



Proposal in Response to RFP

Measuring and Assessing Progress of Vermont's Climate Action Plan

Vermont Agency of Natural Resources



Submitted to:

VT Agency of Natural Resources
Jane Lazorchak, Director of the
Climate Action Office
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Submitted by:

ERG
561 Virginia Rd Suite 300 Building 4
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November 17, 2023



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Vermont Agency of Natural Resources

133 State Street, 5th Floor.

Montpelier, VT 05633-8000

C/O: Jane Lazorchak, Director of the Climate Action Office, jane.lazorchak@vermont.gov

RE: Proposal—Measuring and Assessing Progress of Vermont’s Climate Action Plan

Dear Ms. Lazorchak,

[Eastern Research Group, Inc.](#) (ERG) is pleased to submit the following proposal to measure and assess progress of Vermont’s Climate Action Plan (CAP) for the Vermont Agency of Natural Resources (ANR). **We provide a knowledgeable and agile multidisciplinary team with deep expertise in climate and hazard vulnerability and resilience work, adaptation planning, stakeholder and community engagement, communications, and tool development.** Our current projects with ANR to develop a municipal vulnerability index and conduct a life cycle analysis of the State’s greenhouse gas inventory have provided us with a Vermont-specific understanding of climate vulnerability, greenhouse gas emission drivers, and underlying data sources that are foundational to understanding the State’s climate action goals and how they might be measured. Our ongoing work with U.S. Environmental Protection Agency’s “Climate Change Indicators in the United States” initiative further demonstrates our relevant expertise, as ERG has played an instrumental role in researching, developing, and effectively communicating a set of over 50 indicators of the causes and effects of climate change. The indicators are a key input to the National Climate Assessment, and we have applied our knowledge of these indicators to state-level work in Maine, California, and Vermont. We engage both technical and graphics teams to develop visually appealing and informative plans, tools, and web-based applications. This unique blend of skills and perspectives makes ERG unique in the environmental consulting world and enables us to develop the metrics and data required to measure CAP progress under this project while, simultaneously, laying the foundation for the development of the Measuring and Assessing Progress Tool.

We are flexible, responsive, and dedicated. We select work that can make a difference and that aligns with our core values and our commitment to community and environmental resilience. We are excited by new challenges, which represent openings for innovative approaches and sometimes even transformational change. We have experience meeting tight timelines and are adaptable to changing conditions.

ERG’s core approach is participatory in nature. We engage our clients in defining goals, evaluation methods, and desired outcomes to guide climate and resilience work. We draw on applied research methods and tools, including vulnerability assessments, surveys, interactive application development, structured decision-making, and equitable and dynamic community engagement approaches. Our inclusive approach allows us to consider client needs holistically and effectively when creating interactive tools that can meaningfully contribute to decision-making. We identify actions to increase climate and hazard resilience, recommend effective strategies to address vulnerabilities and risks, and produce actionable, high-quality information that our clients can use to advance priorities for years to come. To successfully measure and assess progress of Vermont’s CAP, our team understands the need to effectively communicate technical materials in a clear and compelling way.

Thank you for taking the time to review our proposal, and feel free to contact me with any questions.

Warmest regards,



Melanie Sands - Senior Social Scientist, ERG

1. Introduction

Eastern Research Group, Inc. (ERG) is pleased to submit this proposal to the Vermont Agency of Natural Resources (ANR). We will draw on our experience with climate indicators, metrics, and relevant data; greenhouse gas (GHG) inventories and datasets; the development of web-based tools; and data governance expertise to support ANR in measuring and assessing the progress of Vermont's Climate Action Plan (CAP). We will draw on our experience with national and state-level climate resilience, GHG, and tool development to ensure the information developed under this project applies the best available methods and data and creates the necessary foundation for the future development of the Measuring and Assessing Progress tool (hereafter referred to as the MAP tool or Tool).

ERG's mission is to protect human health and the environment while achieving positive and sustainable outcomes for our clients. ERG offers a combined staff of over 480, including climate scientists, data scientists, water and air resources specialists, public engagement and communications professionals, information technology specialists, and more, located across the country. ERG brings an interdisciplinary approach and years of experience providing nearly exclusive support to the government sector. ERG works across an array of program areas, including air and water quality, climate change, hazard mitigation, economics, policy analysis, environmental justice, and strategic communication. We have over 14 years of experience addressing multi-hazard resilience and applying our skills to assess user needs, develop tools and reports, engage stakeholders, and design strategies for hazard mitigation and resilience to climate change.

ERG has decades of experience providing climate and resilience support to states such as Vermont, Maine, Massachusetts, Pennsylvania, New York, California, and New Mexico; federal agencies such as Environmental Protection Agency (EPA), Department of Defense (DoD), National Oceanic and Atmospheric Administration (NOAA), and U.S. Army Corps of Engineers (USACE); and local governments in several states. We have designed and developed plans, technical reports, and tools to support program implementation and decision-making, with a focus on vulnerable populations, ecosystem health, economic benefits, risk assessment and communication, hazard mitigation, greenhouse gas reduction, co-benefits of strategies, and funding/financing options.

ERG has multiple offices in New England and team members based in Vermont. As a firm dedicated to improving environmental conditions and community health, we have a vested interest in the protection of the State's communities and natural resources. We understand many of the climate change

Advantages of the ERG Team

ERG is uniquely qualified and offers the following to ANR:

- Extensive knowledge of climate indicators and metrics development and an in-depth understanding of data specific to measuring climate vulnerability and resilience in Vermont.
- Working knowledge of the Vermont GHGI in conjunction with a deep understanding of state GHG inventories and datasets.
- Extensive experience developing climate tools and web-based applications that informs how the underlying data should be developed, mapped, and managed.
- A local, regional, and state perspective to resilience planning.
- New England-based with a Vermont presence and experience.

challenges Vermont faces, like increasing temperature and urban heat islands, stress on agriculture from heat waves, and riverine and stormwater flooding, which impacts public health, infrastructure, emergency services, and utilities. Through our current work with ANR's new Climate Action Office (CAO) to develop a municipal vulnerability index, we continue to develop a stronger understanding of the State's key climate hazards and vulnerabilities, and the types of equity considerations that are faced by frontline communities that most vulnerable to these issues.

For the purposes of this proposal, we assuming the following definitions:

- **Indicators** provide key information on changes that are occurring (i.e., they indicate some type of change).
- **Metrics** are used to quantify the contribution(s) of an activity to an outcome or goal.
- **Resilience** refers to the capacity of individuals, communities, and natural and built systems to withstand and recover from climatic events, trends, and disruptions (GWSA, 2020).

ERG Qualifications and Organization of This Response

The ERG team meets and exceeds all qualifications requested in the Request for Proposal (RFP). The projects highlighted in Table 1 align directly with the scope of services requested in the RFP. The **bolded projects** are further described in Section 4 below.

Table 1: Summary of ERG projects by Key RFP Topic Area.

Project Name	Supporting Climate Action Work at State/Local Level	Climate Tools / Dashboards	Climate Indicators, Metrics, Data, and Inventories	Data Management/ Governance	Logic Model Development	Summary Memos / Reports
Support for Climate Change Indicators Report and Resources. US EPA Office of Atmospheric Programs, Climate Change Division *		✓	✓	✓		✓
2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan. Massachusetts Emergency Management Agency*	✓		✓			✓
Natural Gas and Petroleum Systems Greenhouse Gas Inventory. US EPA Climate Change Division*			✓	✓		
Assessment of Climate Change Impacts on the Maine Economy	✓	✓	✓			✓
Development of a Municipal Vulnerability Index, State of Vermont	✓	✓	✓	✓		✓
EPA's Report on the Environment		✓	✓			✓
Life Cycle Analysis of GHG Emissions, State of Vermont	✓		✓	✓		✓

Project Name	Supporting Climate Action Work at State/Local Level	Climate Tools / Dashboards	Climate Indicators, Metrics, Data, and Inventories	Data Management/ Governance	Logic Model Development	Summary Memos / Reports
Measuring Effectiveness of the Ocean Dumping Management Program, US EPA's Office of Water					✓	✓
Multisector Evaluation Tool for Identifying Resilience Opportunities (METRO)		✓	✓			
San Joaquin Council of Government Climate Adaptation and Resilience Study	✓		✓			✓
Technical Support for a Resilience Indicators Inventory for a Community Resilience Assessment Methodology, National Institute of Standards and Technology Community Resilience Group			✓	✓		✓
US EPA GHG Emissions Inventory Data Explorer		✓	✓			
US EPA Non-CO2 Emissions Tool		✓	✓	✓		✓
US EPA Toxic Release Inventory (TRI) National Analysis		✓	✓	✓		✓
US EPA's Enforcement and Compliance History Online (ECHO)		✓	✓	✓		✓

For ease of review, and to show that ERG meets the scope of services and selection criteria, we have organized our response in accordance with the Proposal Format section of the RFP, as follows:

- **Section 2 - Qualifications of the Project Team.** A summary of experience completing tasks similar to those listed in the RFP.
- **Section 3 - Approach to Completing the Work.** The technical approach we propose to complete tasks 0 through 4, as requested in the RFP.
- **Section 4 – Relevant Project Experience.** Examples of projects relevant to this RFP.
- **Section 5 - References and List of Current and Prior Vermont Projects**
- **Section 6 - Capacity to Accomplish the Work.** The overall timeline for the work and anticipated staff availability.
- **Section 77 - Certificate of Compliance.** A completed copy of the certificate
- **Section 8 – Price Schedule.** Includes our rates, anticipated costs, and assumptions.
- **Appendix A, Team Resumes.**

2. Qualifications of the Project Team

Our proposed project team is experienced in helping communities decide how to prioritize actions and allocate resources for climate adaptation. We bring years of experience combining climate action planning with data governance, logic model and metric creation, and data mapping activities. Our team has collaborated on several resilience planning, GHG, and climate projects for the states of Vermont, Maine, and Massachusetts, California, and New York. We have also worked together on several similar projects for California municipalities, the State of New Mexico, and federal agencies like EPA NIST, and NOAA. Our work on these projects provides us with additional perspectives on vulnerability assessments and indices.

“Eastern Research Group has been an excellent partner to the Maine Climate Council as we work to develop our Climate Action Plan. Their team is deeply knowledgeable in the areas of adaptation, mitigation, and economic analysis. They have been collaborative and responsive to the unique needs of our process, helping us meet an aggressive project schedule.”

– Sarah Curran, Executive Director, Climate Planning and Community Partnerships, Governor’s Office of Policy Innovation and the Future

ERG has the project management systems and organizational structure in place to ensure the efficient and effective execution of the work outlined in the RFP. ERG has a proven history of managing multi-item call orders and delivering high-quality technical work products on time and within budget. Over nearly 40 years of serving government clients, ERG has developed a nimble and collaborative approach to our work, and we understand the need to adjust to any changes in direction that may arise. As demonstrated in our cost/price quote, we have created realistic labor budgets to ensure successful completion of this work. Figure 1 below, provides an overview of the organizational structure of the ERG team for this project. Note the arrows in Figure 1 indicate the lines of communication between team members.

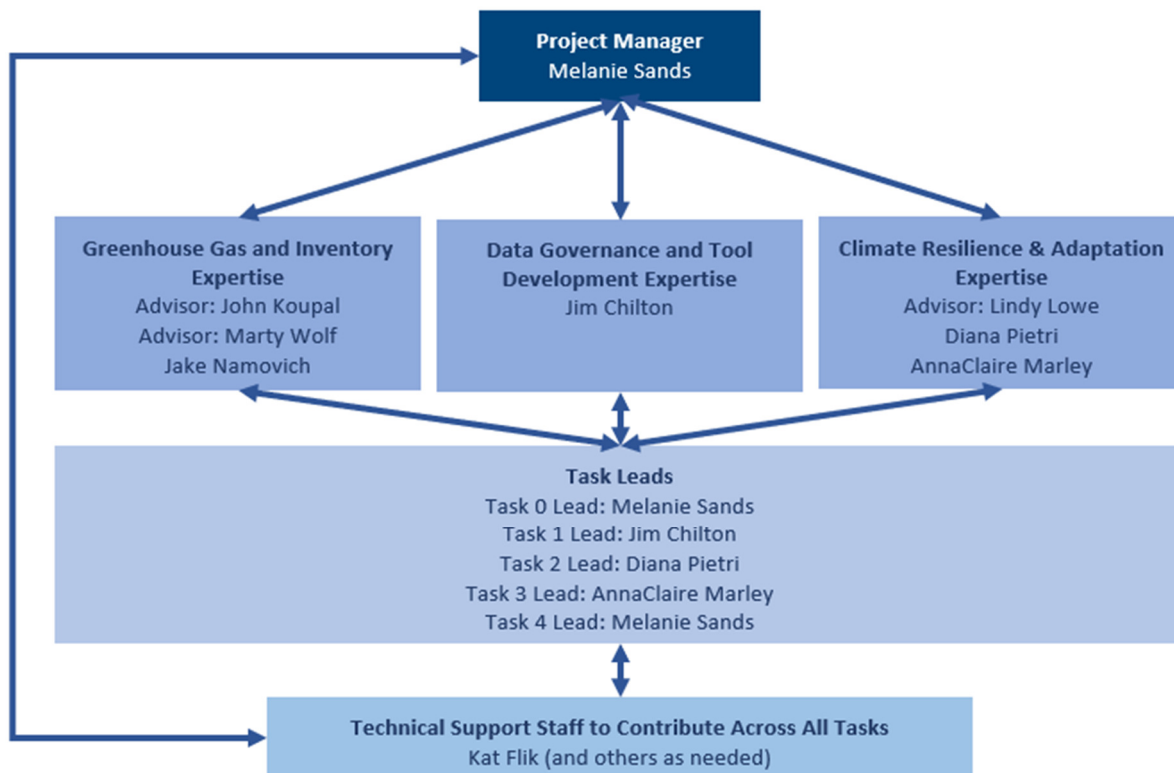


Figure 1: Organizational structure and lines of communication of the ERG team.

Melanie Sands will serve as ERG’s Project Manager for this work. She is Vermont-based and will be the primary point of contact for the ANR lead. Melanie has over 14 years of experience in socioeconomic research, analysis, stakeholder engagement, and program evaluation. She has successfully managed various projects focused on measuring climate vulnerability, increasing resiliency, measuring economic and social impacts of programs and policies, and developing tools for use in impact assessment and policy decision-making. In addition to being the Project Manager (Task 0), she will also be the technical lead for developing infrastructure recommendations under Task 4. She will oversee ERG’s technical staff, lead the public engagement work, ensure timely deliverables, and coordinate scheduling.

The ERG team proposes four qualified technical leads: **Jim Chilton** (Data Governance and Tool Developer, Task 1 Lead), **Diana Pietri** (Developing Indicators/Metrics, Task 2), **AnnaClaire** Climate and Resilience Analyst, Task 3 Lead) and **Melanie Sands** (Infrastructure Recommendation, Task 4) to oversee the work and products developed under each task of the project. **Jim Chilton** is a senior software engineer with over 16 years of experience developing software for the U.S. EPA and other federal agencies. Jim works to improve data quality, reduce the burden on industry reporters, and make data publicly available. He is currently supporting development of the Municipal Vulnerability Index for the State of Vermont through conducting geospatial analysis and processing climate hazard and other factor data. **Diana Pietri** is senior social scientist and climate specialist with over 15 years of experience in the development of climate resilience indicators, metrics, and logic models, as well as deep expertise in monitoring, evaluation and learning. She is an active member of ERG’s Diversity, Equity, and Inclusion Committee and serves as the co-chair of the committee’s Environmental Justice Subcommittee. The proposed task leads will report to ERG project manager and will engage with expert advisors and

technical support staff, as needed. **AnnaClaire Marley** brings climate and resilience specialty and familiarity with Vermont-specific climate vulnerability factors, and datasets. She has experience working with State staff on tool development considerations through her current work on the Vermont MVI. She also offers a range of metrics, data, GIS/tool development, and interview and engagement experience.

Lindy Lowe will serve as the Climate Expert Advisor for this project. Lindy has over 20 years of experience leading resilience, land use, and environmental projects and programs at regional, state, and local scales. She has supported the Federal Emergency Management Agency, EPA, and NOAA in developing the Regional Resilience Toolkit, a best practices approach to climate and hazard mitigation. Her experience serving as a technical advisor for the current Vermont municipal vulnerability index (MVI) project, along with her broader experience with resilience, community engagement, equity, and plan development will provide a critical perspective for project success.

