

# RGGI Verifier Accreditation

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## Renewal Application

July 12, 2019

Submitted to New York State Department of Environmental Conservation

Submitted by First Environment



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Application Renewal

# Contact Information



## Form 1: Contact Information

Name of Applicant (Organization):	First Environment, Inc.
Point-of-Contact:	Luca Nencetti
Mail Address:	79 Madison Avenue, 2 <sup>nd</sup> floor, New York, NY 10016
Telephone Number:	646.873.6781
Fax Number:	973.334.0928
E-mail:	lnencetti@firstenvironment.com

Describe the nature of the Applicant's core business or organization. Additionally, describe the structure of the Applicant's organization, including whether the entity is a sole proprietorship, partnership, limited partnership, limited liability company (LLC), limited liability partnership (LLP), corporation (for-profit), nonprofit corporation (not-for-profit), or cooperative. If a field below is not applicable or is unanswerable, respond with "NA".

Describe the Nature of the Applicant's Core Business or Organization and Organizational Structure:	A full firm profile is located on the following page.
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Place of Incorporation:	New Jersey
Federal Tax Identification Number:	22-2902916
Dun & Bradstreet or DUNS Number:	19-844-3459
Year Founded:	1987
Website URL:	www.firstenvironment.com

## Firm Profile

First Environment has been active in the field of climate change and greenhouse gas (GHG) management since the 1990s—longer than most other companies in the industry. We know from firsthand experience that participation in dialogues on climate change policy and GHG management yields insight that is of value to our clients. At the international level, we maintain involvement through regular attendance at the United Nation’s Framework Convention on Climate Change (UNFCCC) Conferences of the Parties. In the U.S., we provide services under a variety of programs, including the California Air Resources Board (ARB), American Climate Registry (ACR), Climate Action Reserve (CAR), Verified Carbon Standard (VCS), and The Climate Registry (TCR), while monitoring other state and regional climate change initiatives. We are also involved in climate change policy developments in Canada, Europe, and South America.

Notably, First Environment was the first consulting and engineering firm in the western hemisphere to become certified to ISO 14001. The firm was also a charter partner of the U.S. EPA’s Climate Leaders program and has been carbon neutral since 2008. In addition, First Environment is a Founding Reporter to TCR and received verification of our own inventory under the TCR program. Furthermore, First Environment was among the first firms accredited to the ISO 14065 standard by ANSI to conduct greenhouse gas inventory verification services for TCR members.

First Environment is the first firm:

- approved to provide verification services to the participants of the California Climate Action Registry (CCAR)
- to complete a CCAR verification of a CCAR report containing all six Kyoto GHGs
- to verify an international GHG report according to the CCAR Protocols

Our GHG verification services have also received the following industry acknowledgements:

- Environmental Finance’s 2011 and 2012 Best Verification Company for Voluntary Markets
- Environmental Finance’s 2008, 2009, 2010 & 2011 Best Verifier for North American Mandatory Markets

# Application Renewal Offset Categories



## Form 2: Offset Categories

Identify the offset project categories for which the Applicant seeks accreditation by checking the appropriate box(es) below.

Offset Project Category	Accreditation Sought
Landfill methane capture and destruction	<input checked="" type="checkbox"/>
Reduction in emissions of sulfur hexafluoride (SF <sub>6</sub> )	<input checked="" type="checkbox"/>
Sequestration of carbon due to afforestation	<input type="checkbox"/>
Reduction or avoidance of CO <sub>2</sub> emissions from natural gas, oil, or propane end-use combustion due to end-use energy efficiency in the building sector	<input checked="" type="checkbox"/>
Avoided methane emissions from agriculture manure management operations	<input checked="" type="checkbox"/>

Application Renewal  
**ANSI ISO 14065**  
**Accreditation Form**



## Form 3: Documentation of ANSI ISO 14065 Accreditation

Provide the following details of the Applicant's American National Standards Institute (ANSI) International Organization for Standardization (ISO) 14065 accreditation in the fields below. Attach a copy of the certificate of accreditation. The attachment must include a header that identifies it as an attachment to Form 3.

ANSI Accreditation No.:

Date of Initial Accreditation:

Accreditation Valid Until:

Scope of ANSI Accreditation:

Has the Applicant's ANSI accreditation ever been suspended or withdrawn? If yes, please describe the grounds for suspension/withdrawal and the measures taken to become re-accredited:

# CERTIFICATE of ACCREDITATION

GREENHOUSE GAS VALIDATION AND VERIFICATION

The American National Standards Institute hereby affirms that

**First Environment, Inc.**

91 Fulton Street, Boonton, NJ 07005, United States

**ACCREDITATION ID# 0802**

meets the ANSI accreditation program requirements and those set forth in  
ISO 14065:2013 Greenhouse Gases - Requirements for greenhouse gas validation and verification bodies  
for use in accreditation or other forms of recognition

for GHG programs\* that recognize ANSI accreditation within the following

**SCOPE OF ACCREDITATION**

(Please see page 2)

\*Visit [www.ansi.org](http://www.ansi.org) for a list of GHG programs recognizing ANSI accreditation



ANSI VICE PRESIDENT, ACCREDITATION SERVICES

2020-12-01  
VALID THROUGH



## GREENHOUSE GAS VALIDATION AND VERIFICATION

### First Environment, Inc.

**ACCREDITATION ID# 0802**

#### **SCOPE OF ACCREDITATION**

Verification of assertions related to GHG emissions and removals at the organizational level

GRANTED 2008-12-01:

- 01. General
- 02. Manufacturing
- 03. Power Generation

GRANTED 2011-03-15:

- 05. Mining and Mineral Production
- 06. Metals Production
- 07. Chemical Production
- 08. Oil and gas extraction, production and refining including petrochemicals
- 09. Waste

GRANTED 2012-07-09:

- 04. Electric Power Transactions

Verification of assertions related to GHG emission reductions and removals at the project level

GRANTED 2008-12-01:

- 03. Land Use and Forestry
- 05. Livestock
- 06. Waste Handling and Disposal

GRANTED 2010-04-08:

- 01. GHG emission reductions from fuel combustion

GRANTED 2011-05-16:

- 02. GHG emission reductions from industrial processes (non-combustion, chemical reaction, fugitive and other)

Validation of assertions related to GHG emission reductions and removals at the project level

GRANTED 2010-04-08:

- 01. GHG emission reductions from fuel combustion

GRANTED 2010-08-18:

- 05. Livestock
- 06. Waste Handling and Disposal

GRANTED 2012-09-13:

- 02. GHG emission reductions from industrial processes (non-combustion, chemical reaction, fugitive and other)

# Application Renewal Verification Team



## Form 4: Verification Team

### *Landfill Methane Capture and Destruction*

In the fields below, identify the Offset Project Category, Verification Team Leader(s), and Key Personnel that will provide verification services (add additional pages as required). In the organizational affiliation column, indicate the organization that employs the individual. If accreditation is being sought for more than one offset project category, provide a separate Form 4 for each offset project category for which accreditation is being sought.

Offset Project Category		
Landfill Methane Capture and Destruction		
Verification Team		
Role	Name	Organizational Affiliation
Verification Team Leader:	James Wintergreen	First Environment, Inc.
Verification Team Leader:	Michael Carim	First Environment, Inc.
Verification Team Leader:	Jeff Daley	First Environment, Inc.
Key Personnel:	Luca Nencetti	First Environment, Inc.
Key Personnel:	Bernard T. Delaney	First Environment, Inc.
Key Personnel:	Phil Ludvigsen	First Environment, Inc.

Provide as an attachment detailed resumes for all Verification Team Leaders(s) and Key Personnel. Resumes should include identification of any audit certification or registration programs under which the individual is accredited or certified.

If any of the individuals listed above are not employees of the Applicant, attach a signed copy of the contract or engagement letter between the individual and the Applicant.

Each attachment must include a header that identifies it as an attachment to Form 4.

## Form 4: Verification Team

### *Reduction in Emissions of Sulfur Hexafluoride (SF6)*

In the fields below, identify the Offset Project Category, Verification Team Leader(s), and Key Personnel that will provide verification services (add additional pages as required). In the organizational affiliation column, indicate the organization that employs the individual. If accreditation is being sought for more than one offset project category, provide a separate Form 4 for each offset project category for which accreditation is being sought.

Offset Project Category		
Reduction in Emissions of Sulfur Hexafluoride (SF6)		
Verification Team		
Role	Name	Organizational Affiliation
Verification Team Leader:	James Wintergreen	First Environment, Inc.
Verification Team Leader:	Michael Carim	First Environment, Inc.
Key Personnel:	Jeff Daley	First Environment, Inc.
Key Personnel:	Luca Nencetti	First Environment, Inc.
Key Personnel:	Bernard T. Delaney	First Environment, Inc.
Key Personnel:	Phil Ludvigsen	First Environment, Inc.

Provide as an attachment detailed resumes for all Verification Team Leaders(s) and Key Personnel. Resumes should include identification of any audit certification or registration programs under which the individual is accredited or certified.

If any of the individuals listed above are not employees of the Applicant, attach a signed copy of the contract or engagement letter between the individual and the Applicant.

Each attachment must include a header that identifies it as an attachment to Form 4.

## Form 4: Verification Team

### *Reduction or Avoidance of CO2 Emissions from Natural Gas, Oil, or Propane End-Use Combustion Due to End-Use Energy Efficiency in the Building Sector*

In the fields below, identify the Offset Project Category, Verification Team Leader(s), and Key Personnel that will provide verification services (add additional pages as required). In the organizational affiliation column, indicate the organization that employs the individual. If accreditation is being sought for more than one offset project category, provide a separate Form 4 for each offset project category for which accreditation is being sought.

Offset Project Category		
Reduction or Avoidance of CO2 Emissions from Natural Gas, Oil, or Propane End-Use Combustion Due to End-Use Energy Efficiency in the Building Sector		
Verification Team		
Role	Name	Organizational Affiliation
Verification Team Leader:	James Wintergreen	First Environment, Inc.
Verification Team Leader:	Michael Carim	First Environment, Inc.
Key Personnel:	Jeff Daley	First Environment, Inc.
Key Personnel:	Luca Nencetti	First Environment, Inc.
Key Personnel:	Bernard T. Delaney	First Environment, Inc.
Key Personnel:	Phil Ludvigsen	First Environment, Inc.

Provide as an attachment detailed resumes for all Verification Team Leaders(s) and Key Personnel. Resumes should include identification of any audit certification or registration programs under which the individual is accredited or certified.

If any of the individuals listed above are not employees of the Applicant, attach a signed copy of the contract or engagement letter between the individual and the Applicant.

Each attachment must include a header that identifies it as an attachment to Form 4.

## Form 4: Verification Team

### *Avoided Methane Emissions from Agriculture Manure Management Operations*

In the fields below, identify the Offset Project Category, Verification Team Leader(s), and Key Personnel that will provide verification services (add additional pages as required). In the organizational affiliation column, indicate the organization that employs the individual. If accreditation is being sought for more than one offset project category, provide a separate Form 4 for each offset project category for which accreditation is being sought.

Offset Project Category		
Avoided Methane Emissions from Agriculture Manure Management Operations		
Verification Team		
Role	Name	Organizational Affiliation
Verification Team Leader:	James Wintergreen	First Environment, Inc.
Verification Team Leader:	Michael Carim	First Environment, Inc.
Verification Team Leader:	Jeff Daley	First Environment, Inc.
Key Personnel:	Luca Nencetti	First Environment, Inc.
Key Personnel:	Bernard T. Delaney	First Environment, Inc.
Key Personnel:	Phil Ludvigsen	First Environment, Inc.

Provide as an attachment detailed resumes for all Verification Team Leaders(s) and Key Personnel. Resumes should include identification of any audit certification or registration programs under which the individual is accredited or certified.

If any of the individuals listed above are not employees of the Applicant, attach a signed copy of the contract or engagement letter between the individual and the Applicant.

Each attachment must include a header that identifies it as an attachment to Form 4.

## Form 4b: Verification Team Resumes

### JAY WINTERGREEN *Verification Team Leader*

#### Summary of Professional Experience:

Mr. Wintergreen has more than 24 years of professional experience and a background in environmental policy, economics, and law. His current activities include the development of corporate climate change strategies and greenhouse gas (GHG) management programs, as well as technical and financial evaluations of GHG management projects. He is an expert in GHG verification as well as knowledgeable in financial accounting and auditing. Prior to joining First Environment, Mr. Wintergreen was a consultant to the technology manufacturing and nuclear energy industries.

