the proposed regulatory text is applicable to the offshore oil and gas programs when combined with the proposed Presidential rule beginning on page 14, but is similar for the onshore text.

2028	30%	281,316,878	30%	1,207,036,598
2029	20%	187,544,585	20%	804,691,066
2030	17%	159,412,897	17%	683,987,406
2031	14%	131,281,210	14%	563,283,746
2032	11%	103,149,522	11%	442,580,086
2033	8%	75,017,834	8%	321,876,426
2034	5%	46,886,146	5%	201,172,766
2035	2%	18,754,459	2%	80,469,107

§ 101.3 Federal Authority.

(a) The Secretary reserves all authority under subchapter IV of the Mineral Leasing Act, under chapter 7 of the Mineral Leasing Act for Acquired Lands, and under the Naval Petroleum Reserves Production Act including but not limited to, the authority, at the Secretary’s discretion, to alter or modify from time to time the quantity and rate of production of oil and gas leases on lands owned by the United States.

(b) The President reserves all authority under subchapter III of the Outer Continental Shelf Lands Act including but not limited to, the authority, at the President’s discretion, to alter or modify from time to time the quantity and rate of production of oil and gas leases on lands owned by the United States.

(c) The Secretary reserves the right under subchapter IV of the Mineral Leasing Act and under the Naval Petroleum Reserves Production Act to take any action necessary to protect the orderly and competitive functioning of the allocation system, including actions to prevent fraud and misrepresentation.

(d) The President reserves the right under subchapter III of the Outer Continental Shelf Lands Act to take any action necessary to protect the orderly and competitive functioning of the allocation system, including actions to prevent fraud and misrepresentation.

§ 101.4 Definitions.

Act means the Mineral Lands Leasing Act of 1920, as amended and supplemented (30 U.S.C. 181 et seq.) and the Mineral Leasing Act for Acquired Lands of 1947, as amended (30 U.S.C. 351-359).

Allocation means an authorization by the President or Secretary under the Program to produce up to one barrel of oil or 1,000 cubic feet of gas during or after a specified calendar year. Allocations shall be rounded down for decimals less than 0.500 and up for decimals of 0.500 or greater.

Allocation Tracking System means the Program system by which the President or Secretary allocates, records, deducts, and tracks allocations.

Allocation Tracking System account means an account in the Allocation Tracking System established by the President or Secretary for purposes of allocating, holding, transferring, and using allocations.

Barrel or bbl means a barrel of oil or 42 U.S. gallons. All measurements of crude oil and natural gas liquids under this section shall be at 60 degrees Fahrenheit.

Covered lease means a lease that is subject to the Program pursuant to §101.5.

Gas means any fluid, either combustible or noncombustible, which is produced in a natural state from the earth and which maintains a gaseous or rarefied state at ordinary temperatures and pressure conditions.

Lease means any contract, profit-share arrangement, joint venture or other agreement issued or approved by the United States under law that authorizes on any lands, including the surface of a severed mineral estate, exploration for, extraction of or removal of oil or gas.

Lessee means any person holding record title or owning operating rights in a lease issued or approved by the United States. The lessee of a covered lease shall be subject to the provisions of this part pursuant to the Act, OCSLA, or NPRPA and may authorize a responsible natural person which shall represent and, by his or her representations, actions, inactions, or submissions, legally bind each lessee of the covered lease represented, as a matter of Federal Law, in matters pertaining to the Program.

Lessor means the party to a lease who holds legal or beneficial title to the mineral estate in the leased lands.

mcf means one thousand cubic feet or one thousand cubic feet of gas.

NPRPA means the Naval Petroleum Reserves Production Act, as amended (42 U.S.C. § 6501 et seq.).

Outer Continental Shelf or OCS means all submerged lands lying seaward and outside of the area of lands beneath navigable waters as defined in 43 U.S.C. 1301(a).

OCSLA means the Outer Continental Shelf Lands Act, as amended (43 U.S.C. 1331 et seq.).

Oil means all nongaseous hydrocarbon substances other than those substances leasable as coal, oil shale or gilsonite (including all vein-type solid hydrocarbons).

President means the President of the United States.

Recordation, record, or recorded means, with regard to allocations, the transfer of allocations by the President or Secretary from one Allocation Tracking System account to another.

Secretary means the Secretary of the Interior.

§ 101.5 Applicability.

The following shall be included as a covered lease subject to the provisions of the Program to Reduce the Rate of Production of Fossil Fuel:

(a) Any leases granted before the date of enactment of this final rule in which the lessor assented to inclusion cooperative or unit plan for the proper development and operation of the area, field, or pool, or any other restriction on the development or production of such lease under any of the following authorities:

(1) the Mineral Lands Leasing Act of 1920, as amended and supplemented (30 U.S.C. 181 et seq.);

(2) the Mineral Leasing Act for Acquired Lands of 1947, as amended (30 U.S.C. 351-359);

(3) the Naval Petroleum Reserves Production Act, as amended (42 U.S.C. § 6501 et seq.); or

(4) the Outer Continental Shelf Lands Act, as amended (43 U.S.C. 1331 et seq.).

(b) Any leases granted after the date of enactment of this final rule under any provision of law.

Subpart B - Inclusion in a Cooperative or Unit Plan, Allocations, Excess Production of Oil and Gas, Penalties for Overproduction, and Anti-backsliding

§ 102.1 Inclusion in Cooperative or Unit Plan.

(a) Within 30 days after the enactment of the final rule, the Secretary shall identify each shared area, field or pool of oil and/or gas within the United States in which at least one lease has been issued for by the Secretary. No later than every three years, the Secretary shall review each shared area, field or pool and assess whether additional designations are required.

(b) Within 60 days after the enactment of the final rule, the Secretary shall notify each covered lease that is operating within a shared area, field, or pool of oil or gas and enroll such covered lease in a common pool or unit plan.

§ 102.2 Setting Initial Production Allocations for Calendar Year 2022.

(a) The President and the Secretary shall identify each covered lease operating pursuant to the Act, OCSLA, or NPRPA in calendar year 2021.

(b) No later than February 1, 2022, the President and the Secretary shall calculate the pro-rata share allocation for each covered lease enrolled in a common pool or unit plan identified in subsection (a). The pro-rata share for calendar year 2022 shall be the production volume of oil or

gas from a covered lease in year 2021 divided by the total production volume of oil or gas on all covered leases in year 2021 multiplied by the Table 1 production limit (in bbl or mcf) for 2022. The formula for the pro-rata share can be expressed as the following:

$$\text{Pro-rata Oil Share}_{2022} = (\text{production volume on a covered lease}_{2021} \text{ (in bbl)} / \Sigma \text{ production volume on all covered leases}_{2021} \text{ (in bbl)}) \times \text{Table 1 production limit (in bbl)}_{2022}$$

$$\text{Pro-rata Gas Share}_{2022} = (\text{production volume on a covered lease}_{2021} \text{ (in mcf)} / \Sigma \text{ production volume on all covered leases}_{2021} \text{ (in mcf)}) \times \text{Table 1 production limit (in mcf)}_{2022}$$

§ 102.3 Setting Production Allocations for Subsequent Years.

(a) The President and the Secretary shall obtain from each lessee the production volume of barrels of oil and gas from each lease to determine the total volume of oil and gas produced on all public lands and waters each calendar year.

(b) Each lessee shall provide to the President and the Secretary the total volume of oil and gas produced from each covered lease no later than January 15 of each year.

(c) No later than February 1st of each year, the President and the Secretary shall calculate the pro-rata share for each covered lease that produced oil or gas or both and provide a report for the previous calendar year as required by subsection (b).

(d) The pro-rata share allocation shall be no greater than the production volume of oil or gas from a covered lease in the previous calendar year divided by the total production limit of oil or gas on all covered leases in the previous calendar year as set by Table 1, multiplied by the production limit for the current calendar year as set forth in Table 1. The formula for the pro-rata share can be expressed as the following:

$$\text{Pro-rata Oil Share}_{\text{current year}} = (\text{production volume on a covered lease}_{\text{previous year}} \text{ (in bbl)} / \Sigma \text{ production volume on all covered leases}_{\text{previous year}} \text{ (in bbl)}) \times \text{Table 1 production limit (in bbl)}_{\text{current year}}$$

$$\text{Pro-rata Gas Share}_{\text{current year}} = (\text{production volume on a covered lease}_{\text{previous year}} \text{ (in mcf)} / \Sigma \text{ production volume on all covered leases}_{\text{previous year}} \text{ (in mcf)}) \times \text{Table 1 production limit (in mcf)}_{\text{current year}}$$

(e) In the case where the production volume of a covered lease in any calendar year exceeds its allocation, the pro-rata share for the covered lease in subsequent years and the total production limit in subsequent years shall be adjusted as set forth in subsection 102.7(c). In the case where the production volume of a covered lease decreases more than 5% in any calendar year, the pro-rata share for the covered lease in subsequent years and the total production limit in subsequent years shall be adjusted as set forth in subsection 102.7(d).

(f) No later than February 15th of each year, the President and the Secretary shall provide each covered lease the information regarding its share of production established in subsection (d).

§ 102.4 Excess Production of Oil and Gas Prohibited.

(a) A lessee or covered lease shall not exceed its pro-rata share of production as set forth by the President and the Secretary under subsection 102.2 or subsection 102.3 for the current calendar year.

(b) Where a covered lease exceeds its annual pro-rata share as established under subsection 102.2 or subsection 102.3 for the respective calendar year by more than 1% of its total share, the President and the Secretary shall reduce the pro-rata share of such lease in the current year by an amount equivalent to the level of production in excess of its share.

§ 102.5 Penalties for Excess Production of Oil and Gas.

(a) First violation. Where a lessee or covered lease exceeds its share for the current calendar year, the lessee shall pay, without demand, an excess production penalty, as calculated under paragraph (b) of this subsection.

(b) Penalty formula. The following formulas shall be used to determine the excess production penalty:

$$\text{Penalty for excess production of oil} = \text{profit/bbl} \times \text{bbl of excess production of oil} \times 1.30$$
$$\text{Penalty for excess production of gas} = \text{profit/mcf} \times \text{mcf of excess production of gas} \times 1.30$$

(c) Subsequent violations. Where a lessee or covered lease exceeds its share for the current calendar year and the violation is not the first violation, the lessee shall pay, without demand, an excess production penalty of no less than \$1,000/bbl for each barrel by which it exceeded its share, and no less than \$1,000/mcf for each mcf by which it exceeded its share.

(d) If an excess production penalty due under this part is not paid within 180 days, the penalty shall be subject to interest charges in accordance with the Debt Collection Act (31 U.S.C. 3717). Interest shall begin to accrue on the date on which the President or the Secretary notifies the lessee of a covered lease with excess production, a demand notice for the payment.

§ 102.6 Allocations for New Leases Set at Zero.

(a) Any lease issued after 2021 shall receive a zero pro-rata share and may only produce oil and gas in a manner consistent with the procedures set forth in this chapter.

(b) Acquisition of allocation. A new lease that meets the requirements under this subpart, shall only start production of oil or gas after successful receipt of allocations from an existing

lease's Allocation Tracking System account made pursuant to subpart C. For each calendar year, the share allocation is equal to: allocation received by the new lease(s) times the percentage in Table 1 for the current year.

§ 102.7 Anti-backsliding and Reduction of Allocations.

(a) National Progress in Reducing Production. In the case of the limitations established in subsection 101.2 and this subsection, an allocation may not be issued unless the allocation is reduced by the amount set forth in Table 1.

(b) Excess Production Requirement. The lessee of a covered lease that has excess production greater than 2% in any calendar year shall pay without demand the penalty required, and pay upon demand the interest on that penalty under subsection 102.5.

(c) Excess production. In the case of excess production volume of oil or gas for a given calendar year, the President or the Secretary, after determining the allocation set forth in Table 1 for the subsequent year, shall reduce the allocation for that subsequent year (and each subsequent year thereafter) by the excess production in the prior calendar year, as illustrated in Table 2. If there are additional instances of excess production, all instances of excess production shall be summed and the President or the Secretary shall reduce allocation for each subsequent year thereafter by the summed excess production in all prior years. The total production limit for each subsequent year as set forth in Table 1 shall also be reduced by the summed excess production in all prior years. Under no circumstances, may the sum of the volume of oil or gas produced during a year of excess production and the following subsequent year, exceed the sum over the same period (after subtracting any adjustments) as set forth in Table 1.

Table 2. Example of Excess Production

Year	Oil Production Limit (bbl)	Excess production	Adjustment	Actually Produced (bbl)
2022	17,400,000	+2,000,000	0	19,400,000
2023	15,500,000	0	-2,000,000	13,500,000
2024	13,600,000	0	-2,000,000	11,600,000
2025	11,600,000	+5,000,000	-2,000,000	14,600,000
2026	9,700,000	0	-7,000,000	2,700,000
2027	7,800,000	0	-7,000,000	800,000
Total	75,600,000	+7,000,000	-20,000,000	62,600,000

(d) Decrease in production. If a lessee of a covered lease has a decrease in production volume of oil or gas greater than 5% in any calendar year, the President or the Secretary shall set a new maximum production limit for that covered lease equal to the reduction in that particular calendar year by subtracting the difference in production from all subsequent years accordingly, as illustrated in Table 3. If there are additional instances of a decrease in production that are greater than the prior decrease in production that resulted in establishing a new maximum production limit, the President or the Secretary shall again establish a new maximum production limit by subtracting the difference in production from all subsequent years accordingly.

Table 3. Example of a Decrease in Production

Year	Oil Production Limit (bbl)	Actual Production	Percent Actually Produced	Adjustment	Adjusted Oil Production Limit (bbl)
2024	13,600,000	13,100,000	96%	0	n/a
2025	11,600,000	10,100,000*	87%†	0	n/a
2026	9,700,000	8,100,000	99%	-1,500,000	8,200,000*
2027	7,800,000	6,150,000	98%	-1,500,000	6,300,000*
2028	5,800,000	2,600,000**	60%†	-1,500,000	4,300,000*
2029	3,900,000	675,000	6%	-3,200,000	700,000**

* first adjustment of -1,500,000 bbl

** second adjustment of -3,200,000 bbl

† decrease in production volume greater than 5%

§ 102.8 Procedures for Submittals and Appeals.

(a) Electronic submittal. All submittals under this subpart shall be made by the lessee electronically to the President or the Secretary, via an online portal administered by the President or the Secretary.

(b) Determinations regarding a lessee’s share may be appealed to the President or the Secretary within 30 days of receiving its share for the current calendar year. A lessee may only appeal calculations regarding its prior year production level or its current year allocation.

(c) The President or the Secretary shall resolve an appeal within 90 days of receiving an appeal by a lessee. Any finding by the President or the Secretary shall be subject to judicial review.

(d) Production limit pending appeal. The President or the Secretary’s initial determination of a lessee’s share shall remain in effect until and unless such decision is reversed or revised at the conclusion of the appeal process.

Subpart C – Transfers of Allocations and Constructive Abandonment of Oil and Gas Leases

§ 103.1 Allocation Tracking System Accounts.

The President or the Secretary will establish accounts for all covered leases pursuant to this subpart. All allocations, transfers, changes, and deductions pursuant to subparts A, B, and C shall be recorded in the lease’s Allocation Tracking System account.

§ 103.2 Establishment of Accounts and Recordation.

(a) Establishing of accounts. The President or the Secretary will establish an Allocation Tracking System account and allocate allocations for each lease that is, or will become, a covered lease.

(b) Recordation of accounts. In 2022 and each year thereafter, the President or the Secretary will record, in the Allocation Tracking System account, all allocations, transfers, changes, and deductions. The total allocations deducted for oil or gas is equal to the production volume on a covered lease for the current year in either bbl or mcf.

§ 103.3 Scope and Submission of Transfers.

A lessee may transfer all or part of a lease's allocation held to a different lease(s) held by the same lessee or to another lessee, so long as:

(a) the transferor and transferee provide no less than 30 days' notice of such transfer to the President or the Secretary or by the allocation transfer deadline;

(b) the total oil or gas produced by the transferee shall be no greater than the allocation transferred by the transferor; and

(c) the bonding requirements in subsection 103.4 have been met by the transferor.

§ 103.4 Bonding Required.

(a) In General. For any transfer of allocations allocated for either oil or gas for a specific covered lease, the President or the Secretary shall require the submission of reclamation plans as provided in paragraph (b) of this subsection and that an adequate bond, surety, or other financial arrangement be established as provided in paragraph (c) of this subsection prior to transfer of allocations for either oil or gas by the lessee of the transferor.

(b) Reclamation Plans Required. No approval of the transfer of allocations may be granted without the analysis and approval by the President or the Secretary of the reclamation plan covering proposed surface-disturbing activities within the lease area.

(c) Bonding. No approval of the transfer of allocations may be granted until the President or the Secretary reviews and approves the adequacy of a bond, surety, or other financial instrument. A bond, surety, or other financial arrangement shall not be adequate unless it is demonstrated to fully cover the full costs of plugging, remediating, and fully restoring each well site and associated facilities, or for \$150,000 per covered well, whichever is greater.

Text of Proposed Presidential Rule¹⁷

PRESIDENTIAL RULE TO PHASE-DOWN OIL AND GAS PRODUCTION UNDER THE OUTER CONTINENTAL SHELF LANDS ACT

By the authority vested in me as the President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Policy and Purpose.

The overwhelming scientific consensus has definitively concluded that without deep and rapid emissions reductions, warming will exceed 1.5 degrees Celsius, the target of the 2015 Paris Agreement, and will result in catastrophic damage around the world. Every fraction of additional warming above 1.5 degrees Celsius will worsen these harms, threatening lives, health and safety, livelihoods, the environment, economy, and national security for this and future generations. In addition, warming temperatures are already causing harms to the critical importance of the Outer Continental Shelf areas for marine mammals, other wildlife, wildlife habitat, and we must ensure that the unique resources of these areas remain available for future generations.

Global emissions must be reduced by half over the next decade to limit warming to below 1.5 degrees Celsius. Accordingly, it is in the national interest for the United States, based on our cumulative emissions and respective capabilities, to establish a rate of production of oil and gas production on public lands and waters that is compatible with maintaining a stable climate below 1.5 degrees Celsius. Using 2020 as a baseline, beginning in 2022 the total maximum rates of oil and gas production will decrease by 10% annually for 8 years and then 3% annually for each year thereafter. These reductions will apply across the oil and gas sector, gradually decreasing the maximum production rates for every oil and gas lease on public lands until production is reduced 98% by 2035.

Sec. 2. Declaration of a National Climate Emergency.

I, JOSEPH R. BIDEN JR., President of the United States of America, find that the climate crisis, caused primarily by fossil fuels, poses an existential threat to every aspect of society. Therefore, by the authority vested in me by the Constitution and the laws of the United States, including sections 201 and 301 of the National Emergencies Act, 50 U.S.C. § 1601 *et seq.*, I hereby declare that climate change is a national emergency.

Sec. 3. Utilizing the Outer Continental Shelf Lands Act to Phase-Down Oil and Gas Production.

(a) The Outer Continental Shelf Lands Act (“OCSLA”), 43 U.S.C. 1331 *et seq.*, provides the President and the Secretary of the Interior with numerous authorities.

¹⁷ We hereby petition the President of the United States for an executive order or rule that would order the Secretary of the Interior to promulgate regulations for offshore oil and gas production under Section 5 of OCSLA, 43 U.S.C. § 1334, to be added to 30 C.F.R. Part 256. Petitioners believe the text starting on page 6 for the proposed regulations is appropriate for offshore oil and gas programs.

(b) Section 3 of OCSLA provides that it is the policy of the United States to protect the environment from the exploration and development of oil and gas deposits by directing that offshore oil and gas operations shall be “subject to environmental safeguards,” consistent with “national needs,” and be conducted so as to “prevent or minimize . . . damage to the environment,” 43 U.S.C. §§ 1332(3), 1332(6).

(c) Section 5(a)(1) of OCSLA provides the Secretary with the authority “for the suspension or temporary prohibition of any operation or activity, including production, pursuant to any lease or permit . . . in the national interest . . . [or] if there is a threat of serious, irreparable, or immediate harm or damage to life (including fish and other aquatic life) . . . or to the marine, coastal, or human environment,” 43 U.S.C. § 1334(a)(1).

(d) Section 5(g)(1) of OCSLA states that a lessee “shall produce any oil or gas, or both, obtained pursuant to an approved development and production plan, at rates consistent with any rule or order issued by the President in accordance with any provision of law,” 43 U.S.C. § 1334(g)(1).

(e) Section 20 of OCSLA specifically requires that offshore oil development be balanced “with protection of the human, marine, and coastal environments,” 43 U.S.C § 1351(i).

Sec. 4. President Transfers Authority to the Secretary of the Interior.

I hereby delegate, to the Secretary of the Interior, authority under subchapter III of the Outer Continental Shelf Lands Act including but not limited to, the authority, at the President’s discretion, to alter or modify from time to time the quantity and rate of production of oil and gas leases on lands owned by the United States.

Sec. 5. Regulations and Implementation.

(a) Pursuant to the transfer of authority in section 4, the Secretary of the Interior, to the extent permitted by law, shall promulgate regulations that would apply for offshore oil and gas production under Section 5 of OCSLA, 43 U.S.C. § 1334, to be added to 30 C.F.R. Part 256.

(b) Using 2020 as a baseline and beginning in 2022, the Secretary of the Interior is ordered to establish the maximum production rate and phase-down of existing offshore oil and gas wells, which will decrease by 10% annually for 8 years and then 3% annually for each year thereafter. These reductions shall apply across the oil and gas sector, gradually decreasing the maximum production rates for every oil and gas lease on public lands until production is reduced 98% by 2035.

Sec. 6. General Provisions.

Nothing in this Order shall be construed to impair or otherwise affect the authority granted by law to an executive department or agency, or the head thereof. This order shall be implemented consistent with applicable law and subject to the availability of appropriations. This order is not

intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

LEGAL AND SCIENTIFIC SUPPORT FOR PETITIONED ACTION

I. **Both The Mineral Leasing Act And Outer Continental Shelf Lands Act Provide The President and the Secretary With The Authority To Grant The Petitioned Action**

As discussed below, the President and the Secretary can clearly set — and therefore decrease — the rate of oil and gas production. First, the President and the Department of the Interior has always been charged with managing all public lands for the public good and the long-term well-being of the nation. Thus, it makes no sense to read the statutory authorities regarding fossil fuel extraction in such a manner that the President and the Department must always allow fossil fuel extraction at rates that cause extreme climate change to the detriment of public lands, the national interest, and global climate stability. Second, as a straightforward statutory matter, Congress has unambiguously authorized the President and the Department of the Interior to set rates of oil and gas production under the law. Third, setting the rate of production for existing and new fossil fuel production does not represent a breach of existing contracts under the clear lease terms already in place for all fossil fuel leases on public lands and waters, nor does it represent a taking of private property.

A. **The Department of the Interior is Charged by Law with Advancing the Public Interest and the Common Good**

The Department of the Interior is charged with implementing a myriad of laws across numerous agencies and different types of public lands with the goal of managing this nation’s natural resources and cultural heritage. A common theme that motivates these laws — even those that directly authorize the extraction of natural resources — is to do so in a manner that is consistent with meeting the nation’s needs and safeguarding the public interest. For example, the Federal Land Policy and Management Act (“FLPMA”) requires that “public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values.”¹⁸ In accomplishing this multiple use mandate, FLPMA requires the Department of the Interior to “take[] into account the long-term needs of future generations.”¹⁹

Likewise, the National Park System Organic Act directs the Department to “conserve the scenery, natural and historic objects, and wild life . . . by such means as will leave them unimpaired for the enjoyment of future generations.”²⁰ And the laws governing the National Wildlife Refuge System requires that the Secretary administer wildlife refuges “for the benefit of present and future generations.”²¹ In all of these statutes, the Department of the Interior is charged with administering the lands and waters it manages in a manner that promotes the long-term good of the nation, including for the benefit of future generations. It would be nonsensical to argue that the Department must allow fossil fuel production at rates and quantities that not

¹⁸ 43 U.S.C. § 1701(a)(8).

¹⁹ 43 U.S.C. § 1702(c).

²⁰ 54 U.S.C. § 100101(a).

²¹ 16 U.S.C. § 668dd(a)(2).

only undermine, but affirmatively prevent, the ability of the Department to meet its obligations to current and future generations under all of its other statutory mandates.

Fortunately, the Mineral Leasing Act (“MLA”) and Outer Continental Shelf Lands Act (“OCSLA”) make clear that the President and the Secretary of the Interior can — and indeed must — consider the public good when setting rates of production of oil and gas on public lands and waters. In the section charging the Secretary of the Interior with assigning leases for fossil fuel development, the MLA specifies that each lease shall contain provisions “for the protection of the interests of the United States . . . and for the safeguarding of the public welfare.”²² Similarly, the OCSLA charges the President with overseeing the “expeditious and orderly development [of offshore oil and gas resources], subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs.”²³ The President and the Secretary of the Interior cannot safeguard the public welfare or address the needs of the nation if oil and gas production on public lands and waters continues in this fashion.

B. Congress Provided Clear Statutory Authority to Set the Rate of Production for Oil and Gas

The MLA provides that the Secretary may “alter or modify from time to time the rate of prospecting and development and the *quantity and rate of production under such plan*.”²⁴ Similarly, the OCSLA states that “[t]he lessee shall produce any oil or gas, or both, obtained pursuant to an approved development and production plan, *at rates consistent with any rule or order issued by the President in accordance with any provision of law*.”²⁵ These statutory provisions are unambiguous and express clear intent by Congress that the President and the Secretary can and should set the rate of production on public lands and waters.²⁶ Accordingly, the regulatory language sought in this petition fully accords with the plain meaning of both the MLA and OCSLA.

Even if the MLA or OCSLA provisions above were viewed to be ambiguous, the regulatory language within this petition is not only a reasonable interpretation of these statutes, but accords with the canon of construction that a “statute should be construed so that effect is given to all its provisions, so that no part will be inoperative or superfluous, void or insignificant”²⁷ Since the President and the Department of the Interior has never enacted or given effect to these provisions of law, doing so here in this manner would further clarify congressional intent.

Under Supreme Court precedent, if a statute is “silent or ambiguous with respect to the specific issue,” then an agency’s interpretation must be “based on a permissible construction of the statute.”²⁸ Here, Congress did not expressly define “rate” or “quantity” in either the MLA or the

²² 30 U.S.C. § 187.

²³ 43 U.S.C. § 1332(3).

²⁴ 30 U.S.C. § 226(m) (emphasis added) We note that while this explicit reference to setting a rate of production is contained within a section governing leases unitization agreements, the Secretary of the Interior has in fact included the production rate provision in all standard leases.

²⁵ 43 U.S.C. § 1334(g)(1) (emphasis added).

²⁶ *Chevron U.S.A. Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 842 (1984).

²⁷ *Corley v. United States*, 556 U.S. 303, 314 (2009).

²⁸ *Chevron*, 467 U.S. at 843.

OCSLA. However, dictionaries define both terms in a consistent clear manner. “Rate” is generally defined as “a quantity, amount, or degree of something measured per unit of something else.”²⁹ While “quantity” is generally defined as “an indefinite amount or number.”³⁰ Using common definitions, it is a reasonable interpretation that setting the rate of production means exactly what it says — determining the quantity or amount that can be produced over a given period of time of whatever resource is being extracted from public lands or waters. Since the aggregate of definitions from multiple dictionaries coalesce on a plain meaning,³¹ these terms can be reasonably read to allow the President and the Secretary to promulgate rules to either increase or decrease the rate or quantity of production.³²

Importantly, the legislative history for the MLA does not provide any guidance or disagreement with the interpretation of the law in this petition, and is generally silent on how such rates of production should be set, or if this provision could only be used to set — as an example, a minimum rate of production. In other sections of the MLA, Congress was quite specific and prescriptive in articulating maximums and minimums by law. The MLA establishes a maximum number of acres leased per unit of land,³³ and establishes minimum royalty rates.³⁴ In light of these provisions, Congress could have been prescriptive with the rate and quantity of oil or gas production by establishing minimum or maximum requirements, but it chose not to do so. Since Congress did not limit the President or Secretary of the Interior, they have the inherent discretion to interpret this provision in a reasonable way and set a rate of production that declines to near zero. Congress knew that rates and quantities of production might change based on local, national, and global concerns and thus deferred to the agency’s expertise.

Lastly, the OCSLA authorizes the Secretary of the Interior to set production at rates consistent with any rule or order issued by the President in accordance with any provision of law.³⁵ Here we petition the President for a declining production rate pursuant to a National Emergencies Act declaration by the President that climate change is a national emergency.³⁶

The nature of BLM’s statutory responsibilities under FLPMA further clarify that exercise of Secretarial authority under the MLA and mineral lease terms, to protect the public interest, is consistent with Congress’s comprehensive statutory scheme for the management of public lands. In managing the public lands, including the fluid mineral program, BLM is explicitly charged to

²⁹ *Rate*, Merriam-Webster, <https://www.merriam-webster.com/dictionary/rate> (last visited Nov. 29, 2021); *Rate*, Lexico.com (“a measure, quantity, or frequency, typically one measured against some other quantity or measure”), <https://www.lexico.com/en/definition/rate> (last visited Nov. 29, 2021).

³⁰ *Quantity*, Merriam-Webster, <https://www.merriam-webster.com/dictionary/quantity> (last visited Nov. 29, 2021); *Quantity*, Lexico.com (“the amount or number of a material or immaterial thing not usually estimated by spatial measurement”), <https://www.lexico.com/en/definition/quantity> (last visited Nov. 29, 2021).

³¹ *Caminetti v. United States*, 242 U.S. 470, 485 (1917) (noting “[i]t is elementary that the meaning of a statute must, in the first instance, be sought in the language in which the act is framed, and if that is plain . . . the sole function of the courts is to enforce it according to its terms” and if the statute’s language is clear “[w]here the language is plain and admits of no more than one meaning the duty of interpretation does not arise and the rules which are to aid doubtful meanings need no discussion”).

³² *Nat’l Cable & Telecomms. Ass’n v. Brand X Internet Servs.*, 545 U.S. 967, 973 (2005).

³³ 30 U.S.C. § 226(b)(1)(A) (“shall be leased . . . in units of not more than 2,560 acres”).

³⁴ 30 U.S.C. § 226(b)(1)(A) (“a royalty at a rate of not less than 12.5 percent”).

³⁵ 43 U.S.C. § 1334(g)(1).

³⁶ 50 U.S.C. § 1601 *et seq.*

Protect public land values including air and atmospheric, water resource, ecological, environmental, and scenic values, and to preserve and protect “certain public lands in their natural condition,” and “food and habitat for fish and wildlife”;³⁷ account for “the long-term needs of future generations”;³⁸ prevent “permanent impairment of the productivity of the land and quality of the environment”;³⁹ “[t]ake any action necessary to prevent unnecessary or undue degradation of the lands”;⁴⁰ and manage public lands on the basis of multiple use and sustained yield.⁴¹ To carry out these responsibilities in the context of oil and gas leasing, BLM has a corresponding array of authorities to address the impacts of oil and gas leasing and development. These authorities include, among others, managing the rate of oil and gas production in federal leases consistent with the plain language of the MLA.

FLPMA directs that “the public lands be managed in a manner that will protect the quality of [critical resource] values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use.”⁴² This substantive mandate requires that BLM not elevate the development of oil and gas resources above other critical resource values in the planning area. To the contrary, FLPMA requires that where oil and gas development would threaten the quality of critical resources, conservation of these resources should be the preeminent goal.

Congress has declared through FLPMA that it is the policy of the United States that “the public lands [shall] be managed in a manner that will protect the quality of ... air and atmospheric ... values.”⁴³ Under FLPMA’s “multiple use and sustained yield” management directive,⁴⁴ the federal government must manage public lands and resources in a manner that “takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land[.]”⁴⁵ BLM’s exercise of its lease administration authority under the MLA must be understood consistent with these Congressionally-imposed obligations under FLPMA.

³⁷ 43 U.S.C. §1701(a)(8).

³⁸ 43 U.S.C. § 1702(c).

³⁹ 43 U.S.C. § 1702(c).

⁴⁰ 43 U.S.C. § 1732(b).

⁴¹ 43 U.S.C. § 1732(a).

⁴² 43 U.S.C. § 1701(a)(8).

⁴³ 43 U.S.C. § 1701(a)(8).

⁴⁴ 43 U.S.C. § 1701(a)(7)

⁴⁵ 43 U.S.C. § 1702(3).

C. No Breach-of-Contract Will Occur from the Phase-Down of Oil and Gas Production on Public Lands and Waters

Generally, a lease to explore and extract oil and gas from public lands and waters is a contract agreement between the federal government and private parties. Private parties may then attempt to bring breach-of-contract claims against the federal government. However, these claims would fail as the President and the Department of the Interior has nearly always reserved the right — in the lease itself — to set the rate of production.

For onshore production under the MLA, the standard onshore leasing regulations and lease form itself specify separately that lessees are subject to certain future regulations and to all other applicable statutes and regulations and most critically the “lessor reserves [the] right to specify rates of development and production in the public interest.”⁴⁶ Similarly, the leasing regulations that apply to the Naval Petroleum Reserves Production Act state that every National Petroleum Reserve in Alaska unit agreement must include “a provision that acknowledges BLM’s authority to set or modify the quantity, rate, and location of development and production.”⁴⁷

For offshore waters, the OCSLA states a lessee must consent to only produce oil and gas “at rates consistent with any rule or order issued” by the President.⁴⁸ The offshore lease form contains language that specifies that the lease is subject to changes which reflect new or amended regulations, statutes and rules, even when those changes may increase or decrease the lessee’s contractual obligations.⁴⁹ And the lease form states “Assignee(s) is (are) subject to, and shall fully comply with, all applicable regulations now or to be issued under the Act.”⁵⁰

And while the Supreme Court in *Mobil Oil Exploration* held that legislation passed after the issuance of a lease can constitute a breach-of-contract amounting to repudiation,⁵¹ that case has

⁴⁶ See 43 C.F.R. § 3101.1-2; *Offer to Lease and Lease for Oil and Gas*, Form 3100-11, BLM at 3 (Oct. 2008), https://www.blm.gov/sites/blm.gov/files/uploads/Services_National-Operations-Center_Eforms_Fluid-and-Solid-Minerals_3100-011.pdf.

⁴⁷ 43 C.F.R. § 3137.21(a)(4).

⁴⁸ 43 U.S.C. § 1334(g)(1).

⁴⁹ *Oil And Gas Lease Of Submerged Lands Under The Outer Continental Shelf Lands Act*, Form BOEM-2005, BOEM at 1 (Feb. 2017), <https://www.boem.gov/sites/default/files/about-boem/Procurement-Business-Opportunities/BOEM-OCS-Operation-Forms/BOEM-2005.pdf>, (“[t]his lease is subject to the [OCSLA], regulations promulgated pursuant thereto, and other statutes and regulations in existence upon the Effective Date of the lease, and those statutes enacted (including amendments to the Act or other statutes) and regulations promulgated thereafter, except to the extent they explicitly conflict with an express provision of this lease. It is expressly understood that amendments to existing statutes and regulations, including but not limited to the [OCSLA], as well as the enactment of new statutes and promulgation of new regulations, which do not explicitly conflict with an express provision of this lease may be made and that the Lessee bears the risk that such may increase or decrease the Lessee’s obligations under the lease.”).

⁵⁰ *Assignment Of Record Title Interest In Federal OCS Oil And Gas Lease*, Form BOEM-0150, BOEM at 2 (Jan. 2020), <https://www.boem.gov/BOEM-0150/>; *Assignment Of Operating Rights Interest In Federal OCS Oil And Gas Lease*, Form BOEM-0151, BOEM at 2 (Jan. 2020), <https://www.boem.gov/BOEM-0151/>.

⁵¹ See *Mobil Oil Exploration & Producing Southeast v. United States*, 530 U.S. 604 (2000); see also *Century Exploration New Orleans, LLC v. United States*, 745 F.3d 1168, 1177–78 (Fed. Cir. 2014) (noting that in reaching its decision in *Mobil Oil*, “the Supreme Court emphasized the government’s chosen source of authority: the government cited the Outer Banks Protection Act, not OCSLA regulations” and holding that “[a] change to an

no bearing here. In *Mobil Oil*, the Court found, based on unique facts whereby the Interior Department refused to consider an exploration plan based solely on newly created statutory authority outside those statutes incorporated into the lease, that the government had repudiated the contract. Here, because *both* the MLA and the OCSLA *already* contain language that explicitly gives the President and the Secretary the authority to change the rate of production, there would be no breach of contract. For the President and the Secretary to exercise their existing authority here through the promulgation of additional regulations consistent with an existing statute is not outside the scope of the lease and would cause no breach of contract.

D. Reducing the Rate of Production will not Take Private Property in Violation of the Constitution

The phase down of existing oil and gas production also would not take private property in violation of the Fifth Amendment to the U.S. Constitution. There are generally two types of regulatory takings: (1) categorical, or “*per se*” takings, in which a regulation destroys all economic value of a property, and (2) all other takings, which a court can determine through a fact-intensive, multi-factor test known as the *Penn Central* test. While evaluating a takings claim requires a fact-specific analysis, it is clear that in the vast majority of instances, setting a declining rate of oil and gas production would not lead to meritorious takings claims.

In a *per se* taking, a regulatory action results in a taking “when the owner of real property has been called upon to sacrifice all economically beneficial uses in the name of the common good, that is, to leave his property economically idle”⁵² A court will find a regulatory taking when the property valuation drops to zero as a result of regulation, and deprives the property of all economically viable uses. The retention of a small economic benefit in the property is not considered a *per se* taking, however the rule cannot be circumvented by leaving a small economically viable “token interest.”⁵³ The Supreme Court reaffirmed this in *Tahoe-Sierra Preservation Council v. Tahoe Reg’l Planning Agency* when it stated that the categorical rule would not apply “if the diminution in value were 95% instead of 100%.”⁵⁴ And further acknowledged that a regulation that temporarily restricts the economic use of a property is not considered a *per se* taking, and thus still required *Penn Central* analysis.

OCSLA regulation does not breach the express terms of the lease language as interpreted by the Supreme Court in *Mobil Oil* [.]”); *see also Taylor Energy v. United States*, 975 F.3d 1303, 1317 (Fed. Cir. 2020) (holding “*Mobil Oil* has little relevance” where “BSEE’s refusal to grant Taylor’s departure request is in compliance with the OCSLA, and the Trust Agreement specifically references the OCSLA regulations that govern the parties’ contractual duties.”).

⁵² *Tahoe-Sierra Pres. Council v. Tahoe Reg’l Planning Agency*, 535 U.S. 302, 331 (2002); *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1019 (1992).

⁵³ *Maritrans, Inc. v. United States* 51 Fed.Cl. 277, 281 (Fed.Cl. 2001) *aff’d*, 342 F.3d 1344 (Fed.Cir. 2003) (noting that federal law that required owner of single-hulled tanker vessels to retire them within 15 years did not effect a taking as the law “does not permit [a property owner] to separate the years that it used the [property] profitably from the time when the [property] must be retired, to claim a categorical taking”); *see also Rith Energy v. United States*, 270 F.3d 1347 (Fed. Cir. 2001); *Palazzolo v. Rhode Island*, 533 U.S. 606 (2001) (“Assuming a taking is otherwise established, a State may not evade the duty to compensate on the premise that the landowner is left with a token interest.”).

⁵⁴ *Tahoe-Sierra Pres. Council v. Tahoe Reg’l Planning Agency*, 535 U.S. 302, 331 (2002).

The petitioned regulations, if enacted, would not result in a *per se* taking. A gradual reduction in the amount of production over a 14-year time frame would still allow every lease holder to extract a significant amount of oil or gas during this time frame, and around 2035 extraction could still occur at 2% percent of 2020 levels. We note that this holds true for both main categories of covered leases – producing and nonproducing. While the holders of nonproducing leases would not receive an initial allocation, they would be able to purchase or otherwise acquire one from the holder of a producing lease. Thus, the phase down would not result in a total deprivation of economic value — particularly for the richest and most profitable industry in the history of the world, where many of the leaseholders have already reaped uncounted billions by extracting resources from publicly owned lands and waters.

Because no *per se* takings would occur, the *Penn Central* test would properly be applied to any takings claims. Three factors are balanced under the *Penn Central* test: (1) the “economic impact of the regulation on the claimant,” (2) the “extent to which the regulation has interfered with distinct investment-backed expectations,” and (3) “the character of the governmental action.”⁵⁵ Under the first factor, any economic impacts experienced by the lessees would be spread over 14 years, but under existing precedent, because such impacts are not immediately substantial, would weigh against a finding that a regulatory taking has occurred.⁵⁶

The second factor, addresses “investment-backed expectations.” Courts consider three mitigating questions to determine the extent of investment-back expectations: “was the company operating in a highly regulated industry,” “did the company know of the problem at the time it engaged in the activity,” and “in the light of the regulatory environment at the time of the activities, could the possibility of the assessments have been reasonably anticipated?”⁵⁷ In this instance, all three mitigating questions can be affirmatively answered without hesitation. The fossil fuel industry is highly regulated. In part because of this substantial regulation and the worldwide efforts to combat climate change, the industry has been aware of its contribution to the climate crisis for decades.⁵⁸ Perhaps most importantly, given that every lease signed by the fossil fuel industry already includes language allowing the Secretary of the Interior to set the rate of production, there is simply no argument that enacting regulations to implement these restrictions was not something that could be anticipated. More generally, given the overwhelming scientific information that unequivocally concludes that a fossil fuel ramp-down must occur, any industry entering the field of fossil fuel production must do so against a backdrop of more and more stringent restrictions on the extraction, production, and use of fossil fuels.

When addressing the third factor, the “character of the governmental action,” a court will look at whether the government was acting to protect the public health and whether the regulation

⁵⁵ *Penn Cent. Transp. Co. v. New York City*, 438 U.S. 104, 124 (1978).

⁵⁶ *CCA Assocs. v. United States*, 667 F.3d 1239, 1246 (Fed. Cir. 2011) (finding that “[i]n light of the facts of this case, we cannot conclude that an 18% economic impact qualifies as sufficiently substantial to favor a taking” and this court is “aware of no case in which a court has found a taking where diminution in value was less than 50 percent.”).

⁵⁷ *Commonwealth Edison Co. v. United States*, 271 F.3d 1327, 1348 (Fed. Cir. 2001).

⁵⁸ *New Documents Reveal Oil Industry Knew of Climate Risks Decades Earlier Than Suspected; Suggest Coordinated Efforts to Foster Skepticism*, Center for International Environmental Law (CIEL) (April 13, 2016), <https://www.ciel.org/news/smoke-and-fumes/>.

singled out a particular individual or entity.⁵⁹ In this instance, the Secretary would clearly be acting to protect all aspects of public health and welfare from the climate crisis. As outlined below, continued fossil fuel production literally threatens the continuation of our civilization and life on Earth as we know it. Avoiding ever more catastrophic harms from the climate crisis is clearly the type of regulatory action least likely to trigger a successful takings claim. Additionally, the Secretary would not be seen as singling out a particular individual or entity. The regulation would be tied to addressing the climate crisis and as such help to meet climate emissions targets. These changes would impact the fossil fuel industry as a whole and would not unfairly target a particular entity or individual.

Thus, under the *Penn Central* balancing test, all three factors overwhelmingly favor a finding that no regulatory takings has occurred, and in such situations a reviewing court should not find a regulatory takings.

Furthermore, lessees lack any reasonable expectation of future return on investment from, at the very least, a substantial subset of leases issued since 2007. Under the MLA, case law and BLM regulations provide that onshore oil and gas leases “shall be subject to cancellation if improperly issued.”⁶⁰ OCSLA provides even broader authority for offshore lease cancellation, including suspension and subsequent cancellation based on environmental risks.⁶¹ “Improperly issued” leases clearly include leases issued not only based on fraud or misrepresentation by the lessee, but those issued based on statutory violations by the issuing agency, including, relevantly, leases issued based on procedural violations of the National Environmental Policy Act (“NEPA”). Oil and gas leases issued contrary to NEPA are voidable at the Secretary of the Interior’s discretion.⁶²

Since at least 2007, it has been clear that NEPA requires evaluation of the climate consequences of federal agency actions.⁶³ A substantial and consistent line of recent judicial decisions have found federal agency fossil fuel leasing and other actions in recent years failed to comply with that NEPA requirement.⁶⁴ Although the Department of the Interior has not, to date, pursued

⁵⁹ *Rose Acre Farms, Inc. v. U.S.*, 559 F.3d 1260, 1279–1281 (Fed. Cir. 2009) (noting “restrictions were directed at the protection of public health and safety” and that “is the type of regulation in which the private interest has traditionally been most confined and governments are given the greatest leeway to act without the need to compensate those affected by their actions.”); *Penn Cent.* 438 U.S. at 125 (stating compensation need not accompany prohibition when the government “reasonably conclude[s] that the health, safety, morals, or general welfare would be promoted by prohibiting particular contemplated uses of land”).

⁶⁰ 43 C.F.R. § 3108.3(d); *see also Boesche v. Udall*, 373 U.S. 472, 475-76 (1963).

⁶¹ *See* 43 U.S.C. § 1334(a)(2)(i).

⁶² *See Boesche v. Udall*, 373 U.S. 472, 481-83 (1963); *Winkler v. Andrus*, 614 F.2d 707, 711 (10th Cir. 1980); *see also Grynberg v. Kempthorne*, 2008 WL 2445564 (D. Colo. June 16, 2008) (affirming BLM’s cancellation of an oil and gas lease issued in violation of regulation); *High Plains Petroleum Corp.*, 125 IBLA 24, 26 (1992) (“It is well settled that the Secretary has the authority to cancel any oil and gas lease issued contrary to law or regulation because of the inadvertence of his subordinates.”). In the specific context of a lease issued in violation of NEPA, the IBLA has held that such a legal error renders the lease voidable. *St. James Village, Inc.*, 154 IBLA 150, 158 (2001) (vacating BLM’s decision to issue a geothermal lease for NEPA violation); *Clayton W. Williams, Jr.*, 103 IBLA 192, 210 (1988) (lease issued in violation of NEPA is voidable).

⁶³ *See Center for Biological Diversity v. Nat’l Highway Transp. Safety Admin.*, 508 F.3d 508 (9th Cir. 2007).

⁶⁴ *See Citizens for a Healthy Community v. BLM*, No. 1:17-cv-2519 (D. Colo. March 27, 2019) (holding that “Defendants acted in an arbitrary and capricious manner and violated NEPA by not taking a hard look at the

systematic cancellation of improperly-issued leases either through administrative action or the courts, it is well within its authority under *Boesche v. Udall* and its own regulations to do so. As a result, lessees lack any reasonable expectation of future operations on leases issued subsequent to 2007, if not earlier.

Finally, we note that even in the exceptional instance where a law or regulation deprives a property owner of all value, courts will still decline to find a categorical taking if the restricted activity is a nuisance.⁶⁵ Here, the scientific consensus about the fossil fuel industry’s effect on the climate, together with countless studies linking fossil fuel production with other adverse environmental and public health harm, makes oil and gas production a clear nuisance and suggests that industry takings claims are doomed to failure on this basis as well.⁶⁶

Multiple states and municipalities are currently suing fossil fuel producers to recover damages from climate change, because their fossil fuel extraction constitutes a public nuisance.⁶⁷ These harms are in addition to the local adverse impacts to air, water, and health from oil and gas production. Oil and gas companies pursuing takings claims will be forced to confront this evidence, and cannot prevail absent a court finding that their operations do *not* constitute a nuisance. Given the well documented and wide-ranging climate and other damage caused by oil and gas development, it is increasingly unlikely that oil and gas entities will win this fight, and highly unlikely that takings claims against agency actions phasing out or restricting oil and gas production will succeed. Moreover, like paint companies that were recently found liable in California state court for the harm from the lead in their paint, fossil fuel companies have known for decades that their products cause harm, yet actively concealed the impacts while affirmatively promoting their product—behavior that further evinces a public nuisance.⁶⁸

This analysis demonstrates that the President and the Secretary are clearly within their Constitutional and statutory authority to implement regulations in furtherance of aiding in the fight against climate change.

foreseeable indirect effects resulting from the combustion of oil and gas in the EIS and EA. Defendants must quantify and reanalyze the foreseeable indirect effects the emissions.”). *See also WildEarth Guardians v. Zinke*, No. CV 16-1724 (RC), 2019 WL 1273181 (D.D.C. Mar. 19, 2019) (invalidating nine BLM NEPA analyses in support of oil and gas lease sales because “BLM did not take a hard look at drilling-related and downstream [greenhouse gas] emissions from the leased parcels and, it failed to sufficiently compare those emissions to regional and national emissions.”); *San Juan Citizens All.*, 326 F. Supp. 3d at 1242–43 (collecting cases and requiring assessment of greenhouse gas emissions at the lease sale stage); *Western Org. of Res. Councils v. U.S. Bureau of Land Mgmt.*, CV 16-21-GF-BMM, 2018 WL 1475470 (D. Mont. Mar. 26, 2018) (requiring consideration of climate change at the RMP stage); *Sierra Club v. Fed. Energy Regulatory Comm’n*, 867 F.3d 1357, 1374 (D.C. Cir. 2017) (requiring quantification of indirect greenhouse gas emissions).

⁶⁵ In *Lucas*, the Supreme Court confirmed once again that all property is subject to “background principles of the State’s law of property and nuisance[.]” 505 U.S. 1003, 1029.

⁶⁶ The Supreme Court has stated explicitly that certain legal activities could *become* a nuisance if new information shows the activity to be a danger. *Lucas*, 505 U.S. at 1029 (stating that if a fault line were newly discovered under an existing nuclear power plant, the plant would become a nuisance and shuttering the plant would not be a compensable taking).

⁶⁷ *See* cases collected at *Climate Liability Litigation*, Center for Climate Integrity, <https://payupclimatepolluters.org/cases> (last visited Nov. 29, 2021).

⁶⁸ *See e.g., People v. ConAgra Grocery Products Co. et al.* (2017) 17 Cal.App.5th 51 (finding lead paint manufacturers liable for public nuisance and ordering them to pay into an abatement fund, because they knew the danger lead paint posed to children, yet concealed the impacts and affirmatively promoted it).

II. The Fossil Fuel Industry Is Responsible For The Majority Of Greenhouse Gas Emissions And Global Warming

A group of the world's largest fossil fuel producers are responsible for the majority of greenhouse gas emissions and global warming since the Industrial Revolution and during the past three decades. A study that analyzed emissions primarily from companies that produce fossil fuels found that 63% of global industrial CO₂ and methane emissions between 1751 and 2010 came from just 90 international entities — 56 crude oil and gas producers, 37 coal extractors, and 7 cement producers. These 90 entities — consisting of 50 investor-owned companies, 31 majority state-owned companies, and 9 centrally-planned state industries — are responsible for 914 billion tonnes of CO₂-equivalent (GtCO₂e) emissions. Cumulatively, investor-owned entities are responsible for 315 GtCO₂e, state-owned companies for 288 GtCO₂e, and nation-states for 312 GtCO₂e.⁶⁹

Based on historical data and climate modeling, emissions from these 90 fossil fuel “majors” have contributed an estimated 57% to the observed rise in atmospheric CO₂, approximately 50% to the rise in global mean surface temperature, and approximately 32% to global mean sea level rise between 1751 and 2010.⁷⁰ A separate study attributed 71% of global industrial greenhouse gas emissions since 1988 to just 100 fossil fuel producers, with 51% of emissions since 1988 attributable to just 25 corporate and state producers, including ExxonMobil, Shell, BP, Chevron, and Peabody.⁷¹

Several U.S. fossil fuel companies rank in the top 20 worst cumulative emitters, including Chevron at #1, ExxonMobil at #2, ConocoPhillips at #9, Peabody Energy at #12, and Consol Energy, Inc. at #18.⁷² Cumulative emissions from the 20 largest investor-owned and state-owned energy companies alone account for 30% of the global industrial emissions between 1751 and 2010. Emissions from the top 20 contributed approximately 27% of the increase in atmospheric CO₂, approximately 24% of the increase in warming, and approximately 13 to 16% of the increase in global sea level rise.⁷³

Fourteen companies were consistently found to be in the top 20 in terms of the global impacts of their emissions: seven investor-owned companies (Chevron, ExxonMobil, BP, Royal Dutch Shell, ConocoPhillips, Peabody Energy, and Total), and seven majority state-owned companies (Saudi Aramco, Gazprom, National Iranian Oil Company, Pemex, Petroleos de Venezuela, Coal India, and Kuwait Petroleum). Chevron is the largest company contributor to rises in both global

⁶⁹ Heede, Richard, Tracing anthropogenic carbon dioxide and methane emissions to fossil fuel and cement producers, 1854-2010, 122 *Climatic Change* 229 (2014).

⁷⁰ Ekwurzel, Brenda et al., The rise in global atmospheric CO₂, surface temperature, and sea level from emissions traced to major carbon producers, 144 *Climatic Change* 579 (2017).

⁷¹ CDP and Climate Accountability Institute, The Carbon Majors Database, CDP Carbon Majors Report 2017 (July 2017), <https://www.cdp.net/en/articles/media/new-report-shows-just-100-companies-are-source-of-over-70-of-emissions>.

⁷² Heede, Richard, Tracing anthropogenic carbon dioxide and methane emissions to fossil fuel and cement producers, 1854-2010, 122 *Climatic Change* 229 (2014).

⁷³ Ekwurzel, Brenda et al., The rise in global atmospheric CO₂, surface temperature, and sea level from emissions traced to major carbon producers, 144 *Climatic Change* 579 (2017).

temperatures and sea level rise between 1880 and 2010 and the second-largest contributor to the rise in atmospheric carbon dioxide. Meanwhile, ExxonMobil is the third-largest contributor to both the historical rise in atmospheric CO₂ and warming, and the second-largest contributor to global sea level rise.

James Hansen first testified in the U.S. Congress that the human signal of climate change had been detected in 1998. The same year, the Intergovernmental Panel on Climate Change was formed to provide a scientific basis for policy action on climate change.⁷⁴ Yet, half of all industrial emissions of CO₂ since the Industrial Revolution have been emitted *since* 1988. In the face of scientific evidence of the dangers of fossil fuel emissions and resulting climate change, fossil fuel producers failed to reduce their emissions or disclose climate risks,⁷⁵ and instead worked in direct contradiction to emissions reduction goals and spread climate misinformation.⁷⁶

For instance, between 1988 and 2005, ExxonMobil invested over \$16 million into front groups that spread misleading claims about climate science.⁷⁷ Rather than changing their business models, fossil fuel companies remain focused on not only exploiting existing oil, gas, and coal reserves, but also on developing new ones. Rather than supporting fair and effective climate policies, fossil fuel majors including Chevron, Shell, and ConocoPhillips remain members of the American Legislative Exchange Council's Energy, Environment and Agriculture Task Force which is focused on repealing renewable energy standards and regional climate policy initiatives in U.S. states.⁷⁸ Rather than disclosing climate risks, ExxonMobil consistently focused on the uncertainties surrounding climate change in its New York Times advertorials, while only acknowledging the true risks in less public internal and peer-reviewed communications.⁷⁹ Fossil fuel companies have not even begun to pay their fair share of the costs for climate damages and adaptation.⁸⁰

III. New Fossil Fuel Production And Infrastructure Must Be Halted And Much Existing Production Must Be Phased Out To Avoid The Worst Dangers From Climate Change

Scientific research has established that there is no room in the global carbon budget for new fossil fuel extraction if we are to avoid the worst dangers from climate change. Instead, new fossil fuel production and infrastructure must be halted, and much existing production must be

⁷⁴ Hansen, James et al., Global climate changes as forecast by Goddard Institute for Space Studies three-dimensional model, 93 *Journal of Geophysical Research* 9341 (1988); Frumhoff, Peter et al., The climate responsibilities of industrial carbon producers, 132 *Climatic Change* 157 (2015).

⁷⁵ Frumhoff, Peter et al., The climate responsibilities of industrial carbon producers, 132 *Climatic Change* 157 (2015).

⁷⁶ Union of Concerned Scientists, *The Climate Accountability Scorecard: Ranking Major Fossil Fuel Companies on Climate Deception, Disclosure, and Action* (2016).

⁷⁷ Ward, Robert, Letter dated Sept. 4, 2006, from the Royal Society to ExxonMobil (accessed January 17, 2018); Frumhoff, Peter et al., The climate responsibilities of industrial carbon producers, 132 *Climatic Change* 157 (2015).

⁷⁸ Frumhoff, Peter et al., The climate responsibilities of industrial carbon producers, 132 *Climatic Change* 157 (2015).

⁷⁹ Supran, Geoffrey and Oreskes, Naomi, Assessing ExxonMobil's climate change communications (1977-2014), 12 *Environ. Res. Lett.* 084019 (2017).

⁸⁰ Union of Concerned Scientists, *The Climate Accountability Scorecard: Ranking Major Fossil Fuel Companies on Climate Deception, Disclosure, and Action* (2016).

phased out to meet the Paris Agreement climate limits and avoid catastrophic climate damages. Although the United States withdrew from the Paris Agreement under President Trump, President Biden has already taken action to have the United States rejoin the agreement. Under the Paris Agreement, countries commit to holding the long-term global average temperature “to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.”⁸¹ The Paris Agreement established the 1.5°C climate limit given the evidence that 2°C of warming would lead to catastrophic climate harms.⁸²

Scientific research has estimated the global carbon budget—the remaining amount of carbon dioxide that can be emitted — for maintaining a likely chance of meeting the Paris climate limits, providing clear benchmarks for United States and global climate action.⁸³ The Intergovernmental Panel on Climate Change (“IPCC”) Sixth Assessment updated the remaining carbon budget from the beginning of 2020 at 400 GtCO₂ for a 67% probability of meeting the 1.5°C limit and 500 GtCO₂ for a 50% probability of 1.5°C.⁸⁴ At the current global emissions rate of 42 GtCO₂ per year, the entire global carbon budget would be used up in just 10 to 12 years. Notably, the U.S. carbon budget is far smaller than the global carbon budget. Most estimates of the remaining U.S. carbon budget consistent with keeping temperature rise below 1.5°C are negative or near zero, depending on the equity principles used to apportion the global budget across countries.⁸⁵

Importantly, a 2016 global analysis found that the carbon emissions that would be released from burning the oil, gas, and coal in the world’s currently operating fields and mines would fully exhaust and exceed the global carbon budget consistent with staying below 1.5°C.⁸⁶ The reserves

⁸¹ United Nations Framework Convention on Climate Change, Conference of the Parties, Nov. 30-Dec. 11, 2015, Adoption of the Paris Agreement Art. 2, U.N. Doc. FCCC/CP/2015/L.9 (December 12, 2015), <http://unfccc.int/resource/docs/2015/cop21/eng/109.pdf> (“Paris Agreement”). The United States signed the Paris Agreement on April 22, 2016 as a legally binding instrument through executive agreement, and the treaty entered into force on November 4, 2016.

⁸² Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C*, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (October 6, 2018), <http://www.ipcc.ch/report/sr15/>.

⁸³ The 2018 IPCC special report on *Global Warming of 1.5°C* estimated the carbon budget for a 66 percent probability of limiting warming to 1.5°C at 420 GtCO₂ and 570 GtCO₂ from January 2018 onwards, depending on the temperature dataset used. See Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C*, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (October 6, 2018), at SPM-16.

⁸⁴ Intergovernmental Panel on Climate Change, Summary for Policymakers In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-38.

⁸⁵ Van den Berg, Nicole et al., Implications of various effort-sharing approaches for national carbon budgets and emission pathways, *Climatic Change* 162: 1805-1822 (2020), <https://link.springer.com/article/10.1007%2Fs10584-019-02368-y>; Dooley, Kate et al., Ethical choices behind quantifications of fair contributions under the Paris Agreement, 11 *Nature Climate Change* 300 (2021), <https://www.nature.com/articles/s41558-021-01015-8>.

⁸⁶ Oil Change International, *The Sky’s Limit: Why the Paris Climate Goals Require a Managed Decline of Fossil Fuel Production* (September 2016), <http://priceofoil.org/2016/09/22/the-skys-limit-report/> at Table 3. According to this analysis, the CO₂ emissions from developed reserves in existing and under-construction global oil and gas fields and existing coal mines are estimated at 942 Gt CO₂, which vastly exceeds the 1.5°C-compatible carbon budget estimated in the 2018 IPCC report on *Global Warming of 1.5°C* at 420 GtCO₂ to 570 GtCO₂.

in currently operating oil and gas fields alone, even excluding coal mines, would likely lead to warming beyond 1.5°C.⁸⁷ An important conclusion of the analysis is that no new fossil fuel extraction or infrastructure should be built, and governments should grant no new permits for extraction and infrastructure. Furthermore, many of the world’s existing oil and gas fields and coal mines will need to be closed before their reserves are fully extracted in order to limit warming to 1.5°C.⁸⁸ In short, the analysis established that there is no room in the carbon budget for new fossil fuel extraction or infrastructure anywhere, including in the United States, and much existing fossil fuel production must be phased out to avoid the catastrophic damages from climate change.⁸⁹

Other studies issued since then reinforce these findings. The United Nations *Production Gap Reports* found that governments plan to produce more than twice the amount of fossil fuels in 2030 than would be consistent with limiting warming to 1.5°C.⁹⁰ According to the U.N. analyses, fossil fuel producers are planning an average increase of 2% per year in production, which by 2030 would result in more than double the production consistent with the 1.5°C limit. Instead, to follow a 1.5°C-consistent pathway, the world’s governments will need to decrease fossil fuel production by roughly 6% per year between 2020 and 2030, including annual production declines of 11% for coal, 4% for oil and 3% for gas.

The 2021 *Fossil Fuel Exit Strategy* analysis similarly confirms that ending fossil fuel expansion and the early phase-out of existing extraction is necessary to meet the 1.5°C limit.⁹¹ The analysis concluded that even if all new fossil fuel extraction were halted, in 2030 emissions from existing fossil fuel production would be 66% higher than what is needed to limit temperature rise to 1.5°C. The report estimated that global fossil fuel production will need to decline by an average of 9.5% for coal, 8.5% for oil and 3.5% for gas per year between 2021 and 2030 to remain aligned with 1.5°C. The authors emphasized that “more fossil fuels are already being produced than what is needed, as the world has more than enough renewable energy resources that can be scaled up rapidly enough to meet the energy demands of every person in the world without any shortfall in global energy generation.” As a result, many existing fossil fuel projects are already obsolete and risk becoming stranded assets as they simply are not needed to meet demand and cannot compete with renewable energy.

⁸⁷ The CO₂ emissions from developed reserves in currently operating oil and gas fields alone are estimated at 517 Gt CO₂, which would likely exhaust the 1.5°C-compatible carbon budget estimated in the 2018 IPCC report on *Global Warming of 1.5°C* at 420 GtCO₂ to 570 GtCO₂.

⁸⁸ Oil Change International, *The Sky’s Limit California: Why the Paris Climate Goals Demand That California Lead in a Managed Decline of Oil Extraction* (2018), <http://priceofoil.org/ca-skys-limit> at 7, 13.

⁸⁹ This conclusion was reinforced by the IPCC Fifth Assessment Report which estimated that global fossil fuel reserves exceed the remaining carbon budget (from 2011 onward) for staying below 2°C (a target incompatible with the Paris Agreement) by 4 to 7 times, while fossil fuel resources exceed the carbon budget for 2°C by 31 to 50 times. See Bruckner, Thomas et al., 2014: *Energy Systems in Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press (2014), at Table 7.2.

⁹⁰ SEI, IISD, ODI, E3G, and UNEP, *The Production Gap: The discrepancy between countries’ planned fossil fuel production and global production levels consistent with limiting warming to 1.5°C or 2°C (2020)*, <http://productiongap.org/>; SEI, IISD, ODI, E3G, and UNEP, *The Production Gap Report 2021* (2021), <http://productiongap.org/2021report>.

⁹¹ Teske, Sven & Sarah Niklas, *Fossil Fuel Exit Strategy: An orderly wind down of coal, oil and gas to meet the Paris Agreement* (June 2021), <https://fossilfuel treaty.org/exit-strategy>.

In addition, a 2021 analysis concluded that globally at least 89% of coal reserves, 58% of oil reserves, and 59% of gas reserves must be kept in the ground in order to have even a 50-50 chance of meeting a 1.5°C limit.⁹²

Scientific research makes clear that the United States, as a dominant driver in expanding global fossil production, must halt new fossil fuel extraction and infrastructure and rapidly phase out existing production and infrastructure to avoid jeopardizing our ability to meet the Paris climate limits.⁹³ A 2021 analysis concluded that U.S. oil and gas production is poised to expand by the largest absolute increase globally by 2030, more than twice as much as any other country.⁹⁴ A separate study found that the U.S. oil and gas industry is on track to account for 60% of the world's projected growth in oil and gas production between now and 2030—the time period over which the IPCC concluded that global carbon dioxide emissions should be roughly halved to meet the 1.5°C Paris Agreement limit.⁹⁵ Between 2018 and 2050, the United States is poised to unleash the world's largest burst of CO₂ emissions from new oil and gas development—primarily from shale and largely dependent on fracking—estimated at 120 billion metric tons of CO₂ which is equivalent to the lifetime CO₂ emissions of nearly 1,000 coal-fired power plants. Based on a 1.5°C IPCC pathway, U.S. production alone would exhaust nearly 50% of the world's total allowance for oil and gas by 2030 and exhaust more than 90% by 2050. Additionally, if U.S. coal production is to be phased out over a timeframe consistent with equitably meeting the Paris goals, at least 70% of U.S. coal reserves in already-producing mines must stay in the ground. In short, if not curtailed, U.S. fossil fuel expansion will impede the world's ability to meet the Paris climate limits and preserve a livable planet.

Research on the carbon emissions locked in U.S. fossil fuels similarly establishes that the U.S. must halt new fossil fuel production and rapidly phase out existing production to avoid the worst dangers of climate change. One quarter of total U.S. greenhouse gas emissions comes from the extraction and end-use combustion of fossil fuels produced on federal lands alone—not including non-federal lands.⁹⁶ A 2015 analysis estimated that recoverable fossil fuels from U.S. federal lands would release up to 349 to 492 GtCO₂eq of carbon emissions, if fully extracted and burned.⁹⁷ Of that amount, already leased fossil fuels would release 30 to 43 GtCO₂eq of emissions, while as yet unleased fossil fuels would emit 319 to 450 GtCO₂eq of emissions. Thus, the carbon emissions from already leased fossil fuel resources on federal lands alone (30 to 43

⁹² Welsby, Dan et al., Unextractable fossil fuels in a 1.5 °C world, 597 *Nature* 230 (2021), <https://doi.org/10.1038/s41586-021-03821-8>.

⁹³ Oil Change International, *Drilling Toward Disaster: Why U.S. Oil and Gas Expansion Is Incompatible with Climate Limits* (January 2019), <http://priceofoil.org/drilling-towards-disaster>.

⁹⁴ Achakulwisut, Ploy & Peter Erickson, Trends in fossil fuel extraction: Implications for a shared effort to align global fossil fuel production with climate limits, Stockholm Environment Institute Working Paper (April 2021), www.sei.org/publications/trends-in-fossil-fuel-extraction/ at Figure 3.

⁹⁵ Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C*, an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (2018), <http://www.ipcc.ch/report/sr15/> at SPM-15.

⁹⁶ Merrill, Matthew D. et al., Federal lands greenhouse gas emissions and sequestration in the United States—Estimates for 2005–14: U.S. Geological Survey Scientific Investigations Report 2018–5131 (2018) at 8.

⁹⁷ Ecoshift Consulting, et al., *The Potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels*, Prepared for Center for Biological Diversity & Friends of the Earth (2015).

GtCO₂eq) would exceed any remaining U.S. carbon budget for a 1.5°C limit⁹⁸ and exhaust ~10% of the remaining *global* carbon budget for 1.5°C.⁹⁹ The potential carbon emissions from unleased federal fossil fuel resources (319 to 450 GtCO₂eq) would exhaust the entire global carbon budget for limiting warming to 1.5°C. This does not include the additional carbon emissions that will be emitted from fossil fuels extracted on non-federal lands, estimated up to 500 GtCO₂eq if fully extracted and burned. In contrast, a nationwide federal fossil fuel leasing ban would reduce carbon emissions by an estimated 280 million tons per year, ranking among the most ambitious U.S. federal climate policy proposals in recent years.¹⁰⁰

Moreover, the Energy Information Administration (“EIA”) released its Annual Energy Outlook for 2020 that contains energy-related projections through 2050. The report indicates that without significant policy changes and a rapid transition away from fuels, annual U.S. greenhouse gas emissions are projected to begin rising again by the 2030s.¹⁰¹ This means that the United States will not be anywhere close to where scientists say it needs to be to reduce its contributions to the climate crisis and avert the most catastrophic impacts of climate change.

These analyses highlight that the United States has an urgent responsibility to lead in the transition from fossil fuel production to 100% clean energy, as a wealthy nation with ample financial resources and technical capabilities, and due to its dominant role in driving climate change and its harms. The U.S. is currently the world’s largest oil and gas producer and second-largest coal producer.¹⁰² The U.S. is also the world’s largest historic emitter of greenhouse gas pollution, responsible for 25% of cumulative global CO₂ emissions since 1870, and is currently the world’s second highest emitter on an annual basis and highest emitter on a per capita basis.¹⁰³ The U.S. must focus its resources and technology to rapidly phase out extraction while investing in a just transition for affected workers and communities currently living on the front lines of the fossil fuel industry and its pollution.¹⁰⁴

Ending the approval of new fossil fuel production and infrastructure is also critical for preventing “carbon lock-in,” where approvals and investments made now can lock in decades-worth of fossil fuel extraction that we cannot afford. New approvals for wells, mines, and fossil fuel

⁹⁸ See for example, Van den Berg, Nicole et al., Implications of various effort-sharing approaches for national carbon budgets and emission pathways, *Climatic Change* 162: 1805-1822 (2020), <https://link.springer.com/article/10.1007%2Fs10584-019-02368-y> (showing a range for the U.S. carbon budget for 2010-2100 of ~10 GtCO₂ to -90 GtCO₂ for a 1.5°C limit at Figure 4).

⁹⁹ As noted above, the IPCC Sixth Assessment Report updated the remaining global carbon budget from the beginning of 2020 at 400 GtCO₂ for a 67% probability of meeting the 1.5°C limit.

¹⁰⁰ Erickson, Peter & Michael Lazarus, Would constraining U.S. fossil fuel production affect global CO₂ emissions? A case study of US leasing policy, *150 Climatic Change* 29 (2018).

¹⁰¹ U.S. Energy Information Administration, Annual Energy Outlook 2020 with projections to 2050 (Jan. 2020), <https://www.eia.gov/outlooks/aeo/pdf/AEO2020%20Full%20Report.pdf>.

¹⁰² SEI, IISD, ODI, E3G, and UNEP, The Production Gap Report 2021 (2021), <http://productiongap.org/2021report> at Table 4.1.

¹⁰³ Le Quéré, Corinne et al., Global carbon budget 2018, *10 Earth System Science Data* 2141 (2018) at 2163 and Figure 5, 2167; Global Carbon Project, Global Carbon Budget 2018 (Dec. 5 2018), https://www.globalcarbonproject.org/carbonbudget/18/files/GCP_CarbonBudget_2018.pdf at 19 (Historical cumulative fossil CO₂ emissions by country).

¹⁰⁴ Piggot, Georgia et al., Realizing a just and equitable transition away from fossil fuels, Discussion brief, Stockholm Environment Institute (January 2019), <https://www.sei.org/publications/just-and-equitable-transition-fossil-fuels/>.

infrastructure — such as pipelines and marine and rail import and export terminals — require upfront investments that provide financial incentives for companies to continue production for decades into the future.¹⁰⁵ As summarized by Green and Denniss (2018):

When production processes require a large, upfront investment in fixed costs, such as the construction of a port, pipeline or coalmine, future production will take place even when the market price of the resultant product is lower than the long-run opportunity cost of production. This is because rational producers will ignore ‘sunk costs’ and continue to produce as long as the market price is sufficient to cover the marginal cost (but not the average cost) of production. This is known as ‘lock-in.’¹⁰⁶

Given the long-lived nature of fossil fuel projects, ending the approval of new fossil fuel projects is necessary to avoid the lock-in of decades of fossil fuel production and associated emissions.

Other research has separately demonstrated that construction of new fossil fuel infrastructure projects, including but not limited to pipelines, import and export terminals, storage facilities, refineries, power plants and petrochemical plants, is also inconsistent with meeting the 1.5°C limit.¹⁰⁷ This research shows that the committed carbon emissions from *existing* fossil fuel infrastructure in the energy and industrial sectors exceed the carbon budget for limiting warming to 1.5°C, meaning that no new fossil infrastructure can be built and much existing infrastructure must be *retired early* to avoid catastrophic climate harms.¹⁰⁸

The climate emergency demands immediate action to establish the maximum production rate and phase-down the rates of oil and gas well production. Indeed, the best available science on climate change demonstrates that we not only need to end the federal fossil fuel leasing program, but phase-down existing production as well. As recently stated by several scientific experts, “[t]he scale of threats to the biosphere and all its lifeforms — including humanity — is in fact so great that it is difficult to grasp for even well-informed experts” and our planet faces a “ghastly future” unless swift action is taken to reverse the climate crisis, including “a rapid exit from fossil fuel

¹⁰⁵ Davis, Steven J. and Robert H. Socolow, Commitment accounting of CO₂ emissions, 9 Environmental Research Letters 084018 (2014); Erickson, Peter et al., Assessing carbon lock-in, 10 Environmental Research Letters 084023 (2015); Erickson, Peter et al., Carbon lock-in from fossil fuel supply infrastructure, Stockholm Environment Institute, Discussion Brief (2015); Seto, Karen C. et al., Carbon Lock-In: Types, Causes, and Policy Implications, 41 Annual Review of Environmental Resources 425 (2016); Green, Fergus and Richard Denniss, Cutting with both arms of the scissors: the economic and political case for restrictive supply-side climate policies, 150 Climatic Change 73 (2018).

¹⁰⁶ Green, Fergus and Richard Denniss, Cutting with both arms of the scissors: the economic and political case for restrictive supply-side climate policies, 150 Climatic Change 73 (2018) at 78.

¹⁰⁷ Tong, D. et al., Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target, 572 Nature 373 (2019); Smith, C.J. et al., Current fossil fuel infrastructure does not yet commit us to 1.5 °C warming, 10 Nature Communications 101 (2019); Pfeiffer, Alexander et al., Committed emissions from existing and planned power plants and asset stranding required to meet the Paris Agreement, 13 Environmental Research Letters 054019 (2018).

¹⁰⁸ Tong, D. et al., Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target, 572 Nature 373-377 (2019).

use.”¹⁰⁹ In light of this reality, not taking the petitioned actions would constitute a gross dereliction of the Secretary’s obligation to ensure our public lands and waters are managed consistent with protection of the environment and national energy needs.

IV. An International Scientific Consensus Has Established That Human-caused Climate Change Is Already Causing Widespread Harms, Climate Change Threats Are Becoming Increasingly Dangerous, And Fossil Fuels Are The Dominant Driver Of The Climate Crisis

An overwhelming international scientific consensus has established that human-caused climate change is already causing widespread harms and that climate change threats are becoming increasingly dangerous.¹¹⁰ The climate crisis, caused primarily by fossil fuels, poses an existential threat to every aspect of society. Fossil fuel-driven climate change has already led to more frequent and intense heat waves, floods, and droughts; more destructive hurricanes and wildfires; rising seas and coastal erosion; increased spread of disease; food and water insecurity; acidifying oceans; and increasing species extinction risk and the collapse of ecosystems. The climate crisis is killing people across the nation and around the world, accelerating the extinction crisis, and costing the U.S. economy billions in damages every year.

The harms from the climate crisis and fossil fuel pollution are not felt equally, but instead fall first and worst on Black, Brown, Indigenous, and other communities of color, as well as low-wealth and other frontline communities, worsening the environmental justice crisis.¹¹¹ The vast scientific literature documenting these findings has been set forth in a series of authoritative reports from the Intergovernmental Panel on Climate Change (IPCC), U.S. Global Change Research Program, and other institutions,¹¹² which make clear that fossil-fuel driven climate change is a “code red for humanity.”¹¹³ Without limits on fossil fuel production and deep and

¹⁰⁹ Bradshaw, C., et al. 2021. Understanding the Challenges of a Ghastly Future. *Front. Conserv. Sci.* Vol. 1, Article 615419.

¹¹⁰ Intergovernmental Panel on Climate Change, *Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (2014) at 2.

¹¹¹ Donaghy, Tim & Charlie Jiang for Greenpeace, Gulf Coast Center for Law & Policy, Red, Black & Green Movement, and Movement for Black Lives, *Fossil Fuel Racism: How Phasing Out Oil, Gas, and Coal Can Protect Communities* (2021), <https://www.greenpeace.org/usa/wp-content/uploads/2021/04/Fossil-Fuel-Racism.pdf>; U.S. Environmental Protection Agency, *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts*, EPA 430-R-21-003 (2021), www.epa.gov/cira/social-vulnerability-report.

¹¹² The most recent of these reports includes: U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/>; U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II* (2018), <https://nca2018.globalchange.gov/>; Intergovernmental Panel on Climate Change, *Summary for Policymakers*. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (2018) [Masson-Delmotte, V. et al. (eds.)], <https://www.ipcc.ch/sr15/>; Intergovernmental Panel on Climate Change, *Summary for Policymakers*. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i>.

¹¹³ United Nations Secretary-General, *Secretary-General’s statement on the IPCC Working Group I Report on the Physical Science Basis of the Sixth Assessment*, Aug. 9, 2021, <https://www.un.org/sg/en/content/secretary-generals-statement-the-ipcc-working-group-1-report-the-physical-science-basis-of-the-sixth-assessment>.

rapid emissions reductions, global temperature rise will exceed 1.5°C and will result in catastrophic damage in the U.S. and around the world.¹¹⁴

The Intergovernmental Panel on Climate Change (“IPCC”), the international scientific body for the assessment of climate change, concluded in its *Climate Change 2021: The Physical Science Basis* report that:

[i]t is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred,” and further that “[t]he scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years.¹¹⁵

The U.S. federal government has repeatedly recognized that human-caused climate change is causing widespread and intensifying harms across the country in the authoritative National Climate Assessments. These scientific syntheses are prepared by hundreds of scientific experts and reviewed by the National Academy of Sciences and federal agencies. Most recently, the Fourth National Climate Assessment, comprised of the 2017 *Climate Science Special Report* (Volume I)¹¹⁶ and the 2018 *Impacts, Risks, and Adaptation in the United States* (Volume II),¹¹⁷ concluded that “there is no convincing alternative explanation” for the observed warming of the climate over the last century other than human activities.¹¹⁸ It found that “evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans’ physical, social, and economic well-being are rising.”¹¹⁹

In 2009 the Environmental Protection Agency (“EPA”) found that the then-current and projected concentrations of greenhouse gas pollution endanger the public health and welfare of current and future generations, based on robust scientific evidence of the harms from climate change.¹²⁰ A 2018 study reviewed the scientific evidence that has emerged since 2009 and concluded that this

¹¹⁴ Intergovernmental Panel on Climate Change, Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (2018) [Masson-Delmotte, V. et al. (eds.)], <https://www.ipcc.ch/sr15/>.

¹¹⁵ Intergovernmental Panel on Climate Change, Summary for Policymakers In: *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021) at SPM-5 and SPM-9.

¹¹⁶ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment*, Vol. I (2017), <https://science2017.globalchange.gov/>.

¹¹⁷ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States*, Fourth National Climate Assessment, Volume II (2018).

¹¹⁸ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment*, Vol. I (2017), <https://science2017.globalchange.gov/> at 10.

¹¹⁹ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States*, Fourth National Climate Assessment, Volume II (2018) at 36.

¹²⁰ U.S. EPA [U.S. Environmental Protection Agency], *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule*, 74 Federal Register 66496 (2009).

evidence “lends increased support” for EPA’s endangerment finding.¹²¹ The study by 16 prominent scientists examined the topics covered by the endangerment finding and concluded that “[f]or each of the areas addressed in the [endangerment finding], the amount, diversity, and sophistication of the evidence has increased dramatically, clearly strengthening the case for endangerment.”¹²² The study also found that the risks of some impacts are even more severe or widespread than anticipated in 2009.

The National Climate Assessments decisively recognize the dominant role of fossil fuels in driving climate change. As stated by the Third National Climate Assessment: “observations unequivocally show that climate is changing and that the warming of the past 50 years is primarily due to human-induced emissions of heat-trapping gases. These emissions come mainly from burning coal, oil, and gas.”¹²³ The Fourth National Climate Assessment reported that “fossil fuel combustion accounts for approximately 85% of total U.S. greenhouse gas emissions,”¹²⁴ which is “driving an increase in global surface temperatures and other widespread changes in Earth’s climate that are unprecedented in the history of modern civilization.”¹²⁵

The National Climate Assessments make clear that the harms of climate change are long-lived, and the choices we make now on reducing greenhouse gas pollution will affect the severity of the climate change damages that will be suffered in the coming decades and centuries: “[t]he impacts of global climate change are already being felt in the United States and are projected to intensify in the future — but the severity of future impacts will depend largely on actions taken to reduce greenhouse gas emissions and to adapt to the changes that will occur.”¹²⁶ As the Fourth National Climate Assessment explains:

Many climate change impacts and associated economic damages in the United States can be substantially reduced over the course of the 21st century through global-scale reductions in greenhouse gas emissions, though the magnitude and timing of avoided risks vary by sector and region. The effect of near-term emissions mitigation on reducing risks is expected to become apparent by mid-century and grow substantially thereafter.¹²⁷

Similarly, a 2014 White House report found that the cost of delay on reducing emissions is not only extremely steep but also potentially irreversible, and the costs rise exponentially with continued delays.¹²⁸ As summarized by the National Research Council:

¹²¹ Duffy, Philip B. et al., Strengthened Scientific Support for the Endangerment Finding for Atmospheric Greenhouse Gases, Science doi: 10.1126/science.aat5982 (2018) at 1.

¹²² *Id.* at 1.

¹²³ Melillo, Jerry M et al. (eds.), Climate Change Impacts in the United States: The Third National Climate Assessment, U.S. Global Change Research Program (2014) at 2. *See also* Report Finding 1 at 15: “The global warming of the past 50 years is primarily due to human activities, predominantly the burning of fossil fuels.”

¹²⁴ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Volume II (2018), <https://nca2018.globalchange.gov/> at 60.

¹²⁵ *Id.* at 39.

¹²⁶ *Id.* at 34.

¹²⁷ *Id.* at 1347.

¹²⁸ The White House, The Cost of Delaying Action to Stem Climate Change (July 29, 2014), <https://obamawhitehouse.archives.gov/the-press-office/2014/07/29/white-house-report-cost-delaying-action-stem-climate-change> at 2.

Emissions of carbon dioxide from the burning of fossil fuels have ushered in a new epoch where human activities will largely determine the evolution of Earth's climate. Because carbon dioxide in the atmosphere is long lived, it can effectively lock Earth and future generations into a range of impacts, some of which could become very severe. [E]mission reduction choices made today matter in determining impacts experienced not just over the next few decades, but in the coming centuries and millennia.¹²⁹

V. The 2018 and 2021 IPCC Reports Make Clear That Greenhouse Gas Emissions Must Be Halved In This Decade To Avoid The Most Devastating Consequences of Climate Change

In 2018, the Intergovernmental Panel on Climate Change (“IPCC”) issued a *Special Report on Global Warming of 1.5°C* that quantified the devastating harms that would occur at 2°C temperature rise versus 1.5°C. This report highlighted the necessity of limiting warming to 1.5°C to avoid catastrophic impacts to people and life on Earth.¹³⁰ The IPCC 2018 *Special Report* provides overwhelming evidence that aggressive reductions in fossil fuel emissions within this decade are essential to avoiding the most devastating climate change harms.

According to the IPCC's analysis, the damages that would occur at 2°C warming compared with 1.5°C include significantly more deadly heatwaves, drought and flooding; 10 centimeters of additional sea level rise within this century, exposing 10 million more people to flooding; a greater risk of triggering the collapse of the Greenland and Antarctic ice sheets with resulting multi-meter sea level rise; dramatically increased species extinction risk, including a doubling of the number of vertebrate and plant species losing more than half their range, and the virtual elimination of coral reefs; 1.5 to 2.5 million more square kilometers of thawing permafrost area with the associated release of methane, a potent greenhouse gas; a tenfold increase in the probability of ice-free Arctic summers; a higher risk of heat-related and ozone-related deaths and the increased spread of mosquito-borne diseases such as malaria and dengue fever; reduced yields and lower nutritional value of staple crops like maize, rice, and wheat; a doubling of the number of people exposed to climate change-induced increases in water stress; and up to several hundred million more people exposed to climate-related risks and susceptible to poverty by 2050.¹³¹

The IPCC *Special Report* concludes that pathways to limit warming to 1.5°C with little or no overshoot require “a rapid phase out of CO₂ emissions and deep emissions reductions in other

¹²⁹ National Research Council, *Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia* (2011) at 3.

¹³⁰ Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C, An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (2018).

¹³¹ *Id.* at SPM-8 to SPM-14.

GHGs and climate forcers.”¹³² In pathways consistent with limiting warming to 1.5°C, global anthropogenic CO₂ emissions must decline by about 45% below 2010 levels by 2030 and reach near zero around 2045 or 2050.¹³³

The IPCC *Climate Change 2021* report concludes that global warming will exceed 1.5°C and 2°C by 2100 unless we make immediate, deep reductions in CO₂ and other greenhouse gas emissions.¹³⁴ Only the most stringent emissions reduction scenario—SSP1-1.9 in which global emissions fall steeply in the near-term, reach net zero in 2050, and become net negative afterward—is consistent with a 1.5°C climate target. In this low-emissions SSP1-1.9 scenario, global average surface temperature is projected to reach 1.5°C above pre-industrial in the near-term (2021-2040), overshoot and peak at 1.6°C in the mid-term (2041-2060), and drop down to 1.4°C in the long-term (2081-2100).¹³⁵

In short, both the IPCC *Climate Change 2021* report and the 2018 IPCC *Special Report* provide overwhelming scientific evidence for the necessity of immediate, deep greenhouse gas reductions across all sectors to avoid devastating climate change-driven damages, and underscores the high costs of inaction or delays, particularly in this crucial decade, in making these cuts.

VI. Human-caused Climate Change Is Causing Widespread Harms In The United States And Worldwide, And These Harms Will Worsen As Greenhouse Gas Pollution Continues To Rise

The IPCC Assessment Reports, U.S. National Climate Assessments, and tens of thousands of studies make clear that fossil-fuel driven climate change is a “code red for humanity,” and that every additional ton of CO₂ and fraction of a degree of temperature rise matters.¹³⁶ As warned by the IPCC, “every tonne of CO₂ emissions adds to global warming.”¹³⁷ The widespread, intensifying, and often long-lived harms from climate change include soaring air and ocean temperatures; more frequent and intense heat waves, floods, and droughts; more destructive hurricanes and wildfires; coastal flooding from sea level rise and increasing storm surge;

¹³² Rogelj, Joeri et al., *Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development*. In: *Global Warming of 1.5°C, An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (2018), <https://www.ipcc.ch/sr15/> at 112.

¹³³ Rogelj, Joeri et al., *Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development*. In: *Global Warming of 1.5°C, An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (2018), <https://www.ipcc.ch/sr15/> at Figure 2.6; also at *Summary for Policymakers* at 12-14.

¹³⁴ Intergovernmental Panel on Climate Change, *Summary for Policymakers In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021) at SPM-17.

¹³⁵ *Id.* at Table SPM.1.

¹³⁶ United Nations, Secretary-General's statement on the IPCC Working Group 1 Report on the Physical Science Basis of the Sixth Assessment, <https://www.un.org/sg/en/content/secretary-generals-statement-the-ipcc-working-group-1-report-the-physical-science-basis-of-the-sixth-assessment> (last accessed Sept. 24, 2021).

¹³⁷ IPCC, *Climate Change 2021* (2021) at *Summary for Policymakers* SPM-37.

declining food and water security; accelerating species extinction risk; melting Arctic sea ice, glaciers, and ice sheets; the collapse of Antarctic ice shelves; ocean acidification; and the collapse of coral reefs.¹³⁸ As summarized by the Fourth National Climate Assessment:

In addition to warming, many other aspects of global climate are changing, primarily in response to human activities. Thousands of studies conducted by researchers around the world have documented changes in surface, atmospheric, and oceanic temperatures; melting glaciers; diminishing snow cover; shrinking sea ice; rising sea levels; ocean acidification; and increasing atmospheric water vapor.¹³⁹

A. Environmental justice harms

The harms from climate change and fossil fuel pollution are not felt equally, but instead fall first and worst on Black, Brown, Indigenous, and low-wealth communities.¹⁴⁰ A 2021 EPA analysis concluded that communities of color are particularly vulnerable to the greatest impacts of climate change, including health harms, heat waves, poor air quality, and flooding.¹⁴¹ For example, with 2°C (3.6°F) of global warming, Black Americans are 34% more likely to currently live in areas with the highest projected increases in childhood asthma diagnoses and 40% more likely to currently live in areas with the highest projected increases in extreme temperature-related deaths.¹⁴² With 2°C (3.6°F) of global warming, Hispanic and Latino individuals are 43% more likely to currently live in areas with the highest projected reductions in labor hours due to extreme temperatures.¹⁴³

The fossil fuel pollution driving the climate crisis similarly disproportionately harms communities of color and low-wealth communities, and perpetuates the systemic racism and energy violence entrenched in the nation's fossil fuel energy system.¹⁴⁴ Fossil fuel infrastructure including oil and gas wells, refineries, fossil fuel power plants, and processing, transmission and storage facilities are often concentrated in communities of color and low-wealth communities, causing serious health harms to residents exposed to hazardous air and water pollution from

¹³⁸ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/>; U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Volume II (2018), <https://nca2018.globalchange.gov/>.

¹³⁹ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 10.

¹⁴⁰ Donaghy, Tim & Charlie Jiang for Greenpeace, Gulf Coast Center for Law & Policy, Red, Black & Green Movement, and Movement for Black Lives, Fossil Fuel Racism: How Phasing Out Oil, Gas, and Coal Can Protect Communities (2021), <https://www.greenpeace.org/usa/wp-content/uploads/2021/04/Fossil-Fuel-Racism.pdf>; U.S. Environmental Protection Agency, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts, EPA 430-R-21-003 (2021), *available at* www.epa.gov/cira/social-vulnerability-report.

¹⁴¹ U.S. Environmental Protection Agency, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts, EPA 430-R-21-003 (2021), *available at* www.epa.gov/cira/social-vulnerability-report.

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ Donaghy, Tim & Charlie Jiang for Greenpeace, Gulf Coast Center for Law & Policy, Red, Black & Green Movement, and Movement for Black Lives, Fossil Fuel Racism: How Phasing Out Oil, Gas, and Coal Can Protect Communities (2021), <https://www.greenpeace.org/usa/wp-content/uploads/2021/04/Fossil-Fuel-Racism.pdf>.

these facilities.¹⁴⁵ For example, research shows that people of color, particularly Black Americans, disproportionately live near toxic fracking wells,¹⁴⁶ and that the share of people of color living within three miles (five kilometers) of a coal- or oil-fired power plant is 12% larger than the national average.¹⁴⁷ As a result of this unequal siting of fossil fuel infrastructure, Black Americans have 1.54 times the exposure to particulate matter¹⁴⁸ compared to the overall population, while populations of color have 1.28 times higher burden than the general population.¹⁴⁹

B. Rising temperatures

Global average surface temperature rose by 2°F (1.09°C) between 1850-1900 and 2011-2020, with larger increases over land than over the ocean.¹⁵⁰ Each of the last four decades has been successively hotter than any preceding decades since 1850.¹⁵¹ Since 2012, global warming has been especially pronounced, with the past five years (2016-2020) being the hottest five-year period since 1850.¹⁵² Global temperatures of the past decade are likely the hottest it has been on Earth in 125,000 years.¹⁵³

Global surface temperature will continue to increase until at least mid-century under all scenarios considered in the IPCC *Climate Change 2021* report.¹⁵⁴ Global warming will exceed 1.5°C and

¹⁴⁵ See Bullard, Robert D. et al., *Toxic Wastes and Race at Twenty: 1987-2007* (March 2007), <http://www.ejnet.org/ej/twart.pdf>; Wilson, Adrian et al., *Coal Blooded: Putting Profits Before People*, NAACP, Indigenous Environmental Network & Little Village Environmental Justice Organization (2012), <https://naacp.org/resources/coal-blooded-putting-profits-people>; U.S. Environmental Protection Agency, *EJ Screening Report for the Clean Power Plan* (2015), <https://archive.epa.gov/epa/sites/production/files/2016-04/documents/ejscreencpp.pdf>; Massetti, Emanuele et al., *Environmental Quality and the U.S. Power Sector: Air Quality, Water Quality, Land Use and Environmental Justice*, ORNL/SPR-2016/772 (2017), <https://info.ornl.gov/sites/publications/files/Pub60561.pdf>; PSE Healthy Energy, *Natural gas power plants in California's disadvantaged communities* (April 2017), https://www.psehealthyenergy.org/wp-content/uploads/2017/04/CA.EJ_Gas_Plants.pdf.

¹⁴⁶ Zwickl, Klara., *The demographics of fracking: A spatial analysis for four U.S. states*, 161 *Ecological Economics* 202 (2019), <https://www.sciencedirect.com/science/article/abs/pii/S092180091830661X>.

¹⁴⁷ Massetti, Emanuele et al., *Environmental Quality and the U.S. Power Sector: Air Quality, Water Quality, Land Use and Environmental Justice*, ORNL/SPR-2016/772 (2017), <https://info.ornl.gov/sites/publications/files/Pub60561.pdf>.

¹⁴⁸ An air pollutant linked to a wide variety of health harms including respiratory conditions, heart attacks, and premature death. See U.S. Environmental Protection Agency, *Health and Environmental Effects of Particulate Matter (PM)*, <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm> (last visited Aug. 30, 2021).

¹⁴⁹ Mikati, Ihab et al., *Disparities in distribution of particulate matter emission sources by race and poverty status*, 108 *American Journal of Public Health* 480 (2018), <https://ajph.aphapublications.org/doi/10.2105/AJPH.2017.304297>.

¹⁵⁰ Intergovernmental Panel on Climate Change, *Summary for Policymakers*. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-5 and SPM-6.

¹⁵¹ *Id.* at SPM-5 and SPM-6.

¹⁵² Intergovernmental Panel on Climate Change, *Technical Summary*. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at TS-8.

¹⁵³ *Id.* at SPM-9.

¹⁵⁴ *Id.* at SPM-17.

2°C by 2100 unless deep reductions in CO₂ and other greenhouse gas emissions occur in the coming decades.¹⁵⁵ Compared to 1850-1900, global surface temperature by 2100 is very likely to be higher by 1.8°F to 3.2°F (1.0°C to 1.8°C) under the very low GHG emissions scenario considered (SSP1-1.9; CO₂ emissions reach net zero around 2050), by 3.8°F to 6.3°F (2.1°C to 3.5°C) in the intermediate scenario (SSP2-4.5; CO₂ emissions remain around current levels until 2050) and by 5.9°F to 10.2°F (3.3°C to 5.7°C) under the very high GHG emissions scenario (SSP5-8.5; CO₂ emissions double by 2050).¹⁵⁶ It is believed that global surface temperature has not been at or above 4.5°F (2.5°C) higher than 1850-1900 in over 3 million years.¹⁵⁷

In the United States average temperatures rose by 1.8°F (1.0°C) between 1901 and 2016, with the most rapid heating occurring after 1979.¹⁵⁸ U.S. temperatures are expected to rise by an additional 2.5°F (1.4°C), on average, by mid-century relative to 1976-2005, and record-setting hot years will become commonplace.¹⁵⁹ By late century, much greater heating is projected, ranging from 2.8 to 7.3°F (1.6 to 4.1°C) under a lower emissions scenario and 5.8 to 11.9°F (3.2 to 6.6°C) under a higher emissions scenario,¹⁶⁰ with the largest increases in the upper Midwest and Alaska.¹⁶¹ The urban heat island effect—which is expected to strengthen as urban areas expand and become denser—will amplify climate-related warming even beyond those dangerous increases.¹⁶²

C. Increasing frequency of extreme weather events

Climate change is increasing the frequency and intensity of extreme weather events, particularly heat waves and heavy precipitation events.¹⁶³ In the contiguous United States, extreme temperatures are expected to increase even more than average temperatures, with more intense heat waves and 20 to 30 more days per year above 90°F by mid-century for most regions under a

¹⁵⁵ *Id.* at SPM-17.

¹⁵⁶ *Id.* at SPM-17.

¹⁵⁷ *Id.* at SPM-15 - SPM-17.

¹⁵⁸ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 17.

¹⁵⁹ *Id.* at 11.

¹⁶⁰ *Id.* at 17.

¹⁶⁰ *Id.* at 17, 136: The high emissions scenario RCP 8.5 corresponds to a rise of CO₂ levels from the current-day 400 ppm up to 936 ppm by the end of this century. The lower emissions scenarios RCP4.5 and RCP 2.6 correspond to atmospheric CO₂ levels remaining below 550 and 450 ppm by 2100, respectively. These scenarios are numbered according to change in radiative forcing by 2100: +2.6, +4.5, +8.5 watts per square meter (W/m²).

¹⁶¹ *Id.* at Figure ES.4.

¹⁶² *Id.* at 17.

¹⁶³ Coumou, Dim & Stefan Rahmstorf, A decade of weather extremes, 2 *Nature Climate Change* 491 (2012); Intergovernmental Panel on Climate Change, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, Special Report of the Intergovernmental Panel on Climate Change (2012), <https://www.ipcc.ch/report/managing-the-risks-of-extreme-events-and-disasters-to-advance-climate-change-adaptation/>; Herring, Stephanie C. et al., Explaining extreme events of 2016 from a climate perspective, 99 *Bulletin of the American Meteorological Society* S1 (2017); U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 18-20; Intergovernmental Panel on Climate Change, Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-10.

higher emissions scenario.¹⁶⁴ Heavy precipitation has become more frequent and intense in most regions of the U.S. since 1901,¹⁶⁵ as more water vapor is available to fuel extreme rain and snowstorms as the world warms.¹⁶⁶ Heavy precipitation events are projected to continue to increase in frequency and intensity across the United States, with the number of extreme events rising by two to three times the historical average by the end of the century under a higher emissions scenario.¹⁶⁷ Climate change is also projected to increase the frequency and severity of landfalling “atmospheric rivers” on the West Coast.¹⁶⁸

Rising temperatures have exacerbated recent historic droughts by reducing soil moisture and contributing to earlier spring melt and reduced water storage in snowpack.¹⁶⁹ As conditions become hotter and drier, climate change is contributing to an increase in extreme fire weather, area burned by wildfire, and a lengthening of the wildfire season, particularly in the western United States.¹⁷⁰

A growing body of attribution studies (i.e., studies assessing how human-caused climate change may have affected the strength and likelihood of individual extreme events) has determined that human-caused climate change has not only intensified many recent extreme weather events, but that some extreme weather events could not have happened without human-induced climate change.¹⁷¹ For example, in 2016, the intense marine heat wave off Alaska—which drove oyster farm failures, harmful algal blooms, mass seabird die offs, and failed subsistence harvests—was found to be up to fifty times more likely due to anthropogenic warming.¹⁷² The sequence of consecutive record-breaking temperatures in 2014–2016 had a negligible (<0.03%) likelihood of occurring in the absence of anthropogenic warming.¹⁷³

Climate change-related weather extremes are also weakening the ability of the terrestrial biosphere (vegetation and soil) to uptake carbon, a significant development because the terrestrial biosphere absorbs about 25% of anthropogenic carbon dioxide emissions.¹⁷⁴ Droughts,

¹⁶⁴ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 185, 199.

¹⁶⁵ *Id.* at 20.

¹⁶⁶ *Id.* at 214.

¹⁶⁷ *Id.* at 207, 218.

¹⁶⁸ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Volume II* (2018), <https://nca2018.globalchange.gov/> at 74.

¹⁶⁹ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 45, 236.

¹⁷⁰ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II* (2018), <https://nca2018.globalchange.gov/>.

¹⁷¹ Herring, Stephanie C. et al., Explaining extreme events of 2016 from a climate perspective, 99 *Bulletin of the American Meteorological Society* S1 (2018). The *Bulletin of the American Meteorological Society* has published an annual attribution study compendium since 2011.

¹⁷² Oliver, Eric C. et al., Anthropogenic and natural influences on record 2016 marine heat waves, 99 *Bulletin of the American Meteorological Society* S44 (2018); Walsh, John E. et al., The high latitude marine heat wave of 2016 and its impacts on Alaska, 99 *Bulletin of the American Meteorological Society* S39 (2018).

¹⁷³ Mann, Michael E. et al., Record temperature streak bears anthropogenic fingerprint, 44 *Geophysical Research Letters* 7936 (2017).

¹⁷⁴ Green, Julia K. et al., Large influence of soil moisture on long-term terrestrial carbon uptake, 565 *Nature* 476 (2019).

heat waves and other extreme climate-related events reduce soil moisture, lowering carbon uptake now and projected into the future.

D. More destructive hurricanes

Climate change is increasing the destructive power of hurricanes by increasing their intensity, rainfall, and storm surge. Because hurricanes are fueled by heat, hotter ocean temperatures are increasing the strength of Atlantic hurricanes¹⁷⁵ and allowing them to intensify more quickly.¹⁷⁶ During 2016 to 2019, the U.S. suffered the longest streak of Category 5 hurricanes on record. Hotter air also holds more moisture, causing heavier rainfall during hurricanes.¹⁷⁷ For example, global warming is estimated to have made Hurricane Harvey's record rainfall 3.5 times more likely and increased its total rainfall by 15 to 38%.¹⁷⁸ If emissions are not reduced, hurricane rainfall is projected to increase by 15 to 35%, with wind speeds rising by as much as 25 knots.¹⁷⁹ Rising sea levels due to climate change are also causing higher storm surge—the enormous walls of water pushed onto the coast by storms.¹⁸⁰ Large storm surge events of the magnitude of Hurricane Katrina have already doubled, and are projected to increase in frequency by twofold to sevenfold for each degree Celsius of temperature rise.¹⁸¹ During 2017 and 2018 alone, five major hurricanes cost the United States at least 3,269 lost lives and \$325 billion in damages.¹⁸² As the climate crisis worsens, Atlantic hurricane intensity, rainfall and storm surge are projected to increase further, making hurricanes ever-more destructive.¹⁸³

¹⁷⁵ Holland, G. & C.L. Bruyère, Recent intense hurricane response to global climate change, 42 *Climate Dynamics* 617 (2014); Fraza, Erik & James B. Elsner, A climatological study of the effect of sea-surface temperature on North Atlantic hurricane intensification, 36 *Physical Geography* 395 (2015); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Volume I* (2017), <https://science2017.globalchange.gov/> at 257; U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Vol. II* (2018), <https://nca2018.globalchange.gov/> at 74.

¹⁷⁶ Bhatia, Kieran T. et al., Recent increases in tropical cyclone intensification rates, 10 *Nature Communication* 635 (2019).

¹⁷⁷ Emanuel, Kerry, Assessing the present and future probability of Hurricane Harvey's rainfall, 114 *PNAS* 12681 (2017); Keellings, David & José J. Hernández Ayala, Extreme rainfall associated with Hurricane Maria over Puerto Rico and its connections to climate variability and change, 46 *Geophysical Research Letters* 2964 (2019).

¹⁷⁸ Risser, Mark D. & Michael F. Wehner, Attributable human-induced changes in the likelihood and magnitude of the observed extreme precipitation during Hurricane Harvey, 44 *Geophysical Research Letters* 12,457 (2017); Patricola, Christina M. & Michael F. Wehner, Anthropogenic influences on major tropical cyclone events, 563 *Nature* 339 (2018).

¹⁷⁹ Patricola, Christina M. & Michael F. Wehner, Anthropogenic influences on major tropical cyclone events, 563 *Nature* 339 (2018).

¹⁸⁰ Komar, Paul D. & Jonathan C. Allan, Increasing hurricane-generated wave heights along the U.S. east coast and their climate controls, 24 *Journal of Coastal Research* 479 (2008); Grinsted, Aslak et al., Homogeneous record of Atlantic hurricane surge threat since 1923, 109 *PNAS* 19601 (2012).

¹⁸¹ Grinsted, Aslak et al., Homogeneous record of Atlantic hurricane surge threat since 1923, 109 *PNAS* 19601 (2012); Grinsted, Aslak et al., Projected hurricane surge threat from rising temperatures, 110 *PNAS* 5369 (2013).

¹⁸² National Oceanic and Atmospheric Administration, National Centers for Environmental Information (NCEI), *U.S. Billion-Dollar Weather and Climate Disasters* (2021), <https://www.ncdc.noaa.gov/billions/>.

¹⁸³ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 257; U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Volume II* (2018), <https://nca2018.globalchange.gov/> at 74, 95.

E. Rising seas

Global average sea level has risen by seven to eight inches (0.2 m) since 1901 as the oceans have gotten hotter and land-based ice has melted.¹⁸⁴ Global average sea level has risen faster since 1900 than in any other century in at least the last 3,000 years.¹⁸⁵ Sea level rise is accelerating in pace: the recent rate of sea level rise is nearly triple the rate between 1901-1971 (3.7 mm per year from 2006-2018 versus 1.3 mm per year from 1901-1971).¹⁸⁶ The Fourth National Climate Assessment estimated that global sea level is very likely to rise by 1.0 to 4.3 feet by the end of the century relative to the year 2000, with sea level rise of 8.2 feet possible.¹⁸⁷ Sea level rise will be much more extreme without strong action to reduce greenhouse gas pollution. By the end of the century, global mean sea level is projected to increase by 0.8 to 2.6 feet under a lower emissions RCP 2.6 scenario, compared with 1.6 to 6 feet under a high emissions RCP 8.5 scenario.¹⁸⁸ The impacts of sea level rise will be long-lived: under all emissions scenarios, sea levels will continue to rise for many centuries.¹⁸⁹

F. Coastal flooding from sea level rise and intensifying storm surge

Coastal regions are threatened by increasing flooding due to sea level rise and intensifying storm surge.¹⁹⁰ A nation-wide study estimated that approximately 3.7 million Americans live within three feet of high tide, putting them at extreme risk of flooding from sea level rise in the next few decades, with the most vulnerable residents in Florida, Louisiana, California, New York and New Jersey.¹⁹¹ Another study forecast that 4.2 million Americans would be at risk of flooding from three feet of sea level rise, while 13.1 million people would be at risk from six feet of sea level rise, driving mass human migration and societal disruption.¹⁹² An analysis of 136 of the world's largest coastal cities projected that global flood losses of US\$6 billion per year in 2005 will grow to US\$1 trillion or more per year by 2050 due to sea level rise and subsidence, if no

¹⁸⁴ Intergovernmental Panel on Climate Change, Summary for Policymakers In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-6.

¹⁸⁵ *Id.* at SPM-9.

¹⁸⁶ *Id.* at SPM-6.

¹⁸⁷ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Volume II (2018), <https://nca2018.globalchange.gov/> at 487, 758.

¹⁸⁸ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 344.

¹⁸⁹ Intergovernmental Panel on Climate Change, Summary for Policymakers In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-28.

¹⁹⁰ Hauer, Mathew E. et al., Millions projected to be at risk from sea-level rise in the continental United States, 6 Nature Climate Change 691 (2016); See online mapping tools at National Oceanic and Atmospheric Administration, Office for Coastal Management, DigitalCoast, Sea Level Rise Viewer, <https://coast.noaa.gov/digitalcoast/tools/slr.html>.

¹⁹¹ Strauss, Benjamin H. et al., Tidally adjusted estimates of topographic vulnerability to sea level rise and flooding for the contiguous United States, 7 Environmental Research Letters 014033 (2012).

¹⁹² Hauer, Matthew E. et al., Millions projected to be at risk from sea-level rise in the continental United States, 6 Nature Climate Change 691 (2016); Hauer, Mathew E., Migration induced by sea-level rise could reshape the US population landscape, 7 Nature Climate Change 321 (2017).

adaptation actions are taken, with Miami, New York and New Orleans suffering the highest current and projected economic losses in the U.S.¹⁹³

Coastal flooding is becoming more damaging as Atlantic hurricanes and hurricane-generated storm surges grow more severe due to climate change.¹⁹⁴ Sea levels on the U.S. East Coast from Cape Hatteras to Boston are rising three to four times faster than the global average,¹⁹⁵ which when combined with intensifying hurricanes and storm surge, is greatly increasing the flooding risk along the East Coast.¹⁹⁶ Under a lower emissions RCP 4.5 scenario, storm surge is projected to increase by 25 to 47% along the U.S. Gulf and Florida coasts due to the combined effects of sea level rise and growing hurricane intensity.¹⁹⁷ The increasing frequency of extreme precipitation events is also compounding coastal flooding risk when storm surge and heavy rainfall occur together.¹⁹⁸

Since the 1960s, sea level rise has increased the frequency of high tide flooding by a factor of 5 to 10 for several U.S. coastal communities, and flooding rates are accelerating in many Atlantic and Gulf Coast cities.¹⁹⁹ For much of the U.S. Atlantic coastline, a local sea level rise of 1.0 to 2.3 feet (0.3 to 0.7 m) would be sufficient to turn nuisance high tide events into major destructive floods.²⁰⁰ In Florida and Virginia, nuisance flooding due to sea level rise has already resulted in severe property damage and social disruption.²⁰¹ The frequency, depth, and extent of tidal flooding are expected to continue to increase in the future.²⁰²

As the Fourth National Climate Assessment warned, “Although storms, floods, and erosion have always been hazards, in combination with rising sea levels they now threaten approximately \$1 trillion in national wealth held in coastal real estate and the continued viability of coastal communities that depend on coastal water, land, and other resources for economic health and cultural integrity.”²⁰³

¹⁹³ Hallegatte, Stephane et al., Future flood losses in major coastal cities, 3 *Nature Climate Change* 802 (2013).

¹⁹⁴ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Vol. II* (2018), <https://nca2018.globalchange.gov/>, at 99.

¹⁹⁵ Sallenger, Asbury H. et al., Hotspot of accelerated sea-level rise on the Atlantic coast of North America, 2 *Nature Climate Change* 884 (2012).

¹⁹⁶ Little, Christopher M. et al., Joint projections of US East Coast sea level and storm surge, 5 *Nature Climate Change* 1114 (2015).

¹⁹⁷ Balaguru, Karthik et al., Future hurricane storm surge risk for the U.S. gulf and Florida coasts based on projections of thermodynamic potential intensity, 138 *Climatic Change* 99 (2016).

¹⁹⁸ Wahl, T. et al., Increasing risk of compound flooding from storm surge and rainfall for major US cities, 5 *Nature Climate Change* 1093 (2015).

¹⁹⁹ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Vol. II* (2018), <https://nca2018.globalchange.gov/> at 98-99.

²⁰⁰ *Id.* at 99.

²⁰¹ Atkinson, Larry P. et al., Sea level rise and flooding risk in Virginia, 5 *Sea Grant Law and Policy Journal* (2013), http://digitalcommons.odu.edu/cpo_pubs/102; Wdowinski, Shimon et al., Increasing flooding hazard in coastal communities due to rising sea level: Case study of Miami Beach, Florida, 126 *Ocean & Coastal Management* 1 (2016).

²⁰² U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Vol. II* (2018), <https://nca2018.globalchange.gov/> at 75.

²⁰³ *Id.* at 324.

G. Rapid Arctic warming and polar ice loss

Alaska and the Arctic have experienced some of the most severe and rapid warming associated with climate change, with temperatures rising at twice the rate of the rest of the globe on average.²⁰⁴ Arctic summer sea ice extent and thickness have decreased by 40% during the past several decades,²⁰⁵ with each metric ton of CO₂ emissions causing a sustained loss of three square meters of summer sea ice area.²⁰⁶ The Arctic lost 95% of its oldest and thickest sea ice during the past three decades, and the remaining thinner, younger ice is more vulnerable to melting.²⁰⁷ Sea ice loss has accelerated since 2000, with Alaska's coast suffering some of the fastest losses.²⁰⁸ The length of the sea ice season is shortening as ice melts earlier in spring and forms later in autumn.²⁰⁹ Along Alaska's northern and western coasts, the sea ice season has already shortened by more than 90 days.²¹⁰ As sea ice continues to plummet, the Arctic is projected to be nearly ice-free in summer by 2040.²¹¹ As summarized by the Fourth National Climate Assessment:

Since the early 1980s, annual average arctic sea ice has decreased in extent between 3.5% and 4.1% per decade, become thinner by between 4.3 and 7.5 feet, and began melting at least 15 more days each year. September sea ice extent has decreased between 10.7% and 15.9% per decade (*very high confidence*). Arctic-wide ice loss is expected to continue through the 21st century, *very likely* resulting in nearly sea ice-free late summers by the 2040s (*very high confidence*).²¹²

²⁰⁴ *Id.* at 92.

²⁰⁵ Meier, Walter N. et al., Arctic sea ice in transformation: A review of recent observed changes and impacts on biology and human activity, 51 *Reviews of Geophysics* 185 (2014); U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 29, 57, 303; U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 1192-1193. Intergovernmental Panel on Climate Change, Summary for Policymakers In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-6.

²⁰⁶ Notz, Dirk & Julienne Stroeve, Observed Arctic sea-ice loss directly follows anthropogenic CO₂ emission, 354 *Science* 747 (2016), <https://science.sciencemag.org/content/354/6313/747/tab-pdf>.

²⁰⁷ Osborne, Emily, et al. (eds.), Arctic Report Card 2018, NOAA (2018), <https://www.arctic.noaa.gov/Report-Card/Report-Card-2018> at 2.

²⁰⁸ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 305.

²⁰⁹ Parkinson, Claire L., Spatially mapped reductions in the length of the Arctic sea ice season, 41 *Geophysical Research Letters* 4316 (2014).

²¹⁰ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 307.

²¹¹ Overland, James E. & Muyin Wang, When will the summer Arctic be nearly sea ice free? 40 *Geophysical Research Letters* 2097 (2013); U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 303; Intergovernmental Panel on Climate Change, Summary for Policymakers In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-20.

²¹² U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 29, 303.

The Greenland and Antarctic ice sheets are losing ice at an accelerating rate through increasing glacier calving and surface melting and are approaching or already may have passed a tipping point of irreversible melting. A 2019 study found that Greenland's southwest ice sheet is losing ice at nearly four times the rate it did in 2003, and concluded that "Greenland's air-sea-ice system crossed one or more thresholds or tipping points near the beginning of this millennium, triggering more rapid deglaciation."²¹³ Another study found that, over the past two decades, Greenland's ice sheets have been melting at a rate 50% higher than pre-industrial levels and 33% above 20th-century levels, meaning that more meltwater is running off Greenland's ice sheet now than at any time in the last 350 years and likely going back 6,000 to 7,000 years.²¹⁴

A separate study estimated that the rate of Arctic ice loss from melting glaciers and the Greenland ice sheet tripled during the past decade compared with the previous two decades, now adding over a millimeter to the global sea level each year.²¹⁵ The rate of ice loss from the massive Antarctic ice sheet has increased by more than six-fold since the late 1970s, leading to 250 billion tons of ice pouring into the ocean each year, and research suggests that the East Antarctic ice sheet, once thought to be stable, is losing substantial amounts of ice.²¹⁶ Glaciers are also rapidly melting and are committed to continue doing so for centuries, raising sea levels and threatening water supplies in many regions.²¹⁷ Permafrost is thawing worldwide as temperatures rise, and the carbon dioxide and methane released from thawing permafrost has the potential to amplify human-induced warming significantly.²¹⁸

H. Ocean temperature rise

U.S. and global oceans are being hard-hit by climate change. The world's oceans have absorbed more than 90% of the excess heat caused by greenhouse gas warming,²¹⁹ resulting in average sea surface warming of 1.6°F (0.88°C) from 1850-1900 to 2011-2020, and 1.1°F (0.60°C) from 1980 to 2020.²²⁰ A 2019 study estimated that oceans are warming 40% faster than scientists projected,

²¹³ Bevis, Michael et al., Accelerating changes in ice mass within Greenland and the ice sheet's sensitivity to atmospheric forcing, 116 PNAS 1934 (2019).

²¹⁴ Trusel, Luke D. et al., Nonlinear rise in Greenland runoff in response to post-industrial Arctic warming, 564 Nature 104 (2018).

²¹⁵ Box, Jason E. et al., Global sea-level contribution from Arctic land ice: 1971-2017, 13 Environmental Research Letters 125012 (2018).

²¹⁶ Rignot, Eric et al., Four decades of Antarctic ice sheet mass balance from 1979-2017, 116 PNAS 1095 (2019); Slater, Thomas and Andrew Shepherd, Antarctic ice losses tracking high, 8 Nature Climate Change 1025 (2018); IMBIE, Mass balance of the Antarctic ice sheet from 1992 to 2017, 558 Nature 219 (2018).

²¹⁷ Intergovernmental Panel on Climate Change, Summary for Policymakers In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-28.

²¹⁸ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 74; Biskaborn, Boris K. et al., Permafrost is warming at a global scale, 10 Nature Communications 264 (2019).

²¹⁹ Intergovernmental Panel on Climate Change, Summary for Policymakers In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at SPM-14.

²²⁰ Intergovernmental Panel on Climate Change, Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at 9-14.

and that the rate of ocean warming is accelerating.²²¹ Rapid warming of the oceans has widespread impacts and has contributed to increases in rainfall intensity, rising sea levels, the destruction of coral reefs, declining ocean oxygen levels, and ice loss from glaciers, ice sheets and polar sea ice.²²² Global average sea surface temperature is projected to rise by 1.5°F (0.86°C) under a low emissions scenario (SSP1-2.6) and by 5.2°F (2.9°C) by the end of the century under a high emissions scenario (SSP5-8.5).²²³

Large-scale oxygen losses that create harmful low or no-oxygen zones have been developing in the coastal and open oceans due in large part to ocean warming.²²⁴ In the past 50 years, open-ocean low-oxygen zones have expanded by an area the size the European Union, no-oxygen areas have more than quadrupled in size, and the number of low-oxygen sites near the coast has increased tenfold.²²⁵

I. Ocean acidification

The global oceans have absorbed more than a quarter of the CO₂ emitted to the atmosphere by human activities, which has significantly increased the acidity of the surface ocean. Ocean acidification has reduced the availability of key chemicals—aragonite and calcite—that many marine species use to build their shells and skeletons.²²⁶ The ocean's absorption of anthropogenic CO₂ has already resulted in more than a 30% increase in the acidity of ocean surface waters, at a rate likely faster than anything experienced in the past 300 million years.²²⁷ Ocean acidity could increase by 150% by the end of the century if CO₂ emissions continue unabated.²²⁸ In the United States, the West Coast, Alaska, and the Gulf of Maine are experiencing the earliest, most severe changes due to ocean acidification.²²⁹ Regions of the East and Gulf Coasts are also vulnerable because of local stressors such as coastal eutrophication from fertilizer runoff and river discharge that increase acidification.²³⁰

²²¹ Cheng, Lijing et al., How fast are the oceans warming?, 363 *Science* 128 (2019).

²²² *Id.*

²²³ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 368.

²²⁴ *Id.* at 364, 377.

²²⁵ Breitburg, Denise et al., Declining oxygen in the global ocean and coastal waters, 359 *Science* 46 (2018).

²²⁶ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 371-372.

²²⁷ Hönisch, Barbel et al., The geological record of ocean acidification, 335 *Science* 1058 (2012); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 372, 374.

²²⁸ Orr, James C. et al., Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms, 437 *Nature* 681 (2005); Feely, Richard et al., Ocean acidification: Present conditions and future changes in a high CO₂ world, 22 *Oceanography* 36 (2009).

²²⁹ Feely, Richard A. et al., Evidence for upwelling of corrosive 'acidified' water onto the continental shelf, 320 *Science* 1490 (2008); Ekstrom, Julia A. et al., Vulnerability and adaptation of U.S. shellfisheries to ocean acidification, 5 *Nature Climate Change* 207 (2015); Mathis, Jeremy T. et al., Ocean acidification in the surface waters of the Pacific-Arctic boundary regions, 28 *Oceanography* 122 (2015); Mathis, Jeremy T. et al., Ocean acidification risk assessment for Alaska's fishery sector, 136 *Progress in Oceanography* 71 (2015); Chan, Francis et al., *The West Coast Ocean Acidification and Hypoxia Science Panel: Major Findings, Recommendations, and Actions*, California Ocean Science Trust (April 2016).

²³⁰ Ekstrom, Julia A. et al., Vulnerability and adaptation of U.S. shellfisheries to ocean acidification, 5 *Nature Climate Change* 207 (2015).

Ocean acidification negatively affects a wide range of marine species by hindering the ability of calcifying marine creatures like corals, oysters, and crabs to build protective shells and skeletons and by disrupting metabolism and critical biological functions.²³¹ The harms of ocean acidification are already being observed in wild populations, including severe shell damage to pteropods (marine snails at the base of the food web) along the U.S. west coast,²³² reduced coral calcification rates in reefs worldwide,²³³ and mass die-offs of larval Pacific oysters in the Pacific Northwest.²³⁴ An expert science panel concluded in 2016 that “growth, survival and behavioral effects linked to OA [ocean acidification] extend throughout food webs, threatening coastal ecosystems, and marine-dependent industries and human communities.”²³⁵

J. Biodiversity loss

Climate change is causing widespread harm to life across the planet, disrupting species’ distribution, timing of breeding and migration, physiology, vital rates, and genetics—in addition to increasing species extinction risk.²³⁶ Climate change is already affecting 82% of key ecological processes that underpin ecosystem function and support basic human needs.²³⁷ Climate change-related local extinctions are widespread and have occurred in hundreds of species, including almost half of the 976 species surveyed.²³⁸ Nearly half of terrestrial non-flying threatened mammals and nearly one-quarter of threatened birds are estimated to have been negatively impacted by climate change in at least part of their range.²³⁹ Furthermore, across the globe, populations of terrestrial birds and mammals that are experiencing greater rates of climate warming are more likely to be declining at a faster rate.²⁴⁰ Genes are changing, species’ physiology and physical features such as body size are changing, species are moving to try to

²³¹ Fabry, Victoria J. et al., Impacts of ocean acidification on marine fauna and ecosystem processes, 65 ICES Journal of Marine Science 414 (2008); Kroeker, Kristy J. et al., Impacts of ocean acidification on marine organisms: quantifying sensitivities and interactions with warming, 19 Global Change Biology 1884 (2013).

²³² Bednaršek, N. et al., *Limacina helicina* shell dissolution as an indicator of declining habitat suitability owing to ocean acidification in the California Current Ecosystem, 281 Proceedings of the Royal Society B 20140123 (2014).

²³³ Albright, Rebecca et al., Reversal of ocean acidification enhances net coral reef calcification, 531 Nature 362 (2016).

²³⁴ Barton, Alan et al., The Pacific oyster, *Crassostrea gigas*, shows negative correlation to naturally elevated carbon dioxide levels: Implications for near-term ocean acidification effects, 57 Limnology and Oceanography 698 (2012).

²³⁵ Chan, Francis et al., The West Coast Ocean Acidification and Hypoxia Science Panel: Major Findings, Recommendations, and Actions, California Ocean Science Trust (April 2016) at 4.

²³⁶ Warren, Rachel et al., Increasing impacts of climate change upon ecosystems with increasing global mean temperature rise, 106 Climatic Change 141 (2011).

²³⁷ Scheffers, Brett R. et al., The broad footprint of climate change from genes to biomes to people, 354 Science 719 (2016).

²³⁸ Wiens, John J., Climate-related local extinctions are already widespread among plant and animal species, 14 PLoS Biology e2001104 (2016).

²³⁹ Pacifici, Michela et al., Species’ traits influenced their response to recent climate change, 7 Nature Climate Change 205 (2017). The study concluded that “populations of large numbers of threatened species are likely to be already affected by climate change, and ... conservation managers, planners and policy makers must take this into account in efforts to safeguard the future of biodiversity.”

²⁴⁰ Spooner, Fiona E.B. et al., Rapid warming is associated with population decline among terrestrial birds and mammals globally, 24 Global Change Biology 4521 (2018).

keep pace with suitable climate space, species are shifting their timing of breeding and migration, and entire ecosystems are under stress.²⁴¹

Species extinction risk will accelerate with continued greenhouse gas pollution. One million animal and plant species are now threatened with extinction, with climate change as a primary driver.²⁴² At 2°C compared with 1.5°C of temperature rise, species' extinction risk will increase dramatically, leading to a doubling of the number of vertebrate and plant species losing more than half their range, and a tripling for invertebrate species.²⁴³ Numerous studies have projected catastrophic species losses during this century if climate change continues unabated: 15 to 37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario²⁴⁴; the potential extinction of 10 to 14% of species by 2100²⁴⁵; global extinction of 5% of species with 2°C of warming and 16% of species with business-as-usual warming²⁴⁶; the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species²⁴⁷; and the loss of a third or more of animals and plant species in the next 50 years.²⁴⁸ As summarized by the Third National Climate Assessment, "landscapes and seascapes are changing rapidly, and species, including many iconic species, may disappear from regions where they have been prevalent or become extinct, altering some regions so much that their mix of plant and animal life will become almost unrecognizable."²⁴⁹

The current U.S. energy system based on fossil fuel extraction and use is fundamentally damaging to wildlife. Fossil fuel production, transmission, generation, and waste disposal activities cause a wide array of harms to species and ecosystems, such as destroying and

²⁴¹ Parmesan, Camille & Gary Yohe, A globally coherent fingerprint of climate change impacts across natural systems, 421 *Nature* 37 (2003); Root, Terry L. et al., Fingerprints of global warming on wild animals and plants, 421 *Nature* 57 (2003); Parmesan, Camille, Ecological and evolutionary responses to recent climate change, 37 *Annual Review of Ecology Evolution and Systematics* 637 (2006); Chen, I-Ching et al., Rapid range shifts of species associated with high levels of climate warming, 333 *Science* 1024 (2011); Maclean, Ilya M. D. & Robert J. Wilson, Recent ecological responses to climate change support predictions of high extinction risk, 108 *PNAS* 12337 (2011); Warren, Rachel et al., Increasing impacts of climate change upon ecosystems with increasing global mean temperature rise, 106 *Climatic Change* 141 (2011); Cahill, Abigail E. et al., How does climate change cause extinction?, 280 *Proceedings of the Royal Society B* 20121890 (2012).

²⁴² Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES secretariat, Bonn, Germany (2019), available at <https://ipbes.net/global-assessment>.

²⁴³ Intergovernmental Panel on Climate Change, Summary for Policymakers. In: *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (2018), <https://www.ipcc.ch/sr15/>

²⁴⁴ Thomas, Chris. D. et al., Extinction risk from climate change, 427 *Nature* 145 (2004).

²⁴⁵ Maclean, Ilya M. D. & Robert J. Wilson, Recent ecological responses to climate change support predictions of high extinction risk, 108 *PNAS* 12337 (2011).

²⁴⁶ Urban, Mark C., Accelerating extinction risk from climate change, 348 *Science* 571 (2015).

²⁴⁷ Warren, Rachel et al., Quantifying the benefit of early climate change mitigation in avoiding biodiversity loss, 3 *Nature Climate Change* 678 (2013).

²⁴⁸ Román-Palacios, Cristian & J.J. Wiens, Recent responses to climate change reveal the drivers of species extinction and survival, 117 *PNAS* 4211 (2020) .

²⁴⁹ Melillo, Jerry M. et al. (eds.), *Climate Change Impacts in the United States: The Third National Climate Assessment*, U.S. Global Change Research Program (2014), <https://www.globalchange.gov/browse/reports/climate-change-impacts-united-states-third-national-climate-assessment-0> at 196.

fragmenting wildlife habitat, reducing water supplies often in water-stressed areas, causing air, noise, and light pollution, contaminating surface and ground water, and facilitating the spread of ecologically disruptive invasive species,²⁵⁰ with similar harms in the offshore marine environment.²⁵¹ Fossil fuel development also creates the significant risk of oil spills and brine spills which can kill wildlife and cause devastating effects over large areas. For many species, the harms from the fossil fuel-based energy system have led to mortality, changes in behavior, population declines, disruptions to community composition, and loss of ecosystem function. Scientists have called for a rapid transformation of our energy system away from fossil fuels to avoid a mass extinction event.²⁵²

K. Coral reef crisis

The world's coral reefs, which support thousands of marine species and the livelihoods of a half billion people, are in crisis. Rising ocean temperatures and ocean acidification caused by greenhouse gas pollution threaten the continued survival of corals and coral reef ecosystems due to the increasing frequency of mass bleaching events and the dissolution of corals due to ocean acidification.²⁵³ An estimated 50% of the world's coral reefs have already been lost,²⁵⁴ and an estimated one-third of all reef-building coral species are at risk of extinction.²⁵⁵ The 2014 to 2017 global coral bleaching event was the longest and most widespread on record, affecting more reefs than any previous mass bleaching event and causing mass bleaching of reefs that had never bleached before, with U.S. reefs particularly hard-hit.²⁵⁶ Since the first mass bleaching events began in the 1980s, severe bleaching events have increased five-fold and now occur every

²⁵⁰ Butt, Nathalie et al., Biodiversity risks from fossil fuel extraction, 342 *Science* 425 (2013); Brittingham, Margaret C. et al., Ecological risks of shale oil and gas development to wildlife, aquatic resources and their habitats, 48 *Environmental Science and Technology* 11034 (2014); Pickell, Paul D. et al., Monitoring forest change in landscapes under-going rapid energy development: challenges and new perspectives, 3 *Land* 617 (2014); Souther, Sara et al., Biotic impacts of energy development from shale: research priorities and knowledge gaps, 12 *Frontiers in Ecology and the Environment* 330 (2014); Allred, Brady W. et al., Ecosystem services lost to oil and gas in North America, 348 *Science* 401 (2015); Harfoot, Michael B. et al., Present and future biodiversity risks from fossil fuel exploitation, 11 *Conservation Letters* e12448 (2018).

²⁵¹ Venegas-Li, Rubén et al., Global assessment of marine biodiversity potentially threatened by offshore hydrocarbon activities, 25 *Global Change Biology* 2009 (2019).

²⁵² Barnosky, Anthony D., Transforming the global energy system is required to avoid the sixth mass extinction, 2 *MRS Energy and Sustainability* E10 (2015).

²⁵³ Hoegh-Guldberg, Ove et al., Coral reefs under rapid climate change and ocean acidification, 318 *Science* 1737 (2007); Eakin, C. Mark et al., Caribbean corals in crisis: record thermal stress, bleaching, and mortality in 2005, 5 *PLoS ONE* e13969 (2010).

²⁵⁴ Jackson, Jeremy, Status and Trends of Caribbean Coral Reefs: 1970-2012, Executive Summary, Global Coral Reef Monitoring Network - IUCN (2014) at 14, Figure 3: Average coral cover in the Caribbean declined by more than 50% since the 1970s; Bruno, John F. & Elizabeth R. Selig, Regional decline of coral cover in the Indo-Pacific: Timing, extent, and subregional comparisons, 8 *PLoS One* e711 (2007) at 4: Average coral cover in the Indo-Pacific declined by nearly 50% between the 1980s and 2003.

²⁵⁵ Carpenter, Kent E. et al., One-third of reef-building corals face elevated extinction risk from climate change and local impacts, 321 *Science* 560 (2008).

²⁵⁶ Lewis, Sophie C. & J. Mallela, A multifactor risk analysis of the record 2016 Great Barrier Reef bleaching, 99 *Bulletin of the American Meteorological Society* S144 (2017); National Oceanic and Atmospheric Administration, Global coral bleaching event likely ending, but scientists forecast high ocean temperatures may persist in some areas (June 19, 2017), <http://www.noaa.gov/media-release/global-coral-bleaching-event-likely-ending>.

six years on average, which is too frequent to allow full recovery of coral reefs.²⁵⁷ Coral reefs are projected to decline by a further 70-90% with 1.5°C of warming and at 2°C, coral reef ecosystems will suffer a near total collapse with projected declines of more than 99%.²⁵⁸ Coral scientists have warned that unless global temperature is kept under 1.5°C and atmospheric CO₂ concentration is restored to less than 350 ppm, coral reefs and reef-dependent marine life will be committed to a terminal and irreversible decline.²⁵⁹

L. Public health harms

The climate crisis threatens public health and well-being, with disproportionate harms to communities of color, low-wealth communities, children, older adults, and persons with disabilities and pre-existing medical conditions.²⁶⁰ The authoritative Lancet Commission on Health and Climate Change called climate change “the biggest global health threat of the 21st century”²⁶¹ and warned that it is causing a global medical emergency that “threatens to undermine the last half century of gains in development and global health.”²⁶² More than 200 health journals have called on governments to take emergency action to limit warming to 1.5°C, warning that the “[t]he greatest threat to global public health is the continued failure of world leaders to keep the global temperature rise below 1.5°C.”²⁶³ In the U.S., the health costs of air pollution from fossil fuel combustion and climate change are estimated to already exceed \$800 billion per year and expected to become even more expensive without rapid action to curb fossil fuel pollution.²⁶⁴

Health risks from climate change include increased exposure to heat waves, floods, droughts, and other extreme weather events; increases in infectious diseases; decreases in the quality and safety

²⁵⁷ Hughes, Terry P. et al., Spatial and temporal patterns of mass bleaching of corals in the Anthropocene, 359 *Science* 80 (2018).

²⁵⁸ Intergovernmental Panel on Climate Change, 2018, Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (2018) [Masson-Delmotte, V. et al. (eds.)], <https://www.ipcc.ch/sr15/>.

²⁵⁹ Veron, John E.N. et al., The coral reef crisis: the critical importance of <350 ppm CO₂, 58 *Marine Pollution Bulletin* 1428 (2009); Frieler, Katja, et al., Limiting global warming to 2°C is unlikely to save most coral reefs, 3 *Nature Climate Change* 165 (2012); van Hooidonk, Ruben et al., Opposite latitudinal gradients in projected ocean acidification and bleaching impacts on coral reefs, 20 *Global Change Biology* 103 (2014): Even on the lowest emissions pathway considered (RCP 2.6) in which CO₂ concentrations peak at ~430ppm around 2050 followed by a decline to around 400 ppm CO₂ by the end of the century, 88% of reef locations experience severe bleaching events annually by the end of the century.

²⁶⁰ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 548; U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (2016).

²⁶¹ Watts, Nick et al., The 2018 report of the *Lancet* Countdown on health and climate change: shaping the health of nations for centuries to come, 392 *The Lancet* 2479 (2018) at 2482.

²⁶² Watts, Nick et al., Health and climate change: policy responses to protect public health, 386 *The Lancet* 1861 (2015) at 1861.

²⁶³ Atwoli, Lukoye et al., Call for emergency action to limit global temperature increases, restore biodiversity, and protect health, 374 *BMJ* (2021), <https://www.bmj.com/content/374/bmj.n1734>.

²⁶⁴ Medical Society Consortium on Climate and Health, *The Costs of Inaction: The Economic Burden of Fossil Fuels and Climate Change on Health in the United States* (2021), <https://medsocietiesforclimatehealth.org/wp-content/uploads/2021/05/CostofInactionReport-May2021.pdf> at 5.

of air, food, and water; displacement; and stresses to mental health and well-being.²⁶⁵ Illnesses and deaths caused by extreme weather events are escalating as heat waves, floods and storms increase in frequency and intensity.²⁶⁶ Heat is the leading cause of weather-related deaths in the U.S. as well as causing many health harms—particularly among older adults, pregnant women, and children—including cardiovascular and respiratory complications, renal failure, electrolyte imbalance, kidney stones, negative impacts on fetal health, and preterm birth.²⁶⁷ One third of heat-related deaths in the U.S. between 1991 and 2018 are attributable to climate change.²⁶⁸

Extreme heat is projected to increase future mortality on the scale of thousands to tens of thousands of additional premature deaths per year across the U.S. by the end of this century.²⁶⁹ One study estimated that nearly one-third of the world’s population is currently exposed to a deadly combination of heat and humidity for at least 20 days a year, and that will rise to nearly three-quarters by the end of the century, with particular impacts to the southeastern U.S., without deep cuts in greenhouse gas pollution.²⁷⁰ Hotter temperatures also increase suicide risk, and rising temperatures are projected to lead to tens of thousands of additional suicides in the U.S. by mid-century.²⁷¹

Extreme precipitation events have become more common in the United States, contributing to increases in severe flooding in some regions.²⁷² Floods are the second deadliest of all weather-related hazards in the United States and can lead to drowning, contaminated drinking water, and mold-related illnesses.²⁷³ Air pollutants—particularly ozone, particulate matter, and allergens—are expected to increase with climate change.²⁷⁴ Climate-driven increases in ozone will cause more premature deaths, hospital visits, lost school days, and acute respiratory symptoms.²⁷⁵ Rising temperatures are increasing human exposure to insect-borne diseases as ticks, mosquitoes and other vectors become active earlier in the season and expand northward.²⁷⁶ The two species

²⁶⁵ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States*, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 540; U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (2016).

²⁶⁶ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States*, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 541.

²⁶⁷ *Id.* at 544-545.

²⁶⁸ Vicedo-Cabrera, A.M. et al., The burden of heat-related mortality attributable to recent human-induced climate change, 11 *Nature Climate Change* 492 (2021), <https://www.nature.com/articles/s41558-021-01058-x>.

²⁶⁹ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (2016).

²⁷⁰ Mora, Camilo et al., Global risk of deadly heat, 7 *Nature Climate Change* 501 (2017).

²⁷¹ Burke, Marshall et al., Higher temperatures increase suicide rates in the United States and Mexico, 8 *Nature Climate Change* 723 (2018), <https://www.nature.com/articles/s41558-018-0222-x>.

²⁷² Melillo, Jerry M et al (eds.), *Climate Change Impacts in the United States: The Third National Climate Assessment*, U.S. Global Change Research Program (2014), <https://www.globalchange.gov/browse/reports/climate-change-impacts-united-states-third-national-climate-assessment-0> at 221.

²⁷³ *Id.* at 224.

²⁷⁴ U.S. Environmental Protection Agency, *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule*, 74 Fed. Reg. 66496 (Dec. 15, 2009) (to be codified at 40 C.F.R. Ch. 1); U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*, (2016).

²⁷⁵ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (2016).

²⁷⁶ *Id.*

of ticks capable of spreading Lyme disease—the most common vector-borne illness in the U.S.²⁷⁷—have already expanded to new regions in part due to rising temperatures: in 2015, they were found in more than 49% of counties in the continental U.S., a nearly 45% increase since 1998.²⁷⁸ Cases of Lyme disease in the U.S. are projected to increase by 20% at 2°C of temperature rise,²⁷⁹ while cases of West Nile disease are projected to more than double by 2050, resulting in approximately \$1 billion per year in hospitalization costs and premature deaths under a higher emissions scenario.²⁸⁰

Fossil fuel pollution not only drives climate change that causes health harms, but itself is extremely harmful to human health. Every stage of the fossil fuel life cycle—extraction, processing, transport, and combustion—generates hazardous and criteria air pollutants, including known cancer-causing chemicals like benzene and formaldehyde; ozone-forming chemicals like nitrogen oxides, volatile organic compounds, and methane; and particulate matter including black carbon and silica dust that cause lung and heart disease.²⁸¹ Research shows that people exposed to fossil fuel pollution have a higher risk for developing cancer,²⁸² increased asthma attacks,²⁸³ higher hospitalization rates,²⁸⁴ more upper respiratory problems and rashes,²⁸⁵ birth defects,²⁸⁶ premature births and high-risk pregnancies,²⁸⁷ and low-birthweight babies.²⁸⁸ The fine particulate pollution from fossil fuel combustion causes one in five premature deaths worldwide,

²⁷⁷ Schwartz, Amy M., et al., Surveillance for Lyme Disease - United States, 2008-2015, 66 MMWR, Centers for Disease Control and Prevention (2017).

²⁷⁸ Eisen, Rebecca J., County-Scale Distribution of *Ixodes scapularis* and *Ixodes pacificus* (Acari: Ixodidae) in the Continental United States, 53 Journal of Medical Entomology 349 (2016).

²⁷⁹ Dumic, Igor & Edson Severnini, 'Ticking bomb': the impact of climate change on the incidence of Lyme disease, Canadian Journal of Infectious Diseases and Medical Microbiology Article 5719081 (2018), <https://www.hindawi.com/journals/cjidmm/2018/5719081/>.

²⁸⁰ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 552.

²⁸¹ Garcia-Gonzalez, Diane A. et al., Hazardous air pollutants associated with upstream oil and natural gas development: a critical synthesis of current peer-reviewed literature, 40 Annual Review of Public Health 283 (2019), <https://www.annualreviews.org/doi/10.1146/annurevpublhealth-040218-043715>; Johnston, Jill E. et al., Impact of upstream oil extraction and environmental public health: A review of the evidence, 657 Sci Total Environ 187 (2019), <https://pubmed.ncbi.nlm.nih.gov/30537580/>; Concerned Health Professionals of New York & Physicians for Social Responsibility, Compendium of scientific, medical, and media findings demonstrating risks and harms of fracking (unconventional gas and oil extraction) (7th ed.) (2020), <http://concernedhealthny.org/compendium/>.

²⁸² McKenzie, Lisa M. et al., Ambient nonmethane hydrocarbon levels along Colorado's Northern Front Range: Acute and chronic health risks, 52 Environmental Science and Technology 4514 (2018).

²⁸³ Rasmussen, Sara G. et al., Association Between Unconventional Natural Gas Development in the Marcellus Shale and Asthma Exacerbations, 176 JAMA Internal Medicine 1334 (2016).

²⁸⁴ Jemielita, Thomas et al., Unconventional Gas and Oil Drilling Is Associated with Increased Hospital Utilization Rates, 10 PLoS One 7 (2015).

²⁸⁵ Rabinowitz, Peter M. et al., Proximity to Natural Gas Wells and Reported Health Status: Results of a Household Survey in Washington County, Pennsylvania, 123 Environmental Health Perspectives 21 (2015).

²⁸⁶ McKenzie, Lisa M., Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado, 122 Environmental Health Perspectives 412 (2014).

²⁸⁷ Casey, Joan A., Unconventional Natural Gas Development and Birth Outcomes in Pennsylvania, USA, 27 Epidemiology 163 (2016).

²⁸⁸ Stacy, Shaina L. et al., Perinatal Outcomes and Unconventional Natural Gas Operations in Southwest (2015).

and one in ten deaths each year in the United States equaling 355,000 premature deaths in 2018.²⁸⁹

Numerous studies show that many lives can be saved with rapid reductions in fossil fuel pollution.²⁹⁰ The Fourth National Climate Assessment concluded that “by the end of this century, thousands of American lives could be saved and hundreds of billions of dollars in health-related economic benefits gained each year under a pathway of lower greenhouse gas emissions.”²⁹¹ Limiting temperature rise to 1.5°C instead of 2°C would prevent an estimated 153 million premature deaths worldwide due to lowered exposure to fine particulate matter and ozone, including 130,000 fewer premature deaths in Los Angeles and 120,000 in the New York metropolitan area alone.²⁹² Another study estimated that every 4,434 metric tons of CO₂ added to the atmosphere in 2020—equivalent to the lifetime emissions of 3.5 average Americans—will cause one excess death globally through 2100.²⁹³ The implications of this finding are that limiting temperature rise to 1.5°C instead of 2°C will save 169 million lives.²⁹⁴

M. Threats to water resources

Climate change is threatening water supplies in the U.S. As summarized by the Fourth National Climate Assessment, variable precipitation and rising temperature due to climate change are decreasing water quantity and quality in many parts of the U.S. by “intensifying droughts, increasing heavy downpours, and reducing snowpack. Reduced snow-to-rain ratios are leading to significant differences between the timing of water supply and demand. Groundwater depletion is exacerbating drought risk. Surface water quality is declining as water temperature increases and more frequent high-intensity rainfall events mobilize pollutants such as sediments and nutrients.”²⁹⁵

²⁸⁹ Vohra, Karn et al., Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem, 195 *Environmental Research* 110754 (2021), <https://www.sciencedirect.com/science/article/abs/pii/S0013935121000487>.

²⁹⁰ Gasparrini, Antonio et al., Projections of temperature-related excess mortality under climate change scenarios, 1 *Lancet Planet Health* e360 (2017); Hsiang, Solomon et al., Estimating economic damage from climate change in the United States, 356 *Science* 1362 (2017), <https://science.sciencemag.org/content/356/6345/1362>; Silva, Raquel A. et al., Future global mortality from changes in air pollution attributable to climate change, 7 *Nature Climate Change* 647 (2017); Burke, Marshall et al., Higher temperatures increase suicide rates in the United States and Mexico, 8 *Nature Climate Change* 723 (2018); Shindell, Drew et al., Quantified, localized health benefits of accelerated carbon dioxide emissions reductions, 8 *Nature Climate Change* 291 (2018).

²⁹¹ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 541.

²⁹² Shindell, Drew et al., Quantified, localized health benefits of accelerated carbon dioxide emissions reductions, 8 *Nature Climate Change* 291 (2018), <https://www.nature.com/articles/s41558-018-0108-y>.

²⁹³ Bressler, R. Daniel, The mortality cost of carbon, 12 *Nature Communications* 4467 (2021).

²⁹⁴ The difference between the carbon budget needed to limit warming to 1.5°C versus 2°C is 750 Gt, based on the IPCC Sixth Assessment (*see* Intergovernmental Panel on Climate Change, Summary for Policymakers. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at Table SPM.2). With each 4,434 metric tons of CO₂ estimated to result in one death, the additional 750 Gt CO₂ emitted with 2°C versus 1.5°C of temperature rise equates to 169 million additional deaths.

²⁹⁵ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 146.

Snowpack is important for providing water in many regions. In the western U.S., earlier spring snowmelt, reduced snowpack, lower snow water equivalent (i.e. the amount of water contained in snowpack), and reduced river flows have been attributed to human-caused warming.²⁹⁶ As temperatures rise, western U.S. winter and spring snowpack are projected to continue to decline,²⁹⁷ and more precipitation will fall as rain instead of snow in the cold season in many parts of the U.S.²⁹⁸ Under higher emissions scenarios, reductions in snowfall and earlier snowmelt are expected to lead to more frequent “hydrological” drought conditions in the western U.S., characterized by deficits in runoff.²⁹⁹

As a key example, climate change is depleting water flows in the Colorado River Basin, one of the most important water systems in the U.S. that provides water for 40 million people and supports one trillion dollars of economic activity each year. Across much of the Colorado River Basin, spring snowpack, runoff, and streamflow have declined, disrupting the region’s water supply.³⁰⁰ Colorado River flow has decreased by roughly 20% over the last century, and one-half of that decline is attributed to decreased precipitation and increased warming due to climate change.³⁰¹ Studies estimate that every degree Celsius of warming decreases Colorado River flow by 9%.³⁰²

Climate change is also playing an important role in reducing soil moisture as temperatures rise, intensifying “agricultural” droughts.³⁰³ Under higher emissions scenarios, continuing decreases in surface soil moisture and widespread drying over most of the United States are projected.³⁰⁴ Future warming is expected to lead to greater frequencies and magnitudes of agricultural droughts throughout the continental United States as evapotranspiration outpaces precipitation.³⁰⁵

²⁹⁶ Barnett, Tim, et al., Human-induced changes in the hydrology of the Western United States, 319 *Science* 1080 (2008); Pierce, David et al., Attribution of declining Western U.S. snowpack to human effects, *American Meteorological Society* 6425 (2008); Hidalgo, H.G. et al., Detection and attribution of streamflow timing changes to climate change in the western United States, 22 *Journal of Climate* 3838 (2009); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 231, 236.

²⁹⁷ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017) <https://science2017.globalchange.gov/> at 207, 231.

²⁹⁸ *Id.* at 207.

²⁹⁹ *Id.* at 231, 232, 239, 240.

³⁰⁰ Garfin, Gregg et al. (eds.), *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment, Southwest Climate Alliance* (2013); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 236; Udall, Bradley & Jonathan Overpeck, The twenty-first century Colorado River hot drought and implications for the future, 53 *Water Resources Research* 2404 (2017).

³⁰¹ Xiao, M. et al., On the causes of declining Colorado River streamflows, 54 *Water Resources Research* 6739(2018), <https://doi.org/10.1029/2018WR023153>; Hoerling, M. et al., Causes for the century-long decline in Colorado River flow, 32 *Journal of Climate* 8181 (2019), <https://journals.ametsoc.org/view/journals/clim/32/23/jcli-d-19-0207.1.xml>.

³⁰² Milly, P.C.D and K.A. Dunne, Colorado River flow dwindles as warming-driven loss of reflective snow energizes evaporation, 367 *Science* 1252 (2020).

³⁰³ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment, Vol. I* (2017), <https://science2017.globalchange.gov/> at 237.

³⁰⁴ *Id.* at 237.

³⁰⁵ *Id.* at 237.

N. Declining food security

Climate change is threatening U.S. food security³⁰⁶ by decreasing crop yields and nutritional content, creating unsafe conditions for agricultural workers, increasing stress to livestock, contaminating food supplies, and decreasing access to food.³⁰⁷ Climate-related harms to crop and livestock production include increases in weeds, diseases, and insect pests; rising heat stress increasing livestock mortality; insufficient winter chill hours needed for many important tree crops; degradation of soils; changes in water availability; and the increasing frequency of extreme weather events.³⁰⁸ The Third National Climate Assessment warned that “[c]limate disruptions to agricultural production have increased in the past 40 years and are projected to increase over the next 25 years” and that “[b]y mid-century and beyond, these impacts will be increasingly negative on most crops and livestock.”³⁰⁹

Rising temperatures are projected to substantially reduce the yields of four major crops that make up two-thirds of human caloric intake and are critical for food security.³¹⁰ The U.S. is expected to suffer the greatest losses globally for maize and soybeans, with each degree Celsius of temperature rise projected to reduce maize yields by 10%, soybeans by 6.8%, and wheat by 5.5%.³¹¹ A separate analysis estimated that *each additional ton* of CO₂ results in crop losses costing \$8.50.³¹² Research also indicates that crops will become less nutritious as carbon dioxide levels increase, worsening the global prevalence of malnutrition. In one study, major crops, including wheat, barley, rice and potato, when grown at carbon dioxide levels projected for the year 2100, had 6 to 15% less protein than the same crops grown at current carbon dioxide levels, as well as fewer key nutrients such as zinc, calcium and magnesium.³¹³ The United States is one of the countries projected to suffer the largest increases in pest-related crop losses as warming increases the population growth and metabolic rates of insects.³¹⁴ Further, since agriculture is the biggest driver of water shortages in the world, accounting for 70% of global water withdrawals,

³⁰⁶ About 14% of U.S. households currently do not have food security—defined as access by all people at all times to enough food for an active, healthy life—and more than 48 million people live in food insecure homes. See Public Health Institute/Center for Climate Change and Health, *Food Security, Climate Change and Health* (2016).

³⁰⁷ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II* (2018), <https://nca2018.globalchange.gov/> at 391–437.

³⁰⁸ Melillo, Jerry M et al. (eds.), *Climate Change Impacts in the United States: The Third National Climate Assessment*, U.S. Global Change Research Program (2014), <https://www.globalchange.gov/browse/reports/climate-change-impacts-united-states-third-national-climate-assessment-0> at 150; Brown, M.E. et al., *Climate Change, Global Food Security, and the U.S. Food System* (2015), http://www.usda.gov/oce/climate_change/FoodSecurity2015Assessment/FullAssessment.pdf; U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II* (2018), <https://nca2018.globalchange.gov/> at 391–437.

³⁰⁹ Melillo, Jerry M et al. (eds.), *Climate Change Impacts in the United States: The Third National Climate Assessment*, U.S. Global Change Research Program (2014), <https://www.globalchange.gov/browse/reports/climate-change-impacts-united-states-third-national-climate-assessment-0> at 150.

³¹⁰ Zhao, Chuang et al., Temperature increase reduces global yields of major crops in four independent estimates, 114 PNAS 9326 (2017).

³¹¹ *Id.*

³¹² Moore, Frances C. et al., New science of climate change impacts on agriculture implies higher social cost of carbon, 8 Nature Communications 1607 (2017), <https://www.nature.com/articles/s41467-017-01792-x>.

³¹³ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (2016) at 198.

³¹⁴ Deutsch, Curtis A. et al., Increase in crop losses to insect pests in a warming climate, 361 Science 916 (2018).

future changes in water availability will profoundly impact agricultural production on the whole.³¹⁵ Rising temperatures are also increasing unsafe working conditions for the more than one million agricultural workers in the U.S., with the number of unsafe days nearly doubling under 2°C of temperature rise and nearly tripling under 4°C.³¹⁶

Livestock cultivation occurs over approximately 30% of the Earth's ice-free land surface and provides a livelihood for over a billion people globally. As with crop yields, one of the greatest threats to livestock yields is heat stress.³¹⁷ Heat stress diminishes food intake and physical activity for livestock. This leads to less growth, survival, and reproductive rates, and also lower production of meat, milk, and eggs. Heat stress can also weaken immune function in livestock, contributing to the need for more veterinary medications. Increasing temperatures also require greater water intake, which presents further complications if increasing temperatures are combined with increasing drought as predicted for some locations. Such conditions also allow for certain pathogens and parasites to expand their ranges, resulting in increased livestock exposure.³¹⁸

Fisheries and aquaculture provide 4.3 billion people with 15 to 20% of their intake of animal protein.³¹⁹ Ocean warming and ocean acidification threaten marine food resources by disrupting marine communities, promoting harmful algal blooms and the spread of diseases, and increasing contaminants in fish and shellfish.³²⁰ For example, the types of fish caught in fisheries are starting to change due to increasing ocean temperatures. In the rapidly warming Northeast Atlantic Ocean, for instance, fish species are migrating northward over time as waters become warmer, meaning that fish catches in higher latitudes now contain more warm water species, whereas fish catches in lower latitudes contain fewer subtropical species.³²¹ This shift in fish distribution has negative implications for fisheries that rely on specific fish species for subsistence.

Algal bloom species have been expanding their ranges, and many are dangerous to humans because the toxins they produce can make their way into shellfish. These toxins when consumed by humans are associated with illnesses such as amnesic shellfish poisoning, diarrhetic shellfish poisoning, neurotoxic shellfish poisoning, and paralytic shellfish poisoning. These illnesses may cause respiratory and digestive problems, memory loss, seizures, skin lesions, and even death.³²² As an example of their increasing prevalence, cases of paralytic shellfish poisoning (PSP) were just a few decades ago primarily seen along the west coast of the United States. At present, cases

³¹⁵ United Nations Convention to Combat Desertification, *The Global Land Outlook* (2017), <https://www.unccd.int/actions/global-land-outlook-glo>.

³¹⁶ Tigchelaar, Michelle et al., Work adaptations insufficient to address growing heat risk for U.S. agricultural workers, *15 Environmental Research Letters* 094035 (2020), doi:10.1088/1748-9326/ab86f4.

³¹⁷ U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States*, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 406-408.

³¹⁸ Brown, M.E. et al. *Climate Change, Global Food Security, and the U.S. Food System* (2015), http://www.usda.gov/oce/climate_change/FoodSecurity2015Assessment/FullAssessment.pdf at 57.

³¹⁹ *Id.* at 58.

³²⁰ Tirado, M. C. et al., *Climate change and food safety: A review*, *43 Food Research International* 1745 (2010).

³²¹ Porter, J.R. et al., *Food security and food production systems*. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability Part A: Global and Sectoral Aspects, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate* (2014) at 493.

³²² Tirado, M. C. et al., *Climate change and food safety: A review*, *43 Food Research International* 1745 (2010).

of PSP have expanded along both U.S. coasts, and also throughout Southeast Asia, Europe, and South America.³²³ Consuming raw shellfish can also spread pathogens such as *Vibrio* bacteria which are linked to conditions as mild as diarrhea or as severe and fatal blood infections. Ocean warming has a known impact on both the abundance of *Vibrio* and harmful algal blooms.³²⁴

O. Economic impacts

The climate crisis is exacting a heavy economic toll, already costing U.S. economy more than \$1 trillion dollars in damages, with economic losses worsening with each additional ton of carbon pollution.³²⁵ Each 1°C temperature rise is estimated to decrease U.S. gross domestic product (GDP) by 1.2%, with the poorest regions of the U.S. suffering most.³²⁶ A 2021 study of the health costs in the U.S. of air pollution from fossil fuel combustion and resulting climate change estimated the costs already exceed \$800 billion per year and are expected to become even more expensive without rapid action to curb fossil fuel pollution.³²⁷ At the global scale, warming of 2°C versus 1.5°C is projected to decrease global GDP by an additional 1.5 to 2% and cost \$7.7 to 11.1 trillion in damages by mid-century.³²⁸

The Fourth National Climate Assessment similarly concludes that human-caused climate change is already leading to substantial economic losses in the U.S. and that these losses will be much more severe under higher emissions scenarios, impeding economic growth:

Without substantial and sustained global mitigation and regional adaptation efforts, climate change is expected to cause growing losses to American infrastructure and property and impede the rate of economic growth over this century.³²⁹

In the absence of more significant global mitigation efforts, climate change is projected to impose substantial damages on the U.S. economy, human health, and the environment. Under scenarios with high emissions and limited or no adaptation, annual losses in some sectors are estimated to grow to hundreds of billions of dollars by the end of the century. It is very likely that some physical

³²³ Gilbert, P. et al., The global, complex phenomena of harmful algal blooms, 18 *Oceanography* 136 (2005).

³²⁴ Tirado, M. C. et al., Climate change and food safety: A review, 43 *Food Research International* 1745 (2010).

³²⁵ Hsiang, Solomon et al., Estimating economic damage from climate change in the United States, 356 *Science* 1362 (2017), <https://science.sciencemag.org/content/356/6345/1362>; Burke, Marshall, Written Testimony of Marshall Burke, Assistant Professor of Earth System Science, Stanford University, Hearing on “Examining the Macroeconomic Impacts of a Changing Climate,” United States House Subcommittee on National Security, International Development, and Monetary Policy (2019), available at <https://www.congress.gov/116/meeting/house/109911/witnesses/HHRG-116-BA10-Wstate-BurkeM-20190911.pdf>.

³²⁶ Hsiang, Solomon et al., Estimating economic damage from climate change in the United States, 356 *Science* 1362 (2017), <https://science.sciencemag.org/content/356/6345/1362>.

³²⁷ Medical Society Consortium on Climate and Health, The Costs of Inaction: The Economic Burden of Fossil Fuels and Climate Change on Health in the United States (2021), <https://medsocietiesforclimatehealth.org/wp-content/uploads/2021/05/CostofInactionReport-May2021.pdf> at 5.

³²⁸ Burke, Marshall et al., Large potential reduction in economic damages under UN mitigation targets, 557 *Nature* 549 (2018), <https://www.nature.com/articles/s41586-018-0071-9>.

³²⁹ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol. II (2018), <https://nca2018.globalchange.gov/> at 25.

and ecological impacts will be irreversible for thousands of years, while others will be permanent.³³⁰

According to the Fourth National Climate Assessment, the number of extreme weather events per year costing more than one billion dollars per event has increased significantly since 1980, with total costs exceeding \$1.1 trillion.³³¹ The National Oceanic and Atmospheric Administration estimated that, between 2015 and April 2018, 44 billion-dollar weather and climate disasters struck the United States, producing nearly \$400 billion in damages.³³² The 2017 Atlantic Hurricane season alone is estimated to have caused more than \$250 billion in damages and hundreds of deaths throughout the U.S. Caribbean, Southeast, and Southern Great Plains.³³³

By the end of the century, the Fourth National Climate Assessment estimates that warming on our current trajectory would cost the U.S. economy hundreds of billions of dollars each year and up to 10% of U.S. gross domestic product due to damages including lost crop yields, lost labor, increased disease incidence, property loss from sea level rise, and extreme weather damage.³³⁴ Ultimately, the magnitude of financial burdens imposed by climate change depends on how effectively we curb emissions. Across sectors and regions, significant reductions in emissions will substantially lower the costs resulting from climate change damages.³³⁵ For example, annual damages associated with additional extreme temperature-related deaths are projected at \$140 billion (in 2015\$) under the higher RCP 8.5 emissions scenario compared with \$60 billion under the lower RCP 4.5 scenario by 2090.³³⁶ Annual damages to labor would be approximately \$155 billion under RCP 8.5, but reduced by 48% under RCP 4.5.³³⁷ While coastal property damage would carry an annual cost of \$118 billion under RCP 8.5 in 2090, 22% of this cost would be avoided under RCP 4.5.³³⁸

P. Tipping points and compound climate extremes

The more fossil fuel pollution that is added to the atmosphere, the higher the risk of crossing planetary tipping points—abrupt and irreversible changes in Earth systems to states wholly outside human experience, resulting in severe physical, ecological and socioeconomic harms.³³⁹ The Fourth National Climate Assessment concluded with very high confidence that tipping points and the compound effects of simultaneous extreme climate events have the potential to create unanticipated and potentially abrupt and irreversible “surprises” that become more likely

³³⁰ *Id.* at 1357.

³³¹ *Id.* at 81.

³³² *Id.* at 66.

³³³ *Id.* at 66.

³³⁴ *Id.* at 1358, 1360.

³³⁵ *Id.* at 1349.

³³⁶ *Id.* at 552.

³³⁷ *Id.* at 1349.

³³⁸ *Id.* at 1349.

³³⁹ Intergovernmental Panel on Climate Change, *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021), <https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/> at 4-76; Fourth National Climate Assessment, Vol. I (2017) at 32, 411-423; Lenton, Timothy M. et al, Tipping elements in the Earth’s climate system, 105 PNAS 1786 (2008).

as warming increases.³⁴⁰ The IPCC *Climate Change 2021* report similarly concluded that “the higher the warming level and the longer the duration of overshoot [beyond 1.5°C], the greater the risk of unexpected changes.”

Warm-water coral reefs and Arctic ecosystems are already experiencing devastating regime shifts, and evidence indicates that climate system is nearing tipping points including the collapse of the West Antarctic ice sheet,³⁴¹ enormous CO₂ and methane release from thawing Arctic permafrost,³⁴² and slowing of the Atlantic meridional overturning circulation which would worsen sea level rise along the U.S. east coast and cause global weather and climate disruptions.³⁴³ A 2019 expert review concluded in stark terms that “the evidence from tipping points alone suggests that we are in a state of planetary emergency: both the risk and urgency of the situation are acute.”³⁴⁴

For example, research indicates that a critical tipping point important to the stability of the West Antarctic Ice Sheet has been crossed, and that rapid and irreversible collapse of the ice sheet is likely in the next 200 to 900 years.³⁴⁵ According to the Fourth National Climate Assessment, “observational evidence suggests that ice dynamics already in progress have committed the planet to as much as 3.9 feet (1.2 m) worth of sea level rise from the West Antarctic Ice Sheet alone” and that “under the higher RCP8.5 scenario, Antarctic ice could contribute 3.3 feet (1 m) or more to global mean sea level over the remainder of this century, with some authors arguing that rates of change could be even faster.”³⁴⁶ Another tipping point is the release of carbon as CO₂ and methane from thawing Arctic permafrost, which has the potential to “drive continued

³⁴⁰ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment*, Vol. I (2017), <https://science2017.globalchange.gov/> at 32, 411-423; Lenton, Timothy M. et al, Tipping elements in the Earth’s climate system, 105 *PNAS* 1786 (2008).

³⁴¹ Hansen, James et al., Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observation that 2°C global warming could be dangerous, 16 *Atmospheric Chemistry and Physics* 3761 (2016); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment*, Vol. I (2017), <https://science2017.globalchange.gov/> at 420; Pattyn, Frank et al., The Greenland and Antarctic ice sheets under 1.5°C of global warming, 8 *Nature Climate Change* 1053 (2018); Garbe, Julius et al., The hysteresis of the Antarctic ice sheet, 585 *Nature* 538 (2020).

³⁴² U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment*, Vol. I (2017), <https://science2017.globalchange.gov/> at 303, 314-315, 419; Koven, Charles D. et al., Permafrost carbon-climate feedbacks accelerate global warming, 108 *PNAS* 14769 (2011); Commane, Róisín et al., Carbon dioxide sources from Alaska driven by increasing early winter respiration from Arctic tundra, 114 *PNAS* 5361 (2017).

³⁴³ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment*, Vol. I (2017), <https://science2017.globalchange.gov/> at 418; Boers, Niklas, Observation-based early-warning signals of the collapse of the Atlantic Meridional Overturning Circulation, 11 *Nature Climate Change* 680 (2021).

³⁴⁴ Lenton, Timothy M. et al., Climate tipping points—too risky to bet against, 575 *Nature* 592 (2019).

³⁴⁵ Joughin, Ian et al., Marine ice sheet collapse potentially under way for the Thwaites Glacier Basin, West Antarctica, 344 *Science* 735 (2014); Mouginot, Jérémie et al., Sustained increase in ice discharge from the Amundsen Sea Embayment, West Antarctica, from 1973 to 2013, 41 *Geophysical Research Letters* 1576 (2014); Rignot, Eric et al., Widespread, rapid grounding line retreat of Pine Island, Thwaites, Smith, and Kohler glaciers, West Antarctica, from 1992 to 2011, 41 *Geophysical Research Letters* 3502 (2014); DeConto, Robert M. & David Pollard, Contribution of Antarctica to past and future sea-level rise, 531 *Nature* 591 (2016); Hansen, James et al., Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observation that 2°C global warming could be dangerous, 16 *Atmospheric Chemistry and Physics* 3761 (2016).

³⁴⁶ U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment*, Vol. I (2017), <https://science2017.globalchange.gov/> at 420.

warming even if human-caused emissions stopped altogether.”³⁴⁷ Evidence suggests that increased rainfall and meltwater from Arctic glaciers are causing the weakening of a major ocean current called the Atlantic meridional overturning circulation (“AMOC”). If the AMOC slows or collapses, the northeastern U.S. will see a dramatic increase in regional sea levels of as much as 1.6 feet (0.5 meters).³⁴⁸ Another analysis warns that the Earth System is at risk of crossing a planetary threshold that could lock in a rapid pathway toward much hotter conditions (“Hothouse Earth”) propelled by self-reinforcing feedbacks, and that this risk could exist at 2°C temperature rise and increase significantly with additional warming.³⁴⁹

The disastrous effects of compound extreme events are already occurring, such as during Hurricane Sandy when sea level rise, abnormally high ocean temperatures, and high tides combined to intensify the storm and associated storm surge, and an atmospheric pressure field over Greenland steered the hurricane inland to an “exceptionally high-exposure location.”³⁵⁰

Q. Climate change impacts are long-lasting

The greenhouse gases currently in the atmosphere commit the planet to long-lasting climate change impacts that are irreversible on a multi-century to millennial time scale. CO₂ has a long residence time in the atmosphere, meaning that a large fraction of the CO₂ emitted to date will remain in the atmosphere for tens to hundreds of thousands of years. Climatic changes that are caused by CO₂ emissions, such as surface warming, ocean warming, sea level rise, and ocean acidification are long-lasting and irreversible on human timescales. Even if all greenhouse emissions were to completely cease today, significant ongoing regional changes in temperature and precipitation would still occur, global average temperatures would not drop significantly for at least 1,000 years, and sea-level rise would continue for millennia. The National Research Council cautioned that “emission reduction choices made today matter in determining impacts that will be experienced not just over the next few decades, but also into the coming centuries and millennia.”³⁵¹

VII. The Managed Decline in Federal Oil and Gas Extraction Should be Accomplished in Conjunction with Other Policies to Redress the Inadequacy of Current U.S. Climate Policy

The United States has contributed more to climate change than any other country and is a dominant global driver in expanding the fossil fuel production driving the climate crisis. The

³⁴⁷ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 303, 314-315, 419; Koven, Charles D. et al., Permafrost carbon-climate feedbacks accelerate global warming, 108 PNAS 14769 (2011); Commane, Róisín et al., Carbon dioxide sources from Alaska driven by increasing early winter respiration from Arctic tundra, 114 PNAS 5361 (2017).

³⁴⁸ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 418; Fourth National Climate Assessment, Vol. I (2017) at 418; Boers, Niklas, Observation-based early-warning signals of the collapse of the Atlantic Meridional Overturning Circulation, 11 Nature Climate Change 680 (2021).

³⁴⁹ Steffen, Will et al., Trajectories of the Earth System in the Anthropocene, 115 PNAS 8252 (2018).

³⁵⁰ U.S. Global Change Research Program, Climate Science Special Report: Fourth National Climate Assessment, Vol. I (2017), <https://science2017.globalchange.gov/> at 416.

³⁵¹ National Research Council, Warming World: Impacts by Degree (2011) at 3.

U.S. is the world's biggest cumulative emitter of greenhouse gas pollution, responsible for 25% of cumulative global CO₂ emissions since 1870,³⁵² and is currently the world's second highest emitter on an annual basis and highest emitter on a per capita basis.³⁵³ The U.S. is also the world's largest oil and gas producer and second-largest coal producer.³⁵⁴ However, current U.S. climate policy is wholly inadequate to meet the international Paris Agreement climate limits and avoid the worst damages of climate change.

Estimates of an equitable U.S. “fair share” of emissions reductions needed to meet a 1.5°C climate limit make clear that the U.S. must rapidly decarbonize across all sectors. The United States has a responsibility to make much larger emissions reductions than the global average due to its dominant role in driving fossil fuel emissions and resulting climate change harms, combined with greater financial resources and technical capabilities to implement emissions cuts and transition to clean energy. Using an equity approach based on responsibility and capability, the U.S. fair share of emissions reductions for meeting a 1.5°C Paris limit equates to cutting U.S. domestic emissions by at least 70% below 2005 levels by 2030 and reaching near zero emissions by 2040, paired with financial and technological support for large-scale emissions reductions internationally.³⁵⁵

However, the United Nations *Emissions Gap Report* warned that the United States is vastly off-track to limit warming to 1.5°C or even 2°C and must greatly accelerate greenhouse gas emissions reductions.³⁵⁶ The report concluded that limiting warming to 1.5°C requires countries to strengthen their climate pledges fivefold to cut emissions by at least 7.6% per year through 2030, for a total emissions reduction of 55% between 2020 and 2030.³⁵⁷ Importantly, the report concluded that the U.S. “in particular” must ramp up climate action to meet global climate limits and its pledge under the Paris Agreement.³⁵⁸ The report warned that further delays in emissions cuts threaten the global economy, food security, and biodiversity:

Further delaying the reductions needed to meet the goals would imply future emission reductions and removal of CO₂ from the atmosphere at such a magnitude that it would result in a serious deviation from current available pathways. This,

³⁵² Global Carbon Project, *Global Carbon Budget* (Dec. 5, 2018), https://www.globalcarbonproject.org/carbonbudget/18/files/GCP_CarbonBudget_2018.pdf at 19 (*See* Historical cumulative fossil CO₂ emissions by country).

³⁵³ Le Quéré, Corinne et al., *Global carbon budget 2018*, 10 *Earth Syst. Sci. Data* 2141 (2018), at 2163, Figure 5.

³⁵⁴ SEI, IISD, ODI, E3G, and UNEP, *The Production Gap Report 2021* (2021), <http://productiongap.org/2021report> at Table 4.1.

³⁵⁵ Muttitt, Greg & Sivan Kartha, *Equity, climate justice and fossil fuel extraction: principles for a managed phase out*, 20 *Climate Policy* 1024 (2020); U.S. Climate Action Network, *The U.S. Climate Fair Share* (2020), <https://usfairshare.org/backgrounder/>.

³⁵⁶ United Nations Environment Programme, *Emissions Gap Report 2019*, UNEP, Nairobi (2019), <https://www.unenvironment.org/resources/emissions-gap-report-2019> at 37.

³⁵⁷ United Nations Environment Programme, *Emissions Gap Report 2019*, UNEP, Nairobi (2019), <https://www.unenvironment.org/resources/emissions-gap-report-2019> at XV, XX, 26.

³⁵⁸ United Nations Environment Programme, *Emissions Gap Report 2019*, UNEP, Nairobi (2019), <https://www.unenvironment.org/resources/emissions-gap-report-2019> at 12 (“the main contributions would need to come in particular from the United States of America.”) and 11 (Table 2.2 shows the U.S. on course to exceed its pledge under the Paris Agreement by 16.5% by 2030 under current policy).

together with necessary adaptation actions, risks seriously damaging the global economy and undermining food security and biodiversity.³⁵⁹

Yet as summarized by the Fourth National Climate Assessment, U.S. efforts to mitigate greenhouse gas emissions do not approach the scale needed to avoid “substantial damages to the U.S. economy, environment, and human health and well-being over the coming decades”:

Climate-related risks will continue to grow without additional action. Decisions made today determine risk exposure for current and future generations and will either broaden or limit options to reduce the negative consequences of climate change. While Americans are responding in ways that can bolster resilience and improve livelihoods, neither global efforts to mitigate the causes of climate change nor regional efforts to adapt to the impacts currently approach the scales needed to avoid substantial damages to the U.S. economy, environment, and human health and well-being over the coming decades.³⁶⁰

Importantly, to meet a 1.5°C limit, most U.S. and global fossil fuels must remain undeveloped including an immediate halt to new fossil fuel production and infrastructure and a phase-out of existing production and infrastructure within the next several decades.³⁶¹ However, rather than reducing fossil fuel extraction and use, U.S. policies have aggressively promoted ever greater fossil fuel production and infrastructure including by enabling dangerous hydraulic fracturing, lifting the crude oil export ban, providing billions in government subsidies to the fossil fuel industry,³⁶² and violating Indigenous Peoples’ treaty rights.³⁶³

The managed decline in federal oil and gas extraction should be taken in conjunction with other critical policy actions to redress this inadequacy. Complementary policy measures include, but are not limited to, permanently ending new federal fossil fuel leasing³⁶⁴ and cancelling existing leases that were improperly issued, obtained through fraud or misrepresentation, and for

³⁵⁹ United Nations Environment Programme, Emissions Gap Report 2019, UNEP, Nairobi (2019), <https://www.unenvironment.org/resources/emissions-gap-report-2019> at XX.

³⁶⁰ U.S. Global Change Research Program, Impacts, Risks, and Adaptation in the United States, Fourth National Climate Assessment, Vol.II (2018), <https://nca2018.globalchange.gov/> at 34.

³⁶¹ Rogelj, Joeri et al., Energy system transformations for limiting end-of-century warming to below 1.5°C, 5 Nature Climate Change 519 (2015); Rogelj et al. (2015) estimated that a reasonable likelihood of limiting warming to 1.5° or 2°C requires global CO₂ emissions to be phased out by mid-century and likely as early as 2040-2045; Intergovernmental Panel on Climate Change, Global Warming of 1.5°C, An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (Oct. 6, 2018), <http://www.ipcc.ch/report/sr15/>; Oil Change International, Drilling Toward Disaster: Why U.S. Oil and Gas Expansion Is Incompatible with Climate Limits (January 2019), <http://priceofoil.org/drilling-towards-disaster>.

³⁶² SEI, IISD, ODI, E3G, and UNEP, The Production Gap Report 2021 (2021), <http://productiongap.org/2021report> at 39.

³⁶³ Indigenous Environmental Network & Oil Change International, Indigenous Resistance Against Carbon (2021), <https://www.ienearth.org/wp-content/uploads/2021/09/Indigenous-Resistance-Against-Carbon-2021.pdf>.

³⁶⁴ 500 Groups Urge Biden to Order Fossil Fuel Leasing Ban, Center for Biological Diversity (Dec. 15, 2020), <https://biologicaldiversity.org/w/news/press-releases/500-groups-urge-biden-order-fossil-fuel-leasing-ban-2020-12-15/>.

unacceptable environmental damage.³⁶⁵ Additional measures include ending the approval of new fossil fuel infrastructure projects³⁶⁶, declaring a climate emergency and re-instating the crude oil export ban³⁶⁷, and limiting gas exports to the full extent allowed by the Natural Gas Act. Further necessary actions are contained in a model executive order submitted to President Biden by over 350 organizations.³⁶⁸

VIII. DOI Must Acknowledge And Reject The Myth Of “Perfect Substitution”

In its review of this petition, the Department of the Interior must disavow a discredited economic assumption known as “perfect substitution,” which obscures the greenhouse gas emissions from federal fossil fuel production. Rejecting the “perfect substitution” myth is necessary to accurately analyze the impacts of the managed decline of federal oil and gas production proposed herein.

Four separate federal court decisions, from the Ninth, Tenth, and D.C. Circuit Court of Appeals, and the District of Montana, all firmly rejected federal agency NEPA reviews that either denied the proposed fossil fuel project would have any adverse market and climate effect or claimed that the market effect was too uncertain. Most recently, the Ninth Circuit invalidated a Bureau of Ocean Energy Management (“BOEM”) NEPA review that failed to adequately compare the greenhouse gas emissions of the action and no action alternatives of the Liberty oil and gas drilling project.³⁶⁹ BOEM concluded that the no action alternative — rejecting the Liberty project — would, counterintuitively, increase greenhouse gas emissions by shifting production to foreign sources with comparatively weaker environmental protections.³⁷⁰

But BOEM’s model assumed foreign consumption of oil would remain static were the Liberty project approved; crucially, this assumption ignored “basic economic principles” that are key to understanding climate impacts. As the Court explained, increasing the supply of fossil fuels such as oil (*i.e.*, approving the Liberty project) reduces prices; as price drops, foreign consumers will buy and consume more oil.³⁷¹ Thus, the Court concluded, emissions from predictable market responses, whether domestic or foreign “are surely a ‘reasonably foreseeable’ indirect effect” that must be analyzed and disclosed under NEPA.³⁷²

³⁶⁵ *After Spill, Legal Petition Urges Biden Administration to End Oil Drilling Off California*, Center for Biological Diversity (Oct. 20, 2021), <https://biologicaldiversity.org/w/news/press-releases/after-spill-legal-petition-urges-biden-administration-to-end-oil-drilling-off-california-2021-10-20/>.

³⁶⁶ *Legal Petition Demands Biden Administration Stop Unlawful Fossil Fuel Projects*, Center for Biological Diversity (Oct. 6, 2021), <https://biologicaldiversity.org/w/news/press-releases/legal-petition-demands-biden-administration-stop-unlawful-fossil-fuel-projects-2021-10-06/>.

³⁶⁷ *Legal Petition Pushes President Obama to End Crude Oil Exports, Declare Climate Emergency*, Center for Biological Diversity (Apr. 20, 2016), https://www.biologicaldiversity.org/news/press_releases/2016/climate-emergency-04-20-2016.html.

³⁶⁸ *Biden Urged to Sign Climate Emergency Executive Order*, Center for Biological Diversity (Dec. 16, 2020), <https://biologicaldiversity.org/w/news/press-releases/biden-urged-sign-climate-emergency-executive-order-2020-12-16/>.

³⁶⁹ *Center for Biological Diversity v. Bernhardt*, 982 F.3d 723, 736 (9th Cir. 2020).

³⁷⁰ *Id.*

³⁷¹ *Id.*

³⁷² *Id.*

Similarly, the Tenth Circuit Court of Appeals invalidated a BLM NEPA review where the agency asserted that there would be no difference in the market or climate effects of a decision to authorize the expansion of two coal mines that operate on public lands in Wyoming. “Even if we could conclude that the agency had enough data before it to choose between the preferred and no action alternatives [. . .] this perfect substitution assumption [is] arbitrary and capricious because the assumption itself is irrational (i.e., contrary to basic supply and demand principles).”³⁷³

The D.C. Circuit similarly rejected a Federal Energy Regulatory Commission (“FERC”) NEPA review for the Sabal Trail natural gas pipeline where FERC dodged meaningful analysis of substitution effects by asserting that the project’s GHG emissions “might be partially offset” by the market replacing the project’s gas with either coal or other gas supply.³⁷⁴ The Court dismissed FERC’s failure to study this issue, stating, “[a]n agency decisionmaker reviewing this EIS would thus have no way of knowing whether total emissions, on net, will be reduced or increased by this project, or what the degree of reduction or increase will be. In this respect, then, the EIS fails to fulfill its primary purpose.”³⁷⁵

The federal district court in Montana, like the Tenth Circuit, rejected a Department of the Interior environmental assessment where the agency claimed its decision would not likely have any impact on nationwide GHG emissions because other coal mines would be available to meet a supposedly immutable demand for coal if the agency were to select the no action alternative.³⁷⁶ In *Montana Environmental Information Center v. OSM*, the federal Office of Surface Mining Reclamation and Enforcement (“OSM”) asserted in its environmental assessment that, “[t]he No Action Alternative would not likely result in a decrease in CO₂ emissions attributable to coal-burning power plants in the long term. There are multiple other sources of coal that could supply the demand for coal.”³⁷⁷ The *MEIC* court squarely rejected OSM’s assertion:

This conclusion is illogical, and places [OSM’s] thumb on the scale by inflating the benefits of the action while minimizing its impacts. It is the kind of “inaccurate economic information” that “may defeat the purpose of [NEPA analysis] by impairing the agency’s consideration of the adverse environmental effects and by skewing the public’s evaluation of the proposed agency action.”³⁷⁸

This long line of cases provides the Department of the Interior with ample justification to acknowledge and reject past assumptions of perfect substitution that downplayed the significance of agency actions with respect to reducing greenhouse gas pollution and associated climate change impacts. Indeed, in correcting these prior analytic errors, the Department must abandon its past reliance on perfect substitution and explain why that approach was wrong.³⁷⁹ Such action

³⁷³ *WildEarth Guardians v. BLM*, 870 F.3d 1222, 1236 (2017).

³⁷⁴ *Sierra Club v. Fed. Energy Regulatory Comm’n*, 867 F.3d 1357, 1375 (D.C. Cir. 2017).

³⁷⁵ *Id.*

³⁷⁶ *Montana Environmental Information Center v. OSM*, 274 F.Supp.3d 1074, 1098 (D. Mont. 2017).

³⁷⁷ *Id.*

³⁷⁸ *Id.* (quoting *NRDC v. Forest Service*, 421 F.3d 797, 811 (9th Cir. 2005)).

³⁷⁹ *W. Deptford Energy, LLC v. FERC*, 766 F.3d 10, 17 (D.C. Cir. 2014) (agencies “cannot depart from [prior] rulings without provid[ing] a reasoned analysis indicating that prior policies and standards are being deliberately changed, not casually ignored”); *Wis. Valley Improvement v. FERC*, 236 F.3d 738, 748 (D.C. Cir. 2001) (“an agency

is crucial to accurately measure and analyze the phase-down of oil and gas production proposed herein.

CONCLUSION

Thus, you must take swift and decisive action to implement a managed decline of oil and gas production on public lands and waters. Allowing continued, unchecked extraction of fossil fuels would all but make it impossible to avoid disastrous climate change and to keep global temperature increases well below 1.5°C of warming. We have reached the point that unabated fossil fuel production now presents a clear and present danger to the climate, natural habitats and wildlife across the United States, and is unjustly burdening impacted communities everywhere. With the aforementioned in mind, we respectfully ask that you grant our petition and use your inherent authority to control the rates of oil and gas production in order to save our environment from the disastrous scourge of fossil fuels.

Respectfully submitted,

Center for Biological Diversity
A Community Voice
Action for the Climate Emergency (ACE)
Alaska's Big Village Network
Alianza Americas
Allamakee County Protectors - Education Campaign
Alliance for Water Justice in Palestine
American Federation of Government Employees Local 704
Animals Are Sentient Beings, Inc.
Animas Valley Institute
Anthropocene Alliance
Athens County's Future Action Network
Austin Climate Coalition
Baltimore, MD Phil Berrigan Memorial Chapter Veterans For Peace
Battle Creek Alliance & Defiance Canyon Raptor Rescue
Bay Area-System Change not Climate Change
Berks Gas Truth
Better Path Coalition
Beyond Extreme Energy (BXE)
Biodiversity for a Livable Climate
Black Warrior Riverkeeper
Bold Alliance
Breathe Project
Brian Setzler CPA Firm LLC
Bronx Climate Justice North
Bronx Jews for Climate Action
Bucks Environmental Action

acts arbitrarily and capriciously when it abruptly departs from a position it previously held without satisfactorily explaining its reason for doing so”).

CA Businesses for a Livable Climate
Cahaba Riverkeeper
California Democratic Party Environmental Caucus
California Nurses Association
Californians for Western Wilderness
Canton Residents for a Sustain
Canton Residents for a Sustainable, Equitable Future
Cape Downwinders
Carolina Biodiesel, LLC
Carrizo Comecrudo Tribe of Texas
Catholic Network US
Catskill Mountainkeeper
Center For Ecological Living and Learning (CELL)
Center for Environmental Health
Center for International Environmental Law
Central California Environmental Justice Network
Central Jersey Coalition Against Endless War
CERBAT: Center for Environmentally Recycled Building Alternatives
Chaco Alliance
Christians For The Mountains
Church women United in New York State
Citizens Climate Lobby, LA West Chapter
Citizens for a Healthy Community
Citizens' Climate Lobby, Columbia County Chapter
Ciudadanos Del Karso
Clean Energy Action
CLEO Institute
Cleveland Owns
<http://Climable.org>
Climate Action Now Western Mass.
Climate Action Rhode Island – 350
Climate Crisis Policy
Climate Defense Project
Climate Finance Action
Climate First!, Inc.
Climate Hawks Vote
Climate Justice Alliance
Climate Reality Project, New Orleans Chapter
ClimateMama
Coalition Against Death Alley
Coalition Against Pilgrim Pipeline - NJ
Coalition for Outreach, Policy and Education
Coalition to Protect America's National Parks
Common Ground Community Trust
Communities for a Better Environment
Community Church of New York

Community for Sustainable Energy
Community Health
Concerned Health Professionals of New York
Conejo Climate Coalition
Conservation Council For Hawaii
Cooperative Energy Futures
Corvallis Climate Action Alliance
Corvallis Interfaith Climate Justice Committee
Cottonwood Environmental Law Center
Dayenu: A Jewish Call to Climate Action
DC Environmental Network
Divest LA
Don't Gas the Meadowlands Coalition
Don't Waste Arizona
Dryden Resource Awareness Coalition
Earth Action, Inc.
Earth Day Initiative
Earth Ethics, Inc.
<http://EARTHDAY.ORG>
Earthworks
Eco-Eating
Eco-Justice Collaborative
EcoEquity
Elders Climate Action
Electrify Corvallis
Empower our Future - Colorado
End Climate Silence
Endangered Habitats League
Environmental Action Committee of West Marin
Environmental Justice Ministry
Extinction Rebellion Boston
Extinction Rebellion San Francisco Bay Area
Fairbanks Climate Action Coalition
First Wednesdays San Leandro
FLOW (For Love of Water)
Food & Water Watch
Fossil Free California
Frac Sand Sentinel: Project Outreach
FrackBusters NY
FracTracker Alliance
Franciscan Action Network
FreshWater Accountability Project
Fridays for Future U.S.
Friends For Environmental Justice
Friends of the Bitterroot
Friends of the Earth

Fund for Wild Nature
Gas Free Seneca
George Mason University Center for Climate Change Communication
Georgia Conservation Voters
Global Warming Education Network (GWEN)
Global Witness
Golden Egg Permaculture
Grassroots Coalition
Grassroots Environmental Education
Grassroots Global Justice Alliance
Grays Harbor Audubon Society
Great Egg Harbor Watershed Association
Great Old Broads for Wilderness
Greater New Orleans Interfaith Climate Coalition
Green America
Green New Deal Virginia
Green Newton Inc
Green River Action Network
Greenbelt Climate Action Network
GreenFaith
Gulf Coast Center for Law & Policy
Heal the Bay
HealthyPlanet
Heartwood
Heirs To Our Oceans
High Country Conservation Advocates
Hilton Head for Peace
Honor the Earth
Howling For Wolves
Hudson River Sloop Clearwater
I-70 Citizens Advisory Group
In the Shadow of the Wolf
Indian Point Safe Energy Coalition
Indigenous Environmental Network
Indigenous Peoples of the Coastal Bend
Indivisible Ambassadors
Indivisible San Jose
inNative - Business Management Consulting
Inspiration of Sedona
Institute for Policy Studies Climate Policy Program
Interfaith EarthKeepers
Interfaith Earthkeepers Eugene/Springfield Oregon
International Marine Mammal Project of Earth Island Institute
Jewish Climate Action Network
Justice & Beyond Louisiana
Karankawa Kadla

Kentucky Conservation Committee
Klamath Forest Alliance
KyotoUSA
LaPlaca and Associates LLC
L'eau Est La Vie Camp
Let There Be Light International
Liberty Tree Foundation for the Democratic Revolution
Living Rivers & Colorado Riverkeeper
LLCv
Long Beach Alliance for Clean Energy
Los Padres ForestWatch
Louisiana League of Conscious Voters
Love Wild Horses® 501c3
Lutherans Restoring Creation
Malach Consulting
Maryland Ornithological Society
Mass Peace Action
Massachusetts Forest Watch
Media Alliance
Michigan Interfaith Power & Light
Mid-Missouri Peaceworks
Milwaukee Riverkeeper
Mission Blue
Montana Environmental Information Center
Montbello Neighborhood Improvement Association
Mountain Progressives Frazier Park CA
Movement Rights
Movement Training Network
Nature Coast Conservation, Inc
NC Climate Justice
Ndn Bayou Food Forest
New Energy Economy
New Mexico Climate Justice
New Mexico Environmental Law Center
NJ State Industrial Union Council
North American Climate, Conservation and Environment
North Bronx Racial Justice
North Carolina Council of Churches
North County Earth Action
North Range Concerned Citizens
Northern Michigan Environmental Action Council
NY4WHALES
NYC Friends of Clearwater
Oasis Earth
Occupy Bergen County (New Jersey)
Ocean Conservation Research

Oceanic Preservation Society
Ogeechee Riverkeeper
Oil and Gas Action Network
Oil Change International
Operation HomeCare, Inc.
Our Revolution
Our Revolution Massachusetts (ORMA)
Partnership for Policy Integrity
PeaceWorks of Greater Brunswick
Peak Plastic Foundation
Pelican Media
People for a Healthy Environment
People's Justice Council/Alabama Interfaith Power and Light
Peoples Climate Movement - NY
Physicians for Social Responsibility
Physicians for Social Responsibility Arizona
Physicians for Social Responsibility Pennsylvania
PlasticFreeRestaurants.org
Port Arthur Community Action Network
Presente.org
Preserve Giles County
Preserve Montgomery County VA
Progressive Democrats of America
Project Coyote
Protect Our Water AZ
Public Citizen
Public Lands Project
Rachel Carson Council
Raptors Are The Solution
RATT Pack
RE Sources
Reconstructionist Rabbinical Association
Renewable Energy Long Island
Resource Renewal Institute
Rio Grande International Study Center
RootsAction
Samuel Lawrence Foundation
San Bernardino Valley Audubon Society
San Francisco Bay Physicians for Social Responsibility
Sane Energy Project
Santa Barbara Standing Rock Coalition
Santa Barbara Urban Creeks Council
Santa Cruz Climate Action Network
Santa Fe Forest Coalition
Save Our Illinois Land
Save The Colorado

SAVE THE FROGS!

Save the Pine Bush

SD350

Seaside Sustainability.org

SEE-LA (Social Eco Education-LA)

Seeding Sovereignty

Seneca Lake Guardian

Sequoia ForestKeeper®

Sevier Citizens for Clean Air & Water Inc.

Sierra Club

Sisters of Mercy of the Americas Justice Team

Sisters of St. Francis of Philadelphia

SoCal 350 Climate Action

Social Justice Commission (Episcopal Diocese of Western MA)

Society of Fearless Grandmothers-Santa Barbara

Solar Wind Works

SOMA Action

South Asian Fund For Education Scholarship and Training Inc (SAFEST)

South Dakota Chapter of the Sierra Club

South Florida Wildlands Association

Southwest Native Cultures

Spottswode Winery, Inc.

Stand.earth

Stop SPOT & Gulflink

Sunflower Alliance

Sunrise LA

Susanne Moser Research & Consulting

Syracuse Cultural Workers

System Change Not Climate Change

Tennessee Riverkeeper

Terra Advocati

The Climate Mobilization North Jersey

The Consortia

The Earth Bill Network

The Enviro Show

The Green House Connection Center

The Oakland Institute

The People's Justice Council

The Quantum Institute

The Rewilding Institute

The River Project

To Nizhoni Ani

Transition Sebastopol

Tualatin Riverkeepers

Turtle Island Restoration Network

Unitarian Universalist Association

Unitarian Universalists for a Just Economic Community
Unite North Metro Denver
United for Action
United For Clean Energy
United University Professions
Upper Gila Watershed Alliance
Upper Peninsula Environmental Coalition
Upper West Side Recycling
Utah Physicians for a Healthy Environment
UU Fellowship of Corvallis Climate Action Team
V & T Ventures, LLC
Vanderbilt dba Greenvest
Vegan Flag
Verdedenver
Vermont Yankee Decommissioning Alliance
Veterans For Climate Justice
Volusia Climate Action
Vote Climate
Wall of Women
Wasatch Clean Air Coalition
Washington Physicians for Social Responsibility
WATCH, INC
Watchdogs of Southeastern PA (WaSEPA)
Waterkeeper Alliance
WESPAC Foundation, Inc.
West 80s Neighborhood Association
West Berkeley Alliance for Clean Air and Safe Jobs
West Dryden Residents Against the Pipeline
Western Environmental Law Center
Western Nebraska Resources Council
White Rabbit Grove RDNA
Wild Nature Institute
Wild Watershed
WildEarth Guardians
Wilderness Workshop
Women's Earth and Climate Action Network
Women's March Santa Barbara
Womxn from the Mountain
<http://www.SafeEnergyAnalyst.org>
Zero Hour
198 Methods
1st United Methodist Church, Corvallis, OR, Environmental Care Team
350 Butte County
350 Chicago
350 Colorado
350 Conejo / San Fernando Valley

350 Hawaii
350 Humboldt
350 Kishwaukee
350 Marin
350 New Hampshire
350 New Orleans
350 Pensacola
350 Seattle
350 Silicon Valley
350 Tacoma
350 Triangle
7 Directions of Service

APPENDIX

Exhibit A: U.S. Department of the Interior, Bureau of Land Management, Offer to Lease and Lease for Oil and Gas (Form 3100-11)

Exhibit B: U.S. Department of the Interior, Bureau of Ocean Energy Management, Oil and Gas Lease of Submerged Lands Under the OCS Lands Act (BOEM-2005)

Exhibit C: U.S. Department of the Interior, Bureau of Land Management, Alaska State Office, Offer to Lease and Lease for Oil and Gas (Form AK- 3130-1)

Exhibit A: U.S. Department of the Interior, Bureau of Land Management, Offer to Lease and Lease for Oil and Gas (Form 3100-11)

For the onshore oil and gas program under the Mineral Leasing Act, the Bureau of Land Management lease form includes the following provisions:

This lease is issued granting the exclusive right to drill for, mine, extract, remove and dispose of all the oil and gas (except helium) in the lands described in Item 3 together with the right to build and maintain necessary improvements thereupon for the term indicated below, subject to renewal or extension in accordance with the appropriate leasing authority. Rights granted are subject to applicable laws, the terms, conditions, and attached stipulations of this lease, the Secretary of the Interior's regulations and formal orders in effect as of lease issuance, and to regulations and formal orders hereafter promulgated when not inconsistent with lease rights granted or specific provisions of this lease.

Sec. 4. Diligence, rate of development, unitization, and drainage - Lessee must exercise reasonable diligence in developing and producing, and must prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves right to specify rates of development and production in the public interest and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of area, field, or pool embracing these leased lands. Lessee must drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amount determined by lessor.

Sec. 3. Bonds - A bond must be filed and maintained for lease operations as required under regulations.

Sec. 4. Diligence, rate of development, unitization, and drainage - Lessee must exercise reasonable diligence in developing and producing, and must prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves right to specify rates of development and production in the public interest and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of area, field, or pool embracing these leased lands. Lessee must drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amount determined by lessor.

Sec. 5. Documents, evidence, and inspection - Lessee must file with proper office of lessor, not later than 30 days after effective date thereof, any contract or evidence of other arrangement for sale or disposal of production. At such times and in such form as lessor may prescribe, lessee must furnish detailed statements showing amounts and quality of all products removed and sold, proceeds therefrom, and amount used for production purposes or unavoidably lost. Lessee may be required to provide plats and schematic diagrams showing development work and improvements, and reports with respect to parties in interest, expenditures, and depreciation costs. In the form prescribed by lessor, lessee must keep a daily drilling record, a log, information on well surveys and tests, and a record of subsurface investigations and furnish copies to lessor when required. Lessee must keep open at all reasonable times for inspection by any representative of lessor, the leased premises and all wells, improvements, machinery, and fixtures thereon, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or in the leased lands. Lessee must maintain copies of all contracts, sales agreements, accounting records, and documentation such as billings, invoices, or similar documentation that supports costs claimed as manufacturing, preparation, and/or transportation costs. All such records must be maintained in lessee's accounting offices for future audit by lessor. Lessee must maintain required records for 6 years after they are generated or, if an audit or investigation is underway, until released of the obligation to maintain such records by lessor.

During existence of this lease, information obtained under this section will be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 6. Conduct of operations - Lessee must conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee must take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses must be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.

Prior to disturbing the surface of the leased lands, lessee must contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee must immediately contact lessor. Lessee must cease any operations that would result in the destruction of such species or objects.

Sec. 7. Mining operations - To the extent that impacts from mining operations would be substantially different or greater than those associated with normal drilling operations, lessor reserves the right to deny approval of such operations.

Sec. 8. Extraction of helium - Lessor reserves the option of extracting or having extracted helium from gas production in a manner specified and by means provided by lessor at no expense or loss to lessee or owner of the gas. Lessee must include in any contract of sale of gas the provisions of this section.

Sec. 9. Damages to property - Lessee must pay lessor for damage to lessor's improvements, and must save and hold lessor harmless from all claims for damage or harm to persons or property as a result of lease operations.

Sec. 10. Protection of diverse interests and equal opportunity - Lessee must pay, when due, all taxes legally assessed and levied under laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain a safe working environment in accordance with standard industry practices; and take measures necessary to protect the health and safety of the public.

Lessor reserves the right to ensure that production is sold at reasonable prices and to prevent monopoly. If lessee operates a pipeline, or owns controlling interest in a pipeline or a company operating a pipeline, which may be operated accessible to oil derived from these leased lands, lessee must comply with section 28 of the Mineral Leasing Act of 1920.

Lessee must comply with Executive Order No. 11246 of September 24, 1965, as amended, and regulations and relevant orders of the Secretary of Labor issued pursuant thereto. Neither lessee nor lessee's subcontractors must maintain segregated facilities.

Sec. 11. Transfer of lease interests and relinquishment of lease - As required by regulations, lessee must file with lessor any assignment or other transfer of an interest in this lease. Lessee may relinquish this lease or any legal subdivision by filing in the proper office a written relinquishment, which will be effective as of the date of filing, subject to the continued obligation of the lessee and surety to pay all accrued rentals and royalties.

Sec. 12. Delivery of premises - At such time as all or portions of this lease are returned to lessor, lessee must place affected wells in condition for suspension or abandonment, reclaim the land as specified by lessor and, within a reasonable period of time, remove equipment and improvements not deemed necessary by lessor for preservation of producible wells.

Sec. 13. Proceedings in case of default - If lessee fails to comply with any provisions of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease will be subject to cancellation unless or until the leasehold contains a well capable of production of oil or gas in paying quantities, or the lease is committed to an approved cooperative or unit plan or communitization agreement which contains a well capable of production of unitized substances in paying quantities. This provision will not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver will not prevent later cancellation for the same default occurring at any other time. Lessee will be subject to applicable provisions and penalties of FOGRMA (30 U.S.C. 1701).

Sec. 14. Heirs and successors-in-interest - Each obligation of this lease will extend to and be binding upon, and every benefit hereof will inure to the heirs, executors, administrators, successors, beneficiaries, or assignees of the respective parties hereto.

Exhibit B: U.S. Department of the Interior, Bureau of Ocean Energy Management, Oil and Gas Lease of Submerged Lands Under the OCS Lands Act (BOEM-2005)

For the offshore oil and gas program under the Outer Continental Shelf Lands Act, the Bureau of Ocean Energy Management lease form includes the following provisions:

Sec. 1. Statutes and Regulations. This lease is issued pursuant to the Outer Continental Shelf Lands Act of August 7, 1953; 43 U.S.C. 1331 et seq., as amended, (hereinafter called "the Act"). This lease is subject to the Act, regulations promulgated pursuant thereto, and other statutes and regulations in existence upon the Effective Date of the lease, and those statutes enacted (including amendments to the Act or other statutes) and regulations promulgated thereafter, except to the extent they explicitly conflict with an express provision of this lease. It is expressly understood that amendments to existing statutes and regulations, including but not limited to the Act, as well as the enactment of new statutes and promulgation of new regulations, which do not explicitly conflict with an express provision of this lease may be made and that the Lessee bears the risk that such may increase or decrease the Lessee's obligations under the lease.

Sec. 16. Unitization, Pooling, and Drilling Agreements. Within such time as the Lessor may prescribe, the Lessee shall subscribe to and operate under a unit, pooling, or drilling agreement embracing all or part of the lands subject to this lease as the Lessor may determine to be appropriate or necessary. Where any provision of a unit, pooling, or drilling agreement, approved by the Lessor, is inconsistent with a provision of this lease, the provision of the agreement shall govern.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT
**OIL AND GAS LEASE OF SUBMERGED LANDS
UNDER THE OUTER CONTINENTAL SHELF LANDS ACT**

Paperwork Reduction Act of 1995 statement: *This form does not constitute an information collection as defined by 44 U.S.C. 3501 et seq., and therefore does not require approval by the Office of Management and Budget.*

Office	Serial number
Cash bonus	Rental rate per acre, hectare or fraction thereof
Minimum royalty rate per acre, hectare or fraction thereof	Royalty rate
	Profit share rate

This lease is effective as of _____ (hereinafter called the "Effective Date") and shall continue for a primary term of _____ years (hereinafter called the "Primary Term") by and between the United States of America (hereinafter called the "Lessor"), by the authorized officer, and _____ Bureau of Ocean Energy Management (BOEM), its

(hereinafter called the "Lessee"). In consideration of any cash payment heretofore made by the Lessee to the Lessor and in consideration of the promises, terms, conditions, and covenants contained herein, including the Stipulation(s) numbered attached hereto, the Lessee and Lessor agree as follows:

Sec. 1. Statutes and Regulations. This lease is issued pursuant to the Outer Continental Shelf Lands Act of August 7, 1953; 43 U.S.C. 1331 *et seq.*, as amended, (hereinafter called "the Act"). This lease is subject to the Act, regulations promulgated pursuant thereto, and other statutes and regulations in existence upon the Effective Date of the lease, and those statutes enacted (including amendments to the Act or other statutes) and regulations promulgated thereafter, except to the extent they explicitly conflict with an express provision of this lease. It is expressly understood that amendments to existing statutes and regulations, including but not limited to the Act, as well as the enactment of new statutes and promulgation of new regulations, which do not explicitly conflict with an express provision of this lease may be made and that the Lessee bears the risk that such may increase or decrease the Lessee's obligations under the lease.

In accordance with the regulations at 2 CFR, parts 180 and 1400, the Lessee must comply with the U.S. Department of the Interior's debarment and suspension (nonprocurement) requirements and must communicate this requirement to comply with these regulations to all persons with whom the Lessee does business as it relates to this lease by including this term as a condition when entering into contracts and transactions with others.

Sec. 2. Rights of Lessee. The Lessor hereby grants and leases to the Lessee the exclusive right and privilege to drill for, develop, and produce oil and gas resources, except helium gas, in the submerged lands of the Outer Continental Shelf containing approximately _____ acres or hectares (hereinafter referred to as the "leased area"), described as follows:

Sec. 13. Suspension or Cancellation.

(a) The Lessor may suspend or cancel this lease pursuant to section 5 of the Act, and compensation shall be paid when provided by the Act.

(b) The Lessor may, upon recommendation of the Secretary of Defense, during a state of war or national emergency declared by Congress or the President of the United States, suspend operations under the lease, as provided in section 12(c) of the Act, and just compensation shall be paid to the Lessee for such suspension.

Sec. 14. Indemnification. The Lessee shall indemnify the Lessor for, and hold it harmless from, any claim, including claims for loss or damage to property or injury to persons caused by or resulting from any operation on the leased area conducted by or on behalf of the Lessee. However, the Lessee shall not be responsible to the Lessor under this section for any loss, damage, or injury caused by or resulting from:

(a) negligence of the Lessor other than the commission or omission of a discretionary function or duty on the part of a Federal Agency whether or not the discretion involved is abused; or

(b) the Lessee's compliance with an order or directive of the Lessor against which an administrative appeal by the Lessee is filed before the cause of action for the claim arises and is pursued diligently thereafter.

Sec. 15. Disposition of Production.

(a) As provided in section 27(a)(2) of the Act, the Lessor shall have the right to purchase not more than 16 2/3 percent by volume of the oil and gas produced pursuant to the lease at the regulated price or, if no regulated price applies, at the fair market value at the wellhead of the oil and gas saved, removed, or sold, except that any oil or gas obtained by the Lessor as royalty or net profit share shall be credited against the amount that may be purchased under this subsection.

(b) Pursuant to section 27(b) and (c) of the Act, the Lessor may offer and sell certain oil and gas obtained or purchased pursuant to a lease. As provided in section 27(d) of the Act, the Lessee shall take any Federal oil or gas for which no acceptable bids are received, as determined by the Lessor, and which is not transferred to a Federal Agency pursuant to section 27(a)(3) of the Act, and shall pay to the Lessor a cash amount equal to the regulated price or, if no regulated price applies, the fair market value of the oil or gas so obtained.

(c) As provided in section 8(b)(7) of the Act, the Lessee shall offer 20 percent of the crude oil, condensate, and natural gas liquids produced on the lease, at the market value and point of delivery as provided by regulations applicable to Federal royalty oil, to small or independent refiners as defined in the Emergency Petroleum Allocation Act of 1973.

(d) In time of war or when the President of the United States shall so prescribe, the Lessor shall have the right of first refusal to purchase at the market price all or any portion of the oil or gas produced from the leased area, as provided in section 12(b) of the Act.

Sec. 16. Unitization, Pooling, and Drilling Agreements. Within such time as the Lessor may prescribe, the Lessee shall subscribe to and operate under a unit, pooling, or drilling agreement embracing all or part of the lands subject to this lease as the Lessor may determine to be appropriate or necessary. Where any provision of a unit, pooling, or drilling agreement, approved by the Lessor, is inconsistent with a provision of this lease, the provision of the agreement shall govern.

Sec. 17. Equal Opportunity Clause. During the performance of this lease, the Lessee shall fully comply with paragraphs (1) through (7) of section 202 of Executive Order 11246, as amended (reprinted in 41 CFR 60-1.4(a)), and the implementing regulations, which are for the purpose of preventing employment discrimination against persons on the basis of race, color, religion, sex, or national origin. Paragraphs (1) through (7) of section 202 of Executive Order 11246, as amended, are incorporated in this lease by reference.

Sec. 18. Certification of Nonsegregated Facilities. By entering into this lease, the Lessee certifies, as specified in 41 CFR 60-1.8, that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. As used in this certification, the term "facilities" means, but is not limited to, any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees. Segregated facilities include those that are segregated by explicit directive or those that are in fact segregated on the basis of race, color, religion, sex, or national origin, because of habit, local custom, or otherwise; provided, that separate or single-user restrooms and necessary dressing or sleeping areas shall be provided to assure privacy as appropriate. The Lessee further agrees that it will obtain identical certifications from proposed contractors and subcontractors prior to awarding contracts or subcontracts unless they are exempt under 41 CFR 60-1.5.

Sec. 19. Reservations to Lessor. All rights in the leased area not expressly granted to the Lessee by the Act, the regulations, or this lease are hereby reserved to the Lessor. Without limiting the generality of the foregoing, reserved rights included:

(a) the right to authorize geological and geophysical exploration in the leased area that does not unreasonably interfere with or endanger actual operations under the lease, and the right to grant such easements or rights-of-way upon, through, or in the leased area as may be necessary or appropriate to the working of other lands or to the treatment and shipment of products thereof by or under authority of the Lessor;

(b) the right to grant leases for any minerals other than oil and gas, and to issue leases or grants for renewable energy or alternative uses within the leased area, except that operations under such leases or grants shall not unreasonably interfere with or endanger operations under this lease; and

(c) the right, as provided in section 12(d) of the Act, to restrict operations in the leased area or any part thereof, which may be designated by the Secretary of Defense, with approval of the President, as being within an area needed for national defense and, so long as such designation remains in effect, no operations may be conducted on the surface of the leased area or the part thereof included within the designation except with the concurrence of the Secretary of Defense. If operations or production under this lease within any designated area are suspended pursuant to this paragraph, any payments of rentals and royalty prescribed by this lease likewise shall be suspended. During such period of suspension of operations and production, the term of this lease shall be extended by adding thereto any such suspension period, and the Lessor shall be liable to the Lessee for such compensation as is required to be paid under the Constitution of the United States.

Sec. 20. Assignment of Lease. The Lessee shall file for approval with the appropriate regional BOEM OCS office any instrument of assignment or other transfer of any rights or ownership interest in this lease in accordance with applicable regulations.

Sec. 21. Relinquishment of Lease. The Lessee may relinquish this lease or any officially designated subdivision thereof by filing with the appropriate regional BOEM OCS office a written relinquishment, in triplicate, that shall be effective on the date it is filed. No relinquishment of this lease or of any portion of the leased area shall relieve the Lessee of the continuing obligation to pay all accrued rentals, royalties, and other financial obligations or to plug all wells and remove

Exhibit C: U.S. Department of the Interior, Bureau of Land Management, Alaska State Office, Offer to Lease and Lease for Oil and Gas (Form AK- 3130-1)

For the National Petroleum Reserve in Alaska oil and gas program under the Naval Petroleum Reserves Production Act, the Bureau of Land Management lease form includes the following provisions:

This lease is issued granting the exclusive right to drill for, mine, extract, remove and dispose of all the oil and gas (except helium) in the lands described in Item 3 together with the right to build and maintain necessary improvements thereupon for the term indicated below, subject to renewal or extension in accordance with the appropriate leasing authority. Rights granted are subject to applicable laws, the terms, conditions, and attached stipulations of this lease, the Secretary of the Interior's regulations and formal orders in effect as of lease issuance, and to regulations and formal orders hereafter promulgated when not inconsistent with lease rights granted or specific provision of this lease.

Sec. 4. Diligence, rate of development, unitization, and drainage – Lessee must exercise reasonable diligence in developing and producing, and must prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves the right to specify rates of development and production in the public interest and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of area, field, or pool embracing these leased lands. Lessee shall drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amount determined by lessor.

Serial No.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ALASKA STATE OFFICE
OFFER TO LEASE AND LEASE FOR OIL AND GAS

The undersigned (page two) offers to lease all or any of the lands in Item 2 that are available for lease pursuant to the Naval Petroleum Reserves Production Act of 1976 (42 U.S.C. 6501 et seq.), as amended.

READ INSTRUCTIONS BEFORE COMPLETING

1. Name

Street

City, State, Zip Code

2. This application/offer/lease is for Public Domain Lands in the National Petroleum Reserve in Alaska (NPR-A)

Legal description of land requested:

*Tract No.: _____ * Sale Date (m/d/y): _____ / _____ / _____

T. R. Meridian State County

Amount remitted: Filing fee \$ _____ Rental fee \$ _____ Total acres applied for _____
Total \$ _____

DO NOT WRITE BELOW THIS LINE

3. Land included in lease:

T. R. Meridian State County

Total acres in lease _____

Rental retained \$ _____

This lease is issued granting the exclusive right to drill for, mine, extract, remove and dispose of all the oil and gas (except helium) in the lands described in Item 3 together with the right to build and maintain necessary improvements thereupon for the term indicated below, subject to renewal or extension in accordance with the appropriate leasing authority. Rights granted are subject to applicable laws, the terms, conditions, and attached stipulations of this lease, the Secretary of the Interior's regulations and formal orders in effect as of lease issuance, and to regulations and formal orders hereafter promulgated when not inconsistent with lease rights granted or specific provision of this lease.

NOTE: This lease is issued to the high bidder pursuant to his/her duly executed bid or nomination form submitted under 43 CFR Part 3130 and is subject to the provisions of that bid or nomination and those specified on this form.

Type and primary term of lease:

THE UNITED STATES OF AMERICA

Competitive NPR-A Lease (ten years)

by _____ (Signing Officer)

(Title)

(Date)

EFFECTIVE DATE OF LEASE _____

4. (a) Undersigned certifies that (1) offeror is a citizen of the United States; an association of such citizens; a municipality; or a corporation organized under the laws of the United States or of any State or Territory thereof; (2) all parties holding an interest in the offer are in compliance with 43 CFR Part 3132.1 and the leasing authorities; (3) offeror is not considered a minor under the laws of the State in which the lands covered by this offer are located.

(b) Undersigned agrees that signature to this offer constitutes acceptance of this lease, including all terms, conditions, and stipulations of which offeror has been given notice, and any amendment or separate lease that may include any land described in this offer open to leasing at the time this offer was filed but omitted for any reason from this lease. The offeror further agrees that this offer cannot be withdrawn, either in whole or in part.

This offer will be rejected and will afford offeror no priority if it is not properly completed and executed in accordance with the regulations, or if it is not accompanied by the required payments. 18 U.S.C. Sec. 1001 makes it a crime for any person knowingly and willfully to make to any Department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

NOTICE

The Privacy Act of 1974 and the regulations at 43 CFR 2.223(d) provide that you be furnished with the following information:

AUTHORITY: 50 Stat. 900; 25 U.S.C. 500

PRINCIPAL PURPOSE: The primary uses of the records are (1) to determine your qualification to receive an oil and gas lease; and (2) to provide information concerning oil and gas leases for administrative and public use.

ROUTINE USES: BLM and the Department of the Interior (DOI) may disclose your information on this form: (1) to members of the public who have a need for the information that is maintained by BLM for public record; (2) to the U.S. Department of Justice, court, or other adjudicative body when DOI determines the information is necessary and relevant to litigation; (3) to appropriate Federal, State, local or foreign agencies responsible for investigating, prosecuting violations, enforcing or implementing this statute, regulation, or lease; and (4) to a congressional office when you request the assistance of the Member of Congress in writing.

EFFECT OF NOT PROVIDING THIS INFORMATION: If you do not furnish all the information required by this form, your application may be rejected.

Duly executed this _____ day of _____, 20 _____.

(Signature of Lessee or Attorney-in-fact)

LEASE TERMS

Sec. 1. Rentals - Rentals must be paid to the proper office of lessor in advance of each lease year. Annual rental rates per acre or fraction thereof are: 5.00 for Area H; \$3.00 for Area L; or as specified in the detailed statement of sale

If this lease or a portion thereof is committed to an approved cooperative or unit plan which includes a well capable of producing leased resources, or a well that meets criteria in 43 CFR 3137.82 and the plan contains a provision for allocation of production, royalties shall be paid on the production allocated to this lease. However, annual rentals shall continue to be due at the rate specified for those lands not within a participating area.

Failure to pay annual rent, within 30 days after receipt of a Notice of Delinquency shall cause this lease to terminate. Rentals may be waived, reduced, or suspended by the Secretary upon a sufficient showing by lessee.

Sec. 2. Royalties - Royalties shall be paid to the proper office of lessor. Royalties shall be computed in accordance with regulations on production removed or sold. Royalty rates are: 16 2/3% for Area H; 12 1/2% for Area L; or as specified in the detailed statement of sale.

Lessor reserves the right to specify whether royalty is to be paid in value or in kind, and the right to establish reasonable minimum values on products after giving lessee notice and an opportunity to be heard. When paid in value, royalties shall be due and payable on the last day of the month following the month in which production occurred. When paid in kind, production shall be delivered, unless otherwise agreed to by lessor, in merchantable condition on the premises where produced without cost to lessor. Lessee shall not be required to hold such production in storage beyond the last day of the month following the month in which production occurred, nor shall lessee be held liable for loss or destruction of royalty oil or other products in storage from causes beyond the reasonable control of the lessee.

Minimum royalty in lieu of rental of not less than the rental which otherwise would be required for that lease year shall be payable at the end of each lease year beginning on or after a discovery in paying quantities. This minimum royalty may be waived, suspended, or reduced and the above royalty rates may be reduced, for all or portions of the lease if the Secretary determines that such action is necessary to encourage the greatest ultimate recovery of the leased resources, or is otherwise justified.

An interest charge shall be assessed on the late royalty payments or underpayments in accordance with the Federal Oil and Gas Royalty Management Act of 1982 (FOGRMA) (30 U.S.C. 1701). Lessee shall be liable for royalty payments on oil and gas loss or wasted from a lease site when such loss or waste is due to negligence on the part of the operator, or due to the failure to comply with any rules, regulations, orders, or citations issued under FOGRMA or the leasing authority.

Sec. 3. Bonds - A bond shall be filed and maintained for lease operations as required under regulations.

Sec. 4. Diligence, rate of development, unitization, and drainage - Lessee must exercise reasonable diligence in developing and producing, and must prevent unnecessary damage to, loss of, or waste of leased resources. **Lessee reserves the right to specify rates of development and production in the public interest** and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of area, field, or pool embracing these leased lands. Lessee shall drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amount determined by lessor.

Sec. 5. Documents, evidence, and inspection - Lessee shall file with the proper office of lessor, not later than 30 days after effective date thereof, any contract or evidence of other arrangement for sale or disposal of production. At such times and in such form as lessor may prescribe, lessee shall furnish detailed statements showing amounts and quality of all products removed and sold, proceeds therefrom, and amount used for production purposes or unavoidably lost. Lessee may be required to provide plats and schematic diagrams showing development work and improvements, and reports with respect to parties in interest, expenditures, and depreciation costs. In the form prescribed by lessor, lessee shall keep a daily drilling record, a log, information on well surveys and tests, and a record of subsurface investigations and furnish copies to lessor when required. Lessee shall keep open at all reasonable times for inspection by any authorized officer of lessor, the leased premises and all wells, improvements, machinery, and fixtures thereon, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or in the leased lands. Lessee shall maintain copies of all contracts, sales agreements, accounting records, and documentation such as billings, invoices, or similar documentation that support costs claimed as manufacturing,

preparation, and/or transportation costs. All such records shall be maintained in lessee's accounting office for future audit by lessor. Lessee shall maintain required records for 6 years after they are generated or, if an audit or investigation is underway, until released of the obligation to maintain such records by lessor.

During existence of this lease, information obtained under this section shall be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552)

Sec. 6. Conduct of operations - Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with the rights of lessee.

Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short term special studies under guidelines provided by lessor. If, in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects.

Sec. 7. Mining operations - To the extent that impacts from mining operations would be substantially different or greater than those associated with normal drilling operations, lessor reserves the right to deny approval of such operations.

Sec. 8. Extraction of helium - Lessor reserves the option of extracting or having extracted helium from gas production in a manner specified and by means provided by lessor at no expense or loss to lessee or owner of the gas. Lessee shall include in any contract of sale of gas the provision of this section.

Sec. 9. Damages to property - Lessee shall pay lessor for damage to lessor's improvements, and shall save and hold lessor harmless from all claims for damage or harm to persons or property as a result of lease operations.

Sec. 10. Protection of diverse interests and equal opportunity - Lessee shall pay when due, all taxes legally assessed and levied under laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States, maintain a safe working environment in accordance with standard industry practices; and take measures necessary to protect the health and safety of the public.

Lessor reserves the right to ensure that production is sold at reasonable prices and to prevent monopoly. If lessee operates a pipeline, or owns controlling interest in a pipeline or a company operating a pipeline, which may be operated accessible to oil derived from these leased lands, lessee shall comply with section 28 of the Mineral Leasing Act of 1920.

Lessee shall comply with Executive Order No. 11246 of September 24, 1965, as amended, and regulations and relevant orders of the Secretary of Labor issued pursuant thereto. Neither lessee nor lessee's subcontractors shall maintain segregated facilities. During the performance of this lease, the lessee must comply fully with paragraphs (1) through (7) of 41 CFR 60-1.4(a) with respect to employment discrimination on the basis of race, color, religion, sex, or national origin, and must incorporate the requirements set forth in those paragraphs in every subcontract or purchase order, as provided by that regulation.

Sec. 11. Transfer of lease interests and relinquishment of lease - As required by regulations, lessee shall file with lessor any assignment or other transfer of an interest in this lease. Lessee may relinquish this lease or any legal subdivision by filing in the proper office, a written relinquishment, which shall be effective as of the date of filing, subject to the continued obligation of the lessee and surety to pay all accrued rentals and royalties.