We have assembled a team of GHG inventory and data experts and practitioners to support this project. **John Koupal** is a highly regarded GHG emissions expert and will serve as the GHG expert advisor for this project. Mr. Koupal has more than 30 years of experience, including more than 20 years at the EPA where he served as the Director of the Office for Transportation and Air Quality. In this role, John oversaw EPA’s mobile source emission inventory and modeling program. **Marty Wolf** is a senior engineer with 30 years of expertise in State GHG models and data, inventorying, and quantifying emissions reduction efforts via indicators. **Jake Namovich** is an experienced life cycle analysis (LCA) practitioner and has gained familiarity with the Vermont GHGI and data through his current work conducting an LCA for Vermont GHG emissions.

Kat Flik will serve as technical support staff across all project tasks outlined below. Kat is currently working on projects at the intersection of climate and equity issues and brings additional research and data analysis capacity to the team.

Table 2 highlights the name, title, highest degree, years of experience, and anticipated project team roles for this project. It also provides a description of each individual’s relevant experience. Team resumes are included in Appendix A. We do not foresee any issues staffing the project with the proposed team members; however, we have identified backup staff with similar skill sets to provide additional support, as needed. We will be happy to provide resumes and additional background on these staff, upon request.

Table 2: Team member name, degree, years of experience, project team role, and summary of representative project experience.

Name, Title, Degree, Years of Experience, and Project Team Role	Representative Project Experience
Melanie Sands Senior Social Scientist M.A., Environmental Science & Policy 15 years	- Currently managing the development of Vermont’s municipal vulnerability index. Also manages resilience-focused projects for the National Institute of Standards and Technology, such as her current work leading an assessment of the recovery and resilience of hospitals and schools to the impacts from Hurricane Maria. - Key team member on multiple program evaluations for federal agencies.

Name, Title, Degree, Years of Experience, and Project Team Role	Representative Project Experience
Project Manager, Task 0, and Task 4 Lead	• Adept at developing logic models, metrics, and data to measure program progress and benefits. • Accustomed to facilitating expert panels, task groups, stakeholder meetings, and project discussions. • Expertise in designing interviews and surveys, implementing instruments through multiple modes (e.g., in-person, telephone, web-based), and compiling and analyzing resulting data. • Routinely compiles and analyzes the information gleaned from public and private sources to develop logic models, estimate program benefits, conduct economic and regulatory impact analyses, and develop case studies, summary reports, and fact sheets that target both technical and public audiences.
Lindy Lowe Director of Climate and Hazard Resilience Master of Urban and Regional Planning, Master of Public Policy, and J.D. 25 years Climate Expert Advisor	• Resilience and adaptation leader for more than 20 years, with experience designing and leading climate and hazard resilience work at all scales. • Extensive negotiating and community-based planning experience on resilience, land use, affordable housing, design of public spaces and transportation, and utility planning. • Experience leading projects and programs built on equity, environmental justice, and climate justice. Extensive work in hard-to-reach communities with histories of climate, environmental, and economic injustices, and work with equity-focused community organizations. • Developed and led climate and hazard resilience programs, including the nationally recognized Adapting to Rising Tides program and the Port of San Francisco's Waterfront Resilience Program.
John Koupal Vice President & Principal Engineer B.S.E., Industrial and Operations Engineering 34 years GHG Expert Advisor	• Vehicle emissions expert with 30+ years of experience developing innovative methods to quantify and model greenhouse gas emissions to support research, State and Federal regulatory analyses, policy, and climate action. • Former Director of the US EPA's Office of Transportation and Air Quality (OTAQ) responsible for mobile source modeling and emissions inventory development.
Marty Wolf Senior Engineer M.S., Civil Engineering 29 years GHG Inventory and Data Specialist	• Has nearly 30 years of experience developing a wide range of source-specific and regional emissions inventories for use in air quality planning, including climate action plans. • Has extensive experience leading GHG inventory projects for more than 10 states, in addition to Federal clients.
Diana Pietri Senior Social Analyst Ph.D., Environmental and Forest Science 15 years	• Over 15 years of experience leading and supporting complex projects focused on best practices for climate adaptation and resilience. • Skilled in working with a variety of public and private partners to co-design indicators and metrics to assess resilience and programmatic progress. • Has developed logic models to assess programmatic performance for a variety of government and non-government clients.

Name, Title, Degree, Years of Experience, and Project Team Role	Representative Project Experience
Program Evaluation and Climate Specialist, Task 2 Lead	• Extensive experience using equity-based approaches to facilitate diverse groups of partners and form consensus.
Jim Chilton GIS/Database Developer M.S., Information Technology 16 years Data Governance and Tool Developer, Task 1 Lead	• Extensive experience developing a variety of applications with different languages and tools. • Extensive experience building complex data mapping among data sources. • Experience collaborating with a variety of EPA project teams, States, and other partners to build tools to improve data quality, and report data out to stakeholders.
AnnaClaire Marley Analyst M.S., Environmental Science and Management 3.5 years Climate and Resilience Analyst, Task 3 Lead	• Specializes in climate change impacts and adaptation, GIS, and sea level rise impacts to natural and built environments. • Developed multiple interactive web apps using R Shiny to display environmental data and project results. • Research experience in coastal ecosystems and their dynamic response to sea level rise. • Support for EPA on Climate Change Indicators in the United States, including data visualization, data updates, and development of new indicators.
Kat Flik Research Analyst B.A., Economics 1.5 years Research and Data Analyst	• Experience supporting state and federal regulatory analyses and policy development with a focus on greenhouse gas emissions reduction strategies and economic impacts. • Developed public-facing data visualizations of economic, climate, and social indicators. • Experience performing data aggregation and analysis with greenhouse gas emission data. • Experience organizing and conducting interviews with local stakeholders to help inform policy decisions.
Jake Namovich Sustainability and Life Cycle Analyst M.S., Environment and Sustainability 1.5 years Greenhouse Gas Inventory and Data Analyst	• Specializes in life cycle assessment and completed a variety of public and private sector client projects. • Co-stewards/curates the U.S. Life Cycle Inventory database. • Experience working with the Vermont and New York State greenhouse gas inventories; familiar with data sources, activity data, etc. comprising the model(s). • Co-developed upstream GHG emission factors for Vermont energy pathways, scaled for use in inventory leveraging activity data.

3. Approach to Completing the Work

ERG has the technical capabilities, capacity, and in-depth knowledge of each component of the technical work outlined in the RFP to successfully complete the work under this contract and provide the foundation needed to efficiently begin tool development under the subsequent RFP. The ERG team has developed a proven approach to completing the work in the RFP, as further described in the following sub-sections.

Task 0: Project Management

ERG will use our time-tested approach to project management that ensures we exceed expectations for quality, schedule, and budget. This approach includes:

- **Commitment to helping ANR meet its goals.** Through 30 years of support for government technical and communications work, we have earned a reputation for responsiveness, professionalism, creativity, attention to detail, and “going the extra mile” to help bring our client’s vision to fruition.
- **Consistent and transparent communication.** ERG’s plan for communicating and interacting with the Climate Action Office (CAO) Director and ANR team is built around two commitments: 1) carefully listening to ensure that we understand completely your goals and technical directions for completing each task, and 2) keeping you regularly apprised of our progress and any issues encountered during the course of our work that may indicate the need to adjust our approach to ensure success. As previously stated, Melanie Sands will serve as the project manager and will act as the main point of contact to the CAO Director.
- **Quick problem-solving.** Our deliverable and budget tracking systems and methods of quality review and communications help identify and mitigate potential concerns while they are still minor. We will inform the CAO Director immediately if any problems do arise. ERG will undertake corrective action and document the actions taken, as needed.

Hold Kickoff Call (Deliverable 1.00 of the RFP)

Within two weeks of signing the contract (refer to Section 5 for additional information regarding the project timeline), ERG’s project manager will coordinate with the CAO Director and ANR project team to hold the kickoff meeting.¹ Prior to the kickoff meeting, the project manager will confer with the CAO Director to discuss the intended meeting mode (e.g., webinar) and develop a meeting agenda. The purposes of the kick meeting are to:

- Establish clear process-management expectations.
- Discuss ERG’s proposed approach.
- Further clarify the goals, objectives, timelines for project deliverables, key audiences for project outputs, and information needs
- Discuss coordination and channels of communication with the CAO Director, ANR staff, the Data Governance Team (DGT), Vermont Climate Council Science & Data Committee, and the ERG project team for meetings, draft deliverables, review timelines, and final deliverables.

¹ All timelines provided in this proposal are based on the assumed contract award date of 01/08/2024.

- Schedule 1-hour meetings twice per month with appropriate ANR staff to ensure successful project implementation.
- Schedule 30-minute check-in meetings twice per month with the CAO Director. The purpose of these meetings will be to review interim deliverables, discuss tasks underway, identify key decision-points, determine what presentations are necessary and adjust the timeline as necessary, and confer about any other relevant topics.
- Discuss any sensitivities related to the project ERG should be aware of.

The kickoff call will be a working meeting, and we will come prepared to discuss:

- The draft workplan and any recommended modifications (see Task 0, Step 2).
- ANR's preliminary vision of the MAP tool.
- Defining in-scope activities under Task 2. For example, will only the activities (e.g., programs, policies, actions) currently being implemented be measured?
- Who will be responsible (ERG or ANR) for contacting the identified DGP members to request their participation on the team.
- The possibility of staff available for managing the DGT and their anticipated level of involvement in both the DGT and in the development of the DGP.
- Vision for data mapping under Task 3.

Develop Draft and Final Project Initiation Workplan (Deliverable 1.01 of the RFP)

Upon award, ERG will develop a draft workplan based on the proposal, which we will deliver to the State's project team prior to the kickoff meeting. During the kickoff meeting, we will discuss the draft workplan and develop a timeline for ERG to implement any recommended modifications prior to delivering the final workplan. ERG will swiftly revise the draft workplan based on comments received during the kickoff meeting and deliver a final revised workplan within two weeks of signing the contract. While ERG will integrate the State's comments into the final workplan to serve as a clear and achievable project roadmap, this project plan can be modified if agreed to by the CAO Director and Project Manager.

(Ongoing) Project Management Tasks (Deliverables 1.02, 2.00, 3.00, and 4.00 of the RFP)

Throughout the duration of this project, ERG will plan, track, and execute all ongoing project management tasks including 1-hour bi-weekly meetings with Agency staff and 30-minute bi-weekly check-ins with the CAO Director. To help minimize the costs associated with this number of meetings, ERG anticipates having key project staff participate in the bi-weekly meetings with Agency staff to allow for fuller task discussions, and our project manager will conduct check-ins with the CAO Director with input from key staff.

Task 0 Deliverables

- Project kickoff call
- Draft/Final project initiation workplan
- Ongoing project management tasks, including bi-weekly meetings and presentations delivered within two weeks after contract signing, as well as two months, six months, and nine months after project Kickoff Meeting

Task 1: Data Governance (Deliverable 1.02 of the RFP)

Under this task, ERG will conduct two overarching efforts. The first is to establish a DGT and data governance plan to help guide how data is managed and maintained throughout this and subsequent, related projects. The second is to conduct background research through the review of relevant, existing tools and frameworks. Research findings will inform the future development of the MAP tool (to be developed under a subsequent RFP) and considerations for how the work to be performed under this project should be carried out to support the development of the Tool.

Conduct Review of Existing Tools and Frameworks

ERG will review and evaluate a series of tools, frameworks, and datasets relevant to measuring Vermont's climate action progress. The purpose of this task is to: 1) better understand the types of data and frameworks that can be used when measuring Vermont's progress as well as possible tools and/or approaches for integrating and conveying this information and 2) leverage that understanding to identify, discuss, and develop recommendations for the MAP tool development and how the work under this contract should proceed to facilitate future Tool development. We will begin by reviewing the three to five tools, frameworks, and or datasets identified by ANR, along with the following specified in the RFP:

- The [Vermont Green House Gass Emissions Inventory \(GHGI\)](#) is a key data source that ERG will use to measure sequestration and emissions reduction. An understanding of the inventory, its datasets, and parameters will be critical to inform Tool development and management considerations.
- ERG will review Water Quality monitoring resources in the context of climate change. Resources may include water-focused portions of the CAP, ongoing [ANR Water Quality Monitoring studies](#), and other resources recommended by the Vermont Project Team.
- The ERG team will work closely with the Vermont Project Team to understand the full scope of the [UVM Extension Agricultural Policies in the CAP](#). ERG will draw clear connections between information collected through this review and climate indicators for the Tool to help ensure consistency and continuity between methodologies.

Familiarity with Vermont GHGI Will Expedite Review

ERG's pre-existing familiarity with the Vermont GHGI and experience with the data underpinning the model will expedite our review of the inventory and allow us to focus on the emissions data, activity data and their sources, data formatting, modeling methods, and calculation parameters which are directly relevant to metrics and indicators.

ERG will develop an Excel workbook to capture key information from the review and evaluation of existing tools and frameworks. As a first step, ERG will develop a draft workbook with the preliminary types of information that could be helpful to track during the review of existing tools and frameworks. ERG will update this workbook with input from ANR. Upon completion of the review and evaluation of exiting tools, ERG will share the completed workbook with ANR. ERG will meet with ANR to walk-through the workbook and key findings, and discuss the implication for future MAP tool development, and subsequent tasks in this project.

Identify Data Governance Team

ERG will hold up to three meetings with ANR to identify DGT members. ERG anticipates that ANR will provide a preliminary list of team members internal to the Agency and other State offices as well as potentially helpful external candidates, such as those who may serve on the Vermont Climate Council (VCC) S&D Committee. ERG will work with ANR to identify and recommend additional individuals, as needed, to supplement the initial team list of individuals recommended by ANR. This will help ensure that the range of expertise needed on the team is secured. ERG expects that ANR will contact the identified DGP members to request their participation on the team. ERG will discuss and confirm this with ANR at the kick-off meeting.

At the kick-off meeting, ERG will discuss with ANR and the CAO Director possible staff available for managing the DGT, and their anticipated level of involvement in the DGT and in the development of the DGP.

ERG is Accustomed to Working with Working Groups and Teams

ERG has coordinated and facilitated expert panels and working groups that include an array of stakeholders from agency staff to industry experts, academics, community representatives, and non-profit organizations. ERG is currently working with task groups for both the Vermont Municipal Vulnerability Index and greenhouse gas life cycle analysis projects to gather project input and discuss key project deliverables.

Identify Key Content of Data Governance Plan with Director

Data management efforts must be grounded in a thorough understanding of user and technical requirements and a solid knowledge of resources and issues that might impact the design, effectiveness, cost-effectiveness, or feasibility of the system or application. To help facilitate the development of the DGP, ERG will meet with the CAO Director to establish the key content of the data governance plan. Based on our prior experience developing data governance and maintenance plans, ERG will propose a set of draft key topics for possible inclusion as a starting point for the first discussion with the Director. Example topics include:

- Defining clear roles and responsibilities for all stakeholders involved in data governance.
- Establishing data governance policies and standards that align with Agency objectives and regulatory requirements.
- Developing data quality metrics and monitoring mechanisms to measure and improve data quality over time.
- Implementing data governance tools and technologies to automate and streamline data governance processes.
- Continuously educating and training employees on data governance policies, procedures, and best practices.
- Regularly reviewing and updating data governance policies and procedures to adapt to changing business needs and regulatory requirements.

ERG will update the plan topics with input from the Director and use this information as a starting point for the draft DGP described below.

Develop Data Governance Plan

ERG will work with State staff involved in the DGT and DGP to develop a plan that will guide data management and maintenance under the current project as well subsequent, related efforts that the State may undertake in developing and maintaining the MAP tool. The DGP will define the standards and policies for data ownership, collection, availability, usability, integrity, data architecture, tool design, storage, and security. The DGP will also flexibly accommodate future data needs, coordinate relevant data and reporting across multiple private and public entities. The DGP will define a quality assurance process, and detail implementation procedures.

In the interest of having the most expedited project timeline possible, ERG recommends conducting the following steps:

1. Develop a draft DGP outline based on the key topics identified with the CAO Director and share it with the Director, ANR team, and State staff involved in data governance efforts to gather feedback that can be used to develop a final outline. ERG anticipates using one of the project check-in meetings to discuss the outline, along with other, related topics such as:
 - Flexibility for future data needs. Does this mean new datasets entirely or just new fields in the existing datasets provided?
 - Confirm how to best “coordinate relevant data and reporting across multiple private and public entities” as outlined in the RFP.
 - Primary audience for the DGP.
 - Who will maintain the DGP and be responsible for updates over time?
 - Understanding whether there are other State DGPs that the current plan needs to align with.
2. Develop a draft DGP using the final outline. Share with the Director, ANR team, and State staff involved in data governance efforts for initial feedback prior to sharing with the DGP.
3. Provide the draft DGP to the DGT and schedule a meeting to discuss the draft plan and collect feedback that ERG will use to develop a revised version of the plan.
4. ERG will provide the revised DGP to the DGT, ANR staff, CAO Director, and State staff involved in data governance efforts for review and feedback. ERG will hold a second DGT meeting to discuss additional feedback on the revised plan.
5. ERG will develop a final DGP that incorporates feedback provided on the revised plan. The final DGP will be provided to ANR and CAO Director for approval and then circulate the final draft to the DGT.