#### Education:

Masters in Environmental Management, Duke University  
BA, English, Dickinson College

#### Years of Experience: 24

#### Certifications / Registrations:

California Air Resources Board(ARB)-accredited lead verifier for GHG emissions data reports  
ARB-approved sector specialist for transactions, oil and gas, and process emissions  
ARB-accredited lead offset verifier of offset project data reports  
ARB-approved offset project specialist for livestock, ozone depleting substances, and mine methane capture  
Climate Action Reserve-approved lead verifier for the following project types: landfill, livestock, organic waste composting, ozone-depleting substances, and coal mine methane  
Airport Council International Airport Carbon Accreditation-approved verifier

#### Relevant Project Experience:

**California Air Resources Board, Greenhouse Gas Verifications, Various Locations, California.** *Lead verifier.* Conducted verification of ARB GHG reports for the following facilities.

- Anheuser-Busch Fairfield Facility
- Anheuser-Busch Los Angeles Facility
- Merced Irrigation District (power entity)
- City of Santa Cruz Wastewater Treatment Facility
- AES Alamitos Generating Facility
- AES Redondo Beach Generating Facility
- AES Huntington Beach Generating Facility
- GenOn Potrero Generating Facility
- GenOn Pittsburg Generating Facility
- GenOn Contra Costa Generating Facility
- GenOn Energy Management (power entity)
- Inland Empire Energy Center Generating Facility
- Malburg Generating Station
- Cargill Power Markets, LLC (power entity)
- NextEra Energy Marketing, LLC (power entity)
- TransCanada Energy Sales (power entity)
- B. Braun Medical

- Genentech, Inc.
- United States Pipe & Foundry Company

**TCR Greenhouse Gas Verifications.** *Lead verifier.* Conducted verification of TCR reports for the following facilities.

- Xcel Energy, including
  - Northern States Power Company
  - Public Service Company of Colorado
  - Southwestern Public Service Company
- NV Energy
- Recology, Inc.
- Port of San Diego
- City of Vernon

**TCR Greenhouse Gas Verification.** *Internal reviewer.* Provided internal quality reviews for verification reports submitted to TCR.

- Con Edison of New York
- New York Power Authority
- New York State Metropolitan Transportation Authority

**Steuben County, Carbon Credit Verification Services, Steuben County, New York.** *Internal reviewer.* Project consists of active gas collection system to capture methane generated by the Steuben County Bath Landfill and destroys it either in an on-site flare or an on-site engine to generate electricity. Responsible for validating ACR project plan and simultaneous verification of emission reductions as documented in an ACR Monitoring Report over reporting period of June 1, 2018 through December 31, 2018. Will lead the verification of emission reductions as documented in an ACR Monitoring Report over the reporting period of January 1, 2019 through December 31, 2019. 2018 – ongoing.

**Truckee Tahoe Airport District, Greenhouse Gas Inventory Development, Truckee, California.** *Project manager.* Led the development of the airport's first GHG inventory. Provided training on GHG inventory best practices to airport staff. Identified emission sources and identified appropriate emission quantification methodologies. Modeled aircraft operation emissions using the Federal Aviation Administration's (FAA) Aviation Environmental Design Tool (AEDT). Designed custom GHG emissions quantification tool. Drafted GHG inventory report and documented processes, procedures and methods in inventory management plan. 2016 – 2017.

**Hess Corporation, Greenhouse Gas Inventory and Strategy Development, Woodbridge, New Jersey.** *Technical advisor.* Advised the international oil and gas company's GHG management team on the key issues and potential challenges associated with developing a corporate inventory. Led development of a customized GHG inventory protocol, designed to be consistent with the WBCSD/WRI GHG Protocol, ISO 14064 Part 1, and the IPIECA/OGP/API Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions, while defining the company's specific approach to critical aspects. The protocol also referenced the use of emission quantification methodologies from the API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry. 2011.

**Confidential Office Products Manufacturer, Climate Change Strategy.** Advised multinational corporate client on potential regulation of facilities under the EU Emissions Trading System (ETS) and developed survey to assist with identification of facilities qualified as installations under the scheme. Developed a company-specific white paper that provided a strategic overview of the relationship

between the company's international operations and domestic and international climate change policy and regulations. Advised client on background, implications and potential responses regarding a shareholder resolution on climate change.

**Madison Gas and Electric, Climate Change Strategy, Madison, Wisconsin.** Coordinated First Environment's team that provided assistance to the utility with a report to stakeholders communicating the company's understanding and actions addressing the issue of climate change. Drafted sections that identified relevant climate policy including current and proposed regulations at the state, regional and federal levels, the potential impacts of these regulations on the client, and management and mitigation responses. 2006 – 2008.

**Waste Management, Technical Assistance for Greenhouse Gas Inventory, Statewide, California.** *Project manager.* Assisted Waste Management in the development of a GHG inventory for its California operations to facilitate the company's participation in the California Climate Action Registry. The corporation's businesses include collection operations, transfer stations, active landfill disposal sites, waste-to-energy plants, recycling plants, beneficial-use landfill gas projects, and independent power production plants. The inventory includes mobile combustion emissions associated with its highway and off-road fleets' use of gasoline, diesel, propane, CNG, and LNG fuels; stationary combustion emissions from utility-provided natural gas; and indirect emissions from the consumption of electricity. To assist with the verification process, developed an Inventory Management Plan that contains boundary descriptions, data collection and emissions quantification approaches, and appendices with detailed inventory facility lists. Also assisted by facilitating verification activities including coordinating site visits with facility contacts, requesting records for verifier review, and preparing responses to verifier requests for clarification. 2006 – 2008.

**BVQI Greenhouse Gas Verification Management System and Climate Change Training, Brazil.** Consulted the international registrar on the developing market for GHG verification and specific opportunities related to the EU ETS and the Clean Development Mechanism (CDM). Designed a verification management system consisting of processes, procedures, and tools to guide the delivery of quality and consistent

verification services. This system supported the client's subsequent approval as a designated operational entity (DOE) for CDM. Developed training on climate change science, GHG policy, verification, and the company's specific management system to assist with capacity-building in the client's worldwide network of auditors. 2004 – 2005.

**Intergen, Emission Reduction.** Supported evaluation on a developing country energy project to determine feasibility for registration under the CDM. Conducted research on Mexican energy project emission and development trends to assist with emissions baseline development. Developed project-specific cash flow models comparing CDM project costs and benefits resulting from potential emission reduction credits produced by the project.

**International Electronics Manufacturer, Greenhouse Gas Emissions Monitoring Program.** As a subtask of a global environmental management system assessment, focused on the company's monitoring program for greenhouse gas emissions from energy use. Conducted site visit of a representative manufacturing facility to assess the conformance of the facility to corporate data reporting procedures and general completeness of the GHG information provided. Assessed the corporate web-based data collection tool and provided improvement recommendations.

**Eastman Kodak Company CCAR Greenhouse Gas Verification, California.** *Project manager and lead certifier.* Directed the verification of Kodak's 2002, 2003, 2004, and 2005 California Climate Action Registry GHG reports covering its U.S. operations as well as a report of GHG emissions from non-U.S. operations. Ensured verification was performed consistent with CCAR Certification Protocol requirements. Conducted assessments on sampled emission sources, and evaluated associated records and other evidence. Conducted site visits at representative facilities in the U.S. and Mexico. 2005 – 2007.

**Bentley Prince Street, CCAR Greenhouse Gas Verification, California.** *Project manager and lead certifier.* Certification of 2002 through 2005 GHG reports to the California Climate Action Registry. Responsibilities included the evaluation of the data management system, assessment of emissions calculations, and reporting of certification activities as well as conducting a site visit to the company's California manufacturing facility. Verifications have included addressing the company's onsite solar electricity generation, purchases of RECs, and

emissions from its sales staff vehicle fleet. 2002 – 2008.

**Pacific Gas and Electric, CCAR Greenhouse Gas Verification, San Francisco, California.**

*Subcontracted specialist.* Conducted initial strategic review to identify corporate data collection processes and select appropriate sampling approaches and targets. Assessment included review of CARROT corporate report as well as reporting under the CCAR Power and Utility Protocol. 2006.

**Georgia Pacific, Greenhouse Gas Inventory Verification.** Assisted with the verification of the client's global GHG inventory for 2000 and 2002. Participated in the strategic review of the inventory and conducted an assessment comparing the company's corporate protocol against best practice documents such as the WBCSD/WRI GHG Protocol. Assessed the base year emissions adjustment in the 2002 inventory against corporate protocol rules and best practices for executing that adjustment. 2002 - 2004.

**CDM Project Verification and Validation, Brazil.** *Subcontracted specialist.* Participated on a DOE team conducting pre-assessment and validations of several industrial upgrade projects in Brazil. Provided expertise on CDM requirements and procedures, and validation processes and best practices. Evaluated projects' application of approved baseline methodologies to determine adherence to key criteria. 2004.

**First Environment & U.S. Environmental Protection Agency Climate Leaders Greenhouse Gas Inventory, Boonton, New Jersey.** Coordinated the development of First Environment's GHG Inventory, which includes emission from electricity use, natural gas combustion and fleet activity for the company's three main offices.

**Canadian Offset System, Canada.** Participant in the stakeholder dialogues on the originally proposed Offset System. Received intensive training on project validation and verification, including review of all three parts of the ISO 14064 standard, by verification and validation experts representing Environment Canada and Natural Resources Canada, as part of national capacity-building efforts.

**UNFCCC Conference of the Parties, Montreal, Canada.** Supported coordination of the Business Council for Sustainable Energy's delegation to Eleventh Conference of the Parties in Montreal,

Canada. Assisted with events presenting delegation positions and arrangement for meetings between delegation and key negotiator contacts.

**California Air Resources Board, Greenhouse Gas Reporting Program Comparative Analyses, California.** *Subcontracted specialist.* Developed comparative analyses of greenhouse gas reporting requirements for the Northeast states' Regional Greenhouse Gas Initiative and the California Climate Action Registry for use by ARB's staff as reference materials to inform the development of GHG reporting regulations under California's Global Warming Solutions Act of 2006.

**Renewable Energy Credit Projects.** Researched state renewable energy credit programs to identify and evaluate eligibility and cost/benefits for multiple client renewable energy generation projects. Assisted with registration of projects under individual programs to begin credit generation.

**Nuclear Industry Design and Proposal Documents.** Supported development of nuclear power plant design documents with technical editing services and occasional project management roles. Assisted with development of proposals for nuclear fuel services.

#### Publications / Presentations

- "Climate Change: Pressroom, Boardroom, Courtroom" presented to American Bar Association Annual Conference on Environmental Law, by James T. Wintergreen, Keystone, CO, March 2006
- "A Global GHG Standard," published in Carbon Finance, by Jay Wintergreen and Tod Delaney, March 2006
- "ISO 14064: A Standard for GHG Reduction Projects" presented to Electric Utilities

Environmental Conference, by James T. Wintergreen, Tucson, AZ, January 2006

- "Climate Change and GHG Shareholder Resolutions" presented to Electric Utilities Environmental Conference, by James T. Wintergreen, Tucson, AZ, January 2005
- "Preparing for GHG Inventory Verification", Published in Chemical Engineering Progress, by James T. Wintergreen and Lauren M. Sandler, April 2004
- "Common Pitfalls of Corporate GHG Inventories", presented to Electric Utilities Environmental Conference, by James T. Wintergreen, Tucson, AZ, January 2004
- "Validation & Verification Considerations for CDM Projects", presented to EMA 7th Annual Fall Meeting & International Conference, by James T. Wintergreen, Miami, FL, September 2003
- "Practical Corporate Strategies for GHG Emissions, Climate Change and Sustainability" presented to American Bar Association Annual Conference on Environmental Law, by James T. Wintergreen, Keystone, CO, March 2003
- "A Review of State Actions" ", presented to Electric Utilities Environmental Conference, by James T. Wintergreen, Tucson, AZ, January 2003
- "Application of the ISO Standards to Greenhouse Gas Management", presented to Electric Utilities Environmental Conference, by James T. Wintergreen, Tucson, AZ, January 2002
- "Uncertainties Pervade GHG Emission Reduction Projects," published in Environmental Finance, by James Wintergreen and Elizabeth Delaney, May 2001

**MICHAEL CARIM** *Verification Team Leader***Summary of Professional Experience:**

Mr. Carim has more than a decade of experience and a background in environmental economics, policy, and management concentrating on climate change issues. He provides greenhouse gas (GHG) inventory and offset project verification services as well as technical assistance to project developers and corporate environmental officers. His offset project work focuses on methane destruction and avoidance projects including those in the livestock, coal mine, and sold waste sectors. His corporate practice focuses on the aviation, power and utility, manufacturing, transportation, renewable energy, and waste management sectors. Mr. Carim's professional portfolio also spans strategic GHG management, including enterprise advisory services on adaptation to climate change impacts. He has participated in over 400 GHG validations and verifications, serving as the lead auditor in over 250 of these engagements.

