



## Memorandum

To: Lisa Bacanskas, U.S. EPA  
From: Matthew Grieco, Paula Garcia Holley and Brad Hurley, ICF  
Date: October 19, 2021  
Re: Peer Review Report and Documentation of Peer Review Process for *Technical Documentation on The Framework for Evaluating Damages and Impacts (FrEDI)*

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ICF managed the peer review of the report titled *Technical Documentation on The Framework for Evaluating Damages and Impacts (FrEDI)*. This memorandum summarizes the peer review process.

Please contact Brad Hurley at +1 (202) 640-2484 or [brad.hurley@icf.com](mailto:brad.hurley@icf.com) with questions or comments.

## Introduction

Under contract 68HERH19D0029 order No. 68HERH21F0052 with the U.S. Environmental Protection Agency's Climate Change Division, ICF managed the peer review of the report titled *Technical Documentation on The Framework for Evaluating Damages and Impacts (FrEDI)*.<sup>1</sup> The purpose of this memorandum is to summarize the peer review process for the record.

## Peer Review Process

### Work product categorization

This independent peer review was conducted in accordance with EPA's Peer Review Handbook (2015).<sup>2</sup> The type of work product reviewed has been categorized as Influential Scientific Information as indicated in the Product Categorization for *Technical Documentation for the Temperature Binning Framework* memorandum from Jeremy Martinich to Christopher Grundler, Director, Office of Atmospheric Programs, dated March 24, 2021.<sup>3</sup> Peer review of Influential Scientific Information is required per Section II of the Peer Review Handbook (2015).

### Peer review mechanism and logistics

The peer review was conducted as an external individual letter review. Five peer reviewers were provided, on April 30, 2021, with the draft report and an individualized letter indicating the charge questions. The charge letter is provided below for the record. The five peer reviewers were asked to provide written responses to ICF's peer review coordinator by May 28, 2021. ICF sent the reviewers' responses directly to EPA and also performed quality analysis on the Response to Comments to ensure each comment was responded to.

In parallel to the peer review process, the draft report titled *Technical Documentation for the Temperature Binning Framework* was available for Public Comment on [www.regulations.gov](http://www.regulations.gov) in EPA docket EPA-HQ-OAR-2021-0240.<sup>4</sup> On May 26, 2021, peer reviewers were provided with a compilation of the public comments received by EPA. Peer reviewers were provided public comments for informational purposes and were not required to review or address them.

In August 2021, EPA requested a partial re-review focusing on the updated methodology for sea level rise. Only four of the peer reviewers had commented on the sea level rise section during the full peer review; these four reviewers were provided with charge questions (provided below for the record) on August 23, 2021 and were asked to provide written responses to ICF's peer review coordinator by September 1, 2021. ICF sent the reviewers' responses directly to EPA and also performed quality analysis on the Response to Comments.

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<sup>1</sup> The title changed during the peer review process; previous titles were *Technical Documentation for the Temperature Binning Framework* and *A Temperature-Binning Approach for Multi-Sector Climate Impact Analysis*.

<sup>2</sup> Available online at: [https://www.epa.gov/sites/production/files/2016-03/documents/epa\\_peer\\_review\\_handbook\\_4th\\_edition.pdf](https://www.epa.gov/sites/production/files/2016-03/documents/epa_peer_review_handbook_4th_edition.pdf).

<sup>3</sup> As defined by the OMB Peer Review Bulletin, the term "influential scientific information" means scientific information the agency reasonably can determine will have or does have a clear and substantial impact on important public policies or private-sector decisions (EPA 2015). The interpretation of the term "influential" is consistent with OMB's government-wide information quality guidelines (IQG) and the IQG of the Agency (EPA 2015).

<sup>4</sup> Available online at: <https://www.regulations.gov/docket/EPA-HQ-OAR-2021-0240>

## Peer Reviewers

### Peer Reviewer Expertise

EPA's statement of work stipulated enlisting five to seven qualified peer reviewers.<sup>5</sup> ICF independently selected the reviewers, consistent with the guidelines of the EPA Peer Review Handbook (2015). ICF subject matter experts identified 12 potential peer reviewers for this report, from which a smaller pool of 5 individuals were selected who collectively met the following technical selection criteria provided by EPA:

- Expertise and a strong background in, at least one, of the following:
  - Application of simple climate models for estimating changes in the physical climate system in response to changes in emissions/concentrations;
  - Environmental economics, in particular the valuation or monetization of climate change impacts;
  - Applied climate change impacts modeling and analysis; and
  - Climate damage functions used in integrated assessment modeling.

ICF also considered:

- Experience in providing peer reviews for similar types of work products;
- No association with the temperature binning framework report and its recent updates; and
- Interest and availability.

ICF proposed the pool of 10 candidates to EPA on February 16, 2021.<sup>6</sup> Upon EPA confirmation that the proposed candidate pool met the selection criteria, ICF selected six reviewers who would collectively provide the optimal overall balance to identify and address all significant issues in the technical charge. Of the initial six reviewers selected, three declined. ICF reached out to two alternate reviewers from the pool of 10 candidates and two alternate reviewers. Two of those four individuals agreed to participate in the peer review. Each of the reviewers selected has recognized expertise in at least one of the fields identified in EPA's selection criteria.

### Conflict of Interest Review

Each reviewer signed a conflict of interest certification form, confirming that they had no organizational or personal conflicts of interest. ICF reviewed all of these forms and determined that there were no personal or organizational conflicts of interest that would affect the reviewers' impartiality. This form also included requirements for reviewers to hold materials provided to them for the purpose of the review as confidential, and to promptly report any conflicts of interest, should one arise during the course of completing the peer review. The signed conflict of interest certification form was received prior to the distribution of the draft report and charge letter. The conflict of interest certification form was based on Appendix J of the EPA Peer Review Handbook (2015) and is included in the sections below.

After review of the conflict of interest forms and follow-up inquiries, as necessary, it was determined that there was no conflict of interest or perception of conflict of interest. For instances in which, funding of research was provided from a Government Agency it was corroborated that funds were not from EPA or were obtained through an investigator-initiated, peer-reviewed competition. In addition, all reports

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<sup>5</sup> ICF subject matter experts identified 12 potential peer reviewers for this report. Five of those individuals agreed to participate in the peer review.

<sup>6</sup> Three of the 10 candidates were federal employees.

of previous involvement in the development of the document were reviewed and it was determined that it would not affect the peer reviewer’s impartiality. Furthermore, all reports of public statements (e.g., media presence) were reviewed and it was determined that statements issued were factual and would not affect the peer reviewer’s impartiality.

### Selected Peer Reviewers

Table 1 below identifies the peer reviewers participating in the review, their organizational affiliations, and rationale for selection.

**Table 1. Participating Peer Reviewers**

Peer Reviewer	Affiliation	Rationale
Dr. Frances Moore	UC Davis	Expertise in Climate damage functions used in integrated assessment modeling.
Dr. Benjamin Sanderson	CERFACS / NCAR	Expertise in climate model and scenario uncertainty and global climate impact analyses.
Dr. Robert Kopp	Rutgers University	Expertise in application of climate models for estimating changes in physical climate system, as well as climate change impacts modeling.
Dr. James Rising	University of Delaware	Expertise in impacts of climate change bringing together empirical estimates and integrated assessment models; Modeling of social-environmental systems focusing on complex systems.
Dr. Shubhra Misra	U.S. Department of Defense	Expertise in applied climate impacts modeling and analysis, including models of coastal processes and flooding.

## Materials and Information Given to Reviewers

### Conflict of Interest

# Confidential Peer Review Conflict of Interest Certification

For individuals acting as a peer reviewer of the report on EPA’s Temperature Binning Framework:  
“Technical Documentation for the Temperature Binning Framework”

The peer review of this report is sponsored by the  
U.S. Environmental Protection Agency  
Climate Change Division (OAR/OAP)

### Background

It is essential that peer review not be compromised by any significant conflict of interest. For this purpose, the term “conflict of interest” means any financial or other interest that conflicts with the service of the individual because it 1) could significantly impair the individual’s objectivity or 2) could create an unfair competitive advantage for any person or organization.

### Disclosure and Certification

To the best of my knowledge and belief, I have no actual, apparent, or potential organizational or individual conflicts of interest relating to this review that would prevent me from providing a credible and unbiased review. I have disclosed below any relevant organizational affiliations, public statements and positions, and any additional aspects of my background that might reasonably be construed by others as affecting my judgement in matters related to this peer review, and therefore might constitute an actual or potential source of bias.