Task 1 Deliverables

- Review of existing relevant tools and/or data frameworks, GHG Inventory, Water Quality, and UVM Extension data processes and associated recommendations
- Two to three Data Team scoping meetings with Agency staff
- Two to three meetings with Data Governance Team on development of Data Governance Plan
- Draft/Final Data Governance Plan

Task 2: Logic Model Development and Metric Creation (Deliverable 2.00 of the RFP)

Vermont is implementing a range of activities (e.g., strategies, programs, policies, actions) to achieve its climate action goals that include reducing GHG emissions, increasing sequestration, increasing resilience and adaptation to the changing climate's effects on the State's communities, infrastructure, and economy, and making strides to the incorporate equity into these activities. In this task, ERG will lay the foundation for the development of the MAP tool by identifying the activities that Vermont is taking to achieve its climate action goals, the metrics that can be used to measure how those activities are contributing toward these goals, and the data available for the metrics identified. ERG will incorporate the use of logic models to show this information for each MAP tool use case. Each of these steps is described in more detail in the sections that follow.

Develop Logic Models

Under this task, ERG will develop a logic model for each use case to illustrate how the activities being implemented to help Vermont achieve their climate action goals contribute to the outcome for each case. Logic models provide a visual roadmap that shows how activities being conducted contribute to a specified goal.

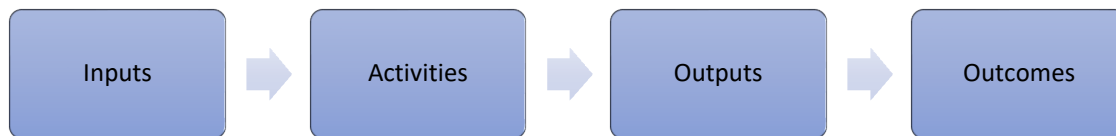


Figure 2: Logic Model Components

Common components of logic models include (See Figure 2):

- **Inputs** are the resources needed to implement activities. This might include financial resources, staffing, agency support, or equipment, for example. ERG will discuss with ANR whether inputs should be included in the process maps for this project.
- **Activities** are the actions being performed to help Vermont achieve its climate action goals, such as those outlined in the CAP. Activities will often be a qualitative description but may involve some quantities. We anticipate using the actions outline in the CAP as a starting point for identifying activities under this project.
- **Outputs** are the results generated as the result of implementing activities. They provide evidence that the activity was conducted. For example, this may be a percentage reduction in number of gasoline vehicles in use or the number of resilience grants provided.
- **Outcomes** are the short- and long-terms changes that result from activities being conducted. For this project, we anticipate that several activities that may have outputs that flow into a single outcome.

- **Impacts** are the key change that the activities are driving toward. For this project, we anticipate the impacts being the end point for each MAP tool use case (e.g., reduced GHG emissions, increased resilience).

Error! Reference source not found. **below** provides an example logic model that illustrates how CAP activities in the transportation and electricity pathways might both contribute to the GHG reduction use case. The upper portion of the logic model shaded in yellow represents CAP actions taken in the transportation pathway; showing how State staff and funding resources are applied to help adopt California's Clean Car Regulations and to also incentivize electric transportation (i.e., activities), which results in lower, acceptable emissions rate and an increased number of electric cars being purchased, respectively (i.e., outputs). Both outputs lead to an outcome of reduced CO2 emissions from transportation by some (X) percentage (i.e., outcome). This outcome contributes to the overall use case impact of reduced GHG emissions. The lower portion of the value chain shaded in blue shows the flow from activities to outputs and outcomes of a CAP action identified for the electricity pathway. Error! Reference source not found. shows how the actions conducted under multiple pathways may result in outcomes that outcomes that lead to the same overall impact.

Skilled at Developing Logic Models and Process Maps

ERG has developed logic models, process maps, and value chains for a variety of clients to help illustrate how their activities lead to outcomes or key programmatic goals, including:

- Logic models used to evaluate EPA's Ocean Dumping Program goals and use of program resources.
- Logic models to aid evaluation of a new strategy assess performance of a new coastal and strengthen watershed resilience program in Southern California
- Process maps to outline programmatic goals for a multi-country coastal resilience data repository in the Caribbean.

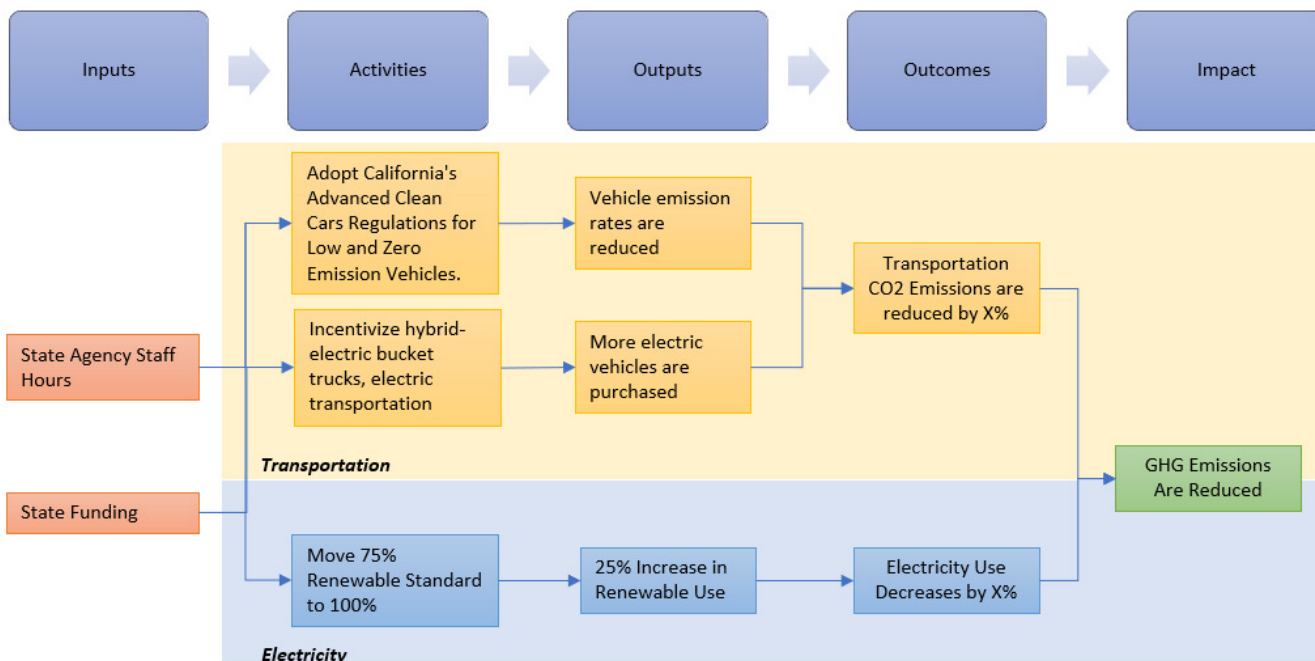


Figure 3: Example Logic Model

The information needed to develop the logic models will be developed through the task steps described in the sections that follow, and ERG will use that information to develop the logic models that will be shared with ANR and the DGP throughout the task.

Develop Use Case Framework and Actions

Once the DGT members have been identified and their participation has been confirmed, ERG will hold a meeting with the DGP to provide an overview of the project and gather input on:

- Goals and objectives for monitoring and assessing progress toward CAP goals.
- Final use cases anticipated for the MAP tool and identifying the key categories for inclusion.
Potential use cases may include:
 - Reduction in GHG emissions
 - Increased sequestration
 - Increased resilience and adaptation
 - Increased incorporation of equity into CAP activities

For each use case identified with DGP team, ERG will identify the corresponding activities considered to be in-scope based on the categories for inclusion identified with the DGP. ERG assumes that this list of activities will come from the current CAP actions and that ANR will provide a list of any activities being conducted that are not currently listed in the CAP. ERG will confirm this assumption with ANR during the kick-off meeting and also discuss other known parameters for determining what activities might be considered in-scope (e.g., should activities that have not yet been implemented (at least started) be considered in-scope?). **Error! Reference source not found.** shows the high-level process steps that ERG will take throughout Task 2, beginning with the identification of use cases.

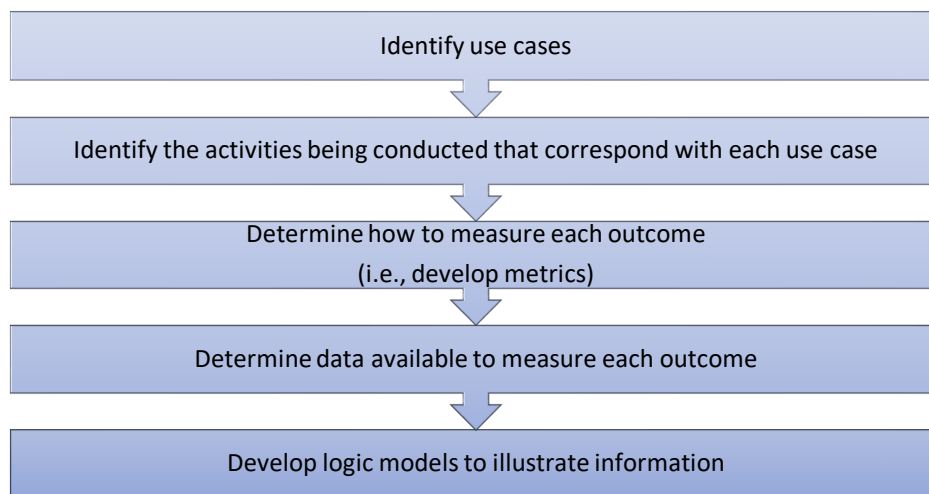


Figure 4: Overview of Task 2 Workflow to Identify Metrics and Develop Logic Models

ERG will develop an Excel workbook to capture information developed under this task. As a first step, ERG will compile a complete list of all the unique activities that are contributing to Vermont's climate action goals as outlined in the CAP or provided by ANR. ERG will begin with the list of actions identified in the CAP and then expand that list for activities not listed in the CAP, as indicated by ANR. Based on our experience developing metrics and value chains, it will be imperative at this stage to identify discreet activities that can be associated with clear outputs and objectives. In conducting a preliminary review of the actions identified in the CAP, it appears that some actions appear to be more

“indicators” (i.e., they indicate some type of change) as opposed to activities that generate outputs and outcomes that can be measured. For example, hiring a consultant to review and assess the state designation programs or developing a climate action toolkit both indicate progress toward a goal, but developing clear, quantifiable outputs and outcomes would be challenging without additional information about the indirect and direct effects of hiring the consultant or implementing the toolkit.

For each action listed, ERG will assess and capture the following information (See Figure 5):

- CAP pathway (if action from CAP)
- Relevant MAP tool use case(s)
- Whether the is action an indicator or an activity for which the team might be able to develop measurable outcomes.
- Whether the state and its partners have control of this activity areas.

	A	B	C	D	E	F	G
1	Unique Action	Pathway	Relevant MAP Tool Use Case (1)	Relevant MAP Tool Use Case (2)	Indicator? (Y/N)	Activity? (Y/N)	State control of activity area? (Y/N)
2	Activity X	Cutting Climate Pollution	Reduced GHG Emissions	NA	Y	N	Y
3	Activity Y	Natural and Working Lands	Increased resilience	Increased Adaptation	N	Y	Y
4	Activity Z	Vital Communities	Increased resilience	NA	N	Y	N

Figure 5: Key Information Captured for Complete List of Activities

This initial assessment will serve as an opportunity to narrow the set of activities that will be considered for metric development by systematically identifying and removing those activities that do not correspond with the selected use cases, are not under the control of the State and its partners, and or those activities that are considered to be indicators that might not be able to be readily measured with metrics. Where activities are identified as indicators that may not be suitable for metrics development, ERG will discuss possible options for capturing and conveying progress made so that the information can be used to supplement and compliment the metrics-based performance information.

ERG will share and discuss the results of this preliminary assessment with ANR and the DGP to gather input and/or confirmation on the information compiled for each activity. ERG will use the feedback collected to develop a final set of activities that will be undergo consideration for metrics identification. ERG will use this final listed of activities to expand the current Excel workbook by developing a separate tab for each use case and listing the final list of activities identified for that use case on that tab.

Determine Metrics

Once a final list of activities has been established, ERG will develop information that informs how each activity can be measured. ERG will expand the Excel workbook developed under Step 1 above and determine the output(s) and outcome associated with each in-scope activity. While the list of CAP actions is seemingly straightforward, discerning a clear set of distinct activities, outputs and measurable outcomes will require thoughtful consideration and an iterative process among the ERG team, ANR, and the DGP. For example, ERG anticipates that our team will develop a draft set of outputs and outcomes that can be shared and discussed with ANR and the DGT. ERG will then use the discussion feedback to revise the outputs and outcomes in a consistent manner. ERG will then review and reorganize the worksheet as needed to help identify activities that have shared outcomes. At this juncture, ERG will re-share the Excel workbook with ANR (and the DGT as needed) to get additional buy-in on the revised set of outputs and outcomes prior to developing metrics for each. ERG anticipated repeating this process several times before a final set of outputs and outcomes is confirmed across the project team (e.g., ANR, DGT).

For each outcome, ERG will develop draft metrics and include those in the worksheet tabs. ERG will share the proposed metrics with ANR and the DGT to gather input and agreement on the information shared. ERG will then revise the metrics using feedback from ANR and the DGT. Based on our current work developing climate vulnerability indicators for Vermont, we anticipate that there will be several cycles of metric development, review, and revisions before agreement is achieved on the final set of metrics for which data is sought.

At this stage, ERG will also begin developing a logic model for each use case that depicts the activities, outputs, and outcomes. This initial mapping will allow the team to see where activities lead to shared outcomes so that information within a given logic model can start being grouped accordingly.

Identify Available Data

ERG will identify the type of data needed for the metrics identified under Step 2 above and will capture information about this data and its availability in additional columns in the Excel worksheets for each use case. In identifying data, we anticipate identifying and tracking the following types of information about that data needed for each metric:

- Type of data needed.
- Data description

Extensive Experience Developing Climate Indicators

- As EPA's lead contractor for the [Climate Change Indicators in the United States](#) initiative since 2008, ERG has played a key role in researching, developing, and effectively communicating a set of more than 50 indicators that track the causes, effects, and impacts of climate change
- For the National Institute for Standards and Technology, ERG led the review and quality assurance of 40 social science frameworks and methodologies, which include an assortment of composite indicators and measures that were characterized and binned into a sortable, filterable database of approximately 10,000 indicators.

- Data source and whether the data is specific to Vermont and publicly available.
- Data link (if available)
- Geographic scale of data

Based on our experience developing climate vulnerability and resilience data and also working with the GHGI, we expect that there will be variation in the types of data and data availability across and within use cases concerning resilience, adaptation, and equity, versus those relating to increased sequestration and GHG emission reductions that may rely more heavily on the data that might be included in Vermont's GHGI. For example, there may be limited or only qualitative data to measure some aspects of increased resilience or incorporation of equity into climate actions, while there may be more quantitative data available for measuring GHG emission reductions.

Where GHGI data is concerned, ERG will identify existing components which could be extended to the MAP tool and identify data gaps as they relate to defined climate metrics and indicators. Foci of this step will include (but not limited to) taking inventory of emissions data, activity data and their sources, data formatting, modeling methods, and calculation parameters which are directly relevant to metrics and indicators. Determinations relating to the adoption of data for application in the Tool will be informed through concurrent development of the logic model. ERG will conduct an intermediary mapping step to illustrate this information (described under Task 3 below).

Information developed under this task will inform current data gaps as well as what activities might need to be excluded from the MAP tool due to the lack of appropriate data, along with recommendations for future data collections. ERG will meet with ANR and the DGT to discuss data availability as described under Task 3.

Conduct External Meetings

ERG will hold up to a combined four meetings with the DGP and/or the S&D committee throughout this task. We anticipate those meeting to occur at key junctures to surrounding the development of the Tool use cases, identification of in-scope activities for each use case, the identification of metrics and available data, and development of the logic models.