**Relevant Project Experience:**

**Steuben County, Carbon Credit Verification Services, Steuben County, New York.** *Project manager/Lead verifier.* Project consists of active gas collection system to capture methane generated by the Steuben County Bath Landfill and destroys it either in an on-site flare or an on-site engine to generate electricity. Responsible for validating ACR project plan and simultaneous verification of emission reductions as documented in an ACR Monitoring Report over reporting period of June 1, 2018 through December 31, 2018. Will lead the verification of emission reductions as documented in an ACR Monitoring Report over the reporting period of January 1, 2019 through December 31, 2019. 2018 – ongoing.

**California Air Resources Board (ARB) Offset Project Verifications.** *Verifier.* Performed over 25 verifications and desk reviews as the lead verifier and project specialist for Compliance Offset Projects under ARB's Cap and Trade programme. Projects verified utilized approved livestock, ozone depleting substances, and mine methane protocols. Assessment activities included the review of project eligibility under ARB requirements, emission reduction quantification, and site visits at project operations, as well as communications with Offset Project Registries and ARB to facilitate project approval.

**Education:**

Master of Public Administration in Environmental Science and Policy, School of International and Public Affairs, Columbia University, 2007  
BA, Economics/Government, Wesleyan University, 2003

**Years of Experience: 15****Certifications / Registrations:**

Airport Carbon Accreditation approved verifier  
ARB-approved lead verifier for livestock, ODS, and coal mine methane offset projects  
ARB-approved lead verifier for mandatory facility reports, including sector specialist accreditation for electricity transactions and process emissions  
CAR-approved lead verifier for the following project types: landfill, livestock, organic waste composting, ozone-depleting substances, and coal mine methane

**Livestock Methane Emission Reduction Project Validation and Verification.** *Verifier.* Performed over 100 validation and verification for projects controlling methane emissions from manure waste management activities, including the first two verifications under the Climate Action Reserve's livestock protocol in 2008. Project verified used technologies such as anaerobic digesters (covered lagoon, complete mix, and plug flow systems) and volatile solids separation to achieve GHG emission reductions. Verification activities included site visits at livestock facilities and digester operations, review of raw data and emission reduction calculations relative to protocol requirements, review of technical reports supporting data and calibration records, and drafting and issuance of verification reports. Work performed under the California Air Resources Board, Climate Action Reserve, Verified Carbon Standard, and American Carbon Registry offset programmes.

**GHG Inventory Verification.** *Lead verifier/internal reviewer.* Served as lead verifier or independent internal reviewer for the verification of over 100 mandatory and voluntary GHG inventory reports to the California Air Resources Board, The Climate Registry, and the California Climate Action Registry since 2008. Client industrial sectors include electric power generation and/or transmission/distribution, manufacturing, solid waste, ethanol production, iron and steel,

transportation. Scopes of verification also included review of specific GHG performance metrics for clients in the electric power sector and verifications of electric power transactions. *Representative clients include:* AES Southland, LLC; Recology; Calgren Renewable Fuels; Eastman Kodak; New York Power Authority; County Sanitation Districts of Los Angeles; 29 Palms Marine Corp Air Ground Combat Center; Xcel Energy; USG Corporation; Midway Sunset Cogeneration Company; TransCanada Energy Services; and NextEra Power Marketing.

**Los Angeles County Metropolitan Transportation Authority, Climate Change Adaptation & Climate Action Plan Development, Los Angeles, California.** Climate risk & resiliency specialist. As a subconsultant to LSA, First Environment is assisting the Los Angeles Metropolitan Transportation Authority (LA Metro) with adaptation planning and development of a climate action plan. 2017 – ongoing.

**National Hockey League, Greenhouse Gas Verification, New York, New York.** *Lead verifier and project manager.* Directed the verification of three years of the National Hockey League's GHG emissions data to provide internal assurance for the organization's voluntary public reporting. The inventory included direct and indirect emissions from both corporate offices as well as team activities including an allocation of arena emissions. It also included Scope 3 emissions from transport and disposal losses, waste, and business travel. The verification was performed consistent with requirements of ISO 14064, Part 3 using the NHL's Inventory Management Plan as the audit standard. 2017.

**Veolia ES Technical Solutions, ODS Destruction Facility Technical Assistance, Beaumont, Texas.** *Verifier.* Conducted initial on-site activities which included training Port Arthur staff on ARB's cap and trade and offset programs and the ozone depleting substances(ODS) compliance project protocol, as well as reviewing facility eligibility and a gap analysis for offset ODS-specific procedures. Drafted offset ODS procedures and supporting documents (e.g., forms, checklists, etc.) to support Port Arthur's execution of offset ODS destruction events. Assess Port Arthur's readiness to perform offset ODS projects during a trial destruction event (i.e., a mock burn) and simulated verification site visit. Reported on the Port Arthur's readiness to perform ODS destruction for the purposes of ARB offset projects based on results of the mock burn and verification. 2017.

**Truckee Tahoe Airport District, Greenhouse Gas Inventory Development, Truckee, California.** *Emission quantification specialist.* Provided technical support and quality assurance in the development of the airport's first GHG inventory. Assisted in the provision training on GHG inventory best practices to airport staff. Identified emission sources and identified appropriate emission quantification methodologies. Performed review of custom GHG emissions quantification tool and GHG inventory report and inventory management plan. 2016 – 2017.

**Alcoa Corp., Corporate GHG Inventory Verification.** *Lead verifier and project manager.* Served as lead verifier for the verification of Alcoa's 2015 and 2016 corporate GHG Inventory. Scope of verification included all Scope 1 & 2 emissions and energy consumption at global operations and selected Scope 3 source categories. Sector-specific emission sources assessed include all process emission from the aluminum smelting process. Scope 3 categories assessed included waste transportation and disposal; employee commuting; business travel; and transport of goods sold. Assurance activities were performed for the purposes of external reporting in Alcoa's annual sustainability report and reporting to CDP. 2016 – 2018.

**Iron and Steel Sector GHG Verification.** *Lead verifier.* Served as lead verifier for numerous assurance engagements in the iron and steel sector. Relevant experience includes verification of GHG emission inventories at a min-steel mill and several pipe foundries incorporating assessment of process emissions from the steel charging and tapping; validation and verification of a waste gas utilization project at an integrated steel mill; and verification of sector product data for compliance reporting to ARB. *Representative clients include:* Hyundai Steel/Hyundai Green Power, TAMCO Steel, Clow Water Systems, and U.S. Pipe & Foundry Co.

**Landfill Gas Emission Reduction Project Validation and Verification.** *Verifier.* Performed over 150 validation and/or verifications for landfill methane destruction projects across the U.S. Verification activities included quality assurance reviews, site visits, review of raw data and emission reduction calculations relative to protocol requirements, review of technical reports supporting data and instrument calibration records, and drafting and issuance of verification reports. Validations and verifications have been conducted against Climate Action Reserve, American Carbon Registry, Verified

Carbon Standard, and Chicago Climate Exchange protocols and collectively have resulted in over 10 million metric tonnes of GHG emission reductions.

**Pratt & Whitney, VCS Validation for Jet Engine Washing Methodology and Project.** *Lead auditor and project manager.* Completed validation and verification of first ever aviation carbon credits for Pratt & Whitney. Emission reductions were created from a new jet engine washing technique. Wash events improve fuel economy of jet engines, resulting in less fuel consumption and therefore fewer CO<sub>2</sub> emissions. Prior to the project-level validation/verification, directed assessment that led to approval of Pratt and Whitney's monitoring and quantification methodology for jet engine washing GHG emissions reductions. 2010 – 2012.

**Verified Carbon Standard Methodology Validation.** *Lead auditor.* Served as lead auditor for a half dozen validations performed under the VCS Double Approval Process for new methodologies and methodology revisions and provided validation support on an equal number. Project experience includes the assessment and approval of methodologies in the mining, transportation, fuel combustion, energy demand, aviation, and livestock sectoral scopes.

**Foam Supplies, Inc. Advanced Formulation Blowing Agent Project Validation and Verification.** *Lead verifier and project manager.* Performed the validation and verification of the first two projects utilizing the American Carbon Registry (ACR) new methodology for transition to low-GWP blowing agents in foam manufacture and use. Validation and verification activities included evaluation of project eligibility against methodology and ACR programmatic criteria, review of project monitoring plans and data management systems, and assessment of emission reduction calculations. Quantitative assessments focused on calculations related to the comparative technical performance of foam products manufactured using different blowing agents. 2016 - 2017.

**ConEdison, Inc. TCR Greenhouse Gas Verification, New York, New York.** *Lead verifier and project manager.* Directed verification of Con Edison's 2008, 2011, 2012, and 2013 GHG reports to TCR. Verification activities focusing on identification of emission sources, assessment of data management systems, and recalculation of reported emissions. The scope of the verification covered emissions from stationary combustion from all facilities in North America emissions from mobile combustion in fleet vehicles, SF<sub>6</sub> emissions

from the electric T&D system, and fugitive methane emission from ConEd's gas T&D system. 2009 – 2015.

**Confidential Client. Greenhouse Gas Inventory Development.** Assisted a major coal mining corporation with development of GHG inventories for operations at a one of the largest surface mines in the western U.S. as well as an underground. Identified quantification methodologies for emission sources, provided data collection and management support, developed an Excel-based calculation tool to quantify and sort emissions for all emission sources within the inventory. Assisted with the preparation of GHG inventory reports compliant with the ISO 14064-1 international standard.

**GenOn Energy Management, California Air Resources Board Greenhouse Gas Verification, California.** *Internal reviewer.* Reviewed verification of GenOn Energy Management's 2011 and 2010 GHG reports to the ARB. Facilities included three electric power generating facilities and one energy trading facility. The scope of verification for energy trading facility including electric power transactions and reviews of e-tags. Also served as a team member for the verification of GenOn's 2009 GHG Report to ARB. 2012.

**Westchester County Airport, Greenhouse Gas Inventory, Westchester County, New York.** *Emission quantification specialist.* Provided quality assurance and technical oversight for a comprehensive air emissions inventory for Westchester County Airport for all transportation operations that occurred at the airport in reporting year 2007. Organizational boundaries of the inventory included air transportation and support operations at the airport with data provided by airport operations, tenants, or vendors. Aircraft engine emissions up to an altitude of 3,000 feet were also included in the emissions inventory. 2006 – 2008.

**Verified Carbon Standard, Renewable Energy Emission Reduction Project Validation and Verification.** *Verifier.* Provided validation and verification services to over a dozen renewable power projects including wind, biomass, hydro, and other generating technologies. Validation and verifications have been performed using the VCS standard. Project history includes VCS validation and verification services for first three waste-to-energy facilities in the U.S. to register emission reduction credits from their operations.

**GHG Emission Reduction Project Technical**

**Assistance.** Provided technical assistance to clients seeking to commercialize GHG emissions reduction activities through the creation of carbon offset. Leveraged understanding of emission reduction protocols to guide clients in registering carbon offset projects to earn offset credits under various programmes including the Climate Action Reserve, Verified Carbon Standard, and American Carbon Registry, and Chicago Climate Exchange. Core activities included estimation of project emission reductions and the development of monitoring plans and project design documents. Scopes of work also including technical support during third party verification of client offset projects. Industries served include the livestock, solid waste (landfill gas), and renewable energy sectors.

**U.S. Environmental Protection Agency – Region 2, Waste-to-Energy Facility Assessment, Puerto Rico.**

*Project manager.* Led a ten-person consulting team that assessed technical, economic, and social factors with regard to siting a waste-to-energy facility in Puerto Rico. The project investigated technological options for municipal solid waste disposal and constructed a detailed financial model to assess the economic viability of waste-to-energy in the territory. It also presented case study analysis of waste-to-energy plants on other islands around the world with special attention to political decisions that aided and impeded facility construction and operation. 2013.