I understand that the materials provided to me for the purpose of this review are not to be redistributed in part or in whole to any individual or organization at any time during or after the completion of the review without explicit written approval.

During the period of this review, I recognize my continuing obligation to identify and promptly report any actual or potential conflicts of interest that may arise.

### Disclosures:

1. Please complete the table below. If any of the responses to the questions is yes, please provide an explanation regarding the nature of the potential conflict. Specifically, if compensated expert witness activities have been undertaken, please provide a brief description of each issue and testimony (attach a separate page as needed).

	Yes	No	Additional Information Regarding Potential Conflict of Interest
To the best of your knowledge and belief, is there any connection between the subject topic and any of your and/or your spouse’s compensated or uncompensated employment, including government service, during the past 24 months?			
To the best of your knowledge and belief, is there any connection between the subject topic and any of your and/or your spouse’s research support and project funding, including from any government source, during the past 24 months?			
To the best of your knowledge and belief, is there any connection between the subject topic and any consulting by you and/or your spouse, during the past 24 months?			

	Yes	No	Additional Information Regarding Potential Conflict of Interest
To the best of your knowledge and belief, is there any connection between the subject topic and any expert witness activity by you and/or your spouse, during the past 24 months?			
To the best of your knowledge and belief, have you, your spouse, or dependent child, held in the past 24 months, any financial holdings (excluding well-diversified mutual funds and holdings, with a value less than \$15,000) with any connection to the subject topic?			
Have you made any public statements or taken positions on or closely related to the subject topic under review?			
Have you had previous involvement with the development of the document (or review materials) you have been asked to review?			
To the best of your knowledge and belief, is there any other information that might reasonably raise a question about an actual or potential personal conflict of interest or bias?			
To the best of your knowledge and belief, is there any financial benefit that might be gained by you or your spouse as a result of the outcome of this review?			

2. If applicable, please provide additional disclosures that may not be included in the table above (attach a separate page as needed).

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name and Title

\_\_\_\_\_  
Date

**Complete and return to Paula Garcia Holley (ICF) at [Paula.GarciaHolley@icf.com](mailto:Paula.GarciaHolley@icf.com)**

Retain a copy for your records.

## Charge Letter

### Peer Review Charge

*Draft Technical Documentation for the Temperature Binning Framework*  
Peer Review Conducted by ICF Incorporated, L.L.C.  
Under U.S. EPA Contract 68HERH19D0029, Order # 68HERH21F0052

## OVERVIEW

The *Technical Documentation for the Temperature Binning Framework* document provides technical documentation of a framework for analyzing the sector-specific impacts of climate change under different levels of warming.<sup>7</sup> This approach serves as an alternative or complement to traditional scenario-based approaches in order to improve communication of results, comparability between studies, and flexibility to facilitate scenario analysis.

This technical documentation report has been written to meticulously document all methodological details involved in the development of the temperature binning framework and its underlying damage functions. This technical documentation describes the design, structure, and scientific basis of the temperature binning framework, including how impact modeling projections for a number of sectors have been built into the framework.

## PURPOSE OF PEER REVIEW

The purpose of peer review by independent, qualified, and objective experts is to ensure that the information summarized by EPA is technically supported, competently performed, properly documented, consistent with established quality criteria, and communicated clearly. The temperature binning framework and underlying sectoral impact modeling have been previously peer reviewed and published in the research literature or are in the process of completing peer review.<sup>8</sup> In addition, the EPA is holding a 30-day public comment period for the draft document. EPA will share any significant public comments with you, in case they are useful in your review. Please note that you are not required to review or address public comments.

The reviewers are asked to provide review and feedback on whether EPA has appropriately explained the analytic framework and summarized results. Note that this report is for science dissemination and documentation of methodologies only and does not reflect analysis of nor recommendations regarding any particular policy.

## INSTRUCTIONS

The overall assignment is to review the *Technical Documentation for the Temperature Binning Framework* report. We welcome and appreciate your comments on any aspect of the report, but responses to the charge questions listed below would be particularly useful. For the charge questions, please provide written responses to explain and justify the rationale for your response and, where possible, specific recommendations and/or relevant references (a simple yes or no response is not

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<sup>7</sup> Available online at: [https://www.epa.gov/sites/production/files/2021-04/documents/technical\\_documentation\\_for\\_the\\_temperature\\_binning\\_framework\\_expert\\_and\\_public\\_review\\_draft.pdf](https://www.epa.gov/sites/production/files/2021-04/documents/technical_documentation_for_the_temperature_binning_framework_expert_and_public_review_draft.pdf)

<sup>8</sup> The temperature binning methodology paper (Sarofim et al.) is completing publication in *Climatic Change*.

acceptable). In addition, if you are providing specific feedback please do so in concise bullets in the respective sections below. Although an overall assessment is required, we appreciate if you could pay particular attention to the main area of your expertise while conducting the review, or if a question is outside your area of expertise, please indicate this in your response.

Please provide written comments on these questions, or any additional comments that you would like to share on this report, by **May 28<sup>th</sup>, 2021**. Please submit your comments to Paula Garcia Holley (the ICF manager for this review process) at [Paula.GarciaHolley@icf.com](mailto:Paula.GarciaHolley@icf.com).

## CONFIDENTIALITY

Upon receipt of the review materials, you should not distribute the materials under review or have communications with colleagues, members of the public, EPA, or other federal agencies on the materials. You will receive notification when EPA releases the report.

## ACKNOWLEDGMENTS

Your name and affiliation will be noted in the front matter of the final report and included in the peer review report for the record. EPA will insert the following statement in this section: "Information and views expressed in this report do not necessarily represent those of the peer reviewers, who also bear no responsibility for any remaining errors or omissions." A response to comments document will also include attribution of comments and will be part of the peer review record on EPA's Science Inventory. Your time and expertise in reviewing this report are greatly appreciated. If you have any questions about the report or this review process, please contact Paula Garcia Holley.

## CHARGE QUESTIONS AND RESPONSE FORMS

### Question 1

<b>Question 1: Does the introductory chapter clearly explain the purpose of the report and provide appropriate context for the rest of the documentation? If not, please provide recommendations for improvement.</b>
[Please enter response here]

Please add any specific comments related to Question 1 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 2

<b>Question 2: The report has been written for an educated and semi-technical audience. Are the writing level and graphics appropriate for these audiences?</b>
[Please enter response here]

Please add any specific comments related to Question 2 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 3

<b>Question 3: Does the report adequately explain the overall analytic framework of the temperature binning approach?</b>
[Please enter response here]

Please add any specific comments related to Question 3 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 4

<p><b>Question 4: Do the text, figures, and tables clearly communicate the framework’s structure and design? Are the requirements for input data, and the options for output/results summaries, clearly stated?</b></p>
<p>[Please enter response here]</p>

Please add any specific comments related to Question 4 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 5

<p><b>Question 5: Does the report clearly convey both the conceptual basis for temperature binning and the specific data processing and analytic steps taken to execute the concept? Is it clear how both the EPA-sponsored CIRA sector studies, and other non-CIRA studies, can be incorporated in the framework?</b></p>
<p>[Please enter response here]</p>

Please add any specific comments related to Question 5 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 6

**Question 6: Is the sector-specific approach to account for the role of socioeconomic driver data clear? Is it reasonable and well-supported?**

[Please enter response here]

Please add any specific comments related to Question 6 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 7

**Question 7: Is the approach to estimating sector-specific and aggregate economic impact (damages) of specified temperature trajectories reasonable and suitable for the stated purposes?**

[Please enter response here]

Please add any specific comments related to Question 7 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 8

<b>Question 8: Does the report adequately inform the reader about how uncertainty is addressed in the framework, including how results should be interpreted and used given the limitations?</b>
[Please enter response here]

Please add any specific comments related to Question 8 in the table below.

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 9

<b>Question 9: Has EPA objectively used, applied, and documented the underlying data of the temperature binning framework? Has the Agency appropriately described the sensitivity of the findings to analytic assumptions?</b>
[Please enter response here]

Please add any specific comments related to Question 9 in the table below.

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

Question 10

**Question 10: Is the draft technical documentation report missing important information based on your review of the report?**

[Please enter response here]

Please add any specific comments related to Question 10 in the table below.

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

GENERAL COMMENTS

**Please provide any additional feedback, including any recommendations on how this report can be improved.**

[Please enter response here]

**Question 11: Report Format: Please comment on whether any aspects of the layout help or hinder the reader to understand the content and key messages of the report**

[Please enter response here]

Please add any specific comments not related to the charge questions above in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

## Re-Review Charge

*Draft* Technical Documentation for the Temperature Binning Framework

Peer Review Conducted by ICF Incorporated, L.L.C.

Under U.S. EPA Contract 68HERH19D0029, Order # 68HERH21F0052

### OVERVIEW

The *Technical Documentation for the Temperature Binning Framework* (this framework in the future will be known as the Framework for Evaluating Damages and Impacts, or FrEDI) document provides technical documentation of a framework for analyzing the sector-specific impacts of climate change under different levels of warming.<sup>9</sup> This approach serves as an alternative or complement to traditional scenario-based approaches in order to improve communication of results, comparability between studies, and flexibility to facilitate scenario analysis.

This technical documentation report has been written to meticulously document all methodological details involved in the development of the temperature binning framework and its underlying damage functions. This technical documentation describes the design, structure, and scientific basis of the temperature binning framework, including how impact modeling projections for a number of sectors have been built into the framework.

**The most substantial change from the original documentation is an updated method to calculate sea level rise and damages from sea level rise. Therefore, we are requesting a second peer review just for this portion of the technical documentation.**

### PURPOSE OF PEER REVIEW

The purpose of peer review by independent, qualified, and objective experts is to ensure that the information summarized by EPA is technically supported, competently performed, properly documented, consistent with established quality criteria, and communicated clearly. The temperature binning framework and underlying sectoral impact modeling have been previously peer reviewed and published in the research literature.<sup>10</sup>

Note that this report is for science dissemination and documentation of methodologies only and does not reflect analysis of nor recommendations regarding any particular policy.

### INSTRUCTIONS

The assignment for this re-review is to review the updated sea level rise method in the *Technical Documentation for the Temperature Binning Framework* report. We welcome and appreciate your comments on the updated sea level rise method, and responses to the charge questions listed below would be particularly useful. For the charge questions, please provide written responses to explain and justify the rationale for your response and, where possible, specific recommendations and/or relevant

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<sup>9</sup> Available online at: [https://www.epa.gov/sites/production/files/2021-04/documents/technical\\_documentation\\_for\\_the\\_temperature\\_binning\\_framework\\_expert\\_and\\_public\\_review\\_draft.pdf](https://www.epa.gov/sites/production/files/2021-04/documents/technical_documentation_for_the_temperature_binning_framework_expert_and_public_review_draft.pdf)

<sup>10</sup> Sarofim et al., 2021 (<https://link.springer.com/article/10.1007/s10584-021-03048-6>)

references (a simple yes or no response is not acceptable). In addition, if you are providing specific feedback please do so in concise bullets in the respective sections below. If a question is outside your area of expertise, please indicate this in your response.

Please provide written comments on these questions, or any additional comments that you would like to share on this report, by **September 1<sup>st</sup>, 2021**. Please submit your comments to Paula Garcia Holley (the ICF manager for this review process) at [Paula.GarciaHolley@icf.com](mailto:Paula.GarciaHolley@icf.com).

## CONFIDENTIALITY

Upon receipt of the review materials, you should not distribute the materials under review or have communications with colleagues, members of the public, EPA, or other federal agencies on the materials. You will receive notification when EPA releases the documentation report.

## ACKNOWLEDGMENTS

Your name and affiliation will be noted in the front matter of the final report and included in the peer review report for the record. EPA will insert the following statement in this section: "Information and views expressed in this report do not necessarily represent those of the peer reviewers, who also bear no responsibility for any remaining errors or omissions." A response to comments document will also include attribution of comments and will be part of the peer review record on EPA's Science Inventory. Your time and expertise in reviewing this report are greatly appreciated. If you have any questions about the report or this review process, please contact Paula Garcia Holley at the email address noted above.

## CHARGE QUESTIONS AND RESPONSE FORMS

### Question 1

**Question 1: Does the new section adequately explain the analytic approach to sea level rise damages? If not, please provide recommendations for improvement.**

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Please add any specific comments related to Question 1 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)

### Question 2

**Question 2: Has this section addressed your comments with respect to the updated sea level rise method?**

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Please add any specific comments related to Question 2 in the table below (add rows as needed).

Section/page/line number	Comment	Supporting Materials (full citation and provide attachment, if possible)