ERG Gains Insight into VT Climate Vulnerability Factors and Data

In developing Vermont's Municipal Vulnerability Index (MVI), ERG has gained an in-depth understanding of critical indicators of climate vulnerability and corresponding data across five domains, including: built and physical environment, economy and jobs, climate influenced hazards, natural environment, and society and community. ERG will leverage this understanding to more efficiently identify resilience metrics and data needed to measure CAP progress.

Task 2 Deliverables

- Summary of Framework use cases and categories, logic models, including identified metrics, indicators, and data needs.
- Up to 4 meetings with Agency Staff which may also include the Data Governance Team or S&D Subcommittee, as necessary.

Task 3: Data Mapping (Deliverable 3.00 of the RFP)

Under this task, ERG will work to fill data gaps identified under Task 2 and also map the data sources identified. These steps are described in further detail below.

Identify Additional Data Sources

Under Task 2, available data sources for each metric will be identified, along with data gaps that may arise from the absence of data or data not specific to Vermont or at a different scale. As a first step, ERG will hold a working session with ANR and the DGP to discuss the data preliminarily identified for each metric, potential data gaps, and possible data source to fill gaps identified. Based on input from ANR and DGT, ERG will review additional data sources that might correspond with the metrics. ERG will fill data gaps for metrics in the Excel workbook for each use case, as appropriate.

Conduct Interviews

ERG will conduct up to seven, one-hour interviews with individuals identified by ANR to further inform data that might be used for outcome metrics. These interviews will also be used to develop a deeper understanding of considerations that need to be accounted for in preparation for MAP tool development. ERG will develop a set of draft interview topics to be covered in each interview based on the DGP and review of relevant tools and datasets. We expect that questions will need to be tailored to each interviewee in order to be specific to the tool or datasets that might be discussed. Interviews will likely include discussion around the following key topics:

- **Data considerations**, such as information about known data sources, suggestions of data sources to fill gaps, data characteristics, and data accessibility.
- **Data management**, such as information on frequency of updates, party responsible for updates, considerations for MAP tool updates if using that data source or connecting to a current tool, and other data governance considerations that might be raised as part of the DGP plan developed under Task 1.
- **Data flows**, such as information that helps the team understand and outline how data gets from its source to a current application and/or how we would be able to connect that data source to the MAP tool.

ERG will develop a set of notes for each interview and update ANR and the DGT on information learned through the interviews. ERG will use the information learned through interviews to update data information in the Excel workbooks and develop data maps as described below.

Develop Data Map

At the kickoff meeting, ERG will discuss the vision for data map(ping) with ANR for further alignment on the anticipated deliverables for this task. ERG envisions several data mapping options under this task.

- **GHGI mapping.** To support the documentation and communication of the adoption of available data for application in the Tool under Task 2, ERG will map out processes and steps comprising the development of inventory updates in a comparable manner to the logic model developed for Task 2 of the project. This mapping step will define key data inputs, data treatments or transformations, external resources, or tools (ex. the EPA State Inventory and Projection Tool [SIT]) used, input parameters set in these tools, restrictions or release intervals of data inputs, and assumptions made. ERG will document gaps in Vermont GHGI as they pertain to Vermont Climate metrics and indicators for consideration in Task 2. This model will not only illustrate differences between the Vermont GHGI and the MAP tool, but portions suitable for use in the Tool can be extracted for repurposing in the logic model deliverable. ERG will list proposed divergences from Vermont GHGI methods as a deliverable for this Task. Misalignment between methods will clearly be communicated in the review documentation.

- **Mapping of available data and data flows.** The underlying components to the data mapping across use cases will be the Excel workbook with information about the data used to measure the outcomes of activities for each use case and the GHGI intermediary map described above. ERG will discuss with ANR whether the intention of the data mapping task is to also show how each type of data flows from its source through the logic model or whether the preference might be something simpler, such as the logic model updated to reflect each type of data used to measure the outputs and/or outcomes, for example.

ERG anticipates having a working session with ANR that may include the DGT to present and discuss the draft data mapping. ERG will revise the data mapping based on feedback gathered during this session to produce a final data map(s).

Conduct Working Sessions

ERG will hold up to three working sessions with ANR and the DGP throughout this task. We anticipate those meeting to occur at key junctures surrounding the development of the Tool use cases, such as the identification of in-scope activities for each use case, the identification of metrics and available data, and the development of the logic models.

Task 3 Deliverables

- Up to three working sessions with Agency staff which may also include the Data Governance Team.
- Up to 7 data manager interviews.
- Data map indicating logic model, metrics and indicators, data source, and data characteristics for Vermont's GWSA-related efforts.

Task 4: Infrastructure Recommendation (Deliverable 4.00 of the RFP)

In Task 4, ERG will deliver a memorandum summarizing work conducted in this RFP and making recommendations for a second phased based on the objectives and goals identified in tasks 1 through 3, with both near- and long-term priorities in mind. ERG will take the following steps to deliver the memo.

Develop Draft Memorandum

ERG will develop a memo that summarizes the work conducted under Tasks 1-3 and also provides recommendations and considerations for MAP tool development based on this work. Prior to starting the memo, ERG will provide ANR with a draft memo outline for feedback and discuss any other considerations for its development (e.g., formatting, audience). ERG expects the memo to include topics such as:

- A brief summary of the outcomes from the review of existing tools and frameworks.
- A brief summary and overview of the DGP (with the full DGP included as an appendix).
- A full list of metrics, data sources to inform the metrics, and corresponding logic models to illustrate the information.
- A summary of information gathered from respondent interviews about data considerations, data management, and data flows.
- Data map illustrating the GHGI, available data, and data flows.
- Recommendations for future work based on the outcomes of findings from work under Tasks 1 through 3.

- Considerations and initial Tool infrastructure recommendations such as platform and hosting needs, and considerations for data processing, storage, and periodic updates.

ERG will develop the draft memo and submit it to the CAO Director, ANR staff, and any other agreed upon groups for review and comment.

Develop Final Memorandum

Following CAO Director, ANR staff, and other stakeholder review and comment on the draft memorandum, ERG will work to implement comments and submit a revised, final memo.

Presentation to the Data Governance Team

ERG will schedule, prepare materials for, and conduct a presentation of findings from the final memorandum (see Task 4, Step 2) to the Data Governance Team. In preparation for the meeting, ERG will develop a draft PowerPoint presentation and provide it to ANR for review and feedback. ERG will discuss with ANR whether this presentation should be held after the draft version of the memo in order to gather feedback from the DGT that can be integrated into the final version of the memo, or if the intention is to hold the presentation after the memo has been finalized.

Presentation to the S&D Subcommittee

ERG will schedule, prepare materials for, and conduct a presentation of findings from the final memorandum (see Task 4, Step 2) to the S&D Subcommittee. Similar to the DGT presentation above, ERG will develop a draft PowerPoint presentation and provide it to ANR for review and feedback prior to the meeting. ERG will also discuss the timing of this presentation with ANR to determine if it should follow the development of the draft or final memo.

Task 4 Deliverables

- Draft and Final Phase 4 Summary Memorandum
- Final Presentations (Data Governance Team and S&D Subcommittee)

4. Relevant Project Experience

As highlighted in previous sections of this proposal, ERG has experience conducting various projects that relate to the development of climate and resilience indicators, metrics, and data; greenhouse gas inventories and datasets; and data management and tool development. Table 3 provides summaries of some of our most recent and relevant experience related to the items in this RFP.

Table 3: Examples of Relevant and Recent Projects.

Project Descriptions
Climate Change Indicators in the United States Client: EPA Project Team Member and Role: Marley (Data Analyst and Researcher) Timeframe: 2008 to present Relevance to Scope of Work: Task 0, Task 1, Task 2, Task 3, and Task 4 As EPA’s lead contractor for the Climate Change Indicators in the United States initiative since 2008, ERG has played a key role in researching, developing, and effectively communicating a set of more than 50 indicators that track the causes, effects, and impacts of climate change. We have provided wide-ranging support for data analysis; developed public-friendly graphs, maps, and summaries; compiled detailed technical documentation to ensure transparency; ensured quality control; and performed statistical analysis, graphic design, and desktop publishing. We wrote and laid out four highly polished print reports, brochures, fact sheets, and a web version with interactive dashboard components. ERG’s role has included conducting literature research, screening candidate data sets according to EPA’s data quality framework, managing files and version control, engaging with academic experts through ad hoc meetings and a stakeholder workshop, coordinating more than a dozen rounds of review leading up to each print publication, responding thoughtfully to more than 1,000 peer review comments, ensuring a proper balance with wording and visuals that promotes understanding without sacrificing accuracy, and maintaining tight production schedules to meet government-mandated publication deadlines.
2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan Client: Massachusetts Emergency Management Agency. Project Team Member(s) and Role(s): Lowe (Climate Expert Advisor), Pietri (Senior Social Analyst), Marley (Data Analyst and Researcher) Timeframe: April 2022, to October 2023 Relevance to Scope of Work: Task 0, Task 2, Task 3, and Task 4 The 2018 Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) is the Commonwealth’s primary risk reduction strategy for natural hazards and climate change. The SHMCAP’S mission is to reduce the statewide loss of life, and protect natural resources, property, infrastructure, public health, and the economy from natural hazards and climate change impacts through the development of a comprehensive and integrated state hazard mitigation and climate adaptation program. The SHMCAP acknowledges that climate change is already worsening natural hazards and extreme weather events and incorporates the best available scientific data and projections to account for projected changes in precipitation, temperature, sea-level rise, and extreme weather events to position the Commonwealth to reduce risk and increase resilience. ERG updated the plan with the best available science and included concrete actions to address the needs of socially vulnerable and environmental justice (EJ) communities across MA.

Project Descriptions

To begin this effort, ERG assessed the state's existing capabilities and adaptive capacity to natural hazards and climate change and identified ways to increase that capacity. ERG then incorporated the 2022 Massachusetts Climate Assessment into the SHMCAP and conducted a supplementary risk assessment to develop a hazards analysis for all FEMA required hazards. Using the best available science and scenarios, we applied a cross-sector approach to assess functional characteristics and the range of risks, determine cascading consequences, and consider people in the community to ensure the most significant consequences of a hazard were captured in the assessment. ERG expanded the 2018 SHMCAP state agency vulnerability assessment. Using the finds of risk assessment, vulnerability assessments and hazards analyses, ERG developed hazard mitigation and climate adaptation strategies that will address the risks specific to sectors, people, and regions of the Commonwealth. Throughout our process, we held internal and external meetings to incorporate diverse perspectives, build trust, and obtain support for identified priority actions. To support further updates to this plan, ERG developed and documented a process for SHMCAP plan maintenance, review, evaluation, and implementation. We compiled and finalized the SHMCAP, including supporting MEMA with review and comments from the FEMA approval process.

Natural Gas and Petroleum Systems Greenhouse Gas Inventory

Client: US EPA Climate Change Division

Project Team Member and Role: Wolf (Task Manager)

Timeframe: 2012 to present

Relevance to Scope of Work: Task 0, Task 1, Task 2, Task 3, and Task 4

ERG has supported EPA's natural gas and petroleum systems greenhouse gas inventory through a range of activities since 2012, including:

- Developed updates to activity data and emission factors based on analyses of Subpart W data and academic studies for many industry segments and sources, including onshore production (e.g., liquids unloading, hydraulically fractured well completions and workovers, pneumatic controllers, tanks), gathering and boosting (e.g., stations, pipelines), offshore production facilities, gas processing plants, transmission (e.g., stations, pipelines), distribution (e.g., pipelines, meters), and refineries. ERG has reviewed more than 100 methane emission studies as part of this effort.
- Developed estimates and documentation, conducted quality assurance/quality control (QA/QC) on the inventory according to the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines.
- Collaborated with industry experts to engage stakeholders throughout the inventory development process by organizing and participating in multiple webinars and stakeholder discussions to fully understand and synthesize stakeholder input into valuable Inventory improvements.

Community Resilience Indicators Inventory and Data Compilation

Client: National Institute of Standards and Technology, Community Resilience Group (as a subcontractor to Applied Research Associates)

Project Team Member and Role: Melanie Sands (Social Scientist)

Timeframe: 2017–2018

Relevance to Scope of Work: Task 1 and Task 2

ERG served as the lead social scientists developing a robust database of resilience indicators. ERG led the review and quality assurance of 40 social science frameworks and methodologies, which include an assortment of composite indicators and measures that were characterized and binned into a sortable, filterable database of approximately 10,000 indicators. ERG also helped download over 200 data sets from the U.S. Census, Bureau of Labor Statistics, National Center for Charitable Statistics, Bureau of Transportation, and other socioeconomic and physical data sets. ERG oversaw the review, download,

Project Descriptions
metadata entry, and data manipulation of these data sets, which were downloaded into a Microsoft Access database at the county level each year. The goal of this work was to help measure county-scale vulnerability to all hazard types.
Development of a Spatial Municipal Vulnerability Index Client: Vermont Agency of Natural Resources Project Team Member and Role: Sands (Project Manager, Social Scientist), Lowe (Technical Advisor for Climate Resilience), Marley (Data Analyst and Tool Developer), Chilton (GIS Analyst and Database Developer) Timeframe: February 2023 to present Relevance to Scope of Work: Task 0, Task 1, Task 2, Task 3, and Task 4
ERG is collaborating with ANR to develop an online municipal vulnerability index (MVI) tool that municipalities and the state can use to identify communities' vulnerability to climate change based on a range of social, economic, and biophysical factors. To develop the tool, ERG: • Conducted background research to evaluate existing tools that inform climate vulnerability. • Developed a tool framework and defined what factors of climate vulnerability will be included in the tool in collaboration with the MVI Task Groups and possible tool users. • Engaged stakeholders and frontline communities through a series of online stakeholder events to ensure that the proposed tool reflects their experiences, expertise, and concerns. • (In process) Developing a prototype and final version of the MVI tool that includes a public interface and user guide. • (Expected) Develop a final report and presentation that documents the work conducted throughout the project as well as an in-depth review of the MVI as it applies to 5 to 7 Vermont municipalities.
Vermont Life Cycle Analysis of Greenhouse Gas Emissions Client: Vermont Agency of Natural Resources Project Team Member and Role: Sands (State Coordinator), Jake Namovich (LCA Analyst) Timeframe: January 2023 to June 2023 Relevance to Scope of Work: Task 0, Task 1, and Task 4
In support of the Vermont 2021 Climate Action Plan, ERG is completing a life cycle analysis (LCA) of the greenhouse gas emissions from the energy sector in Vermont. The LCA will supplement the current VT GHG emissions inventory by assessing emissions that occur outside the boundaries of Vermont due to the use of all energy sources in Vermont. The LCA will provide a more complete understanding of the total GHG impacts from consumption of energy in Vermont. The LCA will cover all types of energy sources such as fossil fuels, biofuels, hydropower, and other renewables. The LCA will provide key information that Vermont needs to support its decision-making as it moves forward with implementing and updating its Climate Action Plan, such as the identification of additional GHG emission sources, where to focus strategic next steps in emission GHG impacts reductions, and how best to prioritize funding for needed programs and technical analyses.

5. References and Vermont Projects

Support for Climate Change Indicators Report and Resources. US EPA Office of Atmospheric Programs, Climate Change Division. (*EPA Contract #68HERH19D0028, Task Order #68HERH23F0132; March 29, 2023, to September 28, 2024; \$308,857; Lisa Bacanskas, 202-343-9758, bacanskas.lisa@epa.gov*). As EPA's lead contractor for the [Climate Change Indicators in the United States](#) initiative since 2008, ERG has played a key role in researching, developing, and effectively communicating a set of more than 50 indicators that track the causes, effects, and impacts of climate change. We have provided wide-ranging support for data analysis; developed public-friendly graphs, maps, and summaries; compiled detailed [technical documentation](#) to ensure transparency; ensured quality control; and performed statistical analysis, graphic design, and desktop publishing. We wrote and laid out four highly polished [print reports, brochures, fact sheets](#), and a web version with interactive dashboard components. ERG's role has included conducting literature research, screening candidate data sets according to EPA's data quality framework, managing files and version control, engaging with academic experts through ad hoc meetings and a stakeholder workshop, coordinating more than a dozen rounds of review leading up to each print publication, responding thoughtfully to more than 1,000 peer review comments, ensuring a proper balance with wording and visuals that promotes understanding without sacrificing accuracy, and maintaining tight production schedules to meet government-mandated publication deadlines.

2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan. Massachusetts Emergency Management Agency. (*Contract #BD-22-1013-RMS00-MITAG-69713; April 13, 2022, to October 31, 2023; \$571,444; Marybeth Groff, 508-820-1435, marybeth.groff@mass.gov*). The 2018 Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) is the Commonwealth's primary risk reduction strategy for natural hazards and climate change. The SHMCAP's mission is to reduce the statewide loss of life, and protect natural resources, property, infrastructure, public health, and the economy from natural hazards and climate change impacts through the development of a comprehensive and integrated state hazard mitigation and climate adaptation program. The SHMCAP acknowledges that climate change is already worsening natural hazards and extreme weather events and incorporates the best available scientific data and projections to account for projected changes in precipitation, temperature, sea-level rise, and extreme weather events to position the Commonwealth to reduce risk and increase resilience. ERG updated the plan with the best available science and included concrete actions to address the needs of socially vulnerable and environmental justice (EJ) communities across MA.

To begin this effort, ERG assessed the state's existing capabilities and adaptive capacity to natural hazards and climate change and identified ways to increase that capacity. ERG then incorporated the 2022 Massachusetts Climate Assessment into the SHMCAP and conducted a supplementary risk assessment to develop a hazards analysis for all FEMA required hazards. Using the best available science and scenarios, we applied a cross-sector approach to assess functional characteristics and the range of risks, determine cascading consequences, and consider people in the community to ensure the most significant consequences of a hazard were captured in the assessment. ERG expanded the 2018 SHMCAP state agency vulnerability assessment. Using the finds of risk assessment, vulnerability assessments and hazards analyses, ERG developed hazard mitigation and climate adaptation strategies that will address the risks specific to sectors, people, and regions of the Commonwealth. Throughout our process, we

held internal and external meetings to incorporate diverse perspectives, build trust, and obtain support for identified priority actions. To support further updates to this plan, ERG developed and documented a process for SHMCAP plan maintenance, review, evaluation, and implementation. We compiled and finalized the SHMCAP, including supporting MEMA with review and comments from the FEMA approval process.

Natural Gas and Petroleum Systems Greenhouse Gas Inventory. US EPA Climate Change Division.

(Contract #68HERH22F0133; 2014-Present; \$1,780,000; Melissa Weitz, 202-343-9897, weitz.melissa@epa.gov). ERG has supported EPA's natural gas and petroleum systems greenhouse gas inventory through a range of activities since 2012, including:

- Developed updates to activity data and emission factors based on analyses of Subpart W data and academic studies for many industry segments and sources, including onshore production (e.g., liquids unloading, hydraulically fractured well completions and workovers, pneumatic controllers, tanks), gathering and boosting (e.g., stations, pipelines), offshore production facilities, gas processing plants, transmission (e.g., stations, pipelines), distribution (e.g., pipelines, meters), and refineries. ERG has reviewed more than 100 methane emission studies as part of this effort.
- Developed estimates, prepared documentation, and conducted quality assurance/quality control (QA/QC) on the inventory according to the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines.
- Collaborated with industry experts to engage stakeholders throughout the inventory development process by organizing and participating in multiple webinars and stakeholder discussions to fully understand and synthesize stakeholder input into valuable Inventory improvements.

Current and Past Vermont Projects

Table 4 provides an overview of ERG's current and past work for the State of Vermont.

Table 4: ERG's Current and Past Work for the State of Vermont.

Project Name	Period of Performance Start Date	Period of Performance End Date	Project #
Urban Air Toxics Monitoring Program Support to the State of Vermont	02/01/1995	10/10/1997	0263422; 0963487
Audit Canisters and Cartridges for the State of Vermont	06/26/1999	06/2000	KG175A00; MW100499; MW120699; MW09699; MW110199
Diagnostic Testing of ATEC Model 301 Canister Sampler	12/1999	03/2000	KG348A00
Certification Testing of ATEC Model 301 Canister Samplers	01/2000	02/2000	KG357A00
VOC/Carbonyl Support and Analysis	04/2000	10/2001	96575
Project KR112503	12/02/2003	02/28/2004	KR112503
Vermont Base Period	02/05/2005	12/31/2010	
Project RL101606A	10/20/2006	02/28/2007	RL101606A
Life Cycle Analysis of GHG Emissions	01/01/2023	12/15/2023	45114
Development of a Municipal Vulnerability Index	01/25/2023	1/24/2024	45202

6. Capacity to Accomplish the Work

As highlighted by the relevant projects in Section 1 and Section 4, the ERG Team has the skills needed to accomplish the work in the RFP. Coordinating with our team is easy, efficient, and convenient. ERG brings a depth of experience in developing web-based tools and dashboards; climate indicators, metrics, and related data; and data governance plans that blend seamlessly for implementing the work under this RFP. The text box (on right) provides links to publicly available example work products that align with these areas of expertise.

Staff Availability

In addition to possessing all the necessary skills to successfully accomplish this work, the ERG Team key personnel and support staff have immediate availability to begin this work. Table 5 highlights the key personnel proposed for the task, their project role, and anticipated percentage of time available to work on this project compared to the percentage of time needed to complete project tasks based on the current scope of work. Should project workflows or task deliverable schedules change, ERG has the bench strength necessary to draw upon a range of qualified staff (e.g., program evaluation specialist, climate and resilience specialist, GHG inventory and data experts, and data services personnel) to bolster team capacity.

Table 5: Summary of Key Personnel and Anticipated Availability.

Key Personnel	Project Role	Estimated Availability Required [a]	Anticipated Project Availability [b]
Melanie Sands	Project Manager (Task 0) and Task 4 Lead	17%	30%
Lindy Lowe	Climate Expert Advisor	8%	10%
Diana Pietri	Program Evaluation and Climate Specialist and Task 2 Lead	10%	15%
AnnaClaire Marley	Climate and Resilience Analyst, Task 3 Lead	18%	25%
Kat Flik	Research and Data Analyst	23%	60%
Marty Wolf	Greenhouse Gas Inventory and Data Specialist	9%	20%
John Koupal	Greenhouse Gas Expert Advisor	5%	5%
Jake Namovich	Greenhouse Gas Inventory and Data Analyst	22%	30%
Jim Chilton	Data Governance and Tool Developer, Task 1 Lead	11%	20%

[a] "Estimated availability required" is the percentage of the person's workload anticipated for this project. It is calculated based on the project hours estimated for that person divided by the hours occurring in nine months of 40-hour work weeks.

[b] "Anticipated project availability" is the percentage of the person's weekly work hours available for this project.

Project Schedule

ERG's proposed project schedule is based on key project tasks and deliverables, as presented in Figure 6. Week 1 of the schedule will be based on the contract award date, and we will include an updated schedule reflecting those dates in the draft work plan. Given the tight project timeline, ERG will discuss the anticipated schedule and any scheduling considerations during the kickoff meeting. We will update the schedule to reflect information learned through the kickoff meeting discussion and include it in the revised workplan. To ensure that tasks and deliverables are completed on time, we will stay in close communication with the CAO Director about the project schedule.

Figure 7 below shows ERG's alternative timeline. We believe that we can complete the project in the same nine-month window outlined in the RFP with a few changes to the timelines of each task. Most notably, we believe that Task 1 will take three to four weeks longer than was originally outlined in the RFP. We believe, however, that there are opportunities to make up this shift later in the project. See Figure 7 for more information.

ERG is accustomed to short turnaround times with projects and has developed a flexible and adaptable approach to achieving these timelines by deploying effective organizational approaches, frequent communication, and involving additional staff to build capacity, when needed. On numerous occasions we have successfully accommodated project timeframes, including the Cape Code Resiliency Economics Project, developing alternatives analysis to mitigate flooding in the Tijuana River watershed, and developing and finalizing reports and trainings on behalf of state of Arizona, all within a timeline of six weeks.

Figure 6: Proposed Project Schedule, Timeframes, and Deliverables.

Project Task/Deliverable	Jan '24	Feb '24	Mar '24	Apr '24	May '24	Jun '24	Jul '24	Aug '24	Sep '24
Phase I									
Task 0: Project Management									
Project Kickoff Meeting	■								
Project Initiation Workplan	■	■							
Ongoing Project Management Tasks [a]	■	■	■	■	■	■	■	■	■
Task 1: Data Governance									
Step 1: Review of Existing Tools & Frameworks	■	■							
Step 2: Identify Data Governance Team	■	■							
Step3: Identify Key Content of DGP with Director	■	■							
Step 4: Develop Data Governance Plan	■	■							
Phase II									
Task 2: Logic Model Dev. and Metric Creation									
Step 1: Develop Logic Models		■	■	■					
Step 2: Develop Use Case Framework & Actions		■	■	■					
Step 3: Determine Metrics		■	■	■					
Step 4: Identify Available Data		■	■	■					
Step 5: External Meetings		■	■	■					
Phase III									
Task 3: Data Mapping									
Step 1: Identify Data Gaps to Fill			■	■	■	■			
Step 2: Interviews			■	■	■	■			
Step 3: Working Sessions			■	■	■	■	■		
Step 4: Develop Data Map			■	■	■	■	■		
Phase IV									
Task 4: Infrastructure Recommendation									
Step 1: Develop Draft Memorandum							■	■	
Step 2: Develop Final Memorandum							■	■	■
Step 3: Presentation to Data Governance Team							■	■	■
Step 4: Presentation to S&D Subcommittee									■
* Assumes contract awarded by 01/08/2024									
[a] Applies to Phases I-IV									

Figure 7: Alternate Proposed Project Schedule, Timeframes, and Deliverables.

Project Task/Deliverable	Jan '24	Feb '24	Mar '24	Apr '24	May '24	Jun '24	Jul '24	Aug '24	Sep '24
Phase I									
Task 0: Project Management									
Project Kickoff Meeting	■								
Project Initiation Workplan	■	■							
Ongoing Project Management Tasks [a]	■	■	■	■	■	■	■	■	■
Task 1: Data Governance									
Step 1: Review of Existing Tools & Frameworks	■	■							
Step 2: Identify Data Governance Team	■	■							
Step 3: Identify Key Content of DGP with Director	■	■	■						
Step 4: Develop Data Governance Plan	■	■	■						
Phase II									
Task 2: Logic Model Dev. and Metric Creation									
Step 1: Develop Logic Models		■	■						
Step 2: Develop Use Case Framework & Actions		■	■						
Step 3: Determine Metrics		■	■	■					
Step 4: Identify Available Data		■	■	■					
Step 5: External Meetings		■	■	■					
Phase III									
Task 3: Data Mapping									
Step 1: Identify Data Gaps to Fill			■	■	■	■			
Step 2: Interviews			■	■	■	■			
Step 3: Working Sessions			■	■	■	■	■		
Step 4: Develop Data Map			■	■	■	■	■		
Phase IV									
Task 4: Infrastructure Recommendation									
Step 1: Develop Draft Memorandum							■	■	
Step 2: Develop Final Memorandum							■	■	■
Step 3: Presentation to Data Governance Team							■	■	■
Step 4: Presentation to S&D Subcommittee									■
* Assumes contract awarded by 01/08/2024									
[a] Applies to Phases I-IV									

7. Certificate of Compliance

CERTIFICATE OF COMPLIANCE

For a bid to be considered valid, this form must be completed in its entirety, executed by a duly authorized representative of the bidder, and submitted as part of the response to the proposal.

- A. **NON COLLUSION:** Bidder hereby certifies that the prices quoted have been arrived at without collusion and that no prior information concerning these prices has been received from or given to a competitive company. If there is sufficient evidence to warrant investigation of the bid/contract process by the Office of the Attorney General, bidder understands that this paragraph might be used as a basis for litigation.
- B. **CONTRACT TERMS:** Bidder hereby acknowledges that is has read, understands and agrees to the terms of this RFP, including Attachment C: Standard State Contract Provisions, and any other contract attachments included with this RFP.
- C. **WORKER CLASSIFICATION COMPLIANCE REQUIREMENT:** In accordance with Section 32 of The Vermont Recovery and Reinvestment Act of 2009 (Act No. 54), the following provisions and requirements apply to Bidder when the amount of its bid exceeds \$250,000.00.

Self-Reporting. Bidder hereby self-reports the following information relating to past violations, convictions, suspensions, and any other information related to past performance relative to coding and classification of workers, that occurred in the previous 12 months.

Summary of Detailed Information	Date of Notification	Outcome
NA- bid does not exceed \$250,000		

Subcontractor Reporting. Bidder hereby acknowledges and agrees that if it is a successful bidder, prior to execution of any contract resulting from this RFP, Bidder will provide to the State a list of all proposed subcontractors and subcontractors' subcontractors, together with the identity of those subcontractors' workers compensation insurance providers, and additional required or requested information, as applicable, in accordance with Section 32 of The Vermont Recovery and Reinvestment Act of 2009 (Act No. 54), and Bidder will provide any update of such list to the State as additional subcontractors are hired. Bidder further acknowledges and agrees that the failure to submit subcontractor reporting in accordance with Section 32 of The Vermont Recovery and Reinvestment Act of 2009 (Act No. 54) will constitute non-compliance and may result in cancellation of contract and/or restriction from bidding on future state contracts.

D. Executive Order 05 – 16: Climate Change Considerations in State Procurements Certification

Bidder certifies to the following (Bidder may attach any desired explanation or substantiation. Please also note that Bidder may be asked to provide documentation for any applicable claims):

1. Bidder owns, leases or utilizes, for business purposes, space that has received:

- ☐ Energy Star® Certification
☒ LEED®, Green Globes®, or Living Buildings ChallengeSM Certification
☐ Other internationally recognized building certification:

2. Bidder has received incentives or rebates from an Energy Efficiency Utility or Energy Efficiency Program in the last five years for energy efficient improvements made at bidder's place of business. Please explain:

Receive rebates on lighting upgrade in Boston office.

3. Please Check all that apply:

- ☒ Bidder can claim on-site renewable power or anaerobic-digester power ("cow-power"). Or bidder consumes renewable electricity through voluntary purchase or offset, provided no such claimed power can be double-claimed by another party.
☐ Bidder uses renewable biomass or bio-fuel for the purposes of thermal (heat) energy at its place of business.
☐ Bidder's heating system has modern, high-efficiency units (boilers, furnaces, stoves, etc.), having reduced emissions of particulate matter and other air pollutants.
☒ Bidder tracks its energy consumption and harmful greenhouse gas emissions. What tool is used to do this? _____
☒ Bidder promotes the use of plug-in electric vehicles by providing electric vehicle charging, electric fleet vehicles, preferred parking, designated parking, purchase or lease incentives, etc..
☐ Bidder offers employees an option for a fossil fuel divestment retirement account.
☐ Bidder offers products or services that reduce waste, conserve water, or promote energy efficiency and conservation. Please explain:

4. Please list any additional practices that promote clean energy and take action to address climate change:

Telecommuting and public transportation incentives reduce business travel

E. Executive Order 02 – 22: Solidarity with the Ukrainian People

- ☒ By checking this box, Bidder certifies that none of the goods, products, or materials offered in response to this solicitation are Russian-sourced goods or produced by Russian entities. If Bidder is unable to check the box, it shall indicate in the table below which of the applicable offerings are Russian-sourced goods and/or which are produced by Russian entities. An additional column is provided for any note or comment that you may have.

Provided Equipment or Product	Note or Comment

Bidder Name: Eastern Research Group, Inc. (ERG) Contact Name: Melanie Sands

Address: 561 Virginia Rd Suite 300 Building 4 Fax Number: _____

Concord, MA 01742 Telephone: 724-833-3401

E-Mail: melanie.sands@erg.com

By: Melanie Sands Name: Melanie Sands
Signature of Bidder (or Representative) (Type or Print)

END OF CERTIFICATE OF COMPLIANCE

8. Price Schedule

ERG PRICE SCHEDULE

A. FIXED PRICE DELIVERABLES:

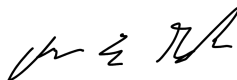
DELIVERABLE DESCRIPTION	FIXED PRICE
TASK 0:	
Deliverable Schedule:	Estimated Cost of Deliverable:
• 1.00 Project Kickoff Meeting two weeks after signing of contract	\$8,993
• 1.01 Project initiation workplan delivered by two weeks after signing of contract	\$17,986
• 1.02 Ongoing project management tasks, including bi-weekly meetings and presentations delivered by two weeks after signing of contract	\$8,393
• 2.00 Ongoing project management tasks, including bi-weekly meetings and presentations delivered by two months after kickoff meeting	\$8,393
• 3.00 Ongoing project management tasks, including bi-weekly meetings and presentations delivered by six months after kickoff meeting	\$8,393
• 4.00 Ongoing project management tasks, including bi-weekly meetings and presentations delivered by nine months after kickoff meeting	\$7,794
Total Costs	\$59,952
TASK 1:	
Deliverable Schedule:	Estimated Cost of Deliverable:
• Review relevant data sources identified by Agency staff	\$9,096
• Up to three Data Team scoping meetings with Agency staff	\$5,457
• Up to three meetings with Data Governance Team on development of Data Governance Plan	\$12,734
• Data Governance Plan draft and final	\$9,096
Total Costs	\$36,382
TASK 2:	
Deliverable Schedule:	Estimated Cost of Deliverable:
• Summary of Framework use cases and categories	\$21,579
• Plan logic models, with identified metrics and data needs	\$21,579
• Up to 4 meetings with Agency Staff which may also include the S&D Subcommittee and/or Data Governance Team	\$18,496
Total Costs	\$61,654
TASK 3:	
Deliverable Schedule:	Estimated Cost of Deliverable:
• Up to three working sessions with Agency staff which may also include the Data Governance Team and/or S&D Subcommittee	\$9,311
• Up to 7 data manager interviews	\$6,983
• Data map indicating logic model, lmetric, data source, and data characteristics	\$30,259
Total Costs	\$46,553
TASK 4:	
Deliverable Schedule:	Estimated Cost of Deliverable:
• Draft and final Phase 4 memo to ANR staff	\$24,818
• Presentations to Data Governance Team and to S&D Subcommittee	\$10,636
Total Costs	\$35,454
TOAL PROJECT COST	\$239,995

B. HOURLY LABOR RATES:

Service Category / Title of Positions (ERG Priced by Person)	Hourly Rate
Melanie Sands	\$130.71
Lindy Lowe	\$244.99
Diana Pietri	\$137.54
AnnaClaire Marley	\$116.56
Kat Flik	\$80.48
Marty Wolfe	\$169.34
John Koupal	\$227.08
Jake Namovich	\$101.82
Jim Chilton	\$202.77
Sean van der Heijden	\$76.06
Mindy Mitchell	\$141.99

Name of Bidder : Eastern Research Group, Inc.

Signature:



Charles Goodhue / Vice President

Date: November 17, 2023

Melanie Sands

Project Manager, Task 0, and Task 4 Lead



Summary of Experience

Melanie Sands brings over 15 years of experience providing socioeconomic research, analysis, evaluation, and stakeholder engagement at local, state, and federal levels. She is skilled at leading projects that integrate qualitative and quantitative approaches to develop a deeper understanding of program activities, processes, and impacts that can be translated into actionable findings and recommendations. She has led numerous tasks for federal agencies focused on building resiliency, measuring economic and social impacts of programs and policies, and developing tools for use in impact assessment. Ms. Sands has gained a nuanced understanding of Vermont's climate vulnerabilities and data used to measure them through her current role managing the development of a municipal vulnerability index for the State.

Ms. Sands has extensive experience coordinating and facilitating expert panels, task groups, and stakeholder interviews; developing logic models; compiling and analyzing public and private datasets; developing logic models and process maps; and developing project summary reports.

EDUCATION

M.A., Environmental Science & Policy, Clark University, 2007

B.A., Environmental Studies, Bethany College, 2002

EMPLOYMENT

Senior Social Scientist, Eastern Research Group, Inc. (ERG), 2009–present

Community Organizer, Southeast Alaska Conservation Council, 2007–2008

Brownfields Coordinator, Kelly's Creek Communities Association, 2003–2004

RELEVANT PROJECTS

Vermont Municipal Vulnerability Index, Vermont Agency of Natural Resources. Project Manager overseeing the development and design of an online tool for municipalities to use to assist them in determining vulnerability within their towns. Led efforts to engage municipal officials, regional planning commissions, and organization representing vulnerable populations to gather input of key factors of climate vulnerability and various aspects of tool function an implementation. Engaging with the Municipal Vulnerability Index Task Group to gather input on key project deliverables and decisions. Project will culminate in tool used by the state, regional planning organizations and local towns to identify risks, prioritize resources, and determine most effective actions to take to increase resilience.

Hurricane Maria Research Services, National Institute for Standards and Technology. Currently supporting National Institute for Standards and Technology (NIST) investigation of the impacts of Hurricane Maria on Puerto Rico. Leading efforts to gauge the recovery of critical social functions in the education and health sectors. Overseeing the collection of surveys from 400 schools and 44 hospitals to inform lessons learned about their resilience and recovery process as it relates to the hurricane. Developed sample frames from publicly available data, provided input on client-developed questionnaires, developed data collection methods and protocols for university students implementing the surveys in Puerto Rico, and is currently overseeing the data collection

process. Future tasks will include summarizing data collection findings and developing presentations to convey task results.

Technical Support for a Resilience Indicators Inventory to Inform the Community Resilience Assessment Methodology, NIST. Co-led the development and population of an inventory of existing community resilience frameworks and methodologies. Developed a draft Microsoft Excel database for capturing framework information. Reviewed and input framework data, including the type of resiliency addressed by the framework, the resiliency indicator, indicator measures, and the spatial and temporal coverage of the framework. Performed quality control (QC) review of completed database entries.

Evaluation of State Coastal Zone Management Programs and National Estuarine Research Reserves, NOAA Office for Coastal Management. Developed a process for streamlining the preliminary performance assessment phase of NOAA's state-based Coastal Zone Management Program and the National Estuarine Research Reserves System evaluations required under the Coastal Zone Management Act. Designed data tables to capture process and outcome evaluation information, reviewed and extracted data from program documentation and metrics for two coastal programs and two reserves, conducted QC review of five other sites (two programs, three reserves), conducted process and outcome evaluations for each selected site based on the content of the data tables, and developed a summary report of the evaluation methods and findings.

Economic Benefits of NOAA Office of Coastal Management Resilience Grants, NOAA Office for Coastal Management. Co-led the development of a set of simple, repeatable, and economically defensible metrics and methodologies to help NOAA Office of Coastal Management (OCM) and their grantees quantitatively estimate and qualitatively present the economic benefits of their grant activities focused on helping communities become more resilient and mitigate losses associated with severe weather and flooding. Conducted interviews with NOAA staff and grant leads for nine OCM resilience grants. Developed a value chain for five grants to visually tell the story of how the grant's activities create economic value, and applied valuation methods to quantify the benefits identified in each value chain using publicly available data and literature. Provided QC review of valuation methodology guides developed for grantees to ensure accuracy and clarity of content.

Impacts of Coastal Zone Management Act Programs: Preparing for Economic Analyses for the National Estuarine Research Reserve System and State Coastal Programs, NOAA OCM. Led the outreach, scheduling, and implementation for 22 interviews with state coastal programs. Assisted in developing an online survey tool to solicit feedback from program managers regarding key activities, outputs, outcomes, and related benefits. Developed value chains for key program activities based on interview findings. Assisted in developing methods to estimate the value of key program activities that were implemented in a pilot of select programs.

Evaluation of Accuracy and Completeness of Nonfatal Injury and Illness Reporting in the Mining Industry, Mine Safety and Health Administration. Evaluated the level of underreporting in Mine Safety and Health Administration's (MSHA) Part 50 injury and illness data by collecting and synthesizing relevant publicly available information, such as federal regulations, agency policies, and state trauma registry data; developing interview questionnaires; conducting interviews with miners, mine operators, and MSHA staff; and analyzing agency injury, audit, and violation data.

Assessing the Economic Impact and Benefits of NOAA's Small Business Innovation Research Program and Cooperative Research and Development Agreement Program, NOAA Technology Partnership Office. Determined economic impacts and developed a database of program participants and beneficiary information by compiling and reviewing agency data. Developed stakeholders interview guides, led interviews of select participating program companies, and developed interview summaries. Assisted developing an electronic questionnaire that will be implemented to over 140 program participants. Analyzed survey data to determine direct and indirect program benefits. Developed case studies based on information gleaned from interviews and survey data to highlight program benefits for audiences within and outside the agency.

Indicators for a Resilient Tourism Industry, NOAA. Developed a set of indicators to measure the resiliency of coastal tourism. Established panels of individuals with experience and insight into tourism resiliency and/or the tourism industry in two geographic areas. Assisted in developing a multi-round electronic survey for panel participants, including survey approval through the Office of Management and Budget. Implemented the survey and assisted in analyzing results and developing a final written report that captured the project process and findings.

Lindy Lowe

Climate Expert Advisor



Summary of Experience

Lindy Lowe has more than 20 years of experience designing and leading multi-sector climate and hazard resilience projects and programs at regional, state, and local scales. Her approach is built on community and stakeholder engagement, as well as structured decision-making.

Ms. Lowe has worked at the intersection of resilience, environment, equity, and land use throughout California. She has designed and led projects and programs built on a foundation of equity, economy, ecology, and governance. Ms. Lowe partnered with the National Oceanic and Atmospheric Administration to create the Adapting to Rising Tides program, a nationally recognized adaptation planning program built on a collaborative process that seeks to understand and address vulnerability through engagement, assessment, and adaptation strategy development and implementation.

Ms. Lowe has designed and led stakeholder and community engagement with an emphasis on historically marginalized communities and large multi-sector stakeholder working groups. She was the technical advisor for the city and county of San Francisco's update to their Climate Action Plan and Local Hazard Mitigation Plan. Other organizations that Ms. Lowe worked closely with include the California Department of Transportation, Port of San Francisco, Metropolitan Transportation Commission, East Bay Regional Park District, Bay Area Rapid Transit, the city of Oakland, and the city of Hayward.

EDUCATION

Master of Urban and Regional Planning,
Master of Public Policy and Juris Doctor,
University of California, Los Angeles,
1998

B.A., Architecture and Urban Planning,
Minor in Environmental Studies,
University of California, Los Angeles,
1995

EMPLOYMENT

Director of Climate and Hazard Resilience,
Eastern Research Group, Inc. (ERG), June
2020–present

Chief Resilience Officer, Port of San
Francisco, 2017–2021

Director of Planning and Policy, Bay
Conservation and Development
Commission, San Francisco, California,
2010–2017

Adapting to Rising Tides Program Manager,
San Francisco, California, 2011–2016

RELEVANT PROJECTS

Vermont Municipal Vulnerability Index, *Vermont Agency of Natural Resources*. Technical lead and strategic advisory for the development and design of an online tool for municipalities to use to assist them in determining vulnerability within their towns. Identified the factors and indicators of vulnerability in Vermont based on data on current and future hazards, social vulnerability, economy and jobs, governance and capacity challenges, and natural resources. Currently engaging towns throughout Vermont to identify key factors of vulnerability, including rural capacity, lack of redundancy, funding and resource challenges, and other considerations related to identifying and implementing plans and projects to reduce risk. Project will culminate in tool used by the state, regional planning organizations and local towns to identify risks, prioritize resources, and determine most effective actions to take to increase resilience.

Funding and Governance to Advance Nature Based Solutions at Scale, *The Nature Conservancy*. Project manager supporting The Nature Conservancy, the state of California, and Mariposa County to identify governance and funding approaches to improve the funding of conservation, restoration, and management projects for climate benefits in natural and working lands. Conducted research, interviewed subject matter experts throughout California, led a group of advisors on the project, and developed finding and recommendations for a new governance structure that would increase the effectiveness and efficiency of nature-based solution projects, reduce the administrative burden of the current funding approaches, and provide significantly more funding to

advance projects at the scale necessary to meet the State of California's climate mitigation and adaptation goals. Engaged Mariposa County as a pilot study area to identify specific opportunities and challenges for new governance and funding mechanisms.

San Francisco Bay Regional Shoreline Adaptation Plan, Bay Conservation and Development Commission. Strategy and technical lead supporting the development of the San Francisco Bay Regional Shoreline Adaptation Plan as a subcontractor to Mithun Architecture and Design. The Bay Conservation and Development Commission is designing a Regional Shoreline Adaptation Plan that will guide the climate adaptation of nine counties along the shoreline of the San Francisco Bay estuary, with a priority on equity and frontline communities, the health of communities and the ecology, and a focus on local government planning and actions. The project includes development of visions and goals for critical topic areas, the selection and design of metrics to measure progress on climate resilience within each municipality and across the region, a framework to support local subregional plan design, and a set of criteria for how the State and the region will assess the adequacy of local plans.

Commonwealth of Massachusetts ResilientMass Plan, Massachusetts Emergency Management Agency. Technical lead for the 2023 update to the Massachusetts' State Hazard Mitigation and Climate Adaptation Plan, also known as the ResilientMass Plan. The effort, which began in 2022, includes a significant update to the climate science and scenarios contained in the previous plan, an expansion of the vulnerability and consequences assessment to include climate justice, sustainability, and community and neighborhood considerations, and includes significant engagement with a working group of state agencies and other key stakeholders. The project outcomes include the development, prioritization, and adoption of a range of actions to reduce risks from coastal and inland flooding, extreme heat and urban heat island, hurricanes, and other hazards. Considerations for rural communities and the unique vulnerabilities and capacity concerns are also a focus of the work. Serving as the technical lead, Ms. Lowe is managing a large team of ERG staff, as well as sub-consultants.

Sonoma County Climate Resilient Lands Strategy, County of Sonoma, California, and Agricultural and Open Space. Project manager and technical lead to develop a comprehensive natural and working lands strategy. The primary hazards included coastal flooding, sea level rise, and extreme heat. Conducted analysis on current and future projections, opportunities to increase carbon sequestration and identified areas and communities most at risk, developed indicators of ecosystem and community benefit, and designed evaluation criteria for use when designing and ranking projects. The Lands Strategy includes a detailed framework that County agencies and their partners can use to help design and fund resilience projects that benefit tribes, rural and under-resourced communities, small farm owners, and farm workers. The document also highlights recommendations on system-scale approaches at the county scale to increase the benefits of risk reduction projects for urban cooling and flood and fire management, as well as high-lighting the unique risks of the county's rural communities and opportunities to increase the capacity and resources available to those communities.

U.S. Environmental Protection Agency (EPA) Labs Climate Resilience Assessments, EPA Office of Administration. Technical lead to develop a framework and methodology to assess EPA facilities for climate and non-climate hazards and identifying opportunities to reduce greenhouse gas emissions while making sites more resilient to risks from climate change. Developed a package of materials to guide the process from vulnerability assessment, risk and consequence, and recommended adaptation actions to address risks including flooding, extreme heat, wildfire, extreme precipitation, hurricane, and others. Completed the assessment and developed findings and action recommendations for each facility. Work included developing a decision-making and prioritization framework and project scopes for recommended projects to reduce risk from extreme heat, flooding, sea level rise, and other hazards using green infrastructure approaches, as well as other green and grey infrastructure, reducing greenhouse gas emissions, and measuring effectiveness of alternatives.

John Koupal

Greenhouse Gas Expert Advisor



Vehicle emissions expert with 30+ years of experience in transportation emissions research, modeling, and policy

- Developed innovative methods to quantify air pollution and fuel consumption from cars and trucks; assessed current and future impacts of clean vehicle and fuel policies at the local, state, federal, and international levels; and led lifecycle modeling assessment for alternative fuels.
- Led trainings and workshops in the United States, Latin America, and Asia on the Motor Vehicle Emission Simulator (MOVES) model and a range of vehicle emissions issues, including ports and heavy trucks.
- Before joining ERG, directed the EPA group responsible for mobile source modeling and emission inventory development. Led development of the MOVES model and supported regulation development, technical feasibility, and emission inventory and forecasts for several EPA rules addressing light-duty vehicles, heavy-duty trucks, renewable fuels, and offroad equipment.

EDUCATION

B.S.E., Industrial and Operations Engineering,
University of Michigan, 1989

EMPLOYMENT

Vice President/Principal Engineer, Eastern
Research Group, Inc. (ERG), 2012–present
Director, Air Quality and Modeling Center, EPA
Office of Transportation and Air Quality (OTAQ),
2006–2012

Environmental Engineer, EPA OTAQ, 1997–2006
and 1989–1995

Senior Staff Engineer, Nissan Research and
Development, 1995–1997

RELEVANT PROJECTS

Support and MOVES Improvements for National Emissions Inventory, EPA. Managed a project to help EPA transition the onroad portion of the National Emissions Inventory (NEI) from MOBILE to MOVES. State, local, and tribal air agencies submitted local inputs for MOVES, resulting in vehicle fleet and activity data submissions for over 1,400 counties. ERG supported this effort by compiling, quality assuring, and formatting state-submitted MOVES data and then running MOVES in a cloud-computing environment to produce the needed emissions factors. The Coordinating Research Council (CRC) also contributed to this effort by sponsoring two projects aimed at improving the MOVES inputs. ERG first analyzed the county-level data submitted by the states, finding significant variability in the data versus MOVES defaults, which resulted in a high degree of sensitivity in total emissions predicted by MOVES. ERG then identified national data sets that could be used to improve default onroad inputs at the local level and updated these defaults for vehicle age distribution, vehicle population, and long-haul truck vehicle miles traveled.

Inventory Guidance Related to GHGs, Commission for Environmental Cooperation. Led the ERG team in developing black carbon emissions estimation guidelines for North America, including technical work for mobile source inventories. The guidelines promote consistency in the methods and data used for black carbon emissions inventories in the United States, Canada, and Mexico. Developed a series of recommendations for “best practice” approaches by major sector (e.g., mobile, open burning, residential, energy/industrial) and alternatives where best practice is not feasible in the short term. An international expert panel was then convened to review and provide comments on these initial recommendations to ensure consensus on the proposed methods and data sources. Based on this initial work and expert panel input, the guidelines were compiled to fill in specific sources of emissions, activity, and speciation factors, with the goal of providing sufficient detail to allow inventory developers across North America to construct black carbon emissions inventories for all sectors. The final guidance document (published on the [Commission for Environmental Cooperation’s website](#)) includes recommendations for each sector and summarizes the results of the literature search, evaluation, and expert panel process.

Renewable Fuel Standard Analysis, City of Portland, Oregon. Led an assessment of the effect of switching to either 100 percent renewable diesel or a blend of renewable and biodiesel on the emissions of Portland's onroad and nonroad diesel fleet in 2028. ERG analyzed raw test data to determine emission impacts on different technology engines and applied this to Portland's onroad and offroad diesel inventory to assess total emission impacts from different blend options. Our analysis of Portland's diesel emissions inventory in 2028 indicated that, relative to B5, introduction of R100 would reduce ozone-forming pollutants (VOC and NOx), carbon monoxide, and particle emissions (PM2.5) from Portland's diesel fleet.

Addressing Truck Emissions and Noise at Freight Bottlenecks, Federal Highway Administration. Led an assessment of exhaust, brake, and tire emissions at freight truck bottlenecks, culminating in three case studies (Tacoma, Washington; Port of Houston, Texas; Chicago, Illinois) that estimated baseline emissions and the impact of several mitigation scenarios including highway expansion, bans on old trucks, electrification, and traffic smoothing. Directed ERG efforts to set up a MOVES project-scale feature for each case study, incorporated traffic data from DANA supplied by the prime, and developed approaches to model each mitigation measure within MOVES. Developed novel approaches to account for port truck activity within terminals and reflect mitigations targeted at port and/or local fleets.

Evaluation of Telematics Data to Improve Vehicle Emission Inventories (Multiple Projects), EPA/OTAQ and CRC. Led project CRC A-100 to provide state and local air agencies and EPA with more accurate vehicle activity data for MOVES2014a, based on the broadest application of telematics data for emissions modeling to date. ERG worked with StreetLight Data, Inc., to synthesize data from millions of personal and commercial vehicles operating on roads across the United States into MOVES2014 county database inputs of average speed and vehicle miles traveled distribution, which were used in the 2014 NEI. Led follow-on project CRC E-131 to evaluate multiple sources of telematics data to assess capabilities and limitations of telematics for improving vehicle emission inventories.

Martinus (Marty) E. Wolf

Greenhouse Gas Inventory and Data Specialist



Summary of Experience

For nearly 30 years, Marty Wolf has developed a wide range of source-specific and regional emissions inventories for use in air quality planning, including climate action plans (CAPs), state implementation plans, National Environmental Policy Act compliance plans, and broad-use air quality modeling studies.

He has served as a project/task manager and primary technical lead for many greenhouse gas (GHG), criteria pollutant, and air toxics emissions inventory projects in Alaska, Arizona, Arkansas, Connecticut, Hawaii, Idaho, Louisiana, Nevada, New Mexico, Oregon, and Texas, as well as in Mexico and several California air districts. His roles in these projects have included project/task management, planning and scoping, data collection, emissions estimation, and quality assurance/quality control (QA/QC). He has also been involved with identifying control strategies and quantifying associated emissions reductions. In addition, Mr. Wolf supported the California Air Resources Board's (CARB's) first in-house training program for accrediting GHG verifiers.

EDUCATION

M.S., Civil Engineering, Stanford University, 1994

B.S., Civil Engineering, Stanford University, 1994

B.A., Japanese, Stanford University, 1994

EMPLOYMENT

Senior Engineer, Eastern Research Group, Inc. (ERG), 2000–present

Research Assistant, Electric Power Research Institute, 1993–1994

Field Assistant, City of Palo Alto Public Works Department, 1992

Intern, Nihon Management Academy, 1991

RELEVANT PROJECTS

U.S. GHG Inventory Development and Technical Support—Natural Gas and Petroleum Systems, U.S. Environmental Protection Agency (EPA). Served as task manager for development of the 1990–2011 U.S. GHG Emissions Inventory for the natural gas production, processing, transmission and storage, and distribution sectors. Identified updates to activity data and emissions factors. Led team in estimating all GHG emissions from all source categories. Reviewed inventory text, spreadsheets, appendices, and submittal to the EPA inventory coordinator for inclusion in overall national inventory. Helped revise emissions projection methodologies for liquids unloading and well completions, as well as workovers with hydraulic fracturing. Developed an estimation method for the previously un-inventoried produced water source category. Performed a comprehensive review of voluntary reductions contained in EPA's Natural Gas STAR database. Estimated emissions and developed text discussion sections for the natural gas systems portion of the inventory. Served as senior technical advisor to the natural gas and petroleum systems inventory from the 1990–2013 inventory to the currently under-development 1990–2022 inventory.

U.S. GHG Inventory Development and Technical Support—Industrial Process and Product Uses, EPA. Served as technical lead for development of the 1990–2011 and 1990–2012 U.S. GHG Emissions Inventory for four industrial process source categories: iron and steel production, ferroalloys production, lead production, and zinc production. Updated activity data and emission factors and led the team in estimating all GHG emissions. Reviewed inventory text, spreadsheets, appendices, and submittal to the EPA inventory coordinator for inclusion in overall U.S. inventory. Ensured that no double counting occurred due to overlap with the energy sector inventory. Continued to support the iron and steel source category for the 1990–2013, 1990–2014, and 1990–2015 inventory years.

Provided Tier 1 QA/QC activities for all chemicals, minerals, and metals source categories in the 1990–2013 and 1990–2014 Industrial Process and Product Uses inventory

Alameda CAP Update, City of Alameda, California. Provided technical assistance for the GHG mitigation portion of this CAP update for Alameda, California. Provided technical analysis of seven non-electric vehicle mitigation strategies, including bikeway construction, free mass transit passes, a new BART transbay tube, telecommuting, traffic signal synchronization, peak-hour congestion pricing, and bans of two-stroke gasoline lawn and garden equipment.

Cap-and-Trade Model Rule Development, Western Climate Initiative. Technical specialist on the ERG team that helped develop a model mandatory rule for GHG reporting for Western Climate Initiative (WCI) jurisdictions in the United States and Canada: Arizona, British Columbia, California, Manitoba, Montana, New Mexico, Ontario, Oregon, Québec, Utah, and Washington. Led research and analysis of existing GHG emissions quantification and monitoring requirements for several industrial sectors (e.g., iron and steel manufacturing, ferroalloy production, pulp and paper manufacturing, adipic acid production, nitric acid production, phosphoric acid production, magnesium production, electronics manufacturing, lead and zinc production, coal storage, coal mining, sulfur hexafluoride from electrical equipment) to assess relevancy for mandatory reporting under WCI's cap-and-trade program. Recommended specific methods for use in WCI's cap-and-trade reporting program. Presented recommendations to the WCI Reporting Committee to receive comments. Made changes and finalized methods in rule format.

Development of Mandatory GHG Reporting Requirements, Western Climate Initiative. Technical specialist on the ERG team that helped the WCI Oil and Gas Workgroup develop essential requirements of mandatory reporting. Provided detailed summaries of the draft subpart W (Oil and Natural Gas Systems) from EPA's Mandatory Reporting Rule (MRR), as well as public comments concerning the draft subpart W. Analyzed methods provided by the American Petroleum Institute and the Canadian Association of Petroleum Producers. Analyzed the applicability of the MRR to refinery fuel gas and field gas. Investigated test methods and protocols for determining the gas-to-oil ratio. Researched topics associated with pneumatic control devices, well venting, storage tank flashing losses, fugitive emissions, flares, and refinery fuel.

GHG Verifier Training Program, CARB. Technical specialist on an ERG team developing verification training materials as part of a curriculum to accredit GHG verifiers under CARB's mandatory GHG reporting regulation. Sectors of responsibility included electricity generation and cogeneration units, electric power entities, and three process sectors (nitric acid production, pulp and paper manufacturing, and iron and steel production). Developed outlines of the revised CARB regulation and slide-by-slide outlines for each sector of responsibility. The outlines were used to develop presentations for training sessions. Interfaced with CARB staff experts regarding sector-specific issues and ambiguities. Presented materials in two webinars and two live training sessions (in Sacramento and El Monte).

Village Emissions Inventory, Bureau of Ocean Energy Management. Technical lead for development of a comprehensive 2012 base year emissions inventories for the eight village communities in North Slope Borough, Alaska: Anaktuvuk Pass, Atkasuk, Barrow (since renamed Utqiagvik), Kaktovik, Nuiqsut, Point Hope, Point Lay, and Wainwright. These inventories included point, area, onroad motor vehicle, and nonroad mobile sources and accounted for unique conditions such as extreme temperatures, year-round heating, unregistered vehicle fleets, increased idling behavior, lack of paved roads, extremely high levels of snowmobile and ATV ownership, and specialized fuel characteristics. Conducted onsite surveys to collect information for area, onroad motor vehicle, and nonroad mobile sources during a one-week data collection visit. Developed inventories for use in regional air quality modeling and helped develop spatial surrogates and subsequent spatial allocation of emissions from all sources—including snowmobiles, ATVs, and fishing vessels—based on subsistence hunting patterns for bowhead whale, caribou, moose, walrus, and other species.

Diana Pietri, Ph.D.

Program Evaluation and Climate Specialist,
Task 2 Lead



Summary of Experience

Dr. Diana Pietri has more than 15 years of experience and a deep understanding of best practices for climate adaptation and resilience, including the development of climate resilience indicators, metrics, and logic models. Dr. Pietri supports and leads the development of firm projects with specializations in monitoring, evaluation, and learning; development of frameworks to assess climate resilience progress and impacts; and community engagement and facilitation.

Dr. Pietri has extensive experience working with state and local agencies and their partners to co-create strategies to measure resilience and the progress of climate adaptation. Through her work, she has supported a wide array of clients, including state and local agencies (e.g., the county of Sonoma, California; the California Department of Fish and Wildlife; the Massachusetts Emergency Management Agency), the federal government, nonprofit organizations, academic institutions, and private businesses. Since 2021, Dr. Pietri has served as an active member of ERG's Diversity, Equity, and Inclusion Committee as well as the co-chair of the committee's Environmental Justice Subcommittee.

EDUCATION

Ph.D., School of Environmental and Forest Sciences,
University of Washington, 2015

Master of Marine Affairs, School of Marine and
Environmental Affairs, University of Washington,
2008

B.A., Ecology, Evolution, and Environmental Biology,
Columbia University, 2003

EMPLOYMENT

Senior Social Scientist, Eastern Research Group, Inc.
(ERG), 2015–present

Independent Consultant, EcoAdapt, 2014–2015

Philippine Field Coordinator, U.S. Coral Triangle
Initiative Learning Project, 2012–2013

Program Manager, California Ocean Science Trust,
2008–2010

RELEVANT PROJECTS

ResilientMass Plan, Massachusetts Emergency Management Agency. ERG helped the Commonwealth of Massachusetts develop its [2023 ResilientMass Plan](#), which was an update to the 2018 State Hazard Mitigation and Climate Action Plan (SHMCAP). ERG updated the 2018 SHMCAP with the best available science and included concrete actions to address the needs of socially vulnerable and environmental justice (EJ) communities across Massachusetts. As part of this process, Dr. Pietri led the development and implementation of a state agency survey to assess agency vulnerabilities and identify concrete strategies to strengthen resilience. ERG also assessed climate risks to the commonwealth. Using the findings of the risk assessment, vulnerability assessments, and hazards analyses, ERG developed measurable hazard mitigation and climate adaptation strategies that address the risks specific to sectors, people, and regions of the Commonwealth. Throughout our process, we held internal and external meetings to incorporate diverse perspectives, build trust, and obtain support for identified priority actions.

Sonoma County Climate Resilient Lands Strategy, County of Sonoma, California. The County contracted ERG to create a Climate Resilient Lands Strategy. Dr. Pietri supported development of the Lands Strategy, which emphasized and highlighted the critical role that natural and working lands must play in climate adaptation, greenhouse gas emission reductions, and resilience building. The ERG team worked with County staff, a technical advisory committee, and implementation advisory group to identify actions to mitigate impacts of climate change through prioritizing resilience projects and developing implementation steps. ERG synthesized information from relevant plans, programs, and data sets, collated landscape resilience attributes and vulnerabilities, considered

the priorities and objectives, and drafted recommendations for adaptation actions and projects, as well as indicators and performance and evaluation criteria to assess potential resilience projects and measure progress toward the Lands Strategy's goals.

Evaluation of the National Coastal Resilience Fund and Hurricane Sandy Coastal Resiliency Program (Sandy), National Fish and Wildlife Foundation. Throughout the coastal United States, climate change is resulting in extreme weather events that are more intense, more frequent, and longer lasting. To address and mitigate these threats from climate change, National Fish and Wildlife Foundation (NFWF) has invested in sustainable coastal communities through the National Coastal Resilience Fund (NCRF) and Sandy programs, in partnership with the National Oceanic and Atmospheric Administration, the U.S. Department of the Interior, and other organizations. Dr. Pietri is leading an evaluation supporting NFWF in assessing the outcomes of the NCRF and Sandy investments. This evaluation will examine outcomes of up to 125 NCRF and 39 Sandy grants, including ecological and community resilience outcomes achieved by grantees, broader impacts stemming from implementation of the grants, and the long-term sustainability of ecological and community resilience outcomes. The evaluation will also assess how grant outcomes are distributed to various communities, the extent of direct engagement of vulnerable communities in grant activities, and potential strategies to help grantees conduct resilience projects in and with underserved communities. The evaluation process will consist of document review, metrics and geospatial analyses, grantee survey and interviews, and site visits. Major deliverables will include draft and final evaluation reports and draft and final presentations to NFWF and program partners summarizing findings.

Evaluating the Impacts of Disaster Response and Recovery Funding to Low-Income Communities, Legal Services Corporation, Inc. Dr. Pietri led an evaluation assessing the impacts and effectiveness of a grant Legal Services Corporation, Inc. received to strengthen the delivery of legal aid disaster services to low-income communities in the Midwest. Through a participatory process involving LSC's Midwest legal service grantees and their partners, this project gathered qualitative data related to grant progress, success, challenges, lessons learned, and opportunities for the future. Dr. Pietri led participatory meetings with grantees, developed a conceptual framework and logic model to illustrate the program's goals and outcomes, led qualitative interviews, and led document and literature review. As a final stage of the analysis, Dr. Pietri facilitated a participatory concept-mapping exercise with grantees to verify and ground-truth findings and analysis collected throughout the evaluation.

Santa Clara River and Coastal Habitat Strategic Planning, Confidential Client. ERG supported an anonymous nonprofit/NGO in developing a strategic plan to protect and restore an area of high biodiversity in Southern California. The plan included strategies for land acquisition, stewardship, land use prioritization, public access infrastructure, and restoration of critical coastal and river habitats, in addition to considering strategies for equitable and effective community engagement, access, and stewardship. The participatory strategic planning process included conducting web research and interviews with key stakeholders such as community leaders, experts, government partners, the philanthropic community, the private sector, and nonprofit organizations. ERG presented a straw proposal of a high-level 10-year and detailed 3-year strategic business plan—including the presentation of detailed logic models—at a two-day retreat with the client's steering committee. In addition, ERG developed a funder database and revenue model organized by project goals. At the retreat, ERG shared key findings and discussed revisions to draft the final strategic business plan.

Lake Tahoe West Restoration Partnership Monitoring Plan Development, California Tahoe Conservancy. Dr. Pietri led a collaborative process with Lake Tahoe West (LTW) stakeholders to build consensus around shared goals and visions for the LTW region and develop a Monitoring Plan. ERG researched existing ecological and socioeconomic indicators and monitoring programs to craft a subset of essential ecological and socioeconomic indicators. ERG also acted as a neutral facilitator and consulted with stakeholders and agencies to finalize indicators. ERG is currently developing an economically feasible LTW Monitoring Plan that builds off existing monitoring programs, applies to the landscape scale, and considers adaptive management. The Monitoring Plan serves as the foundation for a Lake Tahoe Basin-wide monitoring program.

Jim Chilton

Data Governance and Tool Developer, Task 1
Lead



Summary of Experience

Jim Chilton is a senior software engineer with over 16 years of experience building software solutions for the U.S. Environmental Protection Agency (EPA) and other federal agencies. He has worked extensively with environmental facility data over the last decade to reduce the burden on industry reporters, improve data quality, and make the data available to the public and other stakeholders.

He has collaborated with EPA regions and Headquarters, emergency responders, other federal agencies, states, and tribes to build software to meet shared goals.

He is working with the state of Vermont to implement a Municipal Vulnerability Index (MVI) geospatial tool. He is building out an application that is leveraging dozens of data sets, and he will be conducting geospatial analysis and processing to help flag specific municipalities for elevated risk.

EDUCATION

Graduate Certificate, Geospatial Information Systems,
North Carolina State University, 2022

M.I.T, Information Technology, Virginia Polytechnic
University, 2013

B.B.A., Computer Information Systems, James Madison
University, 2007

EMPLOYMENT

Senior Engineer, Eastern Research Group, Inc. (ERG),
2023–present

Senior Developer, CGI Federal, 2017–2023

Senior Developer, INDUS Corporation, 2009–2017

Technical Consultant, BearingPoint, 2007–2009

RELEVANT PROJECTS

MVI Tool, State of Vermont. The MVI tool will allow users to view a variety of data sets geospatially. The tool will also likely allow users to view summary data about the vulnerability risk levels by municipality for further analysis. Is responsible for integrating dozens of geospatial layers into an ArcGIS Online Web Map, building a web application in ArcGIS Experience Builder, and generating a data set for flagging risk levels for municipalities.

Enforcement and Compliance History Online (ECHO), EPA. ECHO provides fast, integrated searches of EPA and state data for more than 800,000 regulated facilities. ECHO focuses on inspection, violation, and enforcement data for the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act, and it includes Safe Drinking Water Act and Toxics Release Inventory data. Is responsible for new development and enhancement tasks in an Oracle database. The tasks focus on extract, transform, and load data as well as web service changes.

Facility Registry Service, EPA. Facility Registry Service (FRS) is a centrally managed database that identifies facilities, sites, or places subject to environmental regulations or of environmental interest. FRS provides internet access to a single integrated source of comprehensive (air, water, and waste) environmental information about those facilities, sites, or places. Mr. Chilton was responsible for the technical lead and new development tasks of FRS. Developed and tested new Oracle PL/SQL source code, performed extensive cross-walking between data sources to map fields to the database, and debugged database issues and submitted solutions.

Worked daily in a production environment loading and processing data and supported large-scale server migrations. Built Oracle Application Express (APEX) and Qlik applications. Built ArcGIS Feature services, geodatabases, and Esri web maps/apps; implemented Python scripts; performed various geospatial analysis and processing in ArcGIS Pro; and leveraged Oracle spatial. Built back-end Java solutions focusing on REST APIs, Maven,

and JAX-RS 2.0. Created and reviewed documentation (requirements, design, and testing) and applied processes to maintain a Capability Maturity Model Integration level 3 maturity rating. Participated in or provided feedback on a variety of workgroups, including a data governance group.

Central Data Exchange Facility Widget, EPA. The Facility Widget tool allows industry reports to submit data to EPA and is leveraged in a variety of Central Data Exchange (CDX) applications. The tool leveraged a variety of data quality checks, had a geospatial component, and leveraged web services to exchange data with partners. Was responsible for new development tasks and debugging issues in an Oracle database.

Vessel General Permit, EPA. The Vessel General Permit is a tool that provides National Pollutant Discharge Elimination System permit coverage nationwide for discharges incidental to the normal operation of commercial vessels greater than 79 feet in length for industry users to report. Was responsible for development, maintenance tasks, and debugging issues in an Oracle database and an Oracle APEX application.

Beach Advisory and Closing Online Notification, EPA. EPA created the Beach Advisory and Closing Online Notification (BEACON) system to meet the Agency's requirement to provide the public with a database of pollution occurrences for coastal recreation waters. EPA's response to this requirement, BEACON, contains state-reported beach monitoring and notification data. EPA recently updated BEACON to include several enhancements and has named the new system BEACON 2.0. Was responsible for new development tasks and debugging issues in an Oracle database and an Oracle APEX application.

AnnaClaire Marley

Climate and Resilience Analyst, Task 3 Lead



Summary of Experience

AnnaClaire Marley is an environmental scientist who specializes in climate change impacts and adaptation. Her past work includes projects focused on coastal resilience, carbon sequestration, and climate vulnerability assessments. She has worked with a range of coastal management stakeholders, including state, federal, and tribal governments.

Ms. Marley has extensive experience performing data analysis to inform environmental management decisions. She is skilled in using ArcGIS and the programming languages R and Python to conduct geospatial analyses and create clear maps and visualizations for effective communication. She also has experience creating web apps for interactive visualization of project results.

EDUCATION

M.S., Environmental Science and Management, University of California, Santa Barbara, 2020

B.S., Environmental Geography, University of St Andrews, Scotland, 2018

EMPLOYMENT

Climate Adaptation Expert, ERG, 2020–present

Remote Sensing Research Fellow, National Aeronautics and Space Administration (NASA) Ames Research Center, summers 2019 and 2020

Spatial Data Analyst, Environmental Market Solutions Lab, University of California, Santa Barbara, 2019–2020

Blue Carbon Researcher, School of Geography, University of St. Andrews, 2017–2018

RELEVANT PROJECTS

Vermont Municipal Vulnerability Index, Vermont Agency of Natural Resources. Data manager for the development and design of an online tool for municipalities to use to assist them in determining vulnerability within their towns. Identified the factors and indicators of vulnerability in Vermont based on data on current and future hazards, social vulnerability, the economy and jobs, governance and capacity challenges, and natural resources. Project will culminate in a tool used by the state, regional planning organizations, and local towns to identify risks, prioritize resources, and determine the most effective actions to take to increase resilience.

Sonoma County Resilient Lands Strategy, County of Sonoma, California. Using R and Python, analyzed the vulnerability of lands and people in Sonoma County to various climate change threats, including wildfire, sea level rise, flooding, landslides, and drought. Calculated the number of critical facilities, percentage of land, and number of people in underserved communities affected by these climate hazards. Used global climate models to project local changes in precipitation and temperature and where these changes would be most severe.

National Shoreline Management Study, United States Army Corps of Engineers Institute of Water Resources. Conducted literature reviews, analyzed data, and drafted reports for United States Army Corps of Engineers National Shoreline Management Study regional assessments. Researched the processes driving shoreline erosion and associated environmental impacts in the Pacific Northwest, Hawaii, and California, and how these shorelines have changed over the last century. Consolidated diverse stakeholder feedback about regional shoreline erosion issues to highlight and communicate as part of the National Shoreline Assessment.

Climate Change Economics Impact Assessment, Cape Cod Commission. Calculated potential economic impacts from 1 to 6 feet of sea level rise in the Cape Cod region through geospatial data analysis in R. Projected future tax revenue loss to the county from property devaluation tied to flooding, property isolation, and flooded roads.

Estimated future costs associated with fixing flooded roads and with land buyouts of isolated properties. Created maps, graphs, and tables for effective communication in final report.

Climate Change Indicators, U.S. Environmental Protection Agency. Supported data updates for the Agency's Climate Change Indicators website through data acquisition and analysis, plain-language summaries, and data visualization. Also performed quality control review of data, figures, and writeups. Conducted literature reviews, performed data quality assessments, and created scripts in R as part of the development of new indicators. Created maps in ArcGIS for clear visualization and communication of indicators. Spearheaded development of the new Growing Degree Days indicator.

R Shiny Application for Environmental Toxicity Data, Agency for Toxic Substances and Disease Registry. Developed entire back end of an R Shiny application for internal use by the Centers for Disease Control and Prevention. Communicated with user interface team and integrated back-end and front-end code. Used Highcharts and interactive data tables for effective visualization of environmental toxicity data.

Climate Change and Snowpack Variability on the Navajo Nation, Navajo Nation Department of Water Resources. Collaborated with the Navajo Nation Department of Water Resources under work at the NASA Ames Research Center to determine priority areas and analyses for a snowpack variability analysis. Analyzed ground station and remote sensing snow data to determine trends in Navajo Nation snowpack and water resource implications. Created maps and graphs in R for effective communication of results. Presented findings to an audience of 100+ snow hydrology experts at the American Geophysical Union's fall 2019 and 2020 conferences.

Assessment of Environmental Factors Controlling Blue Carbon Storage in Saltmarshes, University of St Andrews. Designed field surveys and conducted research to inform projects sampling soil carbon at two Scottish saltmarshes and analyzed lab samples for nutrient concentration and sediment type. Calculated total carbon storage at both saltmarshes and estimated value in carbon offset credits. Combined field data with a modelled historical extent of the saltmarsh to calculate the increase in carbon storage that would result from a managed retreat of the grazing land bordering the marsh. This work is published in the Journal of Geophysical Research: Biogeosciences.

Seaweed Aquaculture Carbon Sequestration Analysis, Environmental Market Solutions Lab. Analyzed the potential of seaweed aquaculture to be used as a carbon sequestration and pollution remediation tool as part of a seaweed aquaculture working group. Researched how seaweed aquaculture could be incorporated into the voluntary carbon offset market. Mapped the spatial extent necessary for seaweed aquaculture to reduce nutrient loading in the Gulf of Mexico dead zone by 20 percent. Developed a seaweed aquaculture suitability map of the Gulf of Mexico in collaboration with the National Oceanic and Atmospheric Administration.

Forest Management to Achieve Carbon Neutrality, Joint Institute for Wood Products Innovation. For master's thesis (group project), modeled the carbon storage implications of 31 forest management practices to determine how forest management could contribute to the state of California's 2045 carbon neutrality goals. Created economic models of carbon stored in both the forest and in harvested wood products to determine cost-effective forest management practices.

Kat Flik

Research and Data Analyst



Summary of Experience

Kat Flik brings experience aggregating and presenting economic data across a range of industries and geographies. She has supported numerous projects for federal and state clients through which she has collected data, engaged key stakeholders, and presented data for public audiences. Ms. Flik also brings experience performing literature reviews and coordinating and conducting interviews to analyze the current state of various industries, ranging from meat processing to offshore wind. Ms. Flik is proficient in Microsoft Excel and R and has recent experience conducting data analysis and creating data visualizations in both software packages.

EDUCATION

B.A., Economics, Middlebury College, February 2023

EMPLOYMENT

Research Analyst, Eastern Research Group, Inc. (ERG), 2023–present

Intern, Vermont Agency of Agriculture, Food & Markets, summer 2022

RELEVANT PROJECTS

Economic Cost and Impact Analysis of Proposed Clean Transportation Rules in New Mexico, *New Mexico Environment Department*. Developed comprehensive economic impact analyses of three proposed clean transportation rules in New Mexico. Carefully reviewed the proposed regulations and gathered external data on fuel prices, vehicle mileage, vehicle population, and tax code to assess the rules' cost to consumers in New Mexico, the cost to the state, and the impact on historically marginalized communities. Created numerous data visualizations in R with results from the economic analysis for use in marketing materials. Developed an educational fact sheet on the rules for public distribution.

Massachusetts Slaughterhouse Survey, *Massachusetts Department of Public Health*. Developed a survey to gather information on current livestock production and slaughterhouse use among meat producers in Massachusetts. Emailed nearly 300 farmers and scheduled and conducted interviews via Microsoft Teams with around 30 farmers and local industry experts. Also helped synthesize the results of a Qualtrics survey, which was sent out to farmers ERG was unable to reach via Teams. Developed several tables and figures showing the results of the survey. These results were used to help explain the current state of meat production and slaughter in Massachusetts and assess the costs and benefits of solutions that address meat processing capacity issues.

Economics: National Ocean Watch Data for U.S. Territories and Commonwealths, *National Oceanic and Atmospheric Administration Office for Coastal Management*. Gathered data on economic indicators for ocean-dependent sectors in the five U.S. territories and commonwealths. Engaged public and private stakeholders in each territory, including government officials and private industry experts, to collect data on employment, establishments, wages, and outputs for ocean sectors. Compiled these data into a fact sheet for each territory on the state of its ocean economy. These fact sheets present economic indicators of ocean-dependent sectors to identify areas for potential economic growth and evaluate the importance of ocean sectors to each territory's economy.

Greenhouse Gas Emissions Reporting Data Program Aggregation, *U.S. Environmental Protection Agency*. Aggregated emissions data from large greenhouse gas sources for the Agency's Greenhouse Gas Reporting Program (GHGRP). Manipulated large data sets to determine average annual emissions of numerous greenhouse gasses from large sources across the country. Data aggregated from the GHGRP is made public each year and is used track greenhouse gas emissions over time, identify areas for emissions reduction, and support the development of climate policy.

Coos County, Oregon, Economic Report, *Sea & Shore Solutions*. Supported the development of an economic report for Coos County, Oregon, which presented a snapshot of the Coos County economy with a focus on water-dependent sectors such as commercial fishing and timber. Conducted IMPLAN analyses of water-dependent sectors in Coos County to evaluate the contribution of these sectors to the Coos County economy and conducted a market analysis of the offshore wind industry in the Pacific region. Developed tables and graphs for the report and created maps describing land zoning in the county and public outdoor recreation sites.

Freshwater Pond Use and Perceptions Survey, *Cape Cod Commission*. Used Qualtrics Offline Surveys to conduct intercept surveys in Cape Cod. These surveys were conducted in person on Cape Cod's freshwater lakes and ponds to assess the impact of lakes and ponds on Cape Cod's economy.

Jacob Namovich

Greenhouse Gas Inventory and Data Analyst



An ERG Life Cycle Assessment & Sustainability Analyst

- Updated the New York State Energy Research and Development Authority (NYSERDA) Energy Sector Greenhouse Gas Emissions Inventory using the latest published supporting data.
- Conducted a variety of life cycle assessments (LCAs), including industry association average production process models and economic consumption-based footprinting.
- Engaged a variety of clients across federal agencies, private organizations, nonprofits, national laboratories, state agencies, and industry associations.
- Modeled state of Vermont energy sector upstream energy pathway emission factors.
- Estimated University of Michigan Scope 3 embodied emissions of purchased goods and services to inform institutional carbon neutrality efforts.
- Developed embodied emission factors of goods and services imports to the United States for the US Environmentally-Extended Input-Output Model, or USEEIO.

EDUCATION

M.S., Environment & Sustainability, University of Michigan School for Environment and Sustainability, 2022

B.S., History, Philosophy, and Sociology of Science, Michigan State University Lyman Briggs College, 2020

EMPLOYMENT

Life Cycle Assessment & Sustainability Analyst, Eastern Research Group, Inc. (ERG), 2022–present

Research Analyst, Resource Recycling Systems, 2021–2022

Doris Duke Research Fellow, University of Michigan, 2021–2022

RELEVANT PROJECTS

Vermont Energy Sector LCAs, Vermont Agency of Natural Resources. Collaborated with the Vermont Climate Action Office to develop greenhouse gas inventory and impact LCA data resulting from upstream supply chain processes of energy resources used within the state. Modeled supply chain processes for renewable and nonrenewable energy pathways. Communicated project design, methods, and goals with Vermont stakeholders.

Annual Greenhouse Gas Inventory Tool Update, NYSERDA. Carried out 2020 and 2021 inventory data updates for New York State’s annual Greenhouse Gas Inventory. Supported ad hoc research for NYSERDA into the effects of draft EPA rulemaking on projected upstream natural gas emission factors. Generated text and figures depicting changes to the inventory for implementation in the annual NYSERDA greenhouse gas emissions inventory methods and results report. Streamlined the update process through developing progress tracking resources. Organized communications materials to client on data year updates. Employed the latest and most representative energy systems data to ensure results were temporally, technologically, and geographically accurate. Became intimately familiar with structure and components of the inventory files.

Industry Association Average Production LCAs, Confidential. Worked with industry association clients to collect primary life cycle inventory data from member manufacturers for integration in modeling software. Performed necessary outreach to data providers to ensure quality and comprehensiveness of data. Developed tools that expedited the modeling process in ways that automate integration of updated or expanded data. Conformed to ISO standards for LCA.

Inflation Reduction Act Oil and Gas Rule Analysis, *NYSERDA*. Interpreted new EPA rules on methane emissions from oil and gas production. Modeled rules in the NYSERDA Greenhouse Gas Inventory to understand how these policies would influence life cycle emissions for oil and gas products consumed in the New York. Generated results and methods documentation, which were presented in a brief to the client. Met with policy analysts to ensure E