**Publications / Presentations**

- Carim, Michael and Gary Yohe (2006). *“Transaction Costs and Relative Efficiency of Global Carbon Permit Markets.”* Integrated Assessment, Vol 6, No 1
- *“Waste To Energy: A Possibility for Puerto Rico.”* Report prepared for U.S EPA, Region 2. Columbia University School of International and Public Affairs, May 2007
- Meeting Monitoring, Reporting, and Verification Requirements to Ensure Compliance.” Carbon Markets North America conference. Miami. January 16, 2009
- “Carbon Offsets: The Whats, Hows, And Watch Outs.” Carbon Finance North America conference. New York. June 12, 2009
- “Collecting the Data.” Carbon Finance North America conference. New York. June 41, 2011
- “Verifying Projects and Valuing Carbon Credits with New Technologies.” Presentation to IQPC 3<sup>rd</sup> Annual Carbon Trading Conference. New York. January 28, 2009
- “Greenhouse Gas Inventories.” New Jersey Institute of Continuing Legal Education Environmental Law Forum. Avalon, NJ. June 27, 2009
- “Introduction to the California Compliance Offset Program – Verifying Coal Mine Methane Projects” EPA Coal Methane Outreach Program/Pittsburgh Coal Conference. Pittsburgh. October 6, 2015

## JEFF DALEY *Key Personnel*

### Summary of Professional Experience:

Mr. Daley has 13 years of experience providing climate change management services with a focus on offset project verification, inventory development, and technical assistance. Through verification and inventory development work, he has worked directly with the Climate Action Reserve's (CAR's) protocols, The Climate Registry's (TCR's) General Reporting Protocol and Electric Power Sector Protocol, and various Clean Development Mechanism (CDM) methodologies. Mr. Daley is familiar with landfill gas operations, anaerobic digester operations, wind power generation facilities, and waste to energy facility operations. Mr. Daley is a lead verifier and project manager and has participated in over 150 verifications, serving as the lead auditor in over 100 verifications.

### Education:

BS, Meteorology (minor in Geography), Northern Illinois University, 2005

### Years of Experience: 13

### Certifications / Registrations:

ARB-accredited verifier for GHG emissions data reports  
CAR-approved lead verifier for the following project types: landfill and livestock  
ARB-approved lead verifier for livestock offset projects  
Washington State approved verifier  
Airport Carbon Accreditation approved verifier

### Relevant Project Experience:

**University of North Carolina, CAR Landfill Verification, Chapel Hill, North Carolina.** *Project manager/Lead verifier.* Project consists of the collection and destruction of landfill gas in an enclosed flare or in a GE Jenbacher engine to produce electricity. Verified eligible emissions reductions from the process during the reporting period of July 1, 2017 through June 30, 2018. Verification process covered data collected and the emission reduction calculations. Verification deliverables included verification report documenting the emissions reductions, findings, results of the verification, and a signed verification statement consistent with CAR requirements. 2018 – 2019.

**Steuben County, Carbon Credit Verification Services, Steuben County, New York.** *Verifier.* Project consists of active gas collection system to capture methane generated by the Steuben County Bath Landfill and destroys it either in an on-site flare or an on-site engine to generate electricity. Responsible for validating ACR project plan and simultaneous verification of emission reductions as documented in an ACR Monitoring Report over reporting period of June 1, 2018 through December 31, 2018. Will lead the verification of emission reductions as documented in an ACR Monitoring Report over the reporting period of January 1, 2019 through December 31, 2019. 2018 – ongoing.

**California Air Resources Board, Greenhouse Gas Verifications, Various Locations, California.** *Verification specialist.* Provided verification reports to ARB for the following facilities:

- B. Braun Medical, Inc., 2016, 2017
- Colorado Energy Management, LLC, 2016
- Los Angeles County Sanitation District, 2017
- NextEra Energy, Inc. - Luz Solar Partners LTD, 2017

- NextEra Energy Power Marketing, Inc – 2013-2016
- Graphic Packaging International, Inc., 2017
- Calgren Renewable Fuels, 2017

**TCR Greenhouse Gas Report Verification.** *Verification specialist.* Assisted in the verification of GHG Reports under The Climate Registry's General Reporting Protocol and Electric Power Sector Protocol.

- Xcel Energy – 2012 - 2014
  - Northern States Power Company
  - Public Service Company of Colorado
  - Southwestern Public Service Company
- Con Edison, New York, 2013
- Metropolitan Transportation Authority, 2016, 2017

**Climate Action Reserve Livestock Methane Emission Reduction Project Verification.** *Verifier.* Participated in over 50 livestock project verifications, acting as the lead verifier in over 15 verifications. Projects used various manure management techniques to control methane emissions from manure waste. Verification activities included site visits, review of raw data and emission reduction calculations relative to protocol requirements, review of technical reports supporting data and calibration records, and drafting and issuance of verification reports. Verification activities have been performed under CAR.

**Landfill Gas Emission Reduction Project Validation and Verification.** *Verifier.* Participated in over 150 landfill project verifications, acting as the lead verifier in over 100 verifications. Verification activities included site visits, review of raw data and emission reduction calculations relative to protocol requirements, review of technical reports supporting data and calibration records, and

drafting and issuance of verification reports. Validations and verifications have been conducted against the CAR and VCS methodologies and protocols. 2010 – 2018.

**California Air Resources Board, Offset Project Verification.**

*Lead verifier.* Verification activities included site visits, review of raw data and emission reduction calculations relative to protocol requirements, review of technical reports supporting data and calibration records, and drafting and issuance of verification reports and opinions consistent with Air Resource Board requirements for the following projects:

- Maple Leaf East Dairy, 2016
- Maple Leaf West Dairy, 2016
- Dairy Dreams Dairy, 2017
- Pagel's Ponderosa Dairy, 2017
- WTE-S&S Ag Enterprises, LLC, 2017
- Green Valley Dairy, 2017
- WTE-Dallmann Dairy, 2018
- Holsum Elm and Irish Dairies, 2018
- Greenwood Dairy, 2018

Offset verifier for the following California Air Resources Board, offset project verification projects:

- Scenic View Dairy, 2016
- Brook View Dairy, 2016
- TMF Biofuels, LLC. 2016
- Farm Power Lynden Anaerobic Digester, 2016
- Open Sky Ranch Dairy Digester, 2016
- Cottonwood Dairy Livestock Gas Capture Project, 2016

**City and County of Honolulu, VCS Validation Services for H-Power Waste to Energy Facility Expansion – Unit No. 3, Honolulu, Hawaii.** *Lead auditor/project manager.* Provided validation services for project acceptance in the Verified Carbon Standard (VCS) program. Validation activities included review of the project description document and assessment of conformance to the VCS standard as well as associated underlying CDM methodologies applied in the project activity. 2014.

**TerraPass, Inc., CAR Landfill Gas Emission Reduction Project Verification of the Beulah Municipal Landfill Project, Dorchester County, Maryland.** *Lead verifier/project manager.* Provided verification services and facilitated project initiation through completion. Verification activities included review of project documentation, raw data and emission reduction calculations, review of supporting documents and calibration records, and drafting verification report. 2013 - 2015.

**City of Superior Wisconsin, CAR Landfill Gas Emission Reduction Project Verification of the Moccasin Mike Landfill Project, Superior, Wisconsin.** *Lead verifier/project*

*manager.* Provided verification services and facilitated project initiation through completion. Verification activities included review of project documentation, raw data and emission reduction calculations, review of supporting documents and calibration records, and drafting verification report. 2012 – 2015.

**Androscoggin Valley Regional Refuse Disposal District, CAR Landfill Gas Emission Reduction Project Verification of the Mt. Carberry Landfill Project, Berlin, New Hampshire.** *Lead verifier/project manager.* Provided verification services and facilitated project initiation through completion as a Project Manager. Verification activities included review of project documentation, raw data and emission reduction calculations, review of supporting documents and calibration records, and drafting verification report. 2013.

**Element Markets, LLC, VCS Renewable Energy Wind Project Verifications of the Crow Lake Wind Emission Reduction Project and the Prairie Winds ND1 Emission Reduction Project, Chamberlain, South Dakota, and Minot, North Dakota.** *Lead verifier/project manager.* Provided verification services and facilitated project initiation through completion. Verification activities included review of project documentation, raw data and emission reduction calculations, review of supporting documents and calibration records, and drafting verification report. 2012 – 2015.

**NativeEnergy, VCS Validation Services for Weowka Small-Scale Landfill Gas Recovery and Thermal Energy Generation Project, Wewoka, Oklahoma.** *Auditor.* Provided validation services for project acceptance in the VCS program. Validation activities included review of the project description document and assessment of conformance to the VCS standard as well as associated underlying CDM methodologies applied in the project activity. 2011 – 2012.

**NativeEnergy, VCS Verification Services for Weowka Small-Scale Landfill Gas Recovery and Thermal Energy Generation Project, Wewoka, Oklahoma.** *Lead verifier/project manager.* Provided verification services and facilitated project initiation through completion. Verification activities included review of project documentation, raw data and emission reduction calculations, review of supporting documents and calibration records, and drafting verification report. 2013.

**National Institutes of Health, Greenhouse Gas Inventory Development, Washington, DC.** *Auditor.* Provided technical assistance for the development of a 2008 and 2010 emissions inventory using the Federal Greenhouse Gas Accounting and Reporting Guidance for the quantification of greenhouse gas emissions. Activities included the collection of activity data for all stationary and mobile sources; compilation and quantification of greenhouse gas and pollutant emissions from all sources and developing an

Inventory Management Plan (IMP) and strategy to reduce emissions. 2010 - 2011.

**Confidential Client, Greenhouse Gas Inventory. Auditor.** Performed data management and quantification of GHG emissions for a global food and beverage manufacturer. GHG inventory activities included gathering facility-level data from manufacturing, distribution, and office locations throughout North America, quantifying associated GHG emissions per industry best practices, and preparing an inventory management plan. 2009 - 2015.

**Confidential Client, EPA Mandatory Reporting of Greenhouse Gases. Program manager.** Prepared annual GHG emissions reports for large manufacturing facility under Subpart C of the U.S. EPA's Mandatory Reporting of GHG Rule, including data collection and quantification. 2010 - 2014.

**Carbon Disclosure Project Reporting.** Assisted a large, international corporation with the quantification of GHG emissions and development of written responses for public reporting to the Carbon Disclosure Project (CDP). 2009.

#### Previous Work Experience:

**Environmental Resources Management, Rolling Meadows, Illinois. Staff scientist.** Assisted with Form R, Tier 2, and Hazardous Waste reporting for various industrial and chemical facilities. Managed and implemented updates to a local refinery's Leak Detection and Repair (LDAR) program. Executed EPA Method 21 monitoring at refineries for LDAR compliance and LDAR Audits. Determined field applicability of refinery operations for Leak Detection and Repair program in compliance with New Source Performance Standards (subparts VV, CC, GGG and QQQ) using process and instrumentation diagrams at various refineries. 2007 - 2010.

**Murray & Trettel Inc., Palatine, Illinois. Environmental meteorologist.** Implemented and maintained Meteorological monitoring programs for nuclear power plants in accordance with Regulatory Guide 1.23, and Code of Federal Regulations (Part 100). Performed daily quality assurance audits of ambient monitoring data. Assisted in preparation of monthly monitoring compliance reports. 2005 - 2007.

## LUCA NENCETTI *Key Personnel*

### Summary of Professional Experience:

Mr. Nencetti has more than 21 years of engineering and climate change policy experience, including work in the fields of environmental compliance, greenhouse gas (GHG) management, energy efficiency, renewable energy project management, and oil and gas equipment performance testing. Mr. Nencetti works on First Environment's climate change team providing validation and verification services for GHG inventories, offset projects and methodologies under the Verified Carbon Standard (VCS), Climate Action Reserve (CAR), California Air Resource Board (ARB) and The Climate Registry (TCR).

Mr. Nencetti has also managed numerous third-party engineering reviews of renewable fuel production facilities under EPA's Renewable Fuel Standard (RFS2). The list of facilities includes municipal solid waste (MSW) landfills, wastewater plants and agricultural anaerobic digesters. He also manages First Environment's Quality Assurance Plans for renewable identification numbers (RINs) under the RFS2. In addition, following on his experience developing GHG methodologies for the United Nation's Clean Development Mechanism (CDM), he is responsible for validation of VCS methodologies and development of GHG emission quantification tools.

### Education:

MA, Climate and Society, Columbia University, 2009  
MS, Mechanical Engineering, University of Florence, 1997

### Years of Experience: 21

### Certifications / Registrations:

Professional Engineer (Italy - Ing)  
California ARB Lead Verifier GHG mandatory reporting rule (MRR); Energy Transaction specialist  
California ARB Lead Verifier GHG Offset Projects; Ozone Depleting Substances GHG Offset Projects Specialist  
Washington State Clean Air Rule GHG Verifier  
Airport Carbon Accreditation Approved Verifier

### Professional Affiliations:

American Society of Mechanical Engineers

### Relevant Project Experience:

**City of Hoboken, Greenhouse Gas Inventory and Climate Action Plan, Hoboken, New Jersey.** *GHG inventory management.* Leading the preparation of the City's GHG inventory report under both ICLEI's Local Government Operations Protocol and Community Protocol. Activities include the determination of the inventory boundaries, emission sources, quantification of emissions from stationary sources, mobile fleet fuel combustion. The GHG inventory is integrated into a Climate Action Plan, providing the City with a strategy and implementation plan for energy reduction and climate impact mitigation measures. 2018.

**Town of Dover, Greenhouse Gas Inventory and Climate Action Plan, Dover, New York.** *Project manager.* Led the preparation of the GHG Inventory Report under ICLEI's Local Government Operations Protocol. Activities included the determination of the inventory boundaries, emission sources, quantification of emissions from stationary sources, mobile fleet fuel combustion. The GHG inventory was integrated into a Climate Action Plan, providing the Town the strategy and implementation plan for energy reduction and climate impact mitigation measures. 2018.

**New York State Metropolitan Transportation Authority, TCR Greenhouse Gas Report Verification, New York, New York.** *Project manager.* Lead the verification of GHG Inventory Report under The Climate Registry's General Reporting Protocol. Activities included the review of emission calculations from stationary sources and mobile fleet fuel combustion, site inspection of relevant facilities, and evaluation of materiality compliance with reported emissions. 2016 – ongoing.

**World Bank Metrobus Bus Rapid Transit Carbon Offset Assessment.** *Project manager.* Provided an assessment of the GHG reductions attributable to a transportation modal shift (car to bus) for a Bus Rapid Transit (BRT) project dedicating two lanes to large capacity buses on a main thoroughfare through Mexico City. Performed an engineering-based audit of activity data collection and management systems and evaluated the results against protocols developed by World Bank and Mexico City Metrobus. The project-specific protocols are based on the United Nations' Clean Development Mechanism (CDM) guidelines and methodologies. The assessment was used by the World Bank to fulfill requirements of the Spanish Carbon Fund related to this emission reduction project. 2012 – 2014.

**City of San Mateo, RFS2 Third Party Engineering Review, San Mateo, California.** *Project manager.* Managed the engineering review of City of San Mateo's recovery of biogas produced from the City's wastewater treatment plant and conversion into transportation fuel. The biogas is treated onsite and converted into CNG for use in trucks and buses as transportation fuel. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed engineering review services required under RFS2 in order to register the activity with EPA and qualify to generate the tradable RINs associated with fuel production and use as transportation fuel. Performed required site inspection visits and review of technical and contractual documentation pertinent to project activities. Submitted and Engineering Review Report to EPA to validate the project's application for registration. 2016.

**New York City Department of Sanitation, RFS2 Third Party Engineering Review for Fresh Kills Landfill, New York.** *Project manager.* Managed the engineering review of New York City Department of Sanitation's (DSNY's) conversion into transportation fuel of landfill gas captured at Fresh Kills Landfill. The biogas is treated onsite at the landfill and injected into a commercial pipeline transferring it to a Liquefied Natural Gas (LNG) conversion plant. The LNG fuel is then transported by truck into California for use in trucks and buses as transportation fuel. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed the engineering review services required under RFS2 in order to register activity with EPA and qualify to generate the tradable RINs associated with fuel production and use as transportation fuel. Performed required site inspection visits and review of technical and contractual documentation pertinent to project activities. Submitted an Engineering Review Report to EPA to validate project's application for registration. 2014 – 2015.

**San Antonio Water System, RFS2 Third Party Engineering Review for Dos Rios Water Recycling Center, San Antonio, Texas.** *Project manager.* Managed the engineering review of San Antonio Water System's recovery and conversion into transportation fuel of biogas produced from Dos Rios Water Recycling Center. The biogas is treated onsite at the wastewater plant and injected in a commercial pipeline transferring it to an LNG conversion plant, as well as to several Compressed Natural Gas (CNG) fuel stations. The LNG fuel is then transported by truck into California for use in trucks and buses. The CNG is dispensed directly by each CNG station for use as transportation fuel, usually by truck and bus fleets. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed engineering review services required under RFS2 in order to register

the activity with EPA and qualify to generate the tradable RINs associated with fuel production and use as transportation fuel. Performed required site inspection visits and review of technical and contractual documentation pertinent to project activities. Submitted Engineering Review Report to EPA to validate the project's application for registration. 2014 – 2015.

**Blue Line Transfer, Inc., RFS2 Third Party Engineering Review Report, San Francisco, California.** *Project manager.* Managed the engineering review of Blue Line Transfer's renewable fuel project for the Prasio Group, LLC. The project entails the recovery and conversion into transportation fuel of the biogas produced from the anaerobic digestion of organic municipal solid waste performed at the Blue Line Transfer facility. The biogas is treated onsite at the facility and converted into CNG for use in Blue Line's fleet of waste collection trucks as transportation fuel. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed the engineering review services required under RFS2 in order to register the activity with EPA and qualify Blue Line Transfer to generate tradable RINs associated with fuel production and use as transportation fuel. Specifically, performed required site inspection visits and review of the technical and contractual documentation pertinent to project activities. Submitted Engineering Review Report to EPA to validate the project's application for registration. 2015.

**Clean World Inc., RFS2 Third Party Engineering Review Report, San Francisco, California.** *Project manager.* Managed the engineering review of Clean World's renewable fuel project for CapOp Energy. The project entails the recovery and conversion into transportation fuel of the biogas produced from the anaerobic digestion of organic municipal solid waste performed at the Clean World Sacramento facility. The biogas is treated onsite at the facility and converted into CNG for use as transportation fuel by fleets of waste collection trucks. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed the engineering review services required under RFS2 in order to register the activity with EPA and qualify Clean World to generate tradable RINs associated with fuel production and use as transportation fuel. Specifically, performed required site inspection visits and review of the technical and contractual documentation pertinent to project activities. Submitted Engineering Review Report to EPA to validate the project's application for registration. Once approved, the project will be able to earn 800,000 RINs per year and avoid the use of 480,000 gallons of diesel fuel annually, which is the equivalent of approximately 4,800 metric tonnes of CO<sub>2</sub> emissions avoided each year. 2015.

**City of Riverview, RFS2 Third Party Engineering Review, Riverview, Michigan.** *Project manager.* Managed the

engineering review of City of Riverview's recovery of biogas produced from Riverview Land Preserve Landfill and conversion into transportation fuel. The biogas is treated onsite at the landfill and converted into CNG for use in trucks and buses as transportation fuel. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed engineering review services required under RFS2 in order to register the activity with EPA and qualify to generate the tradable RINs associated with fuel production and use as transportation fuel. Performed required site inspection visits and review of technical and contractual documentation pertinent to project activities. Submitted Engineering Review Report to EPA to validate the project's application for registration. 2014 - 2016.

**Clean Energy LNG, RFS2 Third Party Engineering Review, Boron, California.** *Project manager.* Managed the engineering review of Clean Energy Renewable Fuels' conversion into transportation fuel of landfill gas from three Johnstown Regional Energy landfills. The biogas is treated onsite at the landfills and injected in a commercial pipeline transferring it to an LNG conversion plant. The LNG fuel is then distributed by truck in California for use as transportation fuel primarily by truck and bus fleets. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed engineering review services required under RFS2 in order to register activity with EPA and qualify to generate the tradable RINs associated with fuel production and use as transportation fuel. Performed required site inspection visits and review of technical and contractual documentation pertinent to project activities. Submitted Engineering Review Report to EPA to validate project's application for registration. 2014.

**U.S. Agency for International Development, Building Low Emissions Alternatives to Develop Economic Resilience and Sustainability, Philippines.** *Project manager.* As a subconsultant to International Resources Group, providing GHG management support to contribute to increasing climate change resilience and mitigation within the Philippines. Responsibilities included conducting a comprehensive review of previously completed GHG management plans for several municipalities, including: Batangas City, Iloilo City, the Province of Aurora, and Makati City. In coordination with local government units (LGUs), Held face to face meetings on site and provided recommendations for improvements in the plans. Developed tools for quantifying/estimating potential GHG emission reductions arising from the reduction activities identified in the GHG management plans. Created training materials and curriculum and conducted on site trainings for LGUs at each municipality. Responsibilities also included performing a validation of the Cost Benefit Analysis of the Philippines Climate Change Mitigation Action Plan to be implemented to meet the GHG emission reduction goals pledged in the INDC. 2014 - ongoing.

**Columbia University, Climate Change Model Research, New York, New York.** Performed simulation and forecast of climate events using atmospheric climate change models, such as the International Research Institute for Climate and Society (IRI) EdGCM. Also performed seasonal forecast and analysis of climate impacts using IRI's Climate Prediction Tool (CPT) to downscale model outputs to predict impacts at regional level, with focus on precipitation, floods, and droughts in Peru, Ecuador. 2009.

**TCR Greenhouse Gas Report Verification.** *Verification specialist.* Assisted in the verification of GHG reports under The Climate Registry's General Reporting Protocol and Electric Power Sector Protocol. Activities included the review of emission calculations from power generation plants, mobile fleet fuel combustion; review of EIA reported emissions and FERC forms; assessment of continuous emissions monitoring systems; evaluation of materiality compliance with reported emissions.

- Xcel Energy, Minneapolis, Minnesota, 2005 - 2011
- New York Power Authority, New York, 2012; 2013
- Con Edison, New York, 2012; 2013

**California Air Resources Board, Mandatory GHG Reporting Verification.** *Verification specialist.* Performed analysis of electricity transactions and GHG emission for Power Marketer under California Mandatory Reporting Rule. Activities included reviewing inventories of energy transactions, assessing sinks and sources, verifying associated GHG emissions.

- NextEra Energy Power Marketing, Juno Beach, Florida, 2009 - 2017
- Twentynine Palms, 2015 - 2017
- Braun Medical Inc., 2015 - 2017
- Pixley Cogeneration Partners/Calgren Renewable Fuels, 2015 - 2017
- Luz Solar Partners, Ltd, 2016
- Malburg Generating Station, 2015
- Patua Geothermal Project, 2015
- NV Energy, Las Vegas, Nevada, 2012
- Trans Canada, Calgary, 2013

**Quality Assurance Program for RINs Verification.** *Assessor.* Developed and received approval from EPA for Quality Assurance Programs (QAP) required

to verify the generation of RINs by renewable fuel producers and importers. The following protocols were developed: biodiesel and renewable diesel from multiple feedstocks, ethanol, biogas. First Environment is one of a few firms that have received pre-approval by EPA to provide a QAP for RINs.

**Multiple Validation and Verification for Methane Recovery, Landfill Gas Emission Reduction and Renewable Energy Projects. Auditor/verifier.**

Provided validation and verification services for numerous methane destruction and renewable energy projects throughout the U.S. Activities included assessing project design, additionality, and monitoring methods; reviewing project data and documentation supporting the emission reduction estimates; performing site visits; and developing validation and/or verification reports.

- Vessels Coal Gas, Inc. - VCS Verification, Ebensburg, Pennsylvania, 2012 - 2014
- Vessels Coal Gas, Inc. - CAR Verification, Somerset, Colorado, 2013 - 2015
- Advanced Disposal Service, - CAR Verification, Ball Ground, Georgia, 2014 - 2015
- Advanced Disposal Service, - CAR Verification, Dry Branch, Georgia, 2014 - 2015
- Advanced Disposal Service, - CAR Verification, Tallassee, Alabama, 2013; 2014
- Southern Ute Indian Tribe - VCS Verification, La Plata, Colorado, 2013 - 2016
- Seneca Meadows, Inc. - ACR Verification, Waterloo, New York, 2012 - 2015
- Recast Energy, LLC - VCS Verification, Louisville, Kentucky, 2013; 2014
- Origin Climate, Inc. - CAR Verification, Dorchester County, Maryland, 2014
- Origin Climate, Inc. - CAR Verification, Alexandria, Virginia, 2014
- Fulton County Dept. Waste - VCS Verification, Fulton County, New York, 2010; 2011; 2012

- Native Energy - VCS Validation, Devils Lake, North Dakota, 2013
- Native Energy - VCS Validation, Middletown-Winchester, Indiana, 2013
- Native Energy - VCS Verification, Union City, Indiana, 2010 - 2012
- Element Markets - VCS Verification, Garvin, Minnesota, 2013
- Element Markets - VCS Verification, Culbertson, Montana, 2013
- Element Markets - VCS Verification, Minot, North Dakota, 2013
- Element Markets - VCS Verification, Chamberlain, South Dakota, 2013
- Challis Water Controls - VCS Methodology Validation, 2014

**Carbon Credit Capital, New York, New York. Director of engineering.** Carbon Credit Capital provides consulting services to support the development of energy efficiency and GHG emission reduction projects, under the United Nations' Clean Development Mechanism (CDM) and other GHG voluntary standards. Developed and received approval by the CDM for methodology AMS-III.BA on quantification and monitoring of GHG emission reductions attributable to e-waste recycling activities. Mr. Nencetti's background in engineering and climate change policy was instrumental for the execution of technical and financial evaluation of projects, including assessment of energy and GHG emission performance and the preparation of the required project design documents.

**Owens Corning - OCV Fabrics U.S. Inc., Columbia, South Carolina. Plant engineering leader.** Owens Corning is one of the global leader manufacturers of composites, insulation and construction materials. Responsible for managing the transfer of operating and environmental permits to new company ownership, managing the transfer of two production lines to the Brunswick, MA plant, and integrating plant energy monitoring and emissions reporting with Owen Corning's corporate sustainability and carbon footprint program.

**B. TOD DELANEY, PHD, PE, BCEE** *Key Personnel***Summary of Professional Experience:****GHG/Renewable Fuels**

A chemical and environmental health engineer, Dr. Delaney possesses more than 40 years of diverse experience assisting clients on a range of environmental concerns, from greenhouse gas (GHG) management and air quality assistance to litigation support and expert testimony. Over the course of his career, he has worked for and consulted to hundreds of clients; taught graduate and undergraduate college courses in chemical and environmental engineering; and authored dozens of reports, presentations, and publications. As president of First Environment since 1987, Dr. Delaney provides strategic oversight on all of the firm's greenhouse gas management, biofuel Renewable Identification Numbers (RINs), and climate change adaptation projects. In addition, Dr. Delaney has maintained active involvement in the international discussions of standards regarding greenhouse gas verification, life cycle analysis, carbon footprinting, and environmental management. He continues to serve as the elected chair of the International Organization of Standardization's (ISO's) Climate Change Coordination Committee, tasked with synthesizing existing adaptation and mitigation best practices and developing consistent international standards.

**Education:**

PhD, Environmental Health Engineering, University of Texas at Austin, 1976  
MBA, Pepperdine University, 1991  
MS, Chemical Engineering, University of New Mexico, 1972  
BS, Chemical Engineering, University of New Mexico, 1968

**Years of Experience:** 40**Certifications / Registrations:**

Professional Engineer (NJ, NY, PA, CT, AL, CO, FL, GA, IA, IL, IN, MS, NE, OH, SC, TX)  
Board Certified Environmental Engineer – American Academy of Environmental Engineers  
Certified Principal Environmental Auditor – Institute of Environmental Management and Assessment, England

**Professional Affiliations:**

ISO Climate Change Coordinating Committee, Chair  
American Institute of Chemical Engineers  
Air and Waste Management Association  
American Chemical Society  
Forensic Expert Witness Association  
International Standards Association – W2 Chair, SC7  
Editorial Board of Environmental Claims Journal  
Business Council for Sustainable Energy - Chairman Emeritus  
Town of Cornwall, New York - Conservation Commission Appointee

**Relevant Project Experience:****RENEWABLE FUELS**

**Multiple Third-Party Engineering Reviews for Renewable Fuel Production Facilities.** *Technical advisor.* Oversaw facility engineering reviews for several biogas and liquefied petroleum gas (LNG) production facilities under the EPA Renewable Fuel Standard program. Project involved reviewing facility production data, process diagrams, and other relevant records; conducting site visits; and preparing engineering review reports to be submitted to EPA. 2013.

**Quality Assurance Program for RINs Verification.** *Technical advisor.* Contributed to development and approval of EPA Quality Assurance Programs (QAP) required to verify the generation of RINs by renewable fuel producers and importers. The following protocols were developed: biodiesel and renewable diesel from multiple feedstocks, ethanol, biogas. First Environment is one of a few firms that have received pre-approval by EPA to provide QAP for RINs. 2012.

**New York City Department of Sanitation, RINs Verification Third Party Engineering Review for Fresh Kills Landfill, New York.** *Technical advisor.* Supported Element Markets with engineering review of New York City Department of Sanitation's (DSNY's) conversion of landfill gas captured at Fresh Kills Landfill to transportation fuel. The biogas is treated onsite at the landfill and injected into a commercial pipeline transferring it to a Liquefied Natural Gas (LNG) conversion plant. The LNG fuel is then transported by truck into California for use in trucks and buses as transportation fuel. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed the engineering review services required under RFS2 in order to register activity with EPA and qualify to generate the tradable RINs associated with fuel production and use as transportation fuel. Performed required site inspection visits and review of technical and contractual documentation pertinent to project activities. Submitted an Engineering Review Report to EPA to validate project's application for registration. Once approved, the project will be able to earn 19 million RINs per year and avoid the use of 12 million gallons of diesel fuel annually, which is

equivalent to approximately 130,000 metric tonnes of CO<sub>2</sub> emissions each year. 2014 – 2015.

**City of Riverview, RINs Verification Third Party Engineering Review, Riverview, Michigan.** *Technical advisor.* Supported Blue Source with engineering review of City of Riverview's recovery and conversion of biogas produced from Riverview Land Preserve Landfill into transportation fuel. The biogas is treated onsite at the landfill and converted into CNG for use in trucks and buses as transportation fuel. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed engineering review services required under RFS2 in order to register the activity with EPA and qualify to generate the tradable RINs associated with fuel production and use as transportation fuel. Performed required site inspection visits and review of technical and contractual documentation pertinent to project activities. Submitted Engineering Review Report to EPA to validate the project's application for registration. Once approved, the project will be able to earn 360,000 RINs per year and avoid the use of 200,000 gallons of diesel fuel annually, which is the equivalent of approximately 2,200 metric tonnes of CO<sub>2</sub> emissions each year. 2014.

**Clean Energy LNG, RINs Verification Third Party Engineering Review, Boron, California.** *Technical advisor.* Supported Element Markets with engineering review of Clean Energy Renewable Fuels' conversion of landfill gas from three Johnstown Regional Energy landfills to transportation fuel. The biogas is treated onsite at the landfills and injected in a commercial pipeline transferring it to an LNG conversion plant. The LNG fuel is then distributed by truck in California for use as transportation fuel primarily by truck and bus fleets. The project qualifies to earn tradable RINs under EPA's RFS2 program. Performed engineering review services required under RFS2 in order to register activity with EPA and qualify to generate the tradable RINs associated with fuel production and use as transportation fuel. Performed required site inspection visits and review of technical and contractual documentation pertinent to project activities. Submitted Engineering Review Report to EPA to validate project's application for registration. Once approved, the project will be able to earn approximately 13 million RINs per year, avoiding the use of 7.8 million gallons of diesel fuel annually, which is the equivalent to approximately 80,000 metric tonnes of CO<sub>2</sub> emissions each year. 2014.

## CLIMATE CHANGE AND SUSTAINABILITY

### ISO 14000 Series of Standards, Climate Change, Participation and Leadership

- **Climate Change Coordinating Committee (CCCC)** – Chair of ISO's CCCC, formed in 2014, responsible for leading reviews of existing ISO deliverables concerning climate change adaptation (related to adjusting to the effects of global warming) and mitigation (related to reducing greenhouse gas emissions) in order to identify gaps and create a road map for future actions. The group also aims to identify and implement collaboration with key international organizations (such as UNFCCC) to collect input, develop joint projects/ initiatives, raise awareness, and promote participation of stakeholders in international development and implementation.
- **U.S. Technical Advisory Group on Climate Change** – Served as the American National Standards Institute's (ANSI's) representative to Ad Hoc Group on Climate Change of ISO's Technical Management Board and Chairman of ANSI's Virtual Technical Advisory Group on climate change. In addition, appointed as Co-Chair to ISO's U.S. Technical Advisory Group Climate Change Task Force and participates in development of protocols on how ISO 14000 standards can be used to support global climate change. Represented U.S. at 2002 meeting of ISO's Technical Committee 207 on environmental management standards in Johannesburg; UN's Framework Convention on Climate Change in Buenos Aires in 1998 and Bonn in 1999; Meetings of the Subsidiary Bodies of the Kyoto Protocol in Bonn and Lyon in 2000; COP-6 meetings in Hague in 2000; COP-15 meetings in Copenhagen in 2009; and COP-16 meetings in Cancun in 2010.
- **ISO 14064: Emission Measurement, Verification, and Reporting** – Served as U.S. technical expert for ISO 14064 and as international coordinator and technical expert for Part I, focused on entity emissions. Served as U.S. lead expert on portion regarding project emissions.
- **ISO 14065: Accreditation** – Served as one of two U.S. experts.

ISO Standards Development Involvement						
Standard	Subject	Group	US Technical Expert	US Lead Expert	International Convener	International Coordinator
ISO 14043	Life cycle interpretation	USTC207, WG 3	1995-1997			
ISO 14064, Part 1	GHG Entity	USTC207, WG 5; TC 207 SC7 WG4	2002-2006			
ISO 14064, Part 2	GHG Project	USTC207, WG 5; TC 207 SC7 WG5		2002-2006		2013 - ongoing
ISO 14064, Part 3	GHG Verification	USTC207, WG 5; TC 207 SC7 WG6	2002-2006		2013 - ongoing	
ISO 14065	GHG Accreditation	USTC207, WG 7; TC 207 SC7; WG6		2005-2009	2013 - ongoing	
ISO 14066	GHG Competency	USTC207, WG 7; TC 207 SC7 WG1			2009-2012	

In these roles, Dr. Delaney has attended and facilitated international meetings across the globe, oftentimes negotiating on behalf of the U.S. throughout the standards development process.

- **ISO 14066: Competency Requirements** –Serves as International Convener for ISO 14066 standard involving competency requirements for validators and verifiers.
- **ISO 14067 – Carbon Footprinting** – Serves as U.S. technical expert for standard on carbon footprinting (published in 2014), which enables consumers to compare products based on associated GHG emissions.

development of the ISO 14000 Series of Standards as a member of the U.S. Technical Advisory Group’s (US TAG) to ISO’s Technical Committee 207 (TC207). Through this participation, he was integrally involved in the development of life cycle interpretation guidelines. He was elected to serve as the United States expert representative on life cycle assessment, and, in that capacity, has consistently represented the interests of the United States at ISO International Meetings all over the world.

**World Business Council for Sustainable Development/World Resources Institute Greenhouse Gas Protocol** – Among original stakeholders in process that produced the protocol. Also participated in GHG studies performed by Civil Engineering Research Foundation focused on transportation and cement manufacturing industries and life cycle assessment.

**NJ TRANSIT, Adaptation of Assets to Climate Change, New Jersey.** *Project director* for the development of an assessment of climate risk for New Jersey Transit which addressed all of NJ TRANSIT’s fixed assets in the region. Dr. Delaney employed a specialized risk model to characterize and prioritize region specific risks from climate change. Impacts assessed included high heat, storm surge, high winds, sea level rise, flooding and erosion, snow and ice events, and lightning. To support both planning and current operations, region-specific risks indicators were developed and assets were assessed using these risk indicators for 0-5 years, 6-10 years, 11-20 years and 21 to 50 years. Dr. Delaney also assisted in the identification of potential mitigation strategies and developed cost estimates for mitigation actions. 2011 – 2012.

**Business Council for Sustainable Energy.** In 1997, Dr. Delaney joined the Business Council for Sustainable Energy (BCSE), a trade group organization created by senior executives in the energy efficiency, electric utility, renewable energy, independent power and natural gas industries in the U.S. Dr. Delaney, who served as the chairman of the Board of Directors of BCSE until 2010, has consistently attended COP meetings to represent the interests of U.S. clean energy companies at the UNFCCC talks.

**NJ TRANSIT Superstorm Sandy Response: Assessing Vulnerability, Short-Term Recovery, and Planning for a More Resilient Future, New Jersey.** *Technical advisor.* Supported programmatic approach to integrate comprehensive

**ISO 14000 Series of Standards Participation, Life Cycle Assessment.** In 1995, Dr. Delaney actively participated in the

resiliency planning building on previous adaptation study and climate change risk indicators First Environment developed for NJ TRANSIT. Focused on recovery efforts associated with Superstorm Sandy, such as storm surge and flooding, as well as other regional indicators. Further developed risk assessment algorithm which relies on overall criticality of assets to the transit system and vulnerability of specific asset to a climate change impacts. 2013 – 2014.

**Los Angeles County Metropolitan Transportation Authority, FTA Adaptation Pilot Grant, Los Angeles, California.** *Project director.* Assisted the Los Angeles Metropolitan Transportation Authority (LA Metro) with one of seven pilot FTA grants to implement transit climate change adaptation and advance the state of practice for adapting transit systems to climate change. The FTA grant includes the development of a plan for the integration of adaptation into LA Metro's Environmental Management System (EMS) that can be applied to other transit agencies. The plan establishes specific efforts, plans, policies, and commitments regarding adaptation to climate change, and describes how they will be integrated into (and addressed by) the organization's existing EMS. This process will help insulate operations and services from climate related impacts. The project also serves as an example for other transit agencies—of any size—seeking to integrate climate adaptation measures into their existing organizational structures and activities. 2012 – 2013.

**USAID, Building Low Emissions Alternatives to Develop Economic Resilience and Sustainability, Philippines.** *Technical lead.* As a subconsultant to International Resources Group, providing GHG management support to contribute to increasing climate change resilience and mitigation within the Philippines. Responsibilities included comprehensive review of previously completed GHG management plans for several municipalities. In coordination with local government units, held face to face meetings and recommended improvements for plans. Developed tools for quantifying/estimating potential GHG emission reductions arising from reduction activities. Conducted on site trainings. 2014 – ongoing.

**National Institutes of Health, Greenhouse Gas Inventory and Inventory Management Plan, Washington, DC.** *Project director.* Involved in effort to develop inventory management plan and software to ensure collection of consistent activity data across National Institutes of Health (NIH) campuses. The inventory has been set up in campus modules that are then rolled up into the NIH-wide inventory. Gapped current activity data against requirements of the federal Greenhouse Gas Accounting and Reporting Guidance and Technical Support document to identify additional data collection needs. Also worked with NIH to fill gaps in the data collection process and develop a dashboard to track the data and its collection. 2011 – 2012.

## GREENHOUSE GAS MANAGEMENT

**Confidential Major Oil and Gas Company, Greenhouse Gas Inventory.** Assisted with a formal review and assessment of GHG management strategy. Analyzed the organization's decisions and understanding of GHG management issues. Developed the company's corporate GHG Inventory Protocol. Advised the team that worked on the development of this corporate level guidance document. This protocol was designed to drive the corporation toward the creation of a robust data collection system that ensures consistency, comparability and transparency throughout the organization. This protocol is also intended to be an effective communication tool to inform interested stakeholder groups of the company's policies, practices and methodologies for GHG data collection.

**Georgia Pacific, Greenhouse Gas Verification.** *Lead verifier.* Helped conduct an in-depth assessment of the company's greenhouse gas inventory protocol design and implementation. Along with the verification team, he also evaluated the preliminary year 2000 GHG inventory report conducted under the guidance of the protocol.

**Bentley Prince Street, CCAR Greenhouse Gas Verification, California.** *Senior internal reviewer* for First Environment's certification of the client's 2002 through 2005 GHG reports to the California Climate Action Registry (CCAR). Verifications have included addressing the company's onsite solar electricity generation, purchases of RECs, and emissions from its sales staff vehicle fleet. 2003 – 2006.

**Eastman Kodak, CCAR Greenhouse Gas Verification, California.** *Senior internal reviewer* for First Environment's verification of Kodak's 2002, 2003, 2004, and 2005 CCAR GHG reports covering its U.S. operations as well as reports of GHG emissions from non-U.S. operations. 2003 – 2006.

**Waste Management, Inc., CCX Greenhouse Gas Project Verification.** *Lead verifier* for numerous verification reports that were provided to Waste Management as a deliverable of the Chicago Climate Exchange's (CCX's) project verification process.

**Multiple Clients, Climate Action Reserve and Verified Carbon Standard Landfill Gas Emission Reduction Projects, Various Locations Nationwide.** *Lead verifier / technical advisor.* Provided validation and verification services to methane destruction projects at landfills across the U.S. Verification activities included site visits, review of raw data and emission reduction calculations relative to protocol requirements, review of technical reports supporting data and calibration records, data collection/data management system, and the drafting and issuance of verification reports. Validations and verifications have been conducted against the Climate

Action Reserve (CAR) and Verified Carbon Standard (VCS) methodologies and protocols. 2009 - 2015.

**Pacific Gas & Electric, Analysis of GHG Inventory Management Systems, San Francisco, California.** *Project lead.* Under a subcontract arrangement with strategic alliance partner and PG&E's certifier, assisted with the verification of report to the California Climate Action Registry. Scope focused on initial strategic review for the verification. Having no previous relationships with PG&E, part of the value First Environment added to the project was the ability to conduct the strategic review with an original and unbiased perspective. The strategic review began with a desktop analysis of PG&E's CARROT and Power and Utility CCAR reports to develop an understanding of the types and diversity of sources included within the inventory and the relative volume of emissions reported from those sources. For each source type including in the report, the quantification methodology identified by the Registry's Power and Utility Reporting Protocol or General Reporting Protocol was also carefully reviewed. Interviewed staff on site to gain information on overall business activities, the company's GHG management programs, and the organizational and operational boundaries. The interviews also reviewed the data collection processes associated with each emission source, including data sources, data collection and consolidation processes, quantification and reporting of emissions, and quality management procedures. Prepared a report detailing findings, including summaries of the data management systems in place for each emission source type as well as identification of the records and other evidence associated with the source data and a potential sampling method for the source. The report also included recommendations for sampling targets based on a risk-based approach that considered factors including but not limited to the relative size of the emissions sources within the inventory, the quantification methodology for the source type, and the source's GHG management system. 2006 - 2007.

**Pacific Gas & Electric, Power Purchase Emissions Assessment for Utility CCAR GHG Report Verification, San Francisco, California.** *Project lead.* As a subcontracted specialist under strategic alliance partner and PG&E's certifier, performed a review of reporting of purchased fossil, biogenic, geothermal, and other renewable generation, as well as the corresponding GHG emissions resulting from the purchase fossil generation under the CCAR Power and Utility Protocol. The review included an assessment of facility specific emission factor information, generation type, and emissions calculation and aggregation for energy purchases from over 250 generating facilities. 2006 - 2007.

**St. Mary's Cement, CCAR Cement Reporting Protocol Verification, Ontario, Canada.** *Project lead.* First Environment verified St. Mary's Cement's assertions of NO<sub>x</sub> and SO<sub>2</sub> emissions reductions occurring during operations between 2004 through 2007. The emissions reductions resulted

from using granulated blast furnace slag instead of clinker to produce Portland cement. The verification process included a site visit to a steel plant to observe the slag granulation process and installed equipment as well as a desktop review of data from both the steel and cement plants to assess the accuracy of the emission reduction calculations. The process confirmed that the claimed emission reductions were real, surplus, quantifiable, unique, and verifiable. The verified emission reductions were accepted into the Ontario Emission Trading Registry. 2004 - 2007.

#### **Additional Greenhouse Gas Verification and/or Consulting:**

- Xcel Energy TCR Verification
- Hawaiian Airlines Validation of Carbon Credits
- World Bank Metrobus BRT Carbon Offsets Verification
- Westchester County Climate Action Plan
- New York Power Authority TCR Verification
- United Technologies Corporation CDP Verification

#### **Publications / Presentations**

- "Reverse Engineering of Historic Processes: The Key to Quantifying Contaminant Mass Loading from Multiple MGP and Other Industrial Facilities," Battelle Conference on Remediation and Management of Contaminated Sediments, 2017
- "Emerging Developments in Resilience - Climate Change Standards," Inter-American Development Bank, Colombia, 2016
- "News from COP21: Latest Developments on Climate Change Standards and Financing Opportunities," New Jersey Water & Environment Association, NJ, May 2016
- "Overview of ISO's Climate Change Coordinating Committee" ANSI Network on Smart & Sustainable Cities, May 2016
- "Walking on Thin Ice: Climate Change Today," Lowenstein Sandler, New Jersey, October 20, 2014
- "Climate Change Coordinating Committee Overview." International Standards Organization, London, April 2014
- "De-mystifying the Carbon Footprint," Asia-Pacific Economic Corporation, Manila, Philippines, March 2013
- "Anatomy of a Carbon Credit: How Transportation Agencies Can Engage in Carbon Markets - Pratt & Whitney Engine Cleaning Protocol for Hawaiian Airlines."

Transportation Research Board, Washington, D.C.,  
January 13, 2013

- “Adaptation and MRV (Measurement, Reporting and Verification),” United Nations 18th Annual Climate Change Conference, Doha, Qatar. November 30, 2012
- “Climate Change - Infrastructure – Adaptation,” Presented at New Jersey Water Environment Association Conference, Atlantic City, NJ, May 14, 2012
- “What the Science Tells Us & How Practitioners Can Use the Science,” Presented at US DOT FTA Climate Change Workshop: Washington, D.C., August 3, 2011
- “Benefits of ISO 14064, 14065 and 14066,” Presented at Low Carbon Earth Summit: Dalian China, October 20, 2011
- “ISO 14064 Series of Standards: A Comprehensive Approach to GHG”, Presented at Chicago Climate Exchange-CCFE Sixth Annual Members Meeting, Chicago, IL. June 11, 2009
- “The Coming of Age of the Voluntary Market: Perspective from an American Verification Company,” Presented at Carbon TradeEx, Washington, DC. April 7, 2009
- “Verification: Standards & Quality: The evolution of verification, its role in the climate change world and an introduction to the process and ISO Standards,” Presented at Navigating the American Carbon World, San Diego, CA. April 3, 2009
- “Carbon Offsets: The Whats, Hows, And Watchouts of Verifying Offsets,” Presented at EBC Carbon Management Series, GHG Inventories, Registries, Life Cycle Assessments and Disclosure Requirements, Westborough, MA. March 6, 2009
- “Verification from a Verifier’s Perspective: Tips for an Easier Verification,” Presented at The Climate Registry Pre-Forum Workshop, Boston, MA. November 19, 2008
- “RIOS QEH&S Management Systems: Certification and Best Practices for the Electronics Recycling Industry,” Presented at E-Scrap 2008 Pre-Conference Workshop, Orlando, FL. September 16, 2008
- “ISO 14064 Series of Standards: A Comprehensive Approach to GHG,” Presented at Auditing Roundtable, Crystal City, VA. September 4, 2008
- “Understanding Your Footprint,” Presented at BIO International Convention, San Diego, CA. June 2008
- “De-mystifying the Carbon Footprint,” Presented at the Institute of Scrap Recycling Industries Annual Convention, Las Vegas, NV. April 7, 2008
- “Issues Regarding GHG Validation and Verification,” Presented at Operating in a Carbon-Constrained World: Positive Experiences from the UK, Los Angeles, CA. October 12, 2007
- “Use of ISO 14064-2 and ISO 14064-3 in Voluntary Emissions Reductions Schemes,” Presented at ISO 14064 Workshop - Implementation and Outlook, Beijing, China. June 28, 2007
- “ISO 14064: An International Standard for GHG Management,” Presented at Carbon Finance Conference 2006, Millennium Gloucester, London. October 9, 2006
- “Best Practices in Greenhouse Gas Verification,” Presented at the Business Roundtable GHG Verification Workshop, August 23, 2006
- “ISO 14064: An International Standard for GHG Management,” Presented at SEMARNAT National Institute of Ecology, Mexico City. April 25 & 26, 2006
- “ISO 14064: An International Standard for GHG Management”. Presented at GLOBE 2006, Vancouver, Canada. March 29, 2006
- With Jay Wintergreen, “Climate Change: Pressroom, Boardroom, Courtroom”. Presented at American Bar Association Environmental Law Conference, Keystone, CO. March 10, 2006
- “ISO 14064: An International Standard for GHG Management,” Presented at AWMA International Specialty Conference, “Planning for the Future: Climate Change, Greenhouse Gas Inventories & Clean Energy Linkages”, San Francisco, CA. March 8, 2006
- “Role of CDM Credits in Financing in South America Emerging Markets,” Presented at Latin America Energy Finance, Miami, FL. February 3, 2006
- Moderator of side event “Market Perspectives on the Clean Development Mechanism Reform.” UNFCCC Conference of the Parties, Montreal, Canada. December 2005
- “Overview on International Scenario for Certification of Projects and Organization Inventories upon GHG,” Presented at Brazilian Climate Change Workshop, Sao Paulo, Brazil. November 8, 2005

- "Climate Change as an Issue of Jobs and Trade: Reframing Climate Change Debate." Presented at Stephen M. Ross School of Business. June 3, 2005
- "Incorporating Sustainability into Business Practices: A Practical Approach," Presented at American Bar Association Environmental Law Conference, Keystone, CO. March 10, 2005
- "Role of Clean Development Mechanism credits in financing in South American emerging markets," Presented at Financing Latin American Energy Projects, Miami, FL. February 4, 2005
- "The Status of the Development of the New ISO Climate Change Standard: ISO 14064," Presented at Business Roundtable GHG Management Workshop, San Francisco, CA. September 18-19, 2003
- With James D. Heeren, P.E., "Benefits of New Technology Demonstrated through Life Cycle Assessment," Presented at AIChE 2001 Annual Meeting: Reno, NV, November 2001
- With Reeva I. Schiffman, J.D., "Flexibility of the ISO 14001 EMS Standard: A Presentation of Case Studies from Different Sectors," Presented at AWMA's Annual Conference, Orlando, FL, June 2001
- With James D. Heeren, P.E., "Life Cycle Analysis, Environmental Management and Global Climate Change," Presented at AIChE Annual Conference in Los Angeles, CA, November 2000
- With Elizabeth Delaney, MBA, "Kyoto Protocol - Toward COP6 ISO and the CDM," CEEM Newsletter, September 2000
- With William S.S. Pendexter, Ph.D., "Characterization of the Complex Flow Geometry of DNAPL's in the Vadose Zone," Presented in Warsaw, Poland and included in The Warsaw 1998 Symposium Proceedings, September 1998
- With Reeva I. Schiffman, Esq. and Scott Fleming, "Implementation of an ISO 14001 Environmental Management System." Chapter in ISO 14000 Handbook, Irwin P. Publishing Co., Burr Ridge, IL
- With Reeva I. Schiffman, Esq., "Organizational Issues Associated with the Implementation of ISO 14000." AAEE Environmental Engineer, January 1997
- With Reeva I. Schiffman, Esq. "The Clean Air Act: Strategic Environmental Planning." Environmental Law and Practice Journal, July/August 1994
- With First Environment "Bioremediation of Soils Contaminated with Bis-(2-ethylhexyl) Phthalate (BEHP) in a Soil Slurry Sequency Batch Reactor." Presented at the Pittsburgh National AIChE Meeting, August 1991
- Delaney, B. Tod, Ph.D., P. E., "Site Assessments and Clean-up Plan Development." Presented at the ECRA Update seminar: Somerset, NJ, May 2, 1985
- With J. L. Duncan, "A Remedial Action Evaluation for Asbestos-Containing Materials in the Ceiling of Washington Dulles International Airport." A Report Prepared for the Federal Aviation Administrator, February 1985
- Delaney, B. Tod, Ph.D., P.E., "Dewatering to Stabilize Pondered Fly Ash." Presented at the Center for Energy and Environmental Management 1984 Conference on Superfund, November 1984
- With J. L. Duncan, "Organic Contamination in Groundwater Removal by Spray Irrigation." Presented at the Center for Energy and Environmental Management's 1984 Conference on Groundwater Compliance: Designing, Installing and Operation of Groundwater Wells, September 1984
- With T. S. Sekulic, "Assessing Hazardous Waste Treatment Facility Fugitive Atmospheric Emissions." Presented at the Center for Energy and Environmental Management 1983 Conference on Superfund, May 1983
- With T. S. Sekulic, Ron C. Tai and K. R. Bolt, "Air Quality Effects of a Hazardous Waste Incineration System." Environmental Progress Vol. 2, No. 1, February 1983
- With J. D. Lauber and W. J. Hinckley, "Controlling the Burning of Hazardous Waste as Fuels in Combustion Installations and Processes." Presented at the Mid-Atlantic Air Pollution Control Association Technical Conference: Albany, NY, November 1982
- With T. S. Sekulic, "Hazardous Waste Facility Air Monitoring Program." Presented at the Mid-Atlantic States Section Air Pollution Control Association Technical Conference: Philadelphia, PA, May 1982

**PHILLIP LUDVIGSEN, PhD**  
*Senior Associate***Summary of Professional Experience:**

Dr. Ludvigsen is a senior level technical director experienced in advanced decision support related to complex environmental litigation, cost allocation and environmental finance. As a certified greenhouse gas (GHG) verifier and quantifier, Dr. Ludvigsen has provided assurance over 10 megatonnes of GHG emissions and has consulted on various global corporate GHG inventories. Early in his career, Dr. Ludvigsen served as principal environmental engineer at ERM, Inc. overseeing projects to automate human health risk and site assessment. While at ERM, he leveraged his doctoral research to build environmental expert system (artificially intelligent) programs to address site assessment tasks including the diagnosis of leaking underground storage tanks (USTs) and application of environmental fate and transport models. These experiences led to Dr. Ludvigsen being selected as an expert peer reviewer for the U.S. Environmental Protection Agency (EPA).

In addition, Dr. Ludvigsen has a proven track record of risk management and program development with a successful history of directing technical and financial aspects of multi-million-dollar projects. Notably, Dr. Ludvigsen helped manage a \$25 million strategic investment fund for American Reinsurance (now part of Munich Reinsurance America) focused on environmental loss prevention and cost control. While at American Re, he also served as senior technical advisor on establishing over \$1 billion in Environmental Impairment Liabilities (EIL) risk reserves.

With regard to environmental financing, Dr. Ludvigsen co-developed environmental, social, and governance (ESG) due diligence work stream frameworks for some of the largest pension funds in North America. He was the first Responsible Investment Professional in North America to be certified via the Responsible Investment Association and recognized by Investment Industry Association of Canada. Dr. Ludvigsen sits on the Climate Bond Standards assurance committee and ISO 14030 Green Bonds Expert Working Group. He has authored several thought leadership articles on advanced topics in green bonds including risk management.

**Relevant Project Experience:**

**City of Santa Fe, Green Bond Verification of Wastewater Utility System, Santa Fe, New Mexico.** *Project manager/verifier.* Established verification procedures for Santa Fe's revenue bonds involving wastewater utility system improvements. Provided a comprehensive pre- and post-issuance verification reports and public verification statements within a tight timeframe. 2019.

**City of Hoboken, Greenhouse Gas Inventory and Climate Action Plan, Hoboken, New Jersey.** *GHG inventory management.* Leading the preparation of the City's GHG inventory report under both ICLEI's Local Government Operations Protocol and Community Protocol. Activities include the determination of the inventory boundaries, emission sources, quantification of emissions from stationary sources, mobile fleet fuel combustion. The GHG inventory is integrated into a

**Education:**

PhD, Civil & Environmental Engineering (Minors: Applied Statistics; Computer Science), Utah State University, 1987  
MBA, Finance and E-Commerce, Rutgers University, 1999  
MS, Environmental Health Engineering, Tufts University, 1984  
BS, Biology, York College of Pennsylvania, 1981  
AS, Chemistry, York College of Pennsylvania, 1980

**Years of Experience:** 30**Certifications / Registrations:**

Airport Carbon Accreditation approved verifier  
RIA-Certified Responsible Investment Professional  
CSA-certified professional GHG Verifier (#5503A)  
CSA-certified GHG Inventory Quantifier (#0006B)  
National (Canadian) Security Clearance as U.S. Citizen

**Professional Training**

Villanova University – Six Sigma Black Belt Certified Training  
Emory University – National Venture Capital Institute Graduate Program  
Canadian Standards Association – ISO 14064-3 Certification Training  
British Standards Institute – ISO 14001 Lead Auditor Training

**Professional Affiliations:**

Responsible Investment Association (RIA)  
American Society of Civil Engineers (ASCE)  
ISO TC265 Working Group on CO<sub>2</sub> Capture & Storage  
ISO 14030 Green Bonds Expert Working Group

Climate Action Plan, providing the City with a strategy and implementation plan for energy reduction and climate impact mitigation measures. 2018.

**Town of Dover, Climate Smart Communities Govt. Operations Studies and Plans, Dover, New York.**

*Subject matter expert.* Develop a GHG Target Reduction Plan and Climate Action Plan. Identify gaps and potential areas for improvement resulting in an overall Certification Readiness Assessment. Maximize possible and tiered points while establishing action items and priorities to be quickly reviewed for certification as well as eligibility for future adaptation and/or mitigation State and National funding. 2017 – Ongoing.

**New York State Energy Research and Development Authority, Climate Bond Verification, New York, New York.**

*Project manager/lead verifier.* NY-Solar is residential solar loan program funded with bonds issued by the New York State Energy Research & Development Agency (NYSERDA). Based on First Environment's Verification Report, the bond was certified to the Climate Bonds Standard. This was NYSEDA's first certified climate bond to be sold into the fast-growing green bond market. 2018.

**Avon, Global GHG Inventory and Reporting Tool Development, Suffern, New York.**

*Project manager.* Conducts quarterly facility data updates and internal reporting including graphical analysis. Supports Avon in producing its annual GHG emissions report and target tracking that is shared internally and externally with the CDP (formally the Carbon Disclosure Project). First Environment has been helping to manage Avon's Global GHG Inventory and reporting since 2009. 2015 - 2018.

**International Plastic Manufacturer, GHG Verification of Streamlined Life Cycle Analysis, North America.**

*Project manager.* Supported client in labelling their product as carbon neutral in order to participate in a reputable carbon neutral certification program. Provided third-party verification of the product's footprint within North American operations and conducted operations using client-selected ISO 14040 and 14044 (LCA standards) requirements as the criteria. Performed verification consisted with specifications in ISO 14064-3 for verifying GHG assertions. 2017 – 2018.

**KNN Public Finance and Los Angeles County Metropolitan Transportation Authority, Climate Bond Verification, Los Angeles, California.**

*Project manager/lead verifier.* The purpose of issuing this green was to attract \$550 million in private sector investment to fund green mass transit infrastructure.

Based on First Environment's Verification Report, this bond was certified to the Climate Bonds Standard. This effort resulted in attracting a number of additional private investment funds focused on green investments thus increasing the demand for the bond offering. 2017 – 2018.

**KNN Public Finance and East Bay Regional Parks District, Readiness & Pre-Issuance Support for Moody's Green Bond Assessment, Castro Valley, California.**

*Project manager/lead verifier.* Provided green bond readiness assessment and pre-issuance support services for East Bay Regional Parks District. City officials wanted the bond certified by the Climate Bonds Standard but there were no sector criteria at the time for parks land use. Firm suggested that as an alternative, the District consider a green bonds assessment by Moody's. Provided a readiness assessment/gap analysis that led to the District receiving green bond rating of GB-1 (excellent). 2017 – 2018.

**Sperry Capital and Bay Area Rapid Transit, Climate Bond Verification, San Francisco, California.**

*Project manager/lead verifier.* Established verification procedures for California's first certified low-carbon transport bond involving financing and re-financing of multiple complex projects. Provided a comprehensive Verification Report and public Verification Statement within a tight timeframe. 2017 – 2018.

**Various Clients, Carbon Disclosure Project Response Optimization, North America.**

*Technical lead.* Lead CDP disclosure services for some of the largest companies in North America, including Rogers Communications and BlackBerry. Projects involved assessment of quantification methodologies, GHG emission reductions, carbon reporting process and overall disclosure strategy of risks, opportunities, and engagement. 2012 – 2015.

**Technical Review of Business Architecture for Ontario Climate Reporting Regulations and Cap and Trade Program, Canada.**

*Senior technical reviewer.* Project involved business architