WESTERN ENERGY ALLIANCE

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*Submitted via regulations.gov*

Karen Marsh
Sector Policies and Programs Division (E143-05)
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

**Re: Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review Docket ID No. EPA-HQ-OAR-2021-0317**

Dear Ms. Marsh:

While Western Energy Alliance (the Alliance) generally supports cost-effective regulation that incentivizes innovation, rewards positive performance, and provides regulatory certainty, the Environmental Protection Agency's (EPA) proposed rules for the New Source Performance Standards (NSPS) Section OOOOb and Emission Guidelines (EG) OOOOc (proposed rules) fail to meet those criteria. Several provisions will be impractical to implement, technically infeasible, provide no environmental or emissions-mitigating benefit and are of dubious legal basis.

The Alliance represents 200 companies engaged in all aspects of environmentally responsible exploration and production of oil and natural gas across the West. The Alliance represents independents, the majority of which are small businesses with an average of fourteen employees.

The proposed rule will adversely affect the supply, distribution, and use of energy, resulting in higher costs to consumers. The preamble clearly states that the proposed rules will have a significant adverse effect on energy supplies and consumption:

> "This action, which is a significant regulatory action under Executive Order 12866, has a significant adverse effect on the supply, distribution or use of energy. The documentation for this decision is contained in the Regulatory Impact Analysis for the Proposed Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review prepared for the November 2021 proposal and the Regulatory Impact Analysis of the Supplemental Proposal for the Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for

1775 Sherman St., Ste 2700 Denver, CO 80203
P 303.623.0987 F 303.893.0709 W WesternEnergyAlliance.org

Existing Sources: Oil and Natural Gas Sector Climate Review for this action."[1]

Certain provisions in the proposed rules could render significant oil and natural gas facilities in the United States, particularly marginal wells, uneconomic to operate, further constraining domestic supply, increasing energy prices, and making America more dependent on oil and natural gas produced overseas, beyond EPA's jurisdiction. EPA has ignored the fact that the rules will force the shutting in of wells in the United States and result in more imports from less regulated countries, ultimately increasing global greenhouse gas emissions and introducing other negative externalities.

Only by using the Social Cost of Methane (SC-$CH_4$) is EPA able to justify the proposed rules. Buried deep in the hundreds of pages of technical supporting documentation are various calculations of the Social Cost of Greenhouse Gases (SC-GHG) and SC-$CH_4$ under various and inconsistent discount rates. Newly developed SC-GHG and SC-$CH_4$ estimates are in and of themselves major policy concerns fraught with extensive econometric, socio-economic, and scientific complexity. They are a matter of major political import and value judgement. It is wholly inappropriate for such an important policy concern to be buried deep in a rule covering just one sector which is not even the main U.S. source of methane. Time did not permit a comprehensive analysis of the new SC-GHG and SC-$CH_4$ estimates, however we point out some of the problems with EPA's draft "Report on the Social Cost of Greenhouse Gases" in our Appendix A. The documentation raises many questions and we can only conclude that the benefits of the rule that EPA has presented in the Regulatory Impact Analysis (RIA) are arbitrary and capricious.

As evidenced by the multitude of comments herein, the proposed NSPS OOOOb and EG OOOOc rules raise a number of complex technical, operational and economic issues. The comment period provided was insufficient to adequately evaluate the proposed rules' impacts. EPA's rejection of reasonable requests for an extension of time to comment is unreasonable, particularly since the many issues with the proposed rules warrant an extension to the period for public comment.

EPA published the proposed rules in the Federal Register on December 6, 2022, resulting in a substantial portion of the comment period occurring over the Christmas, Hannukah, and New Year's holidays. In addition, the Federal government concurrently held a comment period for a similar proposed rule affecting the oil and natural gas industry, the Bureau of Land Management (BLM) Waste Prevention Rule, further limiting the ability of regulated entities to provide meaningful, comprehensive comments on any of the proposed rules. This timing makes it additionally difficult for organizations such as the Alliance to obtain relevant and necessary feedback from members in order to provide substantive and helpful comments separately to EPA and BLM, as the same technical expertise and experience was needed for both rules. Providing more comprehensive comments and information that

[1] Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, 87 Fed. Reg. 74702 December 6, 2022.

would have been more helpful in EPA's effort to develop appropriate rules was severely hampered by the timing and limited opportunity to deliver input. EPA would be well served to expand the comment period and, following the recommendations for improvement provided in this letter, including the development and use of enhanced information.

We request EPA reconsider its denial of additional time for comments and provide a second comment period on the proposed rules to allow EPA to enhance and improve its analyses and for the Alliance and other organizations to provide additional thoughtful and substantive information. Without more time for information gathering that enables the regulated community to offer appropriate technical solutions, the final rule will suffer from technical vulnerabilities and impractical if not infeasible implementation.

We are separately submitting joint comments with a coalition of oil and natural gas trade associations. In this letter we highlight in detail issues that are of specific concern to Alliance members. We urge EPA to make the changes recommended below and in the joint comments in order to provide for a more effective and environmentally beneficial rule.

## I. Executive Summary

A. Many requirements lack meaningful actions that will significantly reduce emissions, such as:

- Treating zero-emitting pneumatic controllers and pneumatic pumps as affected facilities will have very little effect on reducing emissions. Zero-emitting pneumatics are an example of industry innovation to solve the problem of methane leaks. By treating them as affected facilities, EPA is disincentivizing technical innovation and subjecting zero-emitting equipment to unnecessary recordkeeping and reporting. If there were to be a malfunction of a zero-emission pneumatic controller or the gas capture system connected to a pump, the malfunction would be found and subsequently repaired through leak detection and repair (LDAR). There is no need to include zero-emissions equipment as affected facilities.

- Treating liquids unloading events that use non-venting technology as affected facilities. Again, industry innovated to address the environmental problem of venting during liquids unloading, yet EPA is disincentivizing this innovation. Malfunctions of designed zero-emissions liquids unloading events would be addressed with designed venting events, with required best management practices (BMPs) that minimize emissions, and recordkeeping and reporting.

- Regulating reciprocating compressors that are non-emitting. Rod packings routed to a closed vent system (CVS) provides a solution for eliminating emissions, yet again, EPA is treating them as affected facilities with unnecessary regulation. If any leaks were to occur in the CVS, the emissions would be

detected and repaired through LDAR inspection requirements.

These are just a few examples of the regulatory requirements in the proposed rules that will have little effect on emissions. Additional regulatory requirements that do not result in emissions reductions appear throughout the proposed rules. EPA must ensure the proposed rules contain provisions that demonstrate clear benefits and significant emission reductions without duplicating or infringing upon state programs.

B. Super-Emitter Program

The Super-Emitter Program is unprecedented in the Clean Air Act (CAA). EPA should not delegate its enforcement authority to nongovernmental entities who lack the qualifications, CAA expertise, and authority to be so deputized. EPA should remove the program from its final rule. Should EPA seek the appropriate legal authority from Congress and proceed with such a program in the future, the delegation of authority would require much more careful quality control with much better oversight than that articulated in the proposed rules. The opportunity for false identification of source and operator and poor-quality data would render the program highly problematic.

C. Applicability Date

The applicability date of the rule should be the date of publication of the Supplemental Proposed Rules, i.e., November 11, 2022, not the date of the November 15, 2021 publication from EPA, which even at the time EPA acknowledged was not a publication containing proposed regulation or regulatory text. The date of applicability should be the date of the current rulemaking, i.e., November 11, 2022, the date when EPA made regulatory text available.

Further, EPA should ensure that a significant amount of time be provided to operators in complying with the rule for new and existing sources to allow operators to continue to operate their facilities. EPA has not adequately considered the impacts of the current supply chain interruptions on the ability for operators to comply with the rule. Specialized equipment, such as air compressors, electric controllers, and equipment needed to retrofit facilities have been particularly hard-hit by supply chain constraints related to COVID-19. Alliance members have experienced delays of several months in acquiring equipment to retrofit facilities, all prior to this publication being made. The increased demand for equipment, given the potential rule requirements, would only exacerbate the challenges associated with acquiring that equipment.

The Alliance recommends a phase-in period of three years for new and modified facilities to install equipment required to meet a non-emitting standard, and a longer period of seven years for existing facilities to retrofit equipment with low-bleed, intermittent bleed, or non-emitting controllers.

D. Regional Differences

The proposed rules reflect a broad-brush, one-size-fits-all approach and do not account for significant regional challenges and differentiators that occur in distinctive parts of the United States, particularly in the Rocky Mountain West with its wide-open and topographically difficult expanses and extreme weather conditions.

In addition, contrary to EPA's assertion in the Federal Register notice, federalism implications from the proposed rules do exist and they will substantially and directly affect states and their relationship with the federal government.[2] A prime example of this is designation of an oil well with associated gas as an affected facility, which is duplicative and conflicts with the existing regulation of flaring by various state oil and gas commissions.

## II. Previous Comments Provided on the Initial Federal Register Publication

On January 31, 2022, the Alliance provided comments on the NSPS OOOOb and EG OOOOc information published in the Federal Register on November 15, 2021. We call attention to those comments which were not fully and adequately included as improvements in these supplemental proposed rules. In our January 31, 2022 comment letter we addressed the following important issues:

- EPA's Classification of the Publication in 86 FR 63110 as a Proposed Rule is Inappropriate
- The Pneumatic Controller Standards Would be Impractical to Implement, and Should Allow More Flexibility for Compliance
- EPA's Liquids Unloading Requirement Should Be Limited to Gas Wells that Vent to Atmosphere
- EPA's Alternative Leak Screening Language Limits Development of Effective New Technologies

We stand by our earlier comments and request that they be fully addressed with corresponding improvements in the final regulations. In addition, we submit the following comments pertaining to the December 6, 2022 proposed rules and comments on the social cost of carbon in Appendix A.

## III. Applicability Date of Rule Should Be Set to the Date that the Supplemental Proposed Rules Were Made Available

As explained in the Alliance's comments on the 2021 publication, the publication from November 15, 2021 should not have been classified as a proposed rule, as it did not contain sufficient regulatory language to meet the "new source" requirements under 42

[2] *Ibid*.

U.S.C. § 7411(a)(2). Under that definition, a "new source" is defined as "any stationary source, the construction or modification of which is commenced after the publication of regulations (or, if earlier, proposed regulations) prescribing a standard of performance under this section which will be applicable to such source." EPA recognized at the time, that this supplemental proposal was imminent, and in fact this supplemental proposal introduced different requirements than were discussed in the 2021 publication. Within this supplemental proposal, "The EPA solicits comments on whether CAA section 111(a) provides the EPA discretion to define 'new sources' based on the publication date of a supplemental proposal and, if so, whether there are any unique circumstances here that would warrant the exercise of such discretion in this rulemaking by the EPA."

The CAA § 111(a)(2) definition of "new source" uses the term "proposed regulations" in defining the new source applicability date. The November 2021 publication alone, which was at most a lengthy preamble, cannot constitute proposed regulations or "rules," the two terms being essentially synonymous, any more than a final rule that is unaccompanied by regulatory text could qualify as a "rule." Although the November 2021 preamble described the types of regulatory requirements that EPA was considering promulgating, the preamble was not in and of itself a document "prescribing a standard of performance under this section [111]…." A "prescribed standard" would be established only by the proposed regulatory text, which was not provided until the December 2022 supplemental proposal.

As required in the Clean Air Act, under 42 U.S.C. § 7411(b)(1)(B), requirements for new sources are required to be finalized within one year of the publication of proposed regulations. Clearly, a final rule was not finished for the sources listed in the 2021 proposal by November 15, 2022, and this provides even more evidence that the initial proposal should never have been classified as a proposed rule. As suggested in our comments on the 2021 publication, the Alliance recognizes that reclassifying the previous publication as an advanced notice of proposed rulemaking (ANPR) would be difficult, if not impossible retroactively; however, EPA has the deference and indeed is required to base the applicability date on this supplemental proposal, i.e., the publication date of the "proposed rules". Considering also the supplemental rule is the first instance where regulated sources were given fair notice of proposed regulatory language, it's a more appropriate date for future applicability of the final rule. This alone would qualify as a "unique circumstance" to justify a change to the proposed applicability date.

## IV. Regional Considerations

EPA must recognize and integrate regional differentiators in all aspects of the RIA, including differences between regions of the lower 48 states. Regionally differing economic, operational, and development parameters in the lower 48 states, just as with Alaska, play a key role in the resulting economic impacts that oil and natural gas rules create, including revenue and costs, and the feasibility of the implementation of proposed

rules such as NSPS OOOOb and EG OOOOc.

Associated gas for use in processes such as generating electricity and replacing functions like pneumatic controllers and pneumatic pumps will have characteristics that vary widely in different regions. For instance, the State of Colorado employs a default crude oil gas-to-oil-ratio of 23 standard cubic feet per barrel (scf/bbl) and the State of Utah has a default value of 17 scf/bbl for the Uinta Basin where the type of oil produced varies enough such that values as low as 5 scf/bbl are not uncommon. BLM recently used a value of 43 scf/bbl in evaluating the feasibility of using associated gas for on-site processes. All of these types of data need to be factored into an RIA, such as those for NSPS OOOOb and EG OOOOc, demonstrating the importance of regional considerations in the impact of the regulations.

**RECOMMENDATIONS:**

- Supplement the RIA by conducting a more thorough analysis that will account for significant regional challenges and differentiators that occur in distinctive parts of the lower 48 states, such as the undeveloped, wide-open and topographically difficult expanses, and extreme weather conditions of the Rocky Mountain States.
- Analyze the regulatory impacts on a finer geographic scale than the broad-brush, one-size-fits-all, nationwide approach reflected in the proposed regulations.
- Modify proposed NSPS OOOOb and EG OOOOc regulations to account for unique economic, operational, and development challenges that exist as key differentiators across the broad spectrum of environments across the U.S.

## V. Electrification

EPA proposes electrification of well site oil and natural gas operations as a way to meet proposed reductions in emissions from sources such as pneumatic controllers and pneumatic pumps. There are several reasons why electrification is not always an option for oil and natural gas operations. The integration of renewables into oil and natural gas production must include sufficient planning to cover those times when renewable resources are not available.[3] Utility providers do not prioritize the implementation of infrastructure for oil and gas sites because it is uneconomic for them to do so when they can deploy the same resources to a new subdivision and generate much more revenue. Due to the lack of incentivization it may be more challenging for operators to electrify facilities than EPA has assumed in the proposed rules.

