

# Rhode Island Greenhouse Gas Emissions Inventory

## Proposed Methodology Improvements for the 1990 Baseline

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### Introduction

The *Rhode Island Greenhouse Gas Emissions Inventory* is the primary scientific tool for assessing progress towards the emissions reduction mandates outlined in the [2021 Act on Climate](#) (R.I. General Laws § 42-6.2-2). The Department of Environmental Management (DEM) compiles the inventory annually and strives to utilize the best science and data available. On December 15, 2022, the Executive Climate Change Coordinating Council (EC4) approved the [Rhode Island 2022 Climate Update](#) as the State's official plan to guide climate change mitigation. The *2022 Update* recommended evaluation and discussion of updating the inventory's 1990 baseline, a critical dataset used to benchmark Rhode Island's progress towards the Act on Climate.

### History of the 1990 Baseline

The [first inventory](#) for Rhode Island was completed by the Northeast States for Coordinated Air Use Management (NESCAUM) in 2013. Through this contract, the 1990 baseline was established using mainly default data from the Environmental Protection Agency's (EPA) State Inventory Tool (SIT). In 2016, the 1990 baseline was adjusted in the [2016 Rhode Island Greenhouse Gas Emissions Reduction Plan](#). The *2016 Plan* adjusted the baseline's electricity consumption estimate<sup>1</sup> and added a land use, land use change, and forestry (LULUCF) sector<sup>2</sup>.

### Proposal to Update the 1990 Baseline

Since the 1990 baseline was first established, scientific understanding of climate change has continuously evolved. The Intergovernmental Panel on Climate Change (IPCC) published its [Fifth Assessment Report](#) (AR5) in 2014, which included new global warming potentials (GWPs) that more accurately portray the impact of methane, nitrous oxide, and other GHG emissions. DEM's accounting methodologies have also improved, and new data sources have emerged in recent years. Preservation of the 1990 baseline memorializes consistency but results in inaccurate comparisons overtime.

Following stakeholder feedback and recommendations approved by the EC4 in the *2022 Update*, DEM proposes to apply the methodology improvements outlined in this document to the 1990 baseline and the entire inventory timeseries. Adoption of the proposed methodology improvements will further align the inventory with national and international reporting guidelines and provide a more direct comparison across 30 years of data. DEM also proposes to apply relevant methodology updates to the 1990 baseline on an as-needed basis in the future, which would align with the approach taken by EPA and other New England states.

#### *Methodology Improvement: Update the Inventory's Global Warming Potentials*

The GWP evaluates the climate impact one ton of methane, nitrous oxide, or ozone-depleting substances have compared to one ton of carbon dioxide. Since carbon dioxide, the most prevalent GHG, has an atmospheric lifespan greater than 100 years, GWPs are typically expressed on a 100-year-time horizon. Methane traps more heat than carbon dioxide and has a shorter lifespan of only 12.4 years. To demonstrate methane's greater climate impact, GWPs can also alternatively be expressed on a 20-year-time-horizon. The United Nations Framework Convention on Climate Change (UNFCCC) requires 100-year AR5 GWPs, except for fossil

methane<sup>3</sup>. The IPCC’s GWP for fossil methane assesses total carbon content, which includes methane’s oxidation to carbon dioxide in the atmosphere<sup>4</sup>. Since most emission factors used in the inventory already account for total carbon content, the inventory’s fossil methane estimates use the same GWP as biospheric methane<sup>5</sup> to avoid double counting carbon dioxide.

The 1990 baseline and inventories through 2010 presently use 100-year GWPs from the IPCC’s [Second Assessment Report](#) (SAR), while 2011-2019 use 100-year GWPs from the IPCC’s [Fourth Assessment Report](#) (AR4). Examples of 100-year GWPs are listed here:

	IPCC Second Assessment Report (1995)	IPCC Fourth Assessment Report (2007)	IPCC Fifth Assessment Report (2014)
Carbon Dioxide	1	1	1
Methane	21	25	28
Nitrous Oxide	310	298	265

To align with UNFCCC requirements and EPA’s *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, **DEM proposes to update the 1990 baseline and the entire inventory timeseries to 100-year AR5 GWPs**. This proposal is in response to stakeholder feedback from a March 16, 2022 public sharing session and a recommendation approved by the EC4 on page 32 of the *2022 Update*:

*“We recommend further evaluation and discussion of updating the 1990 baseline if the best science suggests new and reasonable parameters or methods.”*

Updating the 1990 baseline and the entire timeseries to 100-year AR5 GWPs incorporates contemporary climate science, follows best practice, and promotes consistency.

*Methodology Improvement: Align the Inventory’s LULUCF Sector with IPCC Guidelines*

Land Use, Land Use Change, and Forestry (LULUCF) represents the net carbon flux from natural and working lands (NWLs)<sup>6</sup> in Rhode Island. The *2016 Plan* estimated LULUCF for the first time and established a net emissions total for the 1990 baseline. The 1990 baseline’s current LULUCF estimate is an interpolated number derived from data provided by the Rhode Island Geographic Information System, Abt Associates, and trends in carbon dynamics found in EPA’s SIT. After the Act on Climate was passed, the 1990 baseline’s net emissions total became increasingly important for assessing progress towards the Act’s “net-zero emissions by 2050”. DEM found the *2016 Plan*’s LULUCF methodology to be irreplicable and [adopted its own methodology with public input](#) last year for estimating carbon sequestered from Rhode Island’s forests.

The *2022 Update* was receptive to DEM’s new methodology and further stated:

*“We recommend RIDEM continue to collaborate with its DAFE [Division of Agriculture and Forest Environment] and the U.S. Climate Alliance to continuously improve the LULUCF sector.”*

In response to this recommendation, DEM worked with its Division of Agriculture and Forest Environment (DAFE) and the U.S. Climate Alliance at its [Natural & Working Lands 2023 National Learning Lab](#) to improve the LULUCF sector. DEM proposes to align the LULUCF sector with the land-use categories defined by the [2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use](#)<sup>7,8</sup>. Aligning the LULUCF sector with IPCC guidelines would cover all categories of NWLs, and this will be accomplished by leveraging state-specific data published in EPA’s [Inventory of U.S. Greenhouse Gas Emissions and Sinks by States](#)<sup>9</sup>. Please note, Forest Land Remaining Forest Land (aboveground biomass and forest fires), Croplands, Grasslands, and Settlements Remaining Settlements (urban trees only) will continue to follow

DEM's methodology adopted last year. EPA's state specific data will only be used to include previously omitted components, highlighted in green below.