The proper management and resulting stability of the electric grid that upstream oil and natural gas operations must depend on is critical to the required reliability of sources of

[3] "Applying Renewable Generation to Oil and Gas Facilities," Adam Bernardi, Burns & McDonnell, January 4, 2021.

electricity.[4] Certain conditions must exist in order for electrification to increase the operational "resiliency and de-risking" of oil and natural gas field operations, including:[5]

- A reliable grid
- Well-designed and maintained infrastructure
- Utility transmission with reliable primary and secondary infrastructure
- Utility transmission with well-maintained primary and secondary infrastructure
- Plans for rapidly restoring power when inevitable failures occur

The oil and natural gas industry requires reliable electricity dependent upon infrastructure that was built and is being maintained to provide for high demand from the electrical grid.[6] Unreliable or insufficient grids not designed or built to support oil and natural gas operations, can result in unnecessary shutdowns. Outages can also result in damage to equipment and wells.

The reliability of adequate voltage to a well site can be an important determining factor in using electricity. Power interruption brings the risk of sending control equipment into "a fail-safe condition." Being dependent upon the reliability of electricity can be especially risky in rural areas. Without sufficient infrastructure to provide nearby levels of reliable power it may take months of working with the local utility to obtain just a portion of the level of power that may be needed.

Relying on renewable energy such as solar or wind power typically involves some manner of backup generation. The intermittent nature of renewable energy requires companies to have backup electricity for those times that renewables are not available.[7] Solely relying on the intermittent nature of renewables is not an option for oil and natural gas operations since they require power on a full-time basis. The need for emissions-generating backup can significantly affect the economic feasibility of using renewables.[8] Backup power is most likely to come in the form of onsite generation, which is discouraged by regulation in some regions, or the local power grid.

Remote regions in the west, especially in sparsely populated areas, are severely restricted from access to reliable electricity in areas with oil and natural gas development. Sparsely populated areas in the west can be significantly lacking in electrical power supply, let alone reliable electrical power supply, and the challenges to expand the availability of the electrical grid can be daunting. Even more developed yet rural areas can be substantially

[4] "New Mexico Methane Advisory Panel Technical Report," New Mexico Environment Department (NMED) and New Mexico Energy, Minerals and Natural Resources Department, 2019.
Note: This report was generated as a collaboration between NGOs, industry and the state. It is not an official position document of NMED.
[5] "The Business Case for Electrification of the Oilfield," Dana Steph, Burns & McDonnell, 2021.
[6] NMED, 2019.
[7] Bernardi, January 4, 2021.
[8] NMED, 2019.

limited in access to a reliable electrical power supply. Even where electrical infrastructure has been developed, sufficient transmission capacity often does not exist.

There are significant development, operational, and socio-economic considerations for the widespread use of electricity for oil and natural gas operations. Expanding electrical infrastructure in many areas in the west can be slower and more costly than other areas in the U.S. This is particularly true given the lack of existing infrastructure, severe geographic challenges such as mountains and canyons, requirements for enhanced extensive environmental studies, added environmental restrictions, lengthy land development challenges, extreme weather conditions, and other trials that are magnified in some areas. Assumptions in feasibility and economic assessments of regulations such as NSPS OOOOb and EG OOOOc need to account for widely varying regional specific key parameters.

There are regions of the U.S. where the proposed regulations are likely to result in more significant economic impacts than those across much of the rest of the lower 48 states. There are areas where oil and natural gas products are required to be sold at discounted rates for reasons such as the characteristics of the product and unique requirements to process the products. Some regions are severely lacking in pipeline transportation and must use more expensive long-distance transportation modes such as trucking. The economic challenges that accompany requirements to retrofit operations for the use of electricity in place of pneumatic energy are significant.

In addition to the challenge brought on by large transmission line distances, is simply finding and building infrastructure to which to connect can be a challenge. Transmission lines must go through a series of steps starting with an electricity substation and follow-on steps to transform the high voltage transmission power to a useable source of electricity at the oil and natural gas site. Lack of nearby access to transmission substations adds to the remote nature of some upstream oil and natural gas sites. Going through the engineering, permitting, and construction process of developing the infrastructure to transform the limited high voltage electricity to oil and natural gas useable levels can be prohibitive in some cases to the implementation of electricity as an option as well as time consuming and expensive.

Amongst the challenges facing electrifying oil and natural gas operations in vast expanses of the open undeveloped regions of the west is permitting on public and Tribal lands when electric transmission and distribution does not already exist and would have to be expanded for sufficient reliable power. Permitting development on much of the public and Tribal lands where oil and natural gas development occurs in the west is under the purview of federal agencies, including BLM and the Forest Service (USFS), and involves environmental studies that assess the impact to the environment, including plants and wildlife, to minimize impacts. Development of oil and natural gas takes into consideration minimizing the associated footprint of projects that could result in impact to plants and wildlife, which is especially true in avoiding threatened and endangered species that are known to live, migrate, nest, and grow on the remote open lands where electric power can

be rare. Federal permitting, as would be required to expand electric power grids, can be lengthy and takes impacts to threatened and endangered species heavily into consideration while emphasizing footprint minimization. Operators work closely with BLM, USFS, U.S. Fish and Wildlife Service and state agencies to avoid significant impact to plants and wildlife.

The feasibility of having local utilities provide power to meet the needs of the oil and natural gas industry depends in part on the timing to get power from the distribution lines to the specific location, such as a well site, where the power is needed.[9] The Colorado Department of Public Health and Environment (CDPHE) has pointed out that one key consideration in evaluating the feasibility of electrification is the proximity of high voltage transmission lines.[10] Therefore, such line power may not always be the answer, especially in the types of remote and rugged environments that are not uncommon in the west.

Speculating that electricity can, and will, be provided locally ignores some of the previously mentioned, regionally specific situations that make this very prohibitive. For example, the challenges in obtaining a needed air permit would be significant under the current attainment status of the Uinta Basin. The Uinta Basin is currently under the regulatory and environmental burden of not meeting the air quality standard for ozone concentrations. Key factors in meeting ozone air quality standards are the emissions from sources such as natural gas fired generators. Obtaining a permit to install a large generator for the purpose of providing electric power to a local micro-grid would face major hurdles that can be difficult to surmount given the current regulatory circumstances in the Uinta Basin. There are regulations that can streamline air quality approvals for oil and natural gas equipment emissions site-by-site, however such regulations don't cover sites not directly involving oil and natural gas equipment and don't ease the crippling nature of the regulations in the area. Challenges presented by easements, rights-of-way, permitting, and approvals make electrifying remote parts of the Uinta Basin, where much of Utah's oil and natural gas development has occurred and continues to develop, "nearly impossible or extremely slow at best."[11] The realities involved with timing of planning and approvals for electric infrastructure expansion may not be consistent with the timing needs for oil and natural gas development.[12]. These challenges around ozone, air quality, easements, rights-of-way, permitting and approvals are ubiquitous across the western United States and can impact development of electrical infrastructure.

For oil wells with low production rates common in oil and natural gas regions, adding

[9] *Ibid*.
[10] "Reciprocating Internal Combustion Engine (RICE) Source Category: $NO_x$ Emission 4-Factor Analysis for Reasonable Progress (RP)," Colorado Department of Public Health and Environment – Air Pollution Control Division, 2018.
[11] Moon Lake Electric Association, Inc. correspondence with Robert Hammer, SLR International, November 21, 2021.
[12] "Oilfield Electrification: Collaboration Between Producers and Utilities Can Result in a Win-Win," Omar Urquidez, Burns & McDonnell, 2021.

electricity costs to operating costs creates a significant operating burden. The use of gas associated with the well for the operation of pneumatic equipment is a readily available resource, often involving no additional cost. The cost of electrifying, especially in a region with low production rates and without existing electrical infrastructure, can force wells to be shut-in when they might otherwise be able to operate without requirements to use electricity.[13]

In a 2017 study the Enhanced Oil Recovery Institute (EORI) at the University of Wyoming examined costs of using electricity in upstream oil and natural gas.[14] The 2017 EORI study evaluated whether, as a result of expanding use of distributed generation, utility provided power was a low-cost option for new oil and natural gas development. The study concluded that the cost of electricity in their Wyoming study area ranged from $7 to $18 per barrel of oil and as a result marginal wells were being shut in. Shutting in wells will result in production decreases, lost revenue for governments and other public entities dependent upon taxes and fees and lost revenue for the utility, all of which will subsequently detrimentally affect the local economy.

It is not clear that EPA has fully considered such regional-specific challenges in the lower 48 states in the development of the proposed rules, but such challenges need to be considered on a regional basis, just as they were for Alaska. Expanding the electric grid in many parts of the region is particularly challenging given the economic, geographic, public land, and weather challenges that exist.

**RECOMMENDATIONS:**

- Supplement the RIA to more thoroughly account for the regional developmental and implementation challenges associated with electrification of oil and natural gas operations.
- In the supplemental RIA make better use of information on the regional difficulties in implementing electric power to replace pneumatic power.
- More thoroughly document how the significant climate, geographic, topographic, and existing power grid obstacles are to be overcome to have a reliable alternative to electricity that can be developed and operated in an economically viable and operationally dependable manner.
- The proposed NSPS OOOOb and EG OOOOc regulations should be modified to take into full consideration the obvious regional electricity factors that would result from a more comprehensive supplemental RIA.

## VI. Well Affected Facilities

Operators conducting liquids unloading operations with zero methane and volatile organic

[13] "Electricity in the Oil Patch: The Power Costs of Production, CO2-EOR, Electric Lines and Onsite Generators," B. Cook, Z. Soukup, G. Buckingham, AIChE Carbon Management Technology Conference, July 18, 2017.
[14] Urquidez, 2021.

compound (VOC) emissions should not be subject to burdensome recordkeeping, reporting and other requirements. The rule should only apply to venting during liquids unloading.

The definition of a modification to an existing well should be simple and applied to the well affected facility to which a standard is applicable, not all operations involving that well facility. Though not defined by EPA, a new well would reasonably be assumed to be a well spudded after the proposed effective date of the rule. A modification to an existing well should be a physical or operational change to the well that results in increased emissions. Consistent with NSPS OOOOa, the proposed NSPS OOOOb provides that a modification to an existing well occurs when an existing well undergoes a well completion with hydraulic fracturing or refracturing. The Alliance does not support adding complexity to the established modification provisions for wells, such as liquids unloading operations on natural gas wells.

Natural gas well liquids unloading operations subject to emission standards promulgated by a state or local authority should be excluded from federal regulation. For example, and as acknowledged by EPA, Colorado Air Quality Control Commission Regulation No. 7, Part D, Section II.G.1.d., Title 20, Chapter 2, Part 50 of the New Mexico Administrative Code (20.2.50.117 NMAC), and other state and local regulations that set emission standards for natural gas well liquids unloading operations. Both New Mexico and Colorado only require recordkeeping and reporting associated with unloading events involving the release of emissions.

The proposed rules provide procedures for the submittal and approval of alternative means of emission limitation (AMEL) for complying with fugitive emissions standards based on programs under state, local, or tribal authorities for the fugitive emissions components affected facility. At a minimum, a similar procedure should apply to natural gas well liquids unloading operations which are also regulated by some states. The AMEL process is overly burdensome and time-consuming and a categorical exclusion should be codified in the final standards for affected facilities currently subject to certain state and local regulations. Future regulations promulgated by a federal, state or tribal authority would be subject to the AMEL process.

Wildcat and delineation wells, and oil wells located on sites with no natural gas takeaway infrastructure (pipeline) should be categorically excluded from requirements to recover natural gas. Associated gas from such wells may be captured for beneficial use (e.g., fuel), routed to a flare or otherwise combusted. Furthermore, a demonstration that it is not feasible to recover natural gas from oil wells with no pipeline takeaway capacity for technical or safety reasons is an unnecessary burden and should not be required.

**RECOMMENDATIONS:**

- Make the determination of whether a modification has occurred at an existing well to be based on the changes that occur at the individual well

affected facility and not in terms of all operations at the facility.

- Define a modification to an existing well as a physical or operational change that subsequently results in increased VOC or methane emissions.
- Do not change the established NSPS OOOOa modification provisions associated with activities such as natural gas well liquids unloading.
- Liquids unloading operations at natural gas wells already subject to state or local emission standards should be excluded from federal regulation.
- Codify a categorical exclusion for well affected facilities subject to certain state or local associated regulations.
- Categorically exclude wildcat and delineation wells, and oil wells at sites with no natural gas takeaway capability from requirements to recover natural gas without a distinct requirement to demonstrate that takeaway is not feasible.

## VII. Reciprocating Compressor Affected Facilities

EPA should provide an option for owners and operators to replace rod packing on a fixed schedule, as set out in the preceding NSPS OOOO series of rules, as an alternative to measuring volumetric leak rates. Volumetric flow measurements must be conducted using rate meters conforming to EPA Method 2D. However, Method 2D does not list specific rate meters or technologies that could be used and there are few meter technologies commercially available to measure low volumetric flow rates from very small vents. Annual flow measurements present many complexities and costs.

**RECOMMENDATIONS:**

Provide an option for owners and operators of reciprocating compressors to replace rod packing on a fixed schedule and, when doing so, not measure volumetric leak rates.

## VIII. Natural Gas Pneumatic Controller Affected Facilities

The Alliance provided most of the comments below on pneumatic controller provisions in our letter on EPA's November 15, 2021, Federal Register initial publication on NSPS OOOOb and EG OOOOc. The Alliance believes that these concerns have not been adequately addressed in the proposed rules and as such our comments and concerns are again provided in the hopes that EPA will more adequately address these issues to accommodate the challenges that are faced.

EPA's publication describes a framework where all gas-driven pneumatic controllers would be eliminated from new and existing sources, with the exception of those controllers in Alaska where electricity and solar power is not available. At the facilities in Alaska, low-bleed pneumatics would be required. EPA has not adequately demonstrated the reasoning for the equivalent criteria not being extended to the lower 48 states. EPA's reasoning is particularly perplexing given the availability of existing reliable electric power throughout

the Alaskan oil fields required to operate well sites in cold temperatures and dark conditions.

At upstream oil and natural gas facilities, pneumatic controllers are used in a wide variety of applications and circumstances, but their main function is to ensure safe operations for facilities that are generally unmanned. To perform this purpose, those controllers need to be reliable and robust, as failure of a controller can potentially lead to spills, fires, and injury to workers.

Alliance members support reducing emissions from our operations, including emissions from pneumatic controllers. In fact, Alliance members in basins across the country have taken on projects to retrofit facilities with intermittent bleed and low-bleed controllers, outfitted facilities with instrument air equipment, and routed emissions from facilities to control devices where possible. However, these retrofits and equipment modifications are not applicable in all scenarios. For this reason, EPA should allow more flexibility in any proposed pneumatic controller requirements.

For those facilities that do not already have a control device on location, typically because they are low-production locations, options for effectively reducing emissions from pneumatic controllers are limited. EPA has overstated the effectiveness and functional application of both solar and mechanical controllers.

For solar controllers, limitations are not only based on availability of sunlight. Average ambient temperature is an important concern for ensuring battery power is reliable for functioning when sunlight isn't available, while the prevalence of fog or dust can also limit solar controller effectiveness. In fact, solar controllers are a relatively new technology that is still being evaluated for its effectiveness and reliability. EPA should not force operators to trade safety and reliability for a slight decrease in emissions when other options are available.

As a further example, in the Uinta Basin, there are certain times of year where fog can sit over the basin for several weeks, effectively making solar controllers useless. Because of climate and geography, cold weather can become entrenched and last for weeks, potentially affecting the use of batteries for backup. This same scenario is not uncommon in much of the northern reaches where Alliance members operate. At the Ouray monitoring site in the Uinta Basin, for the recent time period of January 19, 2023 through February 5, 2023, the average temperature was 1.5°F over that 17-day period and the average low was -8°F, severely hampering the use of battery power. Greentech Renewables says that lithium-ion batteries can be charged down to -4°F and that lead-acid batteries may provide half the nominal capacity at 0°F. [15] In much of the Uinta Basin, as with much of the operating areas for Alliance members, electrical power is also unavailable. An evaluation of access to the electric grid for pneumatic controllers in the

[15] "How Does Temperature Affect Battery Performance?" Greentech Renewables, Michael Prine-Robie, 2020; "Charging at High and Low Temperatures," Battery University, March 1, 2022.

Uinta Basin using the State of Utah's emission inventory and location of transmission lines has shown that approximately 90% of the pneumatic controllers in use are more than a mile from reliable electricity transmission lines, 80% are more than 2 miles, and 70% are more than 3 miles.

For comparison to the proposed rules, it is partially because of this lack of access to infrastructure and renewables that EPA appeared to reach a more regionally specific approach when they finalized the "Federal Implementation Plan for Managing Emissions From Oil and Natural Gas Sources on Indian Country Lands Within the Uintah and Ouray Indian Reservation in Utah" (U&O FIP) for the Uinta Basin on December 8, 2022. The U&O FIP "will help ensure that new development of oil and natural gas sources in the Basin will not interfere with attainment of the ozone National Ambient Air Quality Standard (NAAQS)." (FR 75334) According to EPA the "U&O FIP helps demonstrate that new development on Indian country lands within the U&O Reservation will not necessarily cause or contribute to an ozone NAAQS violation." In the preamble to the U&O FIP, EPA recognized that "commenters asserted that recent evidence indicates zero-emissions controllers (e.g., electric valve, instrument air-actuated, and solar power valve actuated) are cost-effective, widely used, and environmentally necessary" yet EPA did not make zero-bleed pneumatics a requirement in the U&O FIP.[16] It should be noted that VOC emissions are an especially focused issue because the area is an ozone non-attainment area. In response to the commenters call for zero-bleed technology EPA said, "We disagree that the EPA mandating zero-emissions controllers is necessary or required here and provided reasoning in the proposed FIP for requiring low-bleed pneumatic controllers rather than zero-emissions pneumatic controllers."[17] It is inappropriate for EPA, on a nationwide basis, to go above and beyond requirements deemed to be sufficient for an ozone nonattainment area.

For the same reason regionally specific consideration exempted portions of Alaska from proposed requirements, other areas of the country need to be evaluated with as much effort as well. In the West, line power is often unattainable where endangered species concerns preclude the construction of power lines and other infrastructure. Northern basins have concerns with cloud cover, snow, and battery reliability. Southern basins have concerns with dust and heat/humidity related battery reliability. These concerns are not effectively addressed in EPA's publication.

Even electrical controllers have their limitations, as they can generally only be used to control valves. So even in situations where electricity is available, often it won't be sufficient to reliably keep the entire facility operating safely.

In addition, at older facilities where more than electric controllers are required, the only remaining option would be to install a diesel or natural gas driven compressor to use compressed air to control pneumatics. While EPA did address generators in the preamble

[16] Fed. Reg., December 6, 2022.
[17] *Ibid*.

and recognized the emissions from the generator engines, they contend that there would still be an overall emissions benefit when switching to zero emitting pneumatics. However, older facilities that currently have very little throughput, and therefore very little emissions from pneumatics due to infrequent activation, installing a gas driven or diesel driven air compressor could increase GHG emissions from the facility, or at the very least result in a very small reduction in emissions. For those facilities, in the EG OOOOc context, low-bleed or intermittent bleed controllers should be required.

For many applications, mechanical controllers are not reliable and can't be used in higher pressure implementations. EPA should allow for the flexibility to route emissions to a control device where one already exists. Where control devices and flares are adequate at reducing methane emissions by 95% for other processes and equipment, there is little justification to treat pneumatic controllers differently. This should be sufficient to reduce emissions from most controllers at facilities with high throughput.

Additionally, EPA has significantly underestimated the cost and difficulty of retrofitting facilities to comply with the regulation. Alliance member estimates from actual retrofit projects range to as high as $250,000 per facility for large facilities with many controllers, which is a price point far outside the range described in EPA's publication. While these costs may be lower for lower-producing facilities, the fact that EPA estimated the top end for the range for large facilities to be only $96,000 signals there is a flaw in the calculation for it to be that far off actual project execution.

Additionally, for smaller facilities that have lower production, installing and operating instrument air systems could easily exceed the value of the recoverable production from the wells associated with those facilities, forcing those operators to shut in production. Across the United States there are thousands of wells that would be rendered uneconomic to operate should the framework described in EPA's publication be proposed for existing sources. For this reason, EPA should propose a rule that allows for low or intermittent bleed devices to be used for existing facilities.

**RECOMMENDATIONS:**

- EPA should supplement the RIA to more thoroughly examine the availability, functionality, economics and reliability of using electricity as a key resource in eliminating pneumatic controller emissions.
- EPA needs to take a more exhaustive look at lower 48 states' regional challenges associated with the power grid pertaining to obstacles such as climate, permitting, environmental, geography, and topography, accommodating for such factors as was done for Alaska.
- The requirements for pneumatic controllers should be modified to allow more workable options such as using low-bleed pneumatics where critical.

## IX. Storage Vessel (Tank Battery) Affected Facilities

Proposed provisions for legally and practicably enforceable would render many state permits ineligible for determining storage tank applicability. Similarly, the new methane applicability threshold is another new criterion for which state permits would not have a direct limitation. The administrative process to modify these permits to address these new criteria is a very significant and unnecessary burden on owners, operators and permitting authorities without emissions reduction benefit. Assuming the typical pace to process permits and depending on the number of permits that need to be modified, the process to modify permits can take upwards of ten years. As such, EPA should continue to defer to states for establishing appropriate monitoring, recordkeeping, and reporting.

The proposed rules ask about including provisions in the regulations to require storage tank thief hatches to be equipped with preventive automated features such as alarms, pressure change monitors, or automatically closing thief hatches. Installing such automated features are not always feasible due to economic or technical limitations. In some circumstances the cost of equipment and labor can be too high for the benefit that would be seen for the resulting additional reduction in emissions. There are already preventative steps in place that focus on maximizing the proper operation of thief hatches, including fugitive emissions programs and training for operations personnel. LDAR programs can identify leaking gaskets. Automated systems are also not always technologically feasible when power is necessary for actions at the storage tank and for communications that might be necessary to implement systems, especially in areas that bring challenges due to remoteness and geographical features.

It would be duplicative with 40 CFR 60.18 and therefore unnecessary to require monitoring of net heating value (NHV) of the vent gas going to flares and enclosed combustors. Operating in compliance with 40 CFR 60.18 will assure the flare is functioning correctly. 40 CFR 60.18 contains provisions dealing with operation and maintenance pertaining to design, visible emissions testing, pilot flame monitoring, NHV, and velocity. It is not necessary to duplicate the requirements already in place.

**RECCOMENDATIONS:**

- EPA should not codify the excessive proposed language and requirements for meeting the burden of legally and practicably enforceability, and instead continue to defer to states for regulations and permitting.
- Requirements should not be codified for equipping storage tank thief hatches with exhaustive automated features to address thief hatch closure, and defer to LDAR regulations, existing inspection programs and focused operator training programs.
- NSPS OOOOb and EG OOOOc should not include provisions to require monitoring of vent gas NHV.

**X. Fugitive Emissions Component Affected Facilities**

The concept and intent of the alternative periodic screening approach and survey matrices is sound. Operators appreciate the inclusion of the matrices, yet there is still concern that the proposed frequencies will not adequately promote the use of alternative technologies. There is concern with the proposed nine-month approval process for technologies especially when NSPS OOOOb becomes effective and the burden that could be created by multiple approaches. Operators may have to accommodate dual programs such as conventional OGI and an alternative technology, so pre-approval of alternative technologies would help alleviate what could be a significant burden. Validation of advanced methane detection technologies should be done quickly outside of the NSPS and EG, but to promote adoption of advanced technologies, the approval process should be streamlined, particularly for technologies EPA recognizes to be in wide use today. EPA should shorten the duration of review and approve such technologies or allow conditional approval of such technologies (without risk of retroactive non-compliance) until EPA has rendered its final decision.

In the preamble, EPA discusses that the no identifiable emission standard is a numerical emission limitation, so any leak from a cover or closed vent system is a violation. This effectively establishes a "zero" numerical standard to covers and closed vent system, which is practically unachievable and therefore, cannot constitute BSER. In addition, it would strongly discourage voluntary detection campaigns of operators and the use of more sensitive detection technologies. Such a standard is unachievable because all equipment, regardless of design, will eventually leak as a part of normal operation. Leaks on covers and closed vent systems should be treated no differently than those on other types of equipment and be subject to the LDAR work practice standard, instead of an unachievable numerical emission limitation. Simple malfunctions and equipment failures should not be treated the same way as a violation.

There are multiple repair timelines proposed in the rules depending on the section of the rule (AVO/OGI/Alternative Technologies/Super emitter, etc.) There are compliance concerns with implementing the various proposed timeframes. . As such, we recommend EPA streamline these timelines for simplicity.

The proposed rules need not require well closure plans. State and federal agencies (other than the EPA) regulate oil and natural gas industry practices through rules and regulations. Regulations pertaining to well or location closure require operators to file notices or applications. For example, the 500 Series Rules of Practices and Procedure administered by the Colorado Oil and Gas Conservation Commission (COGCC) require operators to file an application to require plugging and abandonment of a well or closure of an oil and natural gas location. An operator of a well site that is a fugitive emissions component affected facility should be able to cease fugitive emissions monitoring surveys upon closure of the well or site, as provided by the state or federal authority regulating the oil and natural gas industry. The federal Clean Air Act should not be used to add additional layers of redundant requirements. At a minimum, the rules should provide overlap provisions for

equivalent state and federal (e.g., BLM) requirements.

**RECOMMENDATIONS:**

- EPA should establish a set of pre-approved alternative methane detection technologies.
- Validation of advanced methane detection technologies should be outside of the NSPS and EG.
- EPA should streamline timelines for repairs by making them more consistent and reduce the complexity to simplify implementation.
- Not all leaks in closed vent systems should be deemed violations and the regulations should have exceptions for simple malfunctions and equipment failure.
- The proposed rules should not require well closure plans.
- NSPS OOOOb and EG OOOOc should not require continued fugitive emissions monitoring surveys following the plugging and abandonment of a well or site.

## XI. Super-Emitter Affected Facilities

The proposed "Super-Emitter Response Program" is not lawful. Under the CAA, Congress did not convey EPA the authority to delegate the monitoring of regulated facilities to third-party members of the public for use by EPA for compliance, supervision and enforcement. In effect, EPA would be delegating to groups with unverified qualifications and technical expertise, an unprecedented action. This provision of the proposed rules is also a violation of the separation of powers of the U.S. Constitution where EPA is seeking to legislate and grant legal authority to itself to delegate regulatory authority to third-party members of the public to monitor and report on regulated facilities, a legislative act that resides solely with Congress.

Moreover, in the preamble to the proposed rules, EPA did not explain the legal basis for establishing such a requirement and whether such a regulation is even legal. This lack of explanation or even rational basis is the hallmark of arbitrary and capricious federal rulemaking, that is not supported by the law, in violation of the Administrative Procedures Act.

EPA's failure to explain the legal authority and supporting legal rationale for this key element of the proposed rules is also a violation of EPA's obligation under the CAA to include as part of the proposed rules "the major legal interpretations … underlying the proposed rule." 42 U.S.C. § 307(d)(3)(C).

CAA sections 111 and 112 allow EPA to transfer primary implementation and enforcement authority for most of the federal standards to state, local, or tribal regulatory agencies. This transfer of authority is called "delegation." The statute, however, does not authorize EPA to delegate any implementation or regulatory authority to third-party members of the

public.

While the preamble to the proposed rules contains an extensive narrative to bolster the policy basis for the Super-Emitter Program, this narrative is devoid of any statutory or legal authority that justifies EPA's proposal to empower third-party members of the public to monitor and report on regulated facilities, which in turn triggers regulatory obligations for the facility under the rule. Section 111 of the CAA does not convey this authority to EPA. Moreover, EPA cannot lawfully utilize only a policy explanation in the preamble to bridge and account for the absence of any legal authority for EPA to provide for such a regulation.

While Section 304 of the CAA expressly prescribes a role for private parties to file civil lawsuits challenging alleged violations of, among other things, CAA § 111 performance standards, significantly, Congress did not provide similar express language in CAA § 111 or elsewhere in the CAA authorizing citizen monitoring and reporting as provided in the proposed Super-Emitter Response Program. Accordingly, the absence of such language should be construed strictly as a limitation by Congress on EPA's authority to allow such monitoring and reporting by the public. Furthermore, nothing in the statute can be interpreted reasonably that Congress implicitly granted such authority to EPA. Therefore, this provision of the proposed rules is not supported by the law, and EPA cannot lawfully take such action in the final rule.

Improperly delegating regulatory monitoring to third-part members of the public who are not directly answerable for the proper implementation of rules opens the door for improper records, inaccurate reporting, inaccurate data that fails regulatory quality standards, and lack of essential oversight for program integrity. The most obvious and likely error will be misidentifying an operator's facility. EPA should remove the program from the final rule. Should EPA seek the appropriate legal authority from Congress and proceed with such a program in the future, EPA should not post any purported super-emitter reports on its public website until EPA has: properly identified the facility; confirmed the responsible operator and emissions source; verified the emissions source is large enough to fall under the super-emitter designation; quality assured the data; and confirmed the facility is subject to the rules.

EPA has not put sufficient preventive measures in place to avoid false reporting in public records. In addition, OGI cameras, especially when used by entities not familiar with the facility in question, would not be consistently able to quantify emissions. It is not uncommon for untrained parties unfamiliar with regulations and operations to erroneously report alleged violations. Questions exist as to whether EPA has the authority to assign formal compliance duties such as this to nongovernmental entities, whereas states are required to go through lengthy formal State Implementation Plan programs to be delegated authority to enforce federal regulations such as New Source Performance Standards. Surely nongovernmental entities, that lack the air quality expertise that states have demonstrated for half a century, should not be given similar authority without much more deliberative thought, consideration, and training. The entire Super-Emitter Program

as proposed by EPA is arbitrary and capricious.

Enabling third parties to conduct enforcement duties also raises very important potential safety and liability issues. Regulatory agencies are provided with focused safety training as part of their jobs as are operator personnel. Safety is a critical aspect of operations. Regulators typically inform operators of their planned visits to sites for audits and get accompanied by operator personnel. Third parties should not expect to be granted site access without consent of the operator and sufficient safety training.

The proposed rules would require an operator that is identified as having an applicable event to submit a written report within 15 days of conducting a root-cause analysis. EPA asked for comment on whether the written report should be sent to the state or local air quality agency. Our answer in the affirmative to a very specific, limited question should not be construed as an endorsement of EPA's proposed unlawful program.

EPA has not provided concrete costs or benefits to justify the Super-Emitter Program. The following statement is provided in the Federal Register notice:

> "Moreover, even if there are costs associated with the investigation and mitigation, the threshold for identifying a super-emitter emissions event is so high that it ensures that the emissions reductions achieved by the mitigation are cost-effective. In other words, it is reasonable to conclude that these actions would be cost-effective in light of the large mass rate of emissions (100 kg/hr of methane or greater) that would be reduced, and the high volume of gas saved. It is highly unlikely that these actions would exceed the $2,185/ton of methane reduced, which is the highest value we have determined to be cost effective for reducing methane from sources within this source category. In summary, the EPA finds the data demonstrate that the super-emitter response program is cost-effective, even though the EPA recognizes that the total emissions reductions that will result from the program are difficult to quantify."[18]

EPA includes a conclusory statement in the preamble of the proposed rules that immediate corrective actions for a super-emitter event could be done at a reasonable cost but does not present sufficient information to support such a conclusion. EPA needs to present a thorough analysis of the cost-effectiveness of the proposed Super-Emitter Program.

A super-emitter event would represent one hour of 100 kilograms or 0.1 metric tonnes (mT) of methane emissions which is equivalent to 2.5 mT of carbon dioxide-equivalent (CO2e) emissions. For comparison the proposed Subpart W new source category of "other large release events" has a reportable event threshold of 250 mT of CO2e emissions, which would be the equivalent of just over 4 days of a continuous NSPS OOOOb super-emitter

[18] Fed. Reg., December 6, 2022, p. 74754.

type event. In comparison to the Subpart W "other large release" threshold, the super-emitter threshold is excessively stricter, indicating the proposed NSPS OOOOb threshold is too low.

**RECOMMENDATIONS:**

- EPA cannot delegate its enforcement authority to nongovernmental entities.
- If EPA were to proceed as is proposed in the Super-Emitter Program, which is not advisable:
    - Sufficient measures should be put in place as part of the requirements to prevent false reporting in public records.
    - Neither EPA nor the nongovernmental entity should make public any super-emitter reports until the operator responsible for the facility has been confirmed, that it is the intended facility, and it is a facility subject to the rules and that the emissions detected are not otherwise authorized and exceeded the defined super-emitter threshold.
    - Requirements should be put in place to disallow unaccompanied access onto sites without operators, prerequisite notification to the operator, and verified sufficient safety training to permitted parties.
    - Written reports required to be submitted to EPA within 15 days of conducting a root-cause analysis should be sent to the state or local agency.
    - The super-emitter threshold should be raised to a more practical level, using proposed Subpart W new source category of "other large release events".

## XII. Cost Estimates

Developing costs associated with sweeping oil and natural gas regulations impacting the vast landscape and multitude of small sites involved cannot be looked upon in the same manner as simply evaluating costs for a generic and spatially bounded operation, such as a manufacturing facility, chemical plant, refinery, mine, or power plant. While it may make more sense to categorize those types of facilities in a generic sense and treat them similarly, regardless of location, the same cannot be done with operations of oil and natural gas facilities that operate in such a wide variety of unique settings.

EPA has done an insufficient analysis of costs for proposed NSPS OOOOb and EG OOOOc by not using more refined and supported information. EPA recognized in numerous places in the preamble that it needs better information on the labor burden and other costs associated with the proposed rules. EPA's lack of sufficient information is reflected in the RIA where the economic analysis, due to a lack of quality information, is weaker than expected for a thorough analysis of a sweeping set of requirements that will represent a

significant new burden.

Not only would onsite activity costs increase but the cost of getting to and traveling between affected facilities can vary widely. For instance, traveling to sites in undeveloped areas in the expanse of open space in regions in the west where Alliance members operate are not always as straightforward as those in more developed areas with better networks of roads and businesses. Such differentiators need to be accounted for. Surmounting the challenges of distance, remoteness, and difficult terrain unique to some areas in the west can multiply the costs. It is not just the matter of the time spent onsite performing tasks, but also the time and extra wear and tear on vehicles and additional use of fuel and resulting emissions that are presented by the proposed rules.

Many tasks involve skills readily available in traditional oil and natural gas workforces, such as skilled electricians, in remote regions. The addition of the types of tasks required in the proposed regulations are unlikely to be completed by existing staff or teams that already visit sites. For instance, installation of solar power will increase maintenance and repair costs and require more frequent care than would be needed for a facility connected to a utility-operated grid. EPA needs to make a more thorough and detailed analysis of the costs of the proposed requirements in NSPS OOOOb and EG OOOOc that takes into consideration the costs associated with operating in a variety of remote undeveloped regions.

EPA has not given operators sufficient time and opportunity to fully address and comment on the data and assumptions used in the proposed rules. With this in mind, EPA needs to take the time to gather more and better information to prepare a supplemental assessment of costs. Allowing additional time to obtain better information and data on the costs would help address the lack of data quality and provide a more accurate regional breakdown associated with these regulations.

**RECOMMENDATIONS**:

- Improve the information and data used in the regulation development by providing sufficient time to gather and process such data.
- Take more careful consideration of the regional challenges that can significantly affect costs of the proposed regulations.
- Allow opportunity to comment on an improved cost analysis.

## XIII. Compliance and Emissions Data Reporting Interface (CEDRI) Reporting

EPA only references the draft template for CEDRI reporting in the preamble to the proposed NSPS OOOOb and EG OOOOc rules. This is insufficient and, as such, EPA needs to include the draft template for CEDRI reporting in the proposed rule language. The template could also be posted along with the technical fact sheet, spreadsheet of comments, solicitations and other critical information on EPA's webpage on the proposed

rules. Only including the draft CEDRI template in the preamble will not facilitate the necessary review and feedback EPA will require to ensure the template is implementable.

EPA also needs to take into consideration that the reporting mechanism for EG OOOOc will include implementation by states under EPA-approved state plans. With this in mind, EPA needs to expedite review and finalization of the template, so it will be available for CEDRI reporting on the first associated NSPS OOOOb annual report.

**RECOMMENDATIONS:**

- Provided a supplemental opportunity to review and comment on the CEDRI template for NSPS OOOOb.
- Make the availability of the template more widely known and identifiable by offering additional notification of an opportunity to comment further and post the template in numerous appropriate locations for review.
- Account for differences that could occur between the needs for reporting for NSPS OOOOb and EG OOOOc.
- Provide additional information on how EPA plans to work with the State and local agencies in implementing their responsibilities for EG OOOOc.

## XIV. Certifications and Personal Liability

The following comment was provided in the preamble relating to certifications and personal liability.

> "The EPA wants to make it clear that in the case that such a certification is determined by the Agency to be fraudulent, or significantly flawed, not only will the owner or operator of the affected facility be in violation of the standards, but the person that makes the certification will also be subject to civil and potentially criminal penalties."[19]

To the extent an engineer will be held responsible for a certification and be subject to potential civil and criminal penalties, it should be limited to fraudulent activity. It should not be related to unintentional errors or oversight that may have resulted in a flaw in the assessment. These sorts of certifications will necessarily include a mix of objective and more subjective criteria, and engineers should be granted the deference to make determinations within their best professional knowledge and experience.

**RECOMMENDATIONS:**

Limit subjecting an engineer's certifications liability and subjecting them to civil and criminal penalties to scenarios that involve fraudulent activity and not include unintentional errors or oversight.

[19] Fed. Reg., December 6, 2022, p. 74776.

**Conclusion**

In conclusion, the Alliance encourages EPA to continue to evaluate the provisions discussed within the proposed rules, so that ultimately when the rules are published, it can fully allow for the intricacies and nuance required to effectively regulate industries as complex as the upstream and midstream oil and natural gas segments. EPA's summary of potential rule provisions lacks flexibility and consideration for several factors that will make compliance impractical, if not technically infeasible, and in some cases may result in an overall increase in total greenhouse gas emissions.

The Alliance encourages EPA to implement the solutions proposed above, in addition to the concerns we shared in the Producer Associations comments. We would be happy to discuss these comments in further detail, should EPA find any further clarification or discussion about the issues identified in this letter to be useful.

Sincerely,

Kathleen M. Sgamma
President

# Appendix A
# Comments on EPA's External Review Draft of: "Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances"

This appendix contains Western Energy Alliance's comments on EPA's External Review Draft of: "Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances" (hereafter "the SC-GHG review draft"). The SC-GHG review draft was provided as Supplementary Material for the Regulatory Impact Analysis for the Supplemental Proposed Rulemaking, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review." Our comments focus generally on issues raised in the review draft, which requires more careful analysis by EPA and an open rulemaking process before EPA or any federal agency use the revised SC-GHG estimates in this or any other rulemaking process. Its use in EPA's Regulatory Impact Analysis (RIA) for OOOOb/c is an error in the RIA.

## I. Incorrect Time Horizon

EPA has significantly increased the proposed value for the Social Cost of Carbon (SCC), also known as the Social Cost of Carbon Dioxide or SC-$CO_2$ and the Social Cost of Greenhouse Gas emissions or SC-GHG, in this rulemaking. EPA relies heavily for the nearly 360% increase from $51/ton to $185/ton for the SC-$CO_2$ on a recent paper published in *Nature* entitled, "Comprehensive evidence implies a higher social cost of $CO_2$", hereafter referred to as "the *Nature* article.[1] . EPA should carefully consider its overreliance on this one study and just a few others in the RIA.

The new estimates include revisions on:

- Socioeconomic assumptions until year 2300, including projected $CO_2$ emissions thru 2300
- New damage modules for projected impacts due to climate change[2]
- A new baseline discount rate for estimating the current value of future impacts.

One aspect of the new estimates in the *Nature* article is the use of panels of experts who arrive at the opinion that $CO_2$ emissions will not decline to zero by 2050. Instead, they believe some level of $CO_2$ emissions will remain through and after 2300. This conclusion is inconsistent with the Paris Climate Agreement and its pathway to limit global climate change to 1.5$^o$ C degree of warming. The dichotomy is confusing as the Biden Administration uses rhetoric in line with the Paris Climate Agreement while appearing to use information in the regulatory realm with much more realistic projections of the timelines needed for a net-zero transition. Likewise, the Energy Information Administration (EIA)

[1] "Comprehensive evidence implies a higher social cost of CO2", K. Renner, et al., *Nature*, Vol 610, Oct. 27, 2022.
[2] EPA applies the approach developed by Renner et al. (2022) for socioeconomics, emissions scenarios, and discounting, The damage functions used by EPA include the damage function developed by Renner at al. known as the Greenhouse Gas Impact Value Estimator (GIVE model), supplemented by two additional damage functions, the Data-driven Spatial Climate Impact Model (DSCIM) and a meta-analysis damage function based on: "Few and Not So Far Between: A Meta-analysis of Climate Damage Estimates," P. Howard and T. Sterner, *Environmental and Resource Economics,* 2017. See Supplementary Material for the Regulatory Impact Analysis, (p. 2).

projects oil and natural gas consumption to increase globally through at least the year 2050.[3] We applaud more realistic scenarios used in the revised SC-GHG estimate.

As noted in the *Nature* article, the modeled future deployed in the SC-$CO_2$ calculations suggests "…median net global $CO_2$ emissions decline to 17 Giga tons of $CO_2$ ($TCO_2$) in 2100, which is roughly 40% of today's levels." (p. 689) SC-$CO_2$ values increase the longer GHG emissions continue into the future. The climate experts involved in developing the new SC-$CO_2$ modeling assumptions reached a consensus that achieving net-zero emissions of $CO_2$ is highly unlikely this century and not likely even by 2300.

**Recommendation:** EPA should estimate the SCC in a future where greenhouse gas emissions ($CO_2$, methane $CH_4$, and other greenhouse gases) reach net zero by 2100, 2200, and 2300 to allow the public to comprehend the costs and benefits associated with various levels and rates of GHG reduction policies both in the United States and around the world.