### Current LULUCF Subsectors

- Forest Land
  - Forest Land Remaining Forest Land (Aboveground Biomass, Forest Fires)
- Croplands
  - Agricultural Soil Carbon Flux
- Grasslands
  - Agricultural Soil Carbon Flux
- Wetlands
  - Not Included
- Settlements
  - Settlements Remaining Settlements (Urban Trees, Settlement Soils, Yard Trimmings)

### Proposed LULUCF Subsectors (NEW)

- Forest Land
  - Forest Land Remaining Forest Land (Aboveground Biomass, Forest Fires)
  - Land Converted to Forest Land
- Croplands
  - Cropland Remaining Cropland
  - Land Converted to Cropland
- Grasslands
  - Grassland Remaining Grassland
  - Land Converted to Grassland
- Wetlands
  - Coastal Wetlands Remaining Coastal Wetlands
  - Land Converted to Coastal Wetlands
- Settlements
  - Settlements Remaining Settlements (Urban Trees, Settlement Soils, Yard Trimmings)
  - Land Converted to Settlements

This methodology improvement can be applied to the entire inventory timeseries since EPA's state specific data goes back to 1990. Additionally, Forest Land Remaining Forest Land can also be estimated from DAFE's data back to 1990. **DEM proposes to replace the current 1990 baseline's LULUCF sector and apply this proposed methodology improvement to the entire inventory timeseries.** Sensitivity analysis demonstrates that alignment with the IPCC reporting guidelines adjusts the 1990 baseline's LULUCF sector from -0.29 MMTCO<sub>2</sub>e to -0.81 MMTCO<sub>2</sub>e, an estimate significantly closer to reality. Adoption of this methodology improvement for the 1990 baseline and entire inventory timeseries follows national and international reporting guidelines, creates a net emissions total for each year, and provides a more direct comparison across three decades of data.

### Conclusion

The proposed methodology improvements to the inventory's 1990 baseline and entire timeseries incorporates 21<sup>st</sup> century climate science and more accurately captures the impact of NWLs in Rhode Island. The 1990 baseline is a critical dataset used to benchmark Rhode Island's progress towards the Act on Climate and should be recognized as a dynamic reference point that is subject to updated climate science and new methodologies. DEM proposes the following methodology improvements:

1. Update the 1990 baseline and entire inventory timeseries to 100-year AR5 GWPs.
2. Replace the LULUCF sector in the current 1990 baseline and 2019 inventory and add a LULUCF sector for all other inventory years with the methodology improvement detailed above.
3. Apply relevant methodology changes to the 1990 baseline on an as-needed basis in the future, which would align with the approach taken by EPA and other New England states.

DEM is striving to incorporate the aforementioned recommendations from the EC4's 2022 Update ahead of the 2020 inventory release. Please provide comments via [SmartComment](#) regarding the application of the proposed methodology improvements to the inventory's 1990 baseline. More information on the *Rhode Island Greenhouse Gas Emissions Inventory* can be found at [www.dem.ri.gov/ghg-inventory](http://www.dem.ri.gov/ghg-inventory). **Public comments will be accepted through Friday, October 6<sup>th</sup> at 4:00 pm.**

## End Notes

1. See page 52, footnote 17 of the [2016 Plan](#).
2. See page 52 “LULUCF Addition” of the *2016 Plan*.
3. See paragraphs 1 and 2 of 7/CP.27, “Common metrics used to calculate the carbon dioxide equivalent of anthropogenic greenhouse gas emissions by sources and removals by sinks” at the 27th UNFCCC Conference of Parties (COP27), available online at [https://unfccc.int/sites/default/files/resource/cp2022\\_10a01\\_adv.pdf](https://unfccc.int/sites/default/files/resource/cp2022_10a01_adv.pdf).
4. Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J.-F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura and H. Zhang, 2013: Anthropogenic and Natural Radiative Forcing. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
5. Biospheric methane originates from biogenic emission sources (i.e., biofuels, livestock, etc.)
6. Natural and working lands include forests and woodlands, grasslands and shrublands, croplands and rangelands, coastal and freshwater wetlands, and urban greenspaces. (U.S. Climate Alliance)
7. IPCC 2006, [2006 IPCC Guidelines for National Greenhouse Gas Inventories](#), Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan
8. The IPCC defines a sixth land use category “other land”, which is classified as bare soil, rock, and ice. This is assumed to have net carbon flux of 0 MMTCO<sub>2e</sub> in Rhode Island and is not included for simplicity.
9. See EPA’s [Inventory of U.S. Greenhouse Gas Emissions and Sinks by States](#).

## Comments Received

DEM held a public comment period on the proposed methodology improvements between September 22, 2023 and October 6, 2023 and a public listening session on October 2, 2023. Public comments are listed here:

1. Acadia Center
2. Christian Roselund
3. Conservation Law Foundation
4. Dawn King
5. Green Energy Consumers Alliance
6. Peter Trafton
7. Rhode Island Farmers for Climate Action
8. Rhode Island Office of the Attorney General
9. The Nature Conservancy Rhode Island
10. William Atkinson, RMI

October 6, 2023

Office of Air Resources  
RI Department of Environmental Management  
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To Whom It May Concern:

Acadia Center commends the Rhode Island Department of Environmental Management (RI DEM) for offering continued transparency and opportunity for stakeholder input in benchmarking progress towards the 2021 Act on Climate. We support the methodology improvements to further align Rhode Island's greenhouse gas inventory with national and international reporting guidelines and provide a more direct comparison across 30 years of data.

### **Proposed GHG Accounting Updates**

#### **Global Warming Potential Updates**

We agree that updating the value of Global Warming Potentials (GWPs) in the 1990 baseline and the entire timeseries to align with the IPCC Fifth Assessment Report (AR5) follows best practice by incorporating contemporary climate science. While the 100-year GWP offers consistency in reporting, Acadia Center recommends that RI DEM also report emissions using 20-year GWP. Acadia Center acknowledges that there is an additional investment of staff time needed to report on both timeframes, but these additional efforts will be valuable and warranted. Reporting carbon dioxide equivalent (CO<sub>2</sub>e) emissions both on a 20-year and 100-year timeframe provides clearer perspective to policy makers by highlighting both short-term and long-term climate impacts. There is no “right answer” with regard to the use of a 100-year vs. 20-year GWP – there are tradeoffs to both approaches, highlighting the benefit of reporting on both timeframes. This is why New York State has adopted an approach to report emissions on both timeframes<sup>1</sup> and why leading experts continue to emphasize the value of dual-timeframe reporting.<sup>2</sup>

#### **LULUCF Methodology Updates**

We similarly agree to the addition of Land Use, Land Use Change, and Forestry (LULUCF) subsectors in the proposed revised LULUCF methodology. Acadia Center looks forward to reviewing the updated methodology, data inputs, and data sources used to calculate both the revised LULUCF baseline and LULUCF negative emissions in subsequent inventory years.

#### **Additional Topics for Future Consideration**

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<sup>1</sup> New York State Department of Environmental Conservation, “Statewide Greenhouse Gas Emissions Report”  
<https://www.dec.ny.gov/energy/99223.html>

<sup>2</sup> Fesenfeld, L.P., Schmidt, T.S. & Schrode, A. Climate policy for short- and long-lived pollutants. *Nature Clim Change* **8**, 933–936 (2018). <https://doi.org/10.1038/s41558-018-0328-1>

### **Lifecycle Accounting of Biofuels**

There is a high degree of uncertainty surrounding lifecycle emissions from biofuels. Currently, the RI GHG Inventory considers biogenic emissions from biofuels as scope 3, thus not impacting reported state-level emissions. This assumption – which treats all forms of biofuels identically from a GHG accounting perspective – is not appropriate for properly weighing the GHG impacts of decarbonization strategies that rely heavily on biofuels. Perhaps most critically, the lifecycle GHG impacts of using biogas to produce and transmit RNG versus the counterfactual of using biogas on site (electricity generation, combined heat and power generation, liquid fuel production) should be taken into consideration when considering lifecycle GHG emissions from RNG.

While, historically, the issue has not received significant attention in state GHG inventory accounting, it will increasingly become an area of interest as states both implement policies requiring blending of biofuels (as Rhode Island has done by increasing the percentage of biofuel included in heating oil to be a B50 blend by July 2030) and as states consider the future of the gas distribution system and the potential role of biomethane in decarbonizing that system, as Rhode Island is currently doing in Docket No. 22-01-NG Investigation Into the Future of the Regulated Gas Distribution System.

While accurate lifecycle accounting on biofuels is not an easy nut to crack, it is critical that Rhode Island continue to closely follow developments at both the state and national levels related to biofuels accounting and continue to actively seek out eventual adoption of a lifecycle accounting structure that helps inform decision making at the state level regarding responsible use of biofuels. The current GHG accounting structure for biofuels used by the state is simply not capable of informing rational decisions about the appropriate use of biofuels as a decarbonization strategy to reach state GHG reduction goals.

### **Methane Leaks from the Gas Distribution System and “Behind-the-meter”**

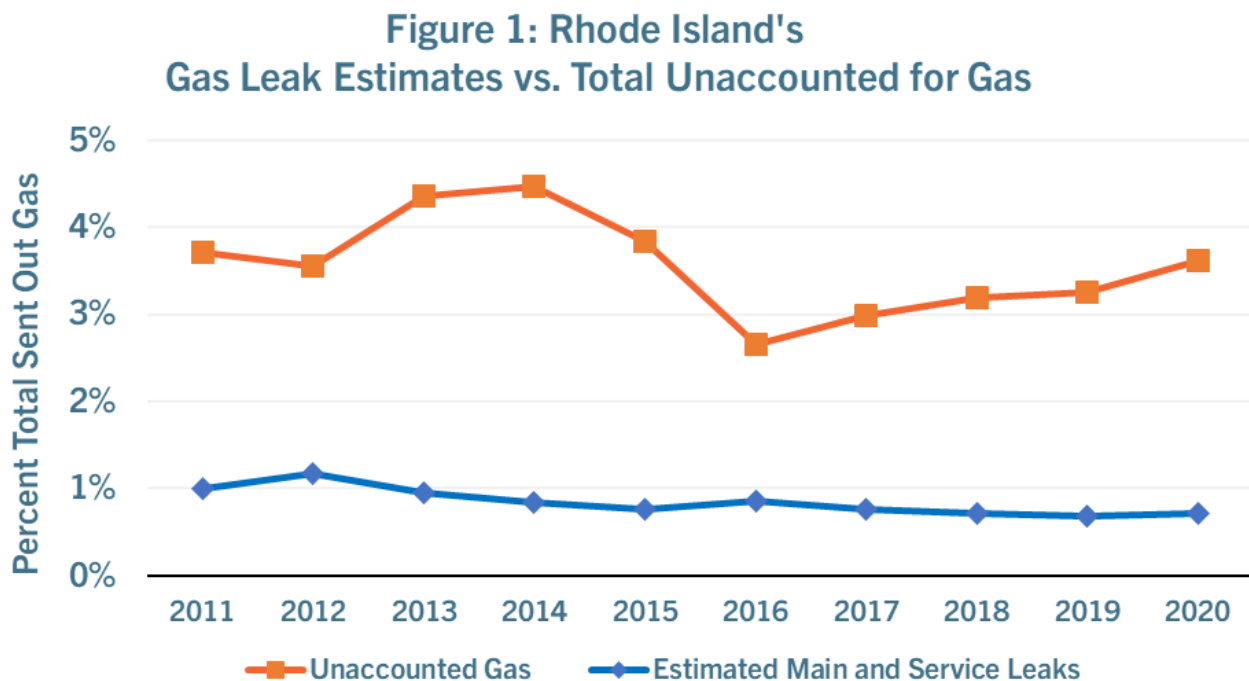
There is a high degree of uncertainty surrounding the level of methane leaks from the gas distribution system. There is a large, unexplained, disconnect between the percent of unaccounted for gas in Rhode Island (3.61% in 2020) and the level of estimated main and service leaks in the gas system used to inform the state’s GHG Inventory (0.71%).<sup>3</sup> The approach of only quantifying main and service leaks also ignores behind-the-meter gas leaks which may be significant based on literature review. Additionally, a long-term study by Harvard scientists found six times more methane leaking into the air in the Boston metro region from the gas system than reported according to the EPA methodology used in the Massachusetts GHG Inventory<sup>4</sup> (this methodology is also used in the Rhode Island GHG Inventory). The study estimated that the metro region within a 28-mile radius of the Boston city center was estimated to have a 4.7% gas leak rate from “well pad to urban consumer” and the study observed no changes to the level of methane emissions in the Boston area over 8 years despite significant efforts to slow the rate of leaks from the gas system.

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<sup>3</sup> Docket No. 5210 - The Narragansett Electric Co. d/b/a National Grid's FY 2023 Gas Infrastructure, Safety And Reliability (ISR) Plan (filed 12/17/2021): National Grid Response to PUC Data Request Set 3 (2/23/22) Attachment PUC 3-22-11 (page 59 of PDF). <https://ripuc.ri.gov/sites/g/files/xkgbur841/files/eventsactions/docket/5210-NGrid-ISR-FY2023-Responses-to-PUC-Set-3%28PUC-2-23-22%29.pdf>

<sup>4</sup> Sargent, et al, 2021. “Majority of US urban natural gas emission unaccounted for in inventories.” <https://www.pnas.org/doi/10.1073/pnas.2105804118>

From 2016-2020, Rhode Island decreased the amount of unprotected steel gas mains by 24.0% and decreased the miles of cast iron steel gas mains 12.6%, yet the level of unaccounted for gas in Rhode Island over that same time period has risen every year – from 2.65% in 2016 to 3.61% in 2020.<sup>5</sup> Similar to the issue of lifecycle accounting for biofuels, there is no “easy fix” currently available, but that should not reduce the level of urgency in addressing this GHG accounting uncertainty. Rhode Island should be actively monitoring the evolving field of methane leak measurement and, when applicable, looking to incorporate the new, emerging methodologies for quantification of methane leakage into the state’s GHG inventory. Active collaboration with other states and federal agencies will be critical.



Source: RIPUC Docket No. 5210 FY 2023

### Communicating Uncertainty in GHG Inventory Reporting

Historically, the Rhode Island GHG inventory has not placed heavy emphasis on communicating the level of uncertainty surrounding reported GHG emissions, either at the sector-specific level or in aggregate. Communicating uncertainty in data is challenging, and we understand that challenge at Acadia Center. Simultaneously, it’s imperative that policy makers skimming through the executive summary of the most recent GHG Inventory understand that the level of confidence in reporting GHG emissions in certain sectors of the economy is *significantly*

<sup>5</sup> Docket No. 5210 - The Narragansett Electric Co. d/b/a National Grid’s FY 2023 Gas Infrastructure, Safety And Reliability (ISR) Plan (filed 12/17/2021): National Grid Response to PUC Data Request Set 3 (2/23/22) Attachments PUC 3-22-8 through 3-22-11 (pages 56-59 of PDF). <https://ripuc.ri.gov/sites/g/files/xkgbur841/files/eventsactions/docket/5210-NGrid-ISR-FY2023-Responses-to-PUC-Set-3%28PUC-2-23-22%29.pdf>



*lower* than the level of confidence in reporting GHG emissions in other sectors. It's imperative that the GHG accounting experts at DEM accurately convey this in reporting.

Certain sectors or components of the GHG Inventory, including methane leaks for the gas distribution system, land-use, land-use change, and forestry (LULUCF), and emissions associated with biofuels, are simply inherently reliant on lower quality data than other components of the inventory, resulting in significantly less confidence in the reported GHG emissions totals as it pertains to those particular sectors/components. A simple table describing the level of uncertainty (even at a qualitative level) for each sector/component of the state's GHG inventory would be instrumental in succinctly conveying this uncertainty.

This uncertainty matters – if the state is currently underestimating methane leaks from the gas distributions by a factor of, for example, 5x and more accurate methane leak accounting methodologies become available in 5 years that shed light on this historic underreporting, it could significantly compromise the ability of the state to achieve its GHG emissions reduction goals. Policymakers should be made aware of this potential scenario well in advance of it potentially occurring. Given the level of uncertainty currently present in the state's GHG Inventory, Acadia Center highly recommends that the state heir on the side of caution by seeking to “overshoot” the established 2030 GHG emissions reduction target to guard against the risk posed by future GHG accounting updates.

Thank you for the opportunity to provide feedback.

Sincerely,

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# Christian Roselund

Dear Rhode Island Department of Environmental Management,

Thank you for your work on updating the methodology towards the 1990 baseline for the Rhode Island Greenhouse Gas Emissions Inventory, and for the opportunity to comment on this baseline. I have three main concerns with the methodology proposed. And while I welcome other aspects of the Proposed Methodology Improvements such as moving to more recent assessments of global warming potential (GWP) of various greenhouse gases, my concerns predate those improvements and I do not feel these concerns were addressed in those improvements.

First, I feel that use of 20-year global warming potentials for greenhouse gases instead of 100-year GWP would be more appropriate as a basis for our state. Second, I would like to be assured that Rhode Island is using the most accurate, recent leakage rate assumptions for methane in our natural gas transmission and distribution system. And finally, I would like to see some effort made to assess the full life cycle impacts of fossil fuel consumption and use in our state.

But before I get to my specific concerns, I would like to comment on why all of this is important. Climate change is the most urgent threat that faces the future of our world, our nation, and the state of Rhode Island. Like the rest of the nation, we are at risk of more and more damaging severe weather events, more pests and diseases that can affect plants, animals, and our residents, and even ecosystem collapse and disruption of our agriculture and food distribution systems. In Rhode Island we are additionally in danger of an increased number of and more severe hurricanes, collapse of fishing stocks, coastal flooding, and eventually sea level rise. This is not a complete list of the risks that we face and does not include "second order" impacts that include climate migration and social unrest.

As such, it is our moral responsibility to address this crisis as rapidly and effectively as possible. That should start with a complete, accurate accounting of the baseline of greenhouse gas emissions. Where there is a question of using one of multiple different methodologies for the baseline which are equally complete and accurate, DEM should use the one that is most meaningful for our goal of confronting the problem at hand.

This brings me to my first concern. While a 100-year accounting of greenhouse gases is both complete and accurate, so is the 20-year standard. But more centrally, the climate crisis is not a problem that we must solve in the next 100 years. Per the IPCC's Special Report on 1.5C, if we are to avoid the worst effects of the climate crisis, we must reduce emissions roughly 50% globally and economy-wide by 2030 and reach net zero or equivalent emissions in or around the next 27 years. Failure to do so could trigger climate "tipping points" such as accelerated melting of Arctic and Antarctic Ice Sheets, the transformation of forests from carbon sinks to carbon sources, greater methane releases from permafrost, and other globally dangerous phenomenon from which there may be no return.

We need to buy ourselves time to address this problem. And this means that the warming that happens in the next 20 years is the most critical concern ❖ not the warming that happens in the next 100 years. Of particular concern are methane

emissions, which have 86 times the warming potential of carbon dioxide over a 20-year timeframe.

While the 100-year timeframe is widely used, this does not mean that it is a better system; the experts who I have spoken with, including Deborah Gordon of Rocky Mountain Institute, have explained that when the UN settled on a 100-year GWP accounting system in 2007, the short-term warming power of methane was not as well understood. She additionally has stated that 100 years was chosen because that is about how long CO<sub>2</sub> stays in the atmosphere.

As such, a 100-year accounting wasn't created with the benefit of the latest climate science and simply doesn't address the urgent moment that we are in now. While it has been previously argued that RIDEM must use a 100-year standard as it is used by the UN Framework Convention on Climate Change, this argument is not valid as Rhode Island is not a signatory to that convention. Other forward-thinking states including New York have moved to a 20-year standard and we should follow suit.

Second, I would like to echo the concerns expressed by Timmons Roberts of Brown University's Climate and Development Lab in the recent listening session and warn that we need to be sure that we are using the latest and most accurate estimates of leakage rates in the natural gas transmission and distribution system in Rhode Island. Our state has an old gas system and it may be prone to leak more than that in other states. This is a key consideration to ensure the accuracy of the 1990 baseline and is particularly important given the warming power of methane.

Finally, I have been told that the methodology takes a consumption-based approach to emissions. If we are to do such an approach, we need to do so fully and make some attempt to measure the full impact of the fossil fuels that are consumed in our state. Both natural gas and petroleum, our two main fossil fuels, have significant emissions during the extraction and transmission stages; petroleum additionally has significant emissions during refining. As the consumers of these fuels we are responsible for their, emissions throughout this lifecycle, whether they happen in Rhode Island, Pennsylvania, Texas, or Saudi Arabia. Not accounting for the full life-cycle emissions including these steps will not only result in significant under-counting of our emissions, but could also distort the outcome by under-counting the climate impacts of some sectors versus other sectors.

Such an accounting may not be easy to do and may require significant additional work for DEM. I would encourage your agency to find generally accepted estimates of the emissions from natural gas and petroleum extraction and transport and petroleum refining. I personally do not think that these estimates have to be geographically specific and feel that even global or national estimates would be superior to having no accounting at all for these stages of emissions.

Thank you for your time, your consideration of these comments, and your work on these extremely important matters.

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Via Electronic Mail

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**Re: Rhode Island Greenhouse Gas Emissions Inventory – Proposed Methodology Improvements for the 1990 Baseline**

Dear Mr. Poccia:

Conservation Law Foundation (“CLF”) appreciates the opportunity to comment on the Rhode Island Department of Environmental Management’s (“DEM”) proposed methodology improvements for the 1990 baseline of the state’s greenhouse gas (“GHG”) emissions inventory. Maintaining an accurate, current emissions inventory is critical to establishing and measuring Rhode Island’s progress towards its 2050 emissions reduction mandates.

CLF is a non-profit, member-supported environmental advocacy organization working in Rhode Island and across New England to protect our environment for the benefit of all people, to build healthy communities, and to sustain a vibrant economy. CLF is working to advance policies and decision-making that reduce GHG emissions and incentivize clean energy sources.

We offer the following suggestions to ensure that the state’s emissions accounting is as robust as possible, helping Rhode Island accurately track and ultimately achieve its GHG emissions reduction mandates.

**1. Updating the 1990 baseline will allow for more accurate tracking of emissions and more direct comparisons between inventories.**

Under the Act on Climate, emissions reductions are calculated in relation to 1990 levels.<sup>1</sup> Progress towards and achievement of the Act on Climate’s mandates cannot be evaluated reliably when different accounting methods are used to calculate emissions at different times. Recalculating the 1990 baseline inventory and subsequent inventories with updated methodology will enable ‘apples-to-apples’ comparisons and allow for a more reliable evaluation of the state’s progress.

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<sup>1</sup> R.I. Gen. Laws § 42-6.2-2(a)(2)(i).

CLF supports this proposed change to the state’s methodology. We also support DEM’s proposal to apply relevant methodology updates to the 1990 baseline on an ongoing basis in the future.

**2. DEM should consider the short-term Global Warming Potential of methane and incorporate better estimates of natural gas leakage.**

DEM proposes updating the global warming potentials (“GWP”) it assigns to different GHGs based on more recent data from the Intergovernmental Panel on Climate Change. It also proposes uniformly using 100-year GWPs—i.e., comparing different GHGs to carbon dioxide based on their contribution to global warming over a 100-year period. The choice of the timescale over which to measure a GHG’s GWP can hugely affect the measured potency of that GHG, and can therefore have major impacts on the state’s emissions inventory and policy decisions.

This issue is particularly salient with respect to methane. Methane is an extremely potent GHG, with a GWP 84-86 times that of carbon dioxide per unit mass over 20 years, but only 28-34 times that of carbon dioxide over 100 years.<sup>2</sup> Natural gas is approximately 90% methane, and natural gas leaks—which occur at nearly every part of the production and distribution process—are the main source of methane emissions in Rhode Island. The choice between using a 20-year or 100-year GWP for methane can therefore have enormous impacts on the overall emissions inventory, and on important policy decisions related to the state’s gas infrastructure.

Understanding the short-term impact of methane emissions is important because we have a limited time—much closer to 20 years than 100—to preserve a livable planet.<sup>3</sup> DEM should therefore use a 20-year GWP for methane, or at least present data based on both a 100-year and 20-year GWP in its emissions inventories.

We also encourage DEM to take further steps to better understand the historic and current levels of methane emissions in Rhode Island from all sectors. A 2019 report by the Stockholm Environmental Institute and Brown University’s Climate and Development Lab (the “2019 GHG Reduction Study”) argues convincingly that the leakage rate used in Rhode Island’s earlier GHG accounting is likely far too low.<sup>4</sup> It bases its modeling on a 2015 study of gas leaks in Boston—a city with a makeup of pipelines (by material, type, and age) comparable to Providence—that

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<sup>2</sup> See Intergovernmental Panel on Climate Change, *Climate Change 2013: The Physical Science Basics* 714 (2013), available at [https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5\\_all\\_final.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf).

<sup>3</sup> See Stockholm Env’tl. Inst. & Brown Univ. Climate and Dev. Lab, *Deeper Decarbonization in the Ocean State: The 2019 Rhode Island Greenhouse Gas Reduction Study* 14 (2019), available at <https://www.sei.org/wp-content/uploads/2019/09/deeper-decarbonization-in-the-ocean-state.pdf> (“Many climate impacts, such as the melting of the permafrost and polar ice caps, are likely to worsen sharply in the next 20 years, and are expected to create cascades of worsening problems...[T]o prioritize prevention of near-term warming and impacts, the 20-year time horizon is a more rigorous reflection of what we need to do to assure a livable planet in general terms, and to stop runaway sea level rise and other impacts for Rhode Island more specifically.”).

<sup>4</sup> See 2019 GHG Reduction Study at 20-23.

found a leakage rate of 2.7%.<sup>5</sup> This is substantially higher than the 0.66% rate used in Rhode Island’s prior modeling.

The authors of the 2019 GHG Reduction Study found that assuming a higher leakage rate and using a 20-year GWP for methane increased 2017 baseline emissions from 10.8 million metric tons of carbon dioxide equivalents (“MtCO<sub>2</sub>e”) to 15.7 MtCO<sub>2</sub>e—a 45% increase in overall statewide emissions.<sup>6</sup> This estimate is massively higher than those of DEM’s emissions inventories, the most recent of which counted a miniscule 0.14 MtCO<sub>2</sub>e in emissions from natural gas distribution in 2019.<sup>7</sup> The implications for Rhode Island’s emissions reduction progress and for state policy are commensurately massive.

CLF appreciates DEM’s commitment to revising the 1990 baseline GHG emissions level as new data becomes available, consistent with the Act on Climate. Thank you for your attention to this matter and for your consideration of these comments.

Sincerely,



James Crowley  
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<sup>5</sup> See Kathryn McKain et al., *Methane Emissions from Natural Gas Infrastructure and Use in the Urban Region of Boston, Massachusetts* (2015), available at <https://www.pnas.org/content/pnas/112/7/1941.full.pdf>.

<sup>6</sup> 2019 GHG Reduction Study at 15.

<sup>7</sup> R.I. Dep’t of Env’tl. Mgmt., *2019 Rhode Island Greenhouse Gas Emissions Inventory 7* (2022), available at <https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-12/ridem-ghg-inventory-2019.pdf>.

## Dawn King

As the former Chair of the Rhode Island Food Policy Council, current co-chair of the agriculture and climate change subgroup, and Professor of Environment and Society, I implore the committee to add agriculture and food to the inventory. While Rhode Island is not a large agricultural state, food waste makes up a large portion of our landfill waste - which then becomes methane. Further, preserving farmland and open space can aid in carbon sequestration if done properly (as well as many other environmental issues such as stormwater management and biodiversity and habitat protection).





Joseph Poccia  
Senior Air Quality Specialist  
RI Department of Environmental Management  
235 Promenade Street  
Providence, RI 02908

October 6<sup>th</sup>, 2023

**RE: Rhode Island Greenhouse Gas Emissions Inventory Proposed Methodology Improvements for the 1990 Baseline**

Dear Mr. Poccia,

Green Energy Consumers Alliance appreciates the opportunity to make these brief comments on the methodology improvements to the 1990 Baseline. Our foremost recommendation is for the Department of Environmental management (DEM) and the Executive Climate Change Coordinating Council (EC4) to adopt the 20-year Global Warming Potential (GWP) standard for methane rather than the 100-year GWP. DEM stated that the reason for retaining the 100-year standard is that it aligns with the Environmental Protection Agency (EPA). However, alignment with EPA is not required by federal or state law and the 100-year standard is greatly misaligned with an Act on Climate which requires Rhode Island to be net zero by 2050, a mere 27 years away. To put it plainly, the 100-year GWP is irrelevant for the purposes of managing the state's GHG inventory and informing the policies and programs that need to be undertaken to reach net zero by 2050.

Given that DEM is fully aware that the GWP of methane is many times greater on a 20-year time frame than a 100-year time frame, failing to switch to 20 years is tantamount to subsidizing methane. In economic terms, this approach is both inefficient and inequitable. For Rhode Island to achieve net zero by 2050, it will be imperative to implement policies and programs that reduce emissions across all sectors. If methane is given a 100-year GWP, the market will be distorted in its favor, forcing Rhode Island to implement less efficient (in terms of dollars per GWP reduction) methods in other sectors. The consequences of this approach are real - either more stringent regulations than necessary would have to be imposed on carbon dioxide or Rhode Island will fail to comply with an Act on Climate.

Additionally, we recommend that DEM update its methodology for methane leakage rates to align with more recent scientific analyses, which indicate that methane is leaking in larger quantities than previously understood. Rhode Island in particular has an old leak-prone gas system that must be properly accounted for.

Sincerely,

Amanda Barker  
RI Policy Advocate

[amanda@greenenergyconsumers.org](mailto:amanda@greenenergyconsumers.org)

# Peter Trafton

Thank you for the opportunity to comment upon proposed updating's of Rhode Island's greenhouse gas emissions inventory.

As called for by Rhode Island's 2022 climate update, evaluation and discussion of updating the inventories 1990 baseline is important, in fact crucial with regard to our having the necessary metrics for establishing and meeting the goals of the act on climate.

The efforts made to present the issues, present practices, and modifications were excellent, and very helpful. However, I believe that a proposed line by line draft of the specific changes in the methodology should be offered to us for review in addition to the discussion of the proposed changes.

Furthermore, based on what has taken place with the understanding, development, and implications of "the science" and the significant likelihood that further such changes will occur with potential effects on the act on climate's 1990 baseline as the years progress toward 2050. Thus I would urge that part of the plan explicitly state that the baseline be reviewed and that any changes proposed be accompanied by their effects on the baseline and the strategies that we must follow to reduce carbon emissions to neutral.

I would urge, as others have, that any adjustments provide the most realistic and well-accepted treatment for methane leakage and that a 20 year timeline should be presented in addition to the traditional "legacy process" of 100 year timeline.

Given that the majority of Rhode Island's electricity is generated out of state, and is transitioning towards in-state generation, some method of consistently treating this while using RECs is essential and should be clearly explained.

Clearly baseline assessment and adjustments must be a continuing process going forward.

Thank you very much for your considering my suggestions and for your hard work on these complex issues.

Sincerely

Peter Trafton

October 6, 2023

To Whom It May Concern:

Thank you for the opportunity to provide comment on proposed changes to the methodology for performing Rhode Island's GHG emissions inventory.

I urge you to use this reevaluation of the inventory methodology to re-consider the decision to use a consumption-based approach to emissions from the electricity sector. While the original reasoning was to align the emissions accounting with the statutory requirements of the 100% renewable energy standard, the subsequent passage of the Act on Climate has created a new enforceable obligation to reduce actual emissions occurring inside Rhode Island's state borders. The methodology should now align with the requirements set out in the Act on Climate: reduce Rhode Island statewide GHG emissions to net zero by 2050. The current consumption-based methodology is not sufficient to track and manage electricity emissions to comply with the Act on Climate.

As you are likely aware, Rhode Island is currently a net exporter of electricity on an annual basis to the ISO-New England grid. Rhode Island's electricity generation profile is dominated by natural gas fired power stations that produce very significant GHG emissions, resulting in Rhode Island's electricity generation creating significantly more GHG emissions per megawatt-hour of electricity than the regional grid as a whole. Using a consumption-based method for calculating electricity emissions wildly understates the actual in-state emissions generated by our Rhode Island power fleet.

Using a generation-based approach will help guide state level policy to proactively collaborate with other states in the ISO-New England grid territory to plan and develop low- and no-emissions alternatives for as much as possible of Rhode Island's high-emitting generation capacity while maintaining a reliable electric grid. Continuing on the current path will result in the purchase of out-of-state REC's by Rhode Island to meet our requirements, without actual reductions of GHG emissions in Rhode Island's electricity sector. There are no known accounting tricks that can substitute for actual emissions reductions in addressing climate change. The Act on Climate requires actual emissions reductions.

One major future benefit of mitigating emissions in Rhode Island is the vast public health benefits from replacing highly polluting activities with non-polluting activities. The electricity sector in Rhode Island produces enormous amounts of air pollution that sickens and pre-maturely kills our citizens. The costs of that pollution are borne mostly by communities of color and low-income Rhode Islanders. Sticking with a consumption-based methodology is a choice to ignore the actual human health costs of our GHG emitting power plants in Rhode Island. Requiring our utilities in Rhode Island to procure electricity from non-emitting sources over time should also come with significant and life-changing public health benefits too. Don't let our inventory methodology result in decision making that exports the benefits of renewable energy while maintaining all the health costs of polluting energy.

While most power plants in Rhode Island are subject to federal and regional laws and regulations, Rhode Island does exercise certain authorities over in-state activities. The Act on Climate obligates state

departments and agencies to use their powers to mitigate climate change by reducing statewide emissions. A production-based methodology will better serve Rhode Island's decision-making process going forward. At a bare minimum, Rhode Island's actual generation-based electricity sector emissions should be inventoried and reported alongside the rest of the emissions.

Sincerely,

Andrew Morley  
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# STATE OF RHODE ISLAND

## OFFICE OF THE ATTORNEY GENERAL

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*Peter F. Neronha*  
*Attorney General*

Mr. Terrence Gray, Director  
Rhode Island Department of Environmental Management  
235 Promenade St,  
Providence,  
Rhode Island 02908

### **Re: Proposed methodology improvements to the Rhode Island Greenhouse Gas Inventory 1990 baseline**

Dear Director Gray,

I am writing to comment on the application of the Rhode Island Department of Environmental Management's ("RIDEM's") proposed methodology improvements to the Rhode Island Greenhouse Gas Inventory 1990 baseline.

Updating the 1990 baseline is important work in refining the critical standards relied upon to inform and track emissions reductions required by the 2021 Act on Climate.<sup>1</sup> Changes to the 1990 baseline directly impact the compliance of numerous Rhode Island agencies and actors with the 2021 Act on Climate's enforceable mandates.<sup>2</sup> Both accurate and sufficiently refined baselines are of paramount importance as Rhode Island's agencies attempt to evaluate and adopt policies that will meet our state's mandates in a way that accomplishes the ultimate goal of limiting global climate change. Accordingly, RIDEM should consider the recommendations outlined below in its review of the proposed methodology improvements to the Rhode Island Greenhouse Gas Inventory 1990 baseline.

- I. The proposed update to the 1990 baseline and accompanying inventory timeseries should reflect both the updated Global Warming Potential ("GWP") values for air pollutants identified in the 100-year AR5 GWP values as well as the updated GWP values for air pollutants expressed on a 20-year time horizon. This dual approach would inform the reduction of pollutants such as methane which has a shorter lifespan in comparison to carbon dioxide, but higher comparative heat absorption value.<sup>3</sup> Inclusion of the 100-year

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<sup>1</sup> R.I. General Laws § 42-6.2-2

<sup>2</sup> *Id.*

<sup>3</sup> "Methane's average atmospheric residence time is about a decade. However, its capacity to absorb substantially more energy than CO<sub>2</sub> gives it a GWP ranging from 28 to 36."

Daniel A. Vallero, *Air Pollution Calculations*, Chapter 8: Air Pollution Biogeochemistry, pgs. 175-206, Elsevier (2019). <https://www.sciencedirect.com/science/article/pii/B9780128149348000089>

"From a warming perspective, methane is 86 times worse than carbon dioxide per unit mass in the short term (20 years)."



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*Peter F. Neronha*  
*Attorney General*

AR5 GWP values would inform the reduction of pollutants with a longer lifespan, such as carbon dioxide. By providing an accounting of GWPs expressed over a 20-year and 100-year horizon, the 1990 baseline would better inform efforts to achieve Rhode Island's near-term and long-term emissions reduction targets mandated under the Act on Climate. This approach also enables more precise treatment of specific policy problems, like the tradeoffs between repair and abandonment in the natural gas system and agricultural management, which are sensitive to specific characteristics of particular gases.<sup>4</sup> Attention to the time-value of emissions reductions will allow major policy choices under consideration to be supported with the most relevant and accurate data that ties back to the ultimate goal of limiting global climate change through greenhouse gas emissions reduction.

- II. The proposed update to the land use, land use change, and forestry (“LULUCF”) sector should reflect past, present, and future changes to Rhode Island’s environment that may affect each of the four LULUCF subsectors: forest land, croplands, grasslands, wetlands and settlements.<sup>5</sup> As such, this office encourages incorporation of specific mandates for periodic updates to LULUCF data to account for changes to subsectors’ calculated emissions sequestration caused by sea level rise, disease-related tree deaths, changing prevalence of forest fires, and other events and factors.<sup>6</sup>

Thank you for your time and attention to this matter.

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Jason Veysey, J. et al., *Deeper Decarbonization in the Ocean State: The 2019 Rhode Island Greenhouse Gas Reduction Study*, pg 14, Stockholm Environment Institute and Brown University Climate and Development Lab (2019). [deeper-decarbonization-in-the-ocean-state.pdf \(sei.org\)](https://www.sei.org/publications/2019/04/deeper-decarbonization-in-the-ocean-state.pdf)

<sup>4</sup> Jason Veysey, J. et al., *Deeper Decarbonization in the Ocean State: The 2019 Rhode Island Greenhouse Gas Reduction Study*, pgs 20 - 23, Stockholm Environment Institute and Brown University Climate and Development Lab (2019). [deeper-decarbonization-in-the-ocean-state.pdf \(sei.org\)](https://www.sei.org/publications/2019/04/deeper-decarbonization-in-the-ocean-state.pdf)

<sup>5</sup> Rhode Island Department of Environmental Management, *Rhode Island Greenhouse Gas Emissions Inventory: Proposed Methodology Improvements for the 1990 Baseline* (2023).

<sup>6</sup> E.g., Haley Sandlow, “Beech leaf disease is killing Rhode Island’s American beeches, experts say” *The Brown Daily Herald*, (Oct 3, 2023). <https://www.browndailyherald.com/article/2023/04/beechn-leaf-disease-is-killing-rhode-islands-american-beeches-experts-say>; Grayson Badgley, Freya Chay, et al. “California’s forest carbon offsets buffer pool is severely undercapitalized,” 5 FRONTIERS IN FORESTS AND GLOBAL CHANGE (Aug. 5, 2022), <https://doi.org/10.3389/ffgc.2022.930426>.



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*Peter F. Neronha*  
*Attorney General*

Sincerely,

*/s/ Alison B. Hoffman*

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Office of the Attorney General  
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October 6, 2023

Director Terry Gray  
RI Department of Environmental Management  
235 Promenade Street  
Providence, RI 02908

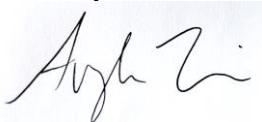
Re: Comments from The Nature Conservancy on DEM's Proposed Methodology Improvements for the 1990 Greenhouse Gas Inventory Baseline

Dear Director Gray,

Thank you so much for the chance to submit comments on this important ongoing effort. We commend the Department's commitment to ensuring an accurate baseline model on which to benchmark the state's progress towards the ambitious goals set forth in the Act on Climate. As you are aware, the climate crisis is real, urgent, and requires bold action. The 1990 greenhouse gas inventory is a baseline against which we can measure progress towards emissions reductions, a critical data point for combatting the climate crisis. We would like to share the following comments and are available to answer any questions or discuss further whenever is convenient:

- We urge DEM to use the best and most accurate science available to fully account for the greenhouse gas inventory per the recommendation from the EC4 to update the baseline "if the best science suggests new and reasonable parameters or methods." We encourage a selection of methodologies that prioritizes accuracy and transparency that reflects the newest and most accurate science.
- We have concern about the elimination of a 20-year Global Warming Potential (GWP) timescale, and instead updating all data sets to the 100-year GWP. While the 100-year GWP accurately reflects the impacts of carbon dioxide, the data suggests the impact of greenhouse gases with a shorter lifespan (such as methane) are diluted under this methodology. As stated in the presentation during the listening session, methane jumps from about 20 times as potent as CO<sub>2</sub> on a 100-year timescale, to 84 times as powerful as CO<sub>2</sub> on a 20-year GWP. We are concerned that using a longer term will falsely categorize methane emissions as less severe warming impact than the science shows. We know that we need to make drastic changes, particularly with our use of fossil fuel gas, in the next 5-10 years, and using the 100 year time horizon could skew this data.
- Measuring the greenhouse gases with the largest warming impact on a timeline that accurately accounts for the real threat they pose is critical to understanding the work ahead. Climate change is not a distant threat, it is clearly at our doorsteps and requires significant near-term action backed by accurate science.

Sincerely,



Angela Tuoni  
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The Nature Conservancy  
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(401) 214-4532

Public comment: Rhode Island Greenhouse Gas Emissions Inventory 1990 Baseline Updates

October 6, 2023

As a Rhode Island native and climate researcher, I wanted to offer a quick comment in service of your important work. I fully support your commitment to the latest science, including updating GWP values to the IPCC AR5. (I will note that the IPCC has published more recent science in AR6, but I acknowledge that EPA and UNFCCC have not yet updated their standards). I also appreciate the importance of accurate land sector accounting, and will refrain from commenting there as it is beyond my expertise.

My recommendation is to consider climate metrics and targets that will have the near-term impact we need. As recent months temporarily [soar above 1.5°C](#) of warming (and 2023 has a [50-50 chance](#) to do so), we increase the risk of crossing [several critical tipping points](#) which have been projected at 1.5°C. It is imperative that we focus on solutions that have quick climate benefits – not to mention health, affordability, and other priorities.

Actions on short-lived climate pollutants will have several times more near-term impact than actions on CO<sub>2</sub> (and vice versa in the long-term). Combining these via GWP<sub>100</sub> is [like forcing all Olympic runners to compete in a 5k](#) – masking the unique skills of Usain Bolt or top marathoners. [Leading research has shown](#) the incompleteness of GWP<sub>100</sub> for meeting mid-century climate goals, as well as the importance of maintaining [two timeframes](#) or [separate GHGs](#) for accuracy and transparency.

A no-regrets first step would be to publish GHG-specific data and report GWP<sub>20</sub> alongside GWP<sub>100</sub> – allowing decision-makers and the public to understand the full picture and identify GHG-specific solutions. One need not move fully to GWP<sub>20</sub> like New York and Maryland, although there are [near-term climate benefits](#) to doing so.

Finally, future policies should include separate targets for short-lived climate pollutants, [like in California](#) as well as 150 countries in the [Global Methane Pledge](#), and jurisdictions on four continents in a recently launched [subnational version](#). This is the surest way to ensure a livable future for ourselves and our children.

Gratefully,

[Will Atkinson, RMI](#)