## II. Revised SCC Estimates Buried in Complex Rulemaking

EPA is proposing a highly technical, complex rulemaking, the Supplemental Proposal, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review" that is over 140 pages long in the dense three-column federal register format. In addition, EPA includes an RIA that is over 250 pages long. In the RIA, EPA includes "Appendix B: Sensitivity Analysis of Monetized Climate Benefits" where a revised Social Cost of Methane is discussed. Appendix B of the RIA explains why new SCC values were estimated.

> "In this Appendix, we present the results of a sensitivity analysis of the monetized climate benefits of this proposal using estimates of the social cost of methane (SC-CH4) newly developed by EPA. As described below, these new SC-CH4 estimates are based on recent research addressing recommendations for updating estimates of the SC-GHG from the National Academies of Sciences, Engineering, and Medicine (National Academies, 2017). Section B.1 describes the methodological updates underlying the new estimates relative to the interim SC-CH4 estimates used in Chapter 3 of this RIA. Section B.2 presents the monetized climate benefits under the proposed NSPS OOOOb and EG OOOOc using the updated SC-CH4 estimates."

A newly developed SC-$CH_4$ is in and of itself a major policy concern fraught with much econometric, socio-economic and scientific complexity. It is a matter of major political import and value judgement. It is wholly inappropriate for such an important policy concern to be buried deep in a rule covering just one sector which is not even the main U.S. source of methane in the atmosphere and not the only industry affected by a SC-$CH_4$. Later in the same RIA appendix EPA notes:

> "The SC-CH4 estimates used in this sensitivity analysis are taken from EPA's September 2022 *Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances* (EPA 2022, external review draft), which has been included as supporting material for this RIA in the docket. The SC-CH4 estimates reflect numerous methodological updates relative to the SC-CH4 estimates used in Section 3.2 of this RIA."

[3] "EIA projects nearly 50% increase in world energy use by 2050, led by growth in renewables", EIA, Oct 7, 2021. "Although petroleum and other liquid fuels will remain the world's largest energy source in 2050, renewable energy sources, which include solar and wind, will grow to nearly the same level." Note that the sentence does not include natural gas, which together with petroleum represent more than all renewables combined.

This new 130-page EPA "Report on the Social Cost of Greenhous Gases" is buried within Appendix B as Supplemental Material for the RIA, itself a lengthy and complex document.[4] EPA has not given the requisite time for the regulated community to evaluate the information provided and risks not satisfying Administrative Procedure Act (APA) requirements for public engagement and comment.

## III. Revised SC-CH4 Estimates Decline in Comparison to Existing SC-CH4 Estimates

In the RIA EPA notes:

> "We estimate the climate benefits of $CH_4$ emissions reductions expected from this proposed rule using the SC-$CH_4$ estimates presented in the Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990 published in February 2021 by the Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) (IWG, 2021). The SC-$CH_4$ is the monetary value of the net harm to society associated with a marginal increase in emissions in a given year, or the benefit of avoiding that increase." (RIA, p. 65)

Later in the RIA EPA presents the current SC-$CH_4$ value used in the primary economic analysis of this rulemaking in Table 3-3 (RIA, p. 72). Included below are the estimates for the SC-$CH_4$ in 2023, the first year the benefits from the new rule will accrue.

**Table 3-3 Interim Estimates of the Social Cost of $CH_4$, 2023–2035 (In 2019$ per metric ton $CH_4$)**

| Discount Rate and Statistics | | | | |
|---|---|---|---|---|
| Year | 5% Average | 3% Average | 2.5% Average | 3% 95th Percentile |
| 2023 | $740 | $1600 | $2,100 | $4,200 |

EPA explains why it has chosen to use the existing estimates for the SC-$CH_4$ in this rulemaking:

> "…As a member of the IWG involved in the development of the February 2021 SC-GHG TSD, the EPA agrees that the interim SC-GHG estimates represent the most appropriate estimate of the SC-GHG until revised estimates have been developed reflecting the latest, peer-reviewed science. While the IWG's SC-GHG review and updating process under EO 13990 continues, in Appendix B of this RIA the EPA presents a sensitivity analysis of the monetized climate benefits using a set of SC-$CH_4$ estimates that incorporates recent research addressing recommendations of the National Academies of Sciences, Engineering, and Medicine (2017)." (RIA, p. 66)

EPA goes on to present the climate benefits of the proposed rule in both undiscounted (RIA, p. 77) and discounted tables (only 2023 values are shown for brevity).

[4] "Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances," EPA, National Center for Environmental Economics, Office of Policy, Climate Change Division, Office of Air and Radiation, September 2022.

**Table 3-4 Undiscounted Monetized Climate Benefits under the NSPS OOOOb and EG OOOOc Option, 2023–2035 (2019$)**

| Undiscounted | | | | |
|---|---|---|---|---|
| Year | 5% Average | 3% Average | 2.5% Average | 3% 95th Percentile |
| 2023 | $97,000,000 | $210,000,000 | $280,000,000 | $560,000,000 |

**Table 3-5 Discounted Monetized Climate Benefits under the NSPS OOOOb and EG OOOOc Option, 2023–2035 (2019$)**

| Discounted back to 2021 | | | | |
|---|---|---|---|---|
| Year | 5% Average | 3% Average | 2.5% Average | 3% 95th Percentile |
| 2023 | $88,000,000 | $200,000,000 | $260,000,000 | $520,000,000 |

In Appendix B of the RIA, EPA uses the newly revised SC-$CH_4$ values to indicate the climate benefits of the rulemaking with lower discount rates. Note that the only common interest rate between Table 3-3 and Table B-1 is the 2.5% column where the revised SC-$CH_4$ estimate has decreased under the revised methodology from $2,100 to $1,400 per ton (highlight added to both tables to indicate this comparison).

**Table B-1 Updated Estimates of the Social Cost of CH4, 2023–2035 (In 2019$ per metric ton $CH_4$)**

| | Near-Term Ramsey Discount Rate | | |
|---|---|---|---|
| Year | 2.5% | 2.0% | 1.5% |
| 2023 | $1,400 | $1,900 | $2,500 |

Later in Appendix B, EPA presents comparison tables for the undiscounted and discounted climate benefits of the rulemaking using the revised SC-CH4 estimates (again, only 2023 values are shown for brevity.)

**Table B-2 Undiscounted Monetized Climate Benefits Using Updated SC-$CH_4$ Estimates under the NSPS OOOOb and EG OOOOc Option, 2023–2035 (2019$)**

| | Near-Term Ramsey Discount Rate | | |
|---|---|---|---|
| Year | 2.5% | 2.0% | 1.5% |
| 2023 | $190,000,000 | $240,000,000 | $330,000,000 |

**Table 3-5 Discounted Monetized Climate Benefits Using Updated SC-$CH_4$ Estimates under the NSPS OOOOb and EG OOOOc Option, 2023–2035 (2019$)**

| | Near-Term Ramsey Discount Rate | | |
|---|---|---|---|
| Year | 2.5% | 2.0% | 1.5% |
| 2023 | $180,000 | $230,000,000 | $320,000,000 |

When the current SC-$CH_4$ estimates are compared to the revised estimates for SC-$CH_4$ at the discount rate of 2.5% (in the revised approach this is simply the initial discount rate) the estimate for SC-$CH_4$ decreases by 33% (from $2,100/t$CH_4$ emitted to $1,400/t$CH_4$ emitted).

However, EPA is also proposing a fundamental change in discount rates and summarizes the change in the climate benefits of the revised SC-$CH_4$ as follows (RIA, Appendix B, p. 194):

> "Comparing the monetized climate benefits presented in Tables B-2 and B-3 with the results presented in Tables 3-4 and 3-5 using the average SC-$CH_4$ estimates under each discount rate, for all emissions years the range of the climate benefits resulting from this sensitivity analysis is higher in magnitude than the monetized climate benefits using the IWG's recommended interim SC-$CH_4$ estimates. For example, this sensitivity analysis projects undiscounted monetized climate benefits of $7.3 billion to $12 billion (in 2019 dollars) by 2035, whereas the undiscounted monetized climate benefits based on average SC-$CH_4$ values in Table 3-4 range from $3.5 billion to $8.9 billion in 2035." (Underline added as this sentence is misleading)

EPA's summary is misleading as it is the result of using a different range of discount rates in the tables being compared, as shown above in comparing Tables from Chapter 3 and Appendix B of the RIA. When comparing the current to the revised SC-$CH_4$ estimates at a similar 2.5% discount rate, the cumulative climate benefits (discounted and presented as the Present Value in 2021) decline from $64B (RIA, Table 3-5, p. 78) to $50B (RIA, Table B-3, p. 194).[5]

This is very technical, complex information with internal inconsistencies. Again, the matter of the value of the SC-CH4 is a major policy issue that affects more than one industry. It should not be buried deep in technical supporting documentation for a rulemaking for one targeted industry. Further, it is hard to see what EPA is trying to do here. In the RIA, EPA uses a $51 SCC to calculate climate benefits for purposes of justifying the rule. Then buried deep in a supporting paper, EPA presents a new SCC with different discount rates. The information isn't consistent enough, particularly with respect to varying discount rates, to allow the public to assess the SC-$CH_4$ nor to understand the background behind the modeling EPA is using. It appears that the new methodology results in a lower SC-$CH_4$ than previously presented, declining to $1,400 per metric ton down from $2,100, but the SC-$CO_2$ is higher. It is impossible to compare with the shifting discount values presented.

Further EPA uses lower discount rates than those historically used in government cost-benefit analyses. Discount rates can be manipulated to arrive at the SC-GHG that is desired. Hence, the choice of a discount rate is inherently controversial. As such, a range of discount rates, compared consistently across time and GHGs, is called for.

**Recommendation:** EPA should first re-do its analysis in a more clear, transparent manner, and include a consistent application of a range of discount rates consistently applied to $CO_2$ and $CH_4$. Upon completion of that analysis, EPA should subject it to the wider public, not just the regulated community and those interested in one particular rulemaking.

## IV. New Climate Damage Estimates Based on Controversial Discount Rate

The *Nature* article goes to great length to explain how the SC-$CO_2$ estimates are different than those used in the past. The authors note that their revised estimates are in response to the 2017 report by the U.S. National Academies of Sciences, Engineering, and Medicine (NASEM) that outlined how SCC estimates could be improved.

[5] Note the initial discount rate of 2.5% declines to a rate of about 2.0% by year 2100 as indicated in *Figure 2.4.1 Distribution of the Dynamic Discount Rates* in EPA's supplemental document titled "Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances" (p.60). The $50B estimate for climate benefit would be even lower if the discount rate remained at 2.5% over the entre discounting period thru 2300.)

In the paper is modeled a single socioeconomic scenario determined by a panel of experts for future $CO_2$ emissions. Also deployed are several new specific damage models to more clearly illustrate how the SC-$CO_2$ was estimated. To positive effect, the following table is included that allows many of the changes to the underlying SC-$CO_2$ estimates to be understood.

| **"Table 1": Evolution of mean SC-$CO_2$ from DICE-2016R to this study** | | | | |
|---|---|---|---|---|
| **Row** | **Scenario** | **Mean SC-$CO_2$ ($ per t$CO_2$)** | **Incremental Change ($ per t$CO_2$)** | **Share of total change (%)** |
| a | DICE-2016R | 44 | | |
| b | GIVE with DICE damage function, 3% near-term discount rate | 59 | 15 | 11 |
| c | GIVE with sectoral damages, 3% near-term discount rate | 80 | 21 | 15 |
| d | This study: GIVE with Sectoral damages, 2% near-term discount rate | 185 | 105 | 74 |
| All SC-$CO_2$ values are expressed in 2020 US dollars per metric tonne of $CO_2$. Row a represents the SC-$CO_2$ using base DICE-2016R deterministic. The mean SC-$CO_2$ of $44 per tCO2 is similar to the value previously estimated from IWE DICE-2010 of $46 per t$CO_2$ at a 3% discount rate, after converting to 2920 dollars. Row b then retains the DICE-2016R damage function but otherwise deploys GIV under the discounting parameters of p=0.8%, n=1.57, which are consistent with a 3% near term discount rate (see Methods section 'Discounting' for descriptions of p and n. Row c replaces the DICE-2016R damage with or sectoral damage functions, and row d then uses our preferred discounting parameters from this study of p-0.2%, n=1.24, which are consistent with a 2% near-term discount rate. The final row represents the preferred mean value from this study. | | | | |

The new SC-$CO_2$ is directly compared in press releases and government proclamations as being $185/t$CO_2$ compared to the existing $51/t$CO_2$ when in fact the new value includes a fundamentally different and assumed discount rate. the discount rate has been one of the most controversial aspects of SCC estimates. EPA simply adopting a new SC-$CO_2$ value and proclaiming that a lower discount rate is somehow appropriate is misleading.

The most comparable SC-$CO_2$ value in "Table 1" to the current SC-$CO_2$ of $51/t$CO_2$ (at a discount rate of 3%) is the $80/t$CO_2$ value in "Table 1" above.[6] This comparison begs several questions not answered in the RFF paper or *Nature* article. One unexplained observation is the significant difference in cumulative $CO_2$ emissions under the RFF SC-$CO_2$ estimate versus those used previously by both the current and past administrations when estimating the SC-$CO_2$. The magnitude of cumulative $CO_2$ emissions used in past and revised SC-$CO_2$ modeling is discussed in Section 8 below.

**Recommendations:** As there will be continued controversy over discount rates and there are different perspectives on the value of money today versus in the future, EPA should conduct a coherent analysis using a range of discount rates. With so much variability that drives the value of any SC-GHG, it will remain a contentious policy issue that cannot be solved within one specific rulemaking not singularly

[6] At a 2% discount rate the Biden Administration's earlier 2021 SC-$CO_2$ increases from $51/t $CO_2$ to $121/t $CO_2$. which should be compared to the $185/t in "Table 1" above.

focused on that question. EPA should also assess how reliable economic forecasting been over the last century and provide evidence to the public that economic forecasting in the realm of climate is a reliable predictive science.

## V. Past and Revised SCC Values Will Remain Highly Controversial

Past SCC estimates, as well as these new estimates for SCC, will remain highly controversial. Although EPA presents the revised SC-$CH_4$ estimates as the result of scientific advances, it is unlikely there will be political consensus on the fundamental assumptions underlying these estimates and their consequential use as an environmental-economic indicator to drive not only U.S. environmental policy, but U.S. energy, economic, military, and foreign policies, as well. Estimated values for the SC-GHG affect many aspects of society and their exposure to the public should not be within just one very limited rulemaking in the limited arena of environmental policy, especially when intended as a means to effect a major change in U.S. energy policy.

As with many other current policy positions by this administration, the underlying assumptions reflect a particular perspective that likely not be shared with all future of administrations. Underlying EPA's approach to estimating the SCC are subjective choices that include a:

- Focus on global rather than U.S. climate impacts
- Strong belief in the reliability of long-term, including multi-century economic forecasting
- Environmental philosophy that emphasizes risk management only rather than acknowledging that human flourishing arises to a large extent as well from risk-taking
- Tendency to assume collective public risk tolerances align with the most cautious approach[7]
- Tendency to underestimate human innovation, adaptation, and the power of humanity to solve technical challenges
- Overreliance on one environmental-economic indicator, i.e., SCC, as a surrogate for a more comprehensive set of policymaking inputs.

As just one an example, EPA explains why it believes the assumption regarding a global SCC (GSCC) versus a U.S.-based SCC makes sense in terms of U.S. climate policymaking:

> "Examples of affected interests include direct effects on U.S. citizens and assets located abroad, international trade, and tourism, and spillover pathways such as economic and political destabilization and global migration that can lead to adverse impacts on U.S. national security, public health, and humanitarian concerns. Those impacts are better captured within global measures of the social cost of greenhouse gases (RIA, p. 69)."

[7] "That is, in most decision-making processes individuals tend to be risk adverse. This is evident by the existence of voluntary insurance markets where individuals demonstrate a positive willingness to pay to reduce risk exposure." from Supplemental Material for the RIA…" p. 62. It is a broad leap to assume this "willingness to pay" (WTP) seen in standard insurance markets for specific risks individuals face is the same WTP to avoid climate risks that are mostly far into the future and diffuse throughout society, and that it applies to everyone across the globe, as implied by a global SCC. Due to the fact that $CO_2$ remains in the atmosphere for centuries, even if $CO_2$ emissions went to zero tomorrow people would not see a significant risk reduction from climate change over the course of their lifetimes. This alone seems a significant contradiction with the historic use of the WTP conceptual framework or the insurance analogy deployed by EPA.

This cursory explanation fails to recognize that global impacts are significantly higher than projected U.S. impacts and that spillover effects to American footprints abroad would certainly not approach in magnitude the overall global damages projected by the SCC estimates.
M. Kotchen, a Yale university economist, compares a country's "preferred" SCC to the "global" SCC.[8] He notes that "climate change is the problem of a global externality" and suggests that "obtaining international consensus on a uniform value to internalize will be more challenging than often appreciated."

Using game theory and decision rules he models individual country "preferred" SCC (PSCC). He demonstrates that countries that will benefit the most from reducing global emissions, i.e., those with the highest projected marginal damages from climate change in comparison to a global average, tend to be those who have a higher PSCC. When using a GSCC of $40 he models a PSCC for the United States of $29. China's PSCC under the modeling is $17. In other words, to serve its national interests the United States would be rational to support an internal SCC that is about 75% of the GSCC. Perhaps there is a policy argument to be made for the United States to internalize a GSCC. *However, that is not a scientific decision but rather a policy choice.* It is not irrational in a world where nation states compete in the realms of energy and military power to argue for the United States to adopt the PSCC when making environmental policy. China in serving its self-interest would theoretically support a PSCC that is less than 50% of the GSCC according to Kotchen's modeling exercise. Will China impose a global SCC on its citizens when the benefit for each ton of carbon not emitted is expected to be less than half of that financial burden?

While perhaps simplistic, Kotchen's modeling indicates that a country's national interests do not necessarily align with a global SCC. He notes:

> "In conclusion, this paper shows how establishing and using the GSCC among sovereign countries is not simply a case of estimating and internalizing an externality. While the theoretical treatments and empirical demonstrations are intentionally simple, they open the door to future research with potentially important insights to guide the estimation and the use of SCC and to inform the design of future climate policy."

Hence, if political consensus on a global SCC were achieved, which to date hasn't happened, it would still be rational for there to be policy differences on the value used by U.S. policymakers when establishing U.S. climate, energy, and national defense policies. EPA's use of the GSCC in this rulemaking is a policy choice based on a "value" proposition. One can argue for it, but EPA should not suggest its position is the only rational position or simply science based. EPA should also not suggest that such a question can simply be buried in the details of a highly complex rulemaking specific to one industrial sector without it being subjected to full rulemaking consideration in and of itself as well as to normal democratic policymaking by elected representatives of the People.

Furthermore, for these newly revised SCC estimates EPA notes the following regarding U.S.-only impacts:

[8] "Which Social Cost of Carbon? A Theoretical Perspective," M. Kotchen, *Journal of the Association of Environmental and Resource Economists*, volume 5, number 3, 2018.

> "For example, the DSCIM damage module, which includes net impacts on temperature-related mortality, agriculture, energy expenditures, labor productivity, and sea level rise, estimates damages from climate change impacts physically occurring within the U.S. of $11/mtCO$_2$ for a 2020 emissions year, rising to $27/mtCO$_2$, for a 2080 emissions year (under a near-term discount rate of 2%). The GIVE damage module, which includes net impacts on temperature related mortality, agriculture, energy expenditures, and seas level rise, estimates damages from climate change impacts physically occurring in the US of $14/mtCO$_2$ for 2020 emissions. Rising to $24/mtCO$_2$, for 2080 CO$_2$ emissions (under a near-term discount rate of 2%).[9]

The above suggests that if a national consensus were possible on the assertions that the SCC is not zero, the development and application of a SCC value to be used in policymaking would remain controversial. It is likely when EPA's revised SCC estimates are applied to additional rulemakings that litigation under the Major Questions Doctrine will occur. EPA would become legally vulnerable should EPA's revised SCC estimates be used to: 1) fundamentally change how environmental regulations are developed to reduce greenhouse gas emissions; and 2) underpin a more comprehensive effort by the administration towards eliminating hydrocarbon development and usage in the United States.

**Recommendation**: The SCC is an economic indicator of future damages from CO$_2$ emissions that fails to comprehensively capture other U.S. policy considerations such as national defense, energy security, energy affordability, energy reliability, and the appropriate change rate of an energy transition. Hence, it is unlikely there will be stability in terms of which SCC estimates are used as elected representatives and administrations change. For this reason we again emphasize that such an important topic as the SCC with such expansive societal implications deserves full public scrutiny and should not be buried in the rulemaking for one industrial sector.

## VI. Disparate Perspectives Agree Net Zero by 2050 is Highly Unlikely

The *Nature* article estimates that CO$_2$ emissions, as used by EPA in its analysis, include future damages associated with sea level rise (SLR) ($2 per tCO$_2$ emitted), temperature mortality ($90/tCO$_2$), agricultural impacts ($84/tCO$_2$), and energy costs for residential and commercial buildings ($9/tCO$_2$). The *Nature* article states that:

> "the inclusion of additional damage sectors such as biodiversity, labor productivity, conflict, and migration in future work would further improve our estimates. (p. 691) …Other costs of climate change, including loss of cultural heritage, particularly ways of life, or valued ecosystems, may never be fully valued in economic terms but would also probably raise the SC-CO$_2$ beyond the estimates presented here." (p. 691)

Not highlighted in the *Nature* article is the propensity for humans to adapt. A countervailing narrative has been presented in a peer-reviewed paper by Bjorn Lomborg of the Copenhagen Consensus Center, Copenhagen Business School and the Hoover Institute at Stanford University.[10] Lomborg notes:

> "Arguments for devastation typically claim that extreme weather (like drought, floods, wildfires, and hurricanes) is already worsening because of climate change. This is mostly misleading and

[9] "Supplemental Material for the Regulatory Impact Analysis … ", p.78.

[10] "Welfare in the 21st century: Increasing development, reducing inequality, the impact of climate change, and the cost of climate policies," B. Lomborg, *Technological Forecasting and Social Change*, Apr 24, 2020.

inconsistent with the IPCC literature. For instance, the IPCC finds no trend for global hurricane frequency and has low confidence in attribution of changes to human activity…". Lomborg further asserts "Each dollar spent on Paris [Agreement] will likely produce climate benefits worth 11 cents."

Lomborg does not calculate a SC-$CO_2$ but instead presents an economic analysis in terms of reduced GDP due to climate impacts into the future and concludes:

> "Climate decisions need to consider two costs. This paper uses Nordhaus' DICE model to find the climate policy that realistically will deliver the lowest combined welfare loss. This optimal policy will reach 3.75oC by 2100, still aggressively halving global emissions by 2100 compared to the no-policy scenario, saving about $18 trillion or 0.4% of GDP across the next five centuries (Fig. 26)." (p. 30).

It is worth noting that both the *Nature* article and Lomborg appear to have areas of agreement on both the expected future climate and associated damages due to climate change:

1) Extreme Weather Events Not Included: The *Nature* article uses a damage assessment that includes SLR, temperature mortality, agricultural impacts, and energy costs for residential and commercial buildings but not extreme weather events. We surmise that had the researchers sufficient studies to quantify extreme weather event damages, they would likely have included those costs in their SC-$CO_2$ estimates. The exclusion of extreme weather events as a driver of SC-$CO_2$ is consistent with Lomborg, who provides significant detail explaining that extreme weather events are not increasing due to climate change, but instead demonstrates that increasing costs and impacts from extreme weather are due to the increasing human population and development footprint primarily in coastal regions around the world.

2) Sea Level Rise: The *Nature* article projected SC-$CO_2$ from SLR as $2/tCO2, a very small percentage of the estimate SC-$CO_2$. Similarly, after a lengthy analysis, Lomborg notes "…warming and increasing sea levels will definitely increase inflation-adjusted coastal flooding costs from $24 billion [annually] to $86 billion [annually world-wide]. Yet, a much richer world spending threefold more on protection, will mostly see this as progress: it will experience a 99.6% decrease in flood victims while spending a much smaller fraction of its income, down from 0.05% to 0.008% of global GDP." (p.8)

3) Climate Future: In another article released by Resources for the Future (hereafter referred to as "the RFF paper"), like Lomborg RFF indicates a net-zero climate future by 2050 is not at all likely.[11] The RFF paper suggests the mostly likely socioeconomic future scenario results in a temperature increase of 2.6°C through 2100 and continued increases thru 2300. Lomborg's recommended climate future is based on minimizing the total costs of both climate and policy impacts:

   "*Using carbon taxes, an optimal realistic climate policy can aggressively reduce emissions and reduce the global temperature increase from 4.1° C in 2100 to 3.75° C. This will cost $18 trillion, but deliver climate benefits worth twice that. The popular 2°C target, in contrast, is unrealistic*

[11] "The Social Cost of Carbon: Advances in Long-Term Probabilistic Projections of Population, GDP, emissions, and Discount Rates," K. Rennert, et al, Working Paper 21-28, October 2021, p.25,

*and would leave the world more than $250 trillion worse off*."

These areas of agreement seem significant: First, a climate future envisioned by both EPA through its use and implicit endorsement of the new SC-$CO_2$ from the RFF paper and Bjorn Lomborg, suggesting $CO_2$ emissions and associated global warming will continue through 2300. Second, both EPA, by assigning only $2 of the total SCC to SLR, and Lomborg agree that SLR will generally be managed through engineering controls and other adaptation. And finally, EPA omits extreme weather events in its new and revised SC-$CO_2$ estimates, an acknowledgement of the state of climate science and its inability to assign with high confidence effects from weather events, as Lomborg demonstrates. We applaud EPA for recognizing these realities.

**Recommendation:** EPA should include in its Supplemental Material for the RIA reference to Lomborg 2020. We appreciate the acknowledgement that there is not a rational argument to be made for calculating SC-$CO_2$ values for extreme weather, although we are concerned that a high SC-$CO_2$ is being calculated now on temperature mortality, which didn't figure as prominently before. The large shifts suggest that much more work is to be done to arrive at a defensible SC-$CO_2$.

## VII. Climate Tipping Points Have Limited Impact on SCC Estimates

The *Nature* article notes the following regarding climate tipping points:

> "Although we approximate the effects of a rapid Antarctic ice sheet disintegration tipping point within the BRICK sea-level component, incorporating additional discontinuities in the climate system would further improve our SC-$CO_2$ estimates."

By rational choice, tipping points for the modified SC-$CO_2$ estimates are not included. Dietz, et al. notes that, "Climate scientists have long emphasized the importance of climate tipping points like thawing permafrost, ice sheet disintegration, and changes in atmospheric circulation," and suggests that, "Collectively, climate tipping points increase the social cost of carbon (SCC) by [about] 25% in our main specification."[12] Table 2" from this paper is included below:

[12] "Economic impacts of tipping points in the climate system," S. Dietz, et al., *PNAS*, vol. 118 No. 34, 2021.

| "Table 2": The SCC (2020 US dollars) and the percentage change in the SCC due to tipping points collectively and individually | | |
|---|---|---|
| TP | Expected SCC, US$/tCO$_2$ | Increase due to TP, % |
| None | 52.03 | - |
| Permafrost carbon | 56.41 | 8.4 |
| Ocean methane hydrates | 58.85 | 13.1 |
| SAF | 51.14 | -1.7 |
| Amazon | 52.07 | 0.1 |
| GIS | 52.97 | 1.8 |
| WAIS | 53.57 | 2.9 |
| AMOC | 51.28 | -1.4 |
| Indian summer monsoon | 52.70 | 1.3 |
| All TPs | 64.80 | 24.5 |
| Sum main effects, all TPs | - | 24.5 |
| All costly TPs | 67.05 | 28.9 |
| Sum main effects, costly TPs only | - | 27.6 |
| The expected SCC is computed over 10,000 Monte Carlo Runs draws with 0.1% trimmed. Specification comprises RCP4.5-SSP2 emissions and GDP/population growth, Hope and Schaefer CF, Whiteman et al. beta OMH, and IPSL AMOC hosing. TP, tipping point. | | |

Several conclusions can be drawn from this work. First, counter to the prevailing press-driven narratives, climate tipping points do not result in significantly higher SC-$CO_2$ estimates. "Disintegration of the WAIS [West Antarctic Ice Sheet] increases the expected SCC by 2.9%." and "Disintegration of the GIS (Greenland Ice Sheet) increases the SCC by 1.8%..." (Dietz, et al., 2021, p. 2 of 9). These increases certainly do not align with the catastrophic public narratives that are often advanced.

In fact, some tipping points will mitigate expected climate impacts from warming temperatures: "All AMOC [Atlantic Meridional Overturning Circulation] slowdown scenarios result in a decrease in the expected SCC ranging from -0.7 to -5.7%, the latter in a scenario with a notably large two-thirds slowdown in the circulation." (Dietz, et al., p. 3 of 9, Underline added). Unsurprisingly, the projected SCC impacts from a slowing of the AMOC do not align with the climate-scare narratives associated with this future scenario.

**Recommendation:** EPA wisely does not use tipping points in the most recent SC-$CO_2$ estimates. EPA should reference the Dietz paper in support of this decision and note the relatively low impact on SC-$CO_2$ estimates in the RIA.

## VIII. Cumulative CO2 Emission Estimates need to be Explained by EPA

Five $CO_2$ emission scenarios are given equal weight in the derivation of SC-$CO_2$ in prior versions as indicated in Table A below. "Four of these represent potential business-as-usual (BAU) growth in population, wealth, and emissions and are associated with CO2 (only) concentrations ranging from 612 to 889 parts per million (ppm) in 2100. The fifth represents an emission pathway that achieves stabilization at 550 ppm $CO_2$e (i.e., $CO_2$-only concentration of 425-484 ppm or a radiative forcing of 3.7W/m2) in 2100, a lower than-than-BAU trajectory" according to the MIT Center for Energy and

Environmental Policy Research in a working paper titled "Estimating the Social Cost of Carbon for Use in U.S. Federal Rulemakings: A Summary and Interpretation".[13]

| Table A: Socioeconomic and Emissions Projections from Select EMF-232 Reference Scenarios (M. Greenstone et al, 2011) | | | | | |
|---|---|---|---|---|---|
| | Fossil and Industrial $CO_2$ Emissions ($GTCO_2$/yr.) | | | Annualize Percent Change | |
| EMF- 22 Based Scenarios | 2000 | 2050 | 2100 | 2000-2050 | 2050-2100 |
| 1 - IMAGE | 26.6 | 45.3 | 60.1 | 1.1% | 0.6% |
| 2 - Merge Optimistic | 24.6 | 66.5 | 117.9 | 2.0% | 1.2% |
| 3 - MESSAGE | 26.8 | 43.5 | 42.7 | 1.0% | 0.0% |
| 4 - MiniCAM | 26.5 | 57.8 | 80.5 | 1.6% | 0.7% |
| 5 - 550 ppm average | 26.6 | 20.0 | 12.8 | -0.5% | -0.9% |

Roger Pielke Jr. compares these future $CO_2$ emission scenarios to the cumulative emissions inherent to the previous iterations of the SC-$CO_2$ estimates.[14] The five emission scenarios used in the previous SC-$CO_2$ methodology, immediately prior to the new EPA revision, as well as two additional net-zero scenarios are shown in Table B, below, from Pielke, 2021. Scenario USG5 (row 5) is close to the $CO_2$ emissions scenario used by RFF if one compares Atmospheric $CO_2$ levels of Scenario USG5 (about 500 ppm $CO_2$ in 2100) to the atmospheric $CO_2$ value (also about 500 ppm) in Figure 1d of *Nature* (2022).

| Table B: Cumulative $CO_2$ emissions ($GtCO_2$) | | | |
|---|---|---|---|
| **Row #** (rows 1-5 match corresponding rows in Table A) | **Scenario** | **By 2200** | **By 2300** |
| 1 | SCC Scenario USG1 | 11,207 | 16,741 |
| 2 | SCC Scenario USG2 | 20,024 | 33,023 |
| 3 | SCC Scenario USG3 | 8,113 | 10,864 |
| 4 | SCC Scenario USG4 | 14,092 | 20,504 |
| 5 | SCC Scenario USG5 | 3,691 | 4,843 |
| **6** | **Average of 5 SCC Scenarios** | **11,425** | **17,195** |
| 7 | Pielke's Net-Zero by 2100 | 1,400 | 1,400 |
| 8 | Pielke's Net-Zero by 2200 | 3,150 | 3,150 |

As also indicated in Table B, total $CO_2$ emissions thru 2300 under Scenario USG5 (again very similar to the modeled RFF socio-economic scenario in *Nature*, 2022) has cumulative $CO_2$ emissions (4,843 $GtCO_2$)

[13] "Estimating the Social Cost of Carbon for Use in U.S. Federal Rulemakings: A Summary and Interpretation," M. Greenstone, E. Kopits, and A. Wolverton, MIT Center for Energy and Environmental Policy Research, working paper CEEPR WP 2011-006, May 2011.

[14] "The Biden Administration Just Failed its First Science Integrity Test," R. Pielke Jr., *The Honest Broker Newsletter*, Feb 28, 2021.

that are nearly 28% (4,843/17,195 = 28%) of the average cumulative $CO_2$ emissions (table B - Row 6) used in previous SC-$CO_2$ estimates.

The good news is that EPA, in adopting the revised SC-$CO_2$ estimate, has endorsed a future $CO_2$ emission scenario that appears reasonable in magnitude. It replaces the unrealistically high cumulative average of 17,195 $GtCO_2$ used in previous SC-$CO_2$ estimates by a value of about 4,800 $GtCO_2$ that is more defendable.

**Recommendations:** EPA should explain in the RIA that the cumulative $CO_2$ emissions used in the revised SC-$CO_2$ estimates are indeed based on cumulative $CO_2$ emissions that are significantly lower than cumulative $CO_2$ emission values used in previous SC-$CO_2$ estimates. EPA should explain why the cumulative $CO_2$ emissions are only about 28% of the emission values used in past SC-$CO_2$ estimates, but the estimated SC-$CO_2$ (using a comparable discount rate of 3%) is now 57% larger ($80/$tCO_2$ versus $51/$tCO_2$). EPA in the RIA Supplement needs to confirm whether the sectoral damage functions used in the revised SC-$CO_2$ estimates are providing damage values per ton that are significantly larger than the previously used damage functions.

## IX. New Damage Functions Raise Fundamental Issues Regarding SCC Uncertainty

The contributions to the SC-$CO_2$ estimate of $184/ton with the initial discount rate of 2% are as follows:

- Temperature Mortality - $90 $tCO_2$
- Agricultural Impacts - $84 $tCO_2$
- Sea Level Rise - $2 $tCO_2$
- Energy Cost Residential and Commercial Building - $9 $tCO_2$

Each of these except SLR, which was discussed previously in Section VI, is discussed below.

**Temperature Mortality:** The SC-$CO_2$ contribution from Temperature Mortality is based on studies indicating that humans are more likely to die from diseases or other health-related factors in warmer climates. The statistical likelihood is relatively low but when these low probabilities are applied to a world population and then multiplied by EPA's "Value of a Statistical Life" the overall contribution to the SC-$CO_2$ becomes significant. EPA on its "Mortality Risk Valuation" web page notes that:

> "The agency does not place a dollar value on individual lives. Rather, when conducting a benefit-cost analysis of new environmental policies, the Agency uses estimates of how much people are willing to pay for small reductions in their risks of dying from adverse health conditions that may be caused by environmental pollution.
>
> "In the scientific literature, these estimates of willingness to pay for small reductions in mortality are often referred to as the "value of a statistical life." This is because these values are typically reported in units that match the aggregate dollar amount that a large group of people would be willing to pay for a reduction in their individual risk of dying in a year, such that we would expect one fewer death among that group on average. This is best explained by way of an example. Suppose each person is a sample of 100,000 people were asked how much he or she would be willing to pay for a reduction in their individual risk of dying of 1 in 100,000, or 0.0001% over the next year. Since this reduction in risk would mean that we would expect one

> fewer death among the sample of 100,000 people over the next year on average, this is sometimes described as "one statistical life saved." Now suppose that the average response to this hypothetical question was $100. Then the total amount that the group would be willing to pay to save one statistical life in a year would be $100 per person x 100,000 people, or $10 million. This is what is meant by the "value of a statistical life." Importantly, this is not an estimate of how much money any single individual or group would be willing to pay to prevent the certain death of any particular person.
>
> "…EPA recommends that the central estimate for $7.4 million ($2006), updated to the year of analysis, be used in all benefits analyses that seek to quantify mortality risk reduction benefits regardless of the age, income, or other population characteristics of the affected population…"[15]

Cromar et al. notes:

> "In accordance with recommendations from the National Academies in a 2017 report on approaches to update the social cost of greenhouse gases (SC-GHG), an expert panel of 26 health researchers and climate economists gathered for a virtual technical workshop in May 2021…net increases in mortality risk associated with increased average annual temperature (ranging from 0.1% to 1.1% per 1°C) were estimated for all global regions."[16]

In the *Nature* article the estimated percent increase from dying in a warmer climate is multiplied by a projected global temperature increases modeled to estimate increased death rates over time. That is then multiplied by the estimated number of people across the globe from temperature increases to estimate future excess deaths. That is then multiplied by the "value of statistical life" to estimate the contribution to the SC-$CO_2$ from Temperature Mortality, arriving at a value of $90/t$CO_2$ emitted. This is the largest contribution to the revised SC-$CO_2$ estimates adopted by EPA.

But does this make sense? Would people really choose to pay to keep temperature down in the same manner they are willing to pay to reduce air carcinogens? Is the underlying premise of this human health valuation exercise valid? A Science Advisory Board (SAB) letter to the EPA Administrator in 2011 notes: "Building from the recognition that WTP [Willingness to Pay] to reduce cancer risks may differ from WTP to reduce other fatal health risks, the SAB recommends EPA work toward developing a set of VRR [Value of Risk Reduction][17] corresponding to policy-relevant contexts defined by the type or characteristics of the risk. . . .and of the affected population (e.g., age, health, income.) Economic theory and empirical evidence suggest that WTP can vary with these characteristics and that a single value of mortality risk reduction is not appropriate for all contexts."[18]

Human mortality risk reduction has now become one of the primary elements of the revised SC-$CO_2$ estimates. The mortality cost of carbon was hardly mentioned in past estimates of SC-$CO_2$: "...climate-

[15] "Mortality Risk Valuation" web page, EPA, accessed Jan 30, 2023.
[16] "Global Health Impacts for Economic Models of Climate Change, A Systemic Review and Meta-Analysis," K. Cromar, et al., *Systematic Reviews*, The American Thoracic Society, Vol. 19, No. 7, p. 1203-1212, July 2021.
[17] "Letter to the Honorable Lisa Jackson Re: Review of Valuing Mortality Risk Reductions for Environmental Policy: A White Paper (December 10, 2010)," EPA Science Advisory Board, July 29, 2011. The terms Value of Statistical Life (VSL), Value of Mortality Risk (VMR) and Value of Risk Reduction(VRR) are all used interchangeable in this document.
[18] *Ibid.*

mortality damages are currently limited in the most widely used IAMs. In FUND, mortality costs account for ~3% of total damages. In DICE-2016, mortality impacts are not updated to the latest scientific understanding and less than 5% of the damages come from mortality…"[19] The same article goes on to suggest: "Incorporating mortality costs increases the 2020 SCC from $37 to $258 [-$69 to $545] per metric ton in the baseline emissions scenario."

So, to be clear, Temperature Mortality has not been a significant factor in estimating the SC-$CO_2$ for the last ten years but now it contributes fully half of the latest EPA endorsed SC-$CO_2$ estimate. That seems to be a major change that is worthy of closer consideration and inclusion of other scientific sources to verify. What seems to be missing is consideration that there are very different perspectives on willingness to pay. The approach used to increase the contribution from temperature mortality is akin to the approach used for the much more straightforward assessment of carcinogenic risk. Most people are willing to pay to reduce their individual carcinogenic risk because it affects them personally. It should not be assumed that the same approach can be used for climate change which is much more diffuse, the major effects of which will be felt after most people alive today are dead. Further, how people perceive risk is very different. On page 62 of the RIA supplement EPA assumes most people are risk averse, but that a false assumption. We all have different risk tolerances and perceptions. Certainly reactions to COVID proved that. Taking EPA's assumption logically forward, we would expect to see more people relocate to New York from Florida to escape the risk of temperature mortality, but by the hundreds of thousands, that is not the case.[20]

Understanding whether scientists and medical researchers are evaluating mortality from climate change with comparable methodologies is challenging. *The Lancet* reported in 2015 and again in 2021 that cold temperatures are responsible for more deaths around the globe than warm temperatures.[21] "Globally, 5,083,173 deaths…were associated with non-optimal temperatures per year, accounting for 9.43%…of all deaths (8.52% were cold-related and 0.91% were heat-related…"[22]

In this comprehensive paper the ambiguity associated with non-optimal temperatures is clearly stated:

> "Our study also explored the temporal change in temperature-related mortality burden from 2000 to 2019. The global daily mean temperature increased by 0.26oC per decade during this time, paralleled with a large decrease in cold-related deaths and a moderate increase in heat-related deaths. The results indicate that global warming might slightly reduce the net temperature-related deaths, although in the long run, climate change is expected to increase mortality burden." (Underline added, Zhao et al.)

Hence, as with all long-term demographic multi-century climate impact projections, temperature related mortality is an exercise in uncertainty, as indicated by the last sentence in the previous quote.

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[19] "The mortality cost of carbon," Daniel Bressler, *Nature Communications*, 2021. Note that the $258 value is for a baseline emissions scenario of about 4.1°C temperature rise by 2100.
[20] "New York, again, leads nation in population decline," *USA Today,* Dec 23, 2020.
[21] "Climate and health: mortality attributable to heat and cold," K. Dear and Z. Wang, *The Lancet,* Volume 386, Issue 9991, P320-322, July 25, 2015.
[22] "Global, regional, and national burden of mortality associated with non-optimal temperatures from 2000 to 2019: a three stage modeling study", Q. Zhao, et al., *The Lancet, Planetary Health*, Volume 5, Issue 7, E415-E425, July 1, 2021,

Finally, to verify EPA's assumptions on how the public values the incremental health risks from a warming world and the Willingness to Pay (WTP) that underlies the SCC estimate for Temperature Mortality, EPA must assess what would people be willing to pay in 2022 to reduce a relatively small increased mortality risk from a warming climate into the future. WTP values used in the revised SC-$CO_2$ methodology provide a current present value for the SC-$CO_2$ that some would suggest be applied as a carbon tax. What would this carbon tax look like for a tank of gasoline?

> "Gasoline is about 87% carbon and 13% hydrogen by weight. So, the carbon in a gallon of gasoline (weighing 6.3 pounds) weighs 5.5 pounds (.87 x 6.3 pounds = 5.5 pounds). So, multiply the weight of the carbon times 3.7, which equals 20 pounds of carbon dioxide. It seems impossible that a gallon of gasoline, which weighs about 6.3 pounds, could produce 20 pounds of carbon dioxide ($CO_2$) when burned. However, most of the weight of the $CO_2$ doesn't come from the gasoline itself, but the oxygen in the air."[23]

Hence, a gallon of gas results in 20 pounds or 0.01 tons of $CO_2$ emissions. If the SC-$CO_2$ (Temperature Mortality contribution) is \$90/t$CO_2$ emitted, then the temperature mortality damages in every gallon of gasoline is \$0.90. For a 25-gallon tank of gasoline, the carbon tax would be about \$23 if this externality were included in its cost. EPA should not ask the American public the question: Are you willing to pay \$X[24] over the course of your life to reduce the small risk from dying from a warmer planet? Rather EPA should ask: Are you willing to pay \$23 more per every tank of gasoline for the remainder of your life for that same risk reduction?

**Recommendation:** EPA should explain what value was used for the Statistical Value of a Life and the WTP values in the revised SC-$CO_2$ estimates. What basis does EPA have for using these values as they relate to the underlying health risks of living in a warmer climate?

**Agricultural Impacts**: Historical damage functions have indicated that a certain degree of warming is beneficial to agricultural. The new damage function contained in the *Nature* article and endorsed by EPA as demonstrated by the use of it in the GIVE damage module suggests otherwise. Yet research such as Moore et al. 2017 highlights the uncertainty of predictive results from various agricultural damage functions: [25]

> "These new damage functions reveal far more adverse agricultural impacts than currently represented in IAMS. Impacts in the agriculture increase from net benefits of \$27/ton $CO_2$ to net costs of \$85/ton, leading the total SCC to more than double.
>
> "The effect of higher temperatures on yields is negative for all crops in almost all locations. The interaction between the effects of warming and current growing-season temperature is in the expected direction, with warming consistently more damaging in places that are already hot. However, for wheat and maize (and soybeans at low levels of warming) this effect is not particularly large."

[23] From the webpage https://yourwiseanswers.com/what-is-the-carbon-footprint-of-a-gallon-of-gasoline/
[24] The WTP value embedded within the revived SC-$CO_2$ estimates is unknown and not revealed in the *Nature* article, but we refer to it here as \$X.
[25] "New science of climate change impacts agriculture implies higher social cost of carbon," F. Moore et al., *Nature Communications*, 8, Article number 1607, 2017.

Figure 3 from Moore et al. shows that the results are quite variable for the United States in particular. Agricultural sector damage functions indicate increased agricultural production in the United States using the existing FUND damage function (dashed line); no net change in production using the meta-analysis (solid line, from Challinor et al.[26] and used in the IPCC 5th Assessment report): and a 20% decline in production with a 3°C temperature increase using the Agricultural Model Intercomparison and Improvement Project (AgMIP) damage function (dotted line).

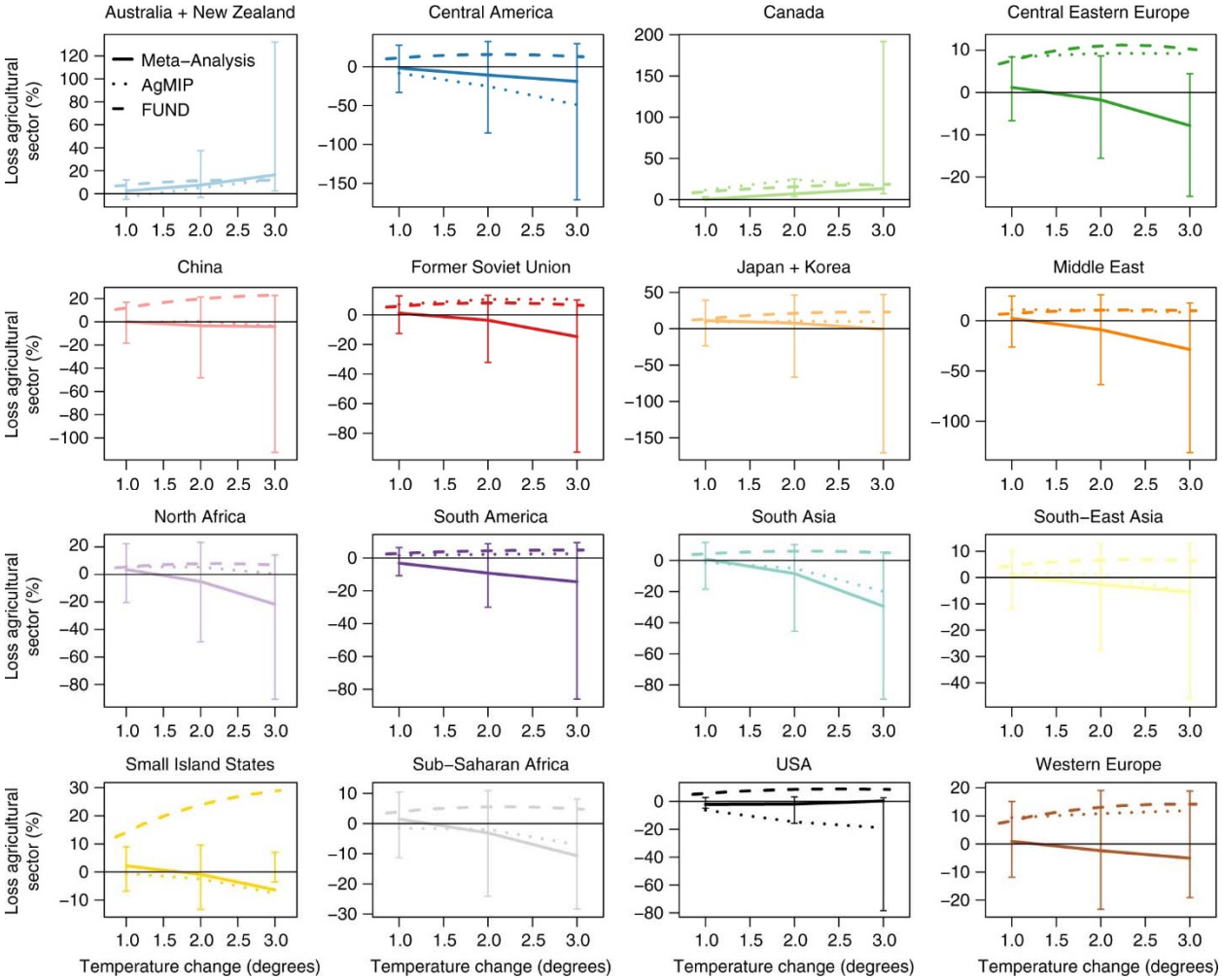


**Figure 3:** Three agriculture-sector damage functions for each of the 16 FUND regions. Solid lines are from meta-analysis results, dotted lines are AgMIP results, and dashed lines are the existing FUND damage functions. Error bars show the damage functions based on the 2.5th and 97.5th quantiles of the meta-analysis results. Temperature changes are global averages and are relative to a global average 1995–2005 baseline.

Hence, the impact of temperature increases on U.S. agriculture is highly dependent on the selection of available damage functions. The meta-analysis (solid line) agricultural damage function that appears to

[26] "A meta-analysis of crop yield under climate change and adaptation," A. Challinor, et al., *Nature Climate Change,* Jan 28, 2014.

have been adopted in the *Nature* article indicates no impact to U.S. agriculture up to a 3° C increase from the 1995-2005 baseline.[27]

Moore et al. goes on to note that:

> "Agriculture in FUND [one of three damage modules used historically in SCC estimates] shows benefits in all regions for warming <3°C. This is a result of both a direct positive effect of moderate amounts of warming on yields for all regions and the $CO_2$ fertilization effect. In contrast, our meta-analysis results show almost universal negative welfare changes for warming beyond 2°C that in many cases are very large."
>
> "Currently, agriculture in FUND contributes a benefit of \$2.7/ton $CO_2$ toward the SCC. In contrast, damage functions based on both the preferred AgMIP GGCMI ensemble and the meta-analysis show net costs of \$3.5 and \$8.5/ton respectively…" [28]

The *Nature* article does not explain why the meta-analysis damage function was selected rather than the AgMIP damage function from Moore et al. It is unclear which of these two damage functions is most scientifically supported, but the damage function used in the *Nature* article does result in the highest agricultural damage estimates globally but no impact to U.S. agriculture up to 3°C warming over the 1995-2005 baseline.

Further, the SC-$CO_2$ values for agricultural damage suffer from the same lack of clarity regarding discount rates that we noted above. In Moore et al. Supplemental Table 5, SCC values for the multiple agricultural damage functions are presented with discount rates ranging from 2.5% to 5%. The highest SCC value for the meta-analysis damage function is \$27 at a 2.5% discount rate. It is unclear how this value becomes \$84 in the *Nature* article. EPA needs to show a rational reason for its application to the SCC it has chosen. We assume the lower initial discount rate of 2% drives this increase, but again, such is an arbitrary selection.

**Recommendation:** EPA should note in the RIA that the new agricultural damage function in the GIVE model used in the *Nature* article results in a significant increase in the contribution of agricultural damages in revised global SC-$CO_2$ estimates. EPA should also note independently what the expected impacts to U.S. agricultural might be, referencing the results in Figure 3 above. In particular EPA should report the U.S.-only SC-$CO_2$ for the agricultural sector. EPA should also highlight the uncertainties reflected in Table 3 above when discussing the SC-$CO_2$ in the RIA.

**Energy Cost Residential and Commercial Buildings**: The SC-$CO_2$ contribution from energy consumption is estimated as \$9/t$CO_2$ in the *Nature* article, based upon work by Clark et al., who suggest in a warming world: "Increasing expenditures result from increased electricity use for cooling, and are offset to

[27] The *Nature* article climate future is a 2.6° C overall temperature increase by 2100, indicated on these graphs as a 1.6° C temperature change (the 1995-2005 baseline already includes about a 1°C increase from the pre-industrial period).

[28] In Moore et al. (2017) Supplemental Table 5, SCC values for the multiple agricultural damage functions evaluated are presented for discount rates ranging from 2.5% to 5%. The highest SCC value for the meta-analysis damage function is \$27 at a 2.5% discount rate. It is unclear how this value becomes \$84 in the *Nature* article. This needs to be explained. It is assumed the lower initial discount rate of 2% drives this increase.

varying degrees, depending on the region, by the decreased energy consumption for heating… Results indicate that changes in net expenditures are not uniform across the globe."[29]

Further the Clark et al. authors conclude:

> "In the scenarios explored in this study, net global building energy expenditures increase on the order of 0.1% of global economic output for a 2°C increase in global mean surface temperature." However, Figure 13 from the same paper indicates these cost impacts will be significantly less in developed nations, where the impact as it relates to total income appears to not reach 0.1 percent of total income until there is a 5°C change in global temperatures."

**Recommendations:** EPA should report in the RIA the U.S.-only SC-$CO_2$ for the building energy expenditures sector.

## X. Conclusion

We have been able to identify only some of the problems with how EPA has arrived at a significantly higher SC-GHG than that used in the past, as the time allotted for the comment period of this highly complex rulemaking is seriously compressed. The complexity of calculating a SCC and its application broadly throughout society and across the globe indicates the folly of EPA's attempt to use it in this rulemaking without a broad public comment period open to society generally and not just those specifically interested in this one rule targeted at one industrial sector.

Estimating the value of the SC-$CO_2$ is a complex exercise that results in a fair degree of uncertainty in the final value. EPA must provide clear, transparent justification for the increase, particularly since it is nearly four times higher than the value currently in use by the federal government. EPA continues to assert the new SC-$CO_2$ estimates are an under-estimation of future climate change impacts: "Due to the limitations associated with the DSCIM and GIVE damage modules the models significantly underestimate the benefits of GHG mitigation to **U.S. citizens and residents**." (Supplemental Material for the RIA, p. 80, emphasis added)

This conclusion is not well-supported as our review attests. The GIVE damage functions used by EPA indicate that climate change impacts to U.S. citizens are significantly lower than those impacts suggested by a global SC-$CO_2$ value and almost entirely result from the contribution of the Temperature Mortality damage function.

Advocates for extreme climate change measures have a strong inclination towards the "better safe than sorry" mindset or in academic terms, "The Precautionary Principle." The regulator, regulated community, and other groups in society also have different starting assumptions regarding risk, risk management, the reliability of economic predictions, and the power of capitalism to innovate and solve problems. A resolution on the SC-$CO_2$ is not the purview of one rule directed at one industrial sector, but rather a broad subject for the full democratic policy- and rule-making processes.

In conclusion:

[29] "Effects of long-term climate change on global building energy expenditures," L. Clark, et al., *Energy Economics* 72, 2018, pp. 667-677.

- The current SC-$CO_2$ estimate is on more solid ground in terms of the underlying socio-economic pathway and projected future $CO_2$ emissions through 2300 that underpins the modeling. Despite those more realistic time horizons, EPA makes several fundamental errors in arriving at a SC-$CO_2$ of $185/ton.

- Damage estimates for the revised SC-$CO_2$ regarding SLR and energy usage are not significant in magnitude and likely not controversial.

- Projected damages from temperature mortality seem highly speculative. It is not at all clear that the methodology is well supported by the underlying assumptions of "willingness to pay." WTP values used in the revised SC-$CO_2$ estimates are based on cancer risk reduction that one might be a beneficiary of in one's own lifetime. EPA has now applied that concept to climate change risk reduction that are more likely to impacts non-U.S. citizens well outside the range of a current adult's life span.

- Different opinions on assumed discount rates are unresolvable, hence a range of discount rates should be evaluated consistently and used when reporting SC-$CO_2$ estimates.

- Agricultural damages should be an area of ongoing and rigorous research. Evidence over the last 100 years in terms of increased agricultural production might suggest agricultural science and crop engineering will adapt at a rate that mitigates the increased SC-$CO_2$ damages asserted in the revised SC-$CO_2$.

- Policymakers should not use the SC-$CO_2$ in isolation when making environmental, energy, and national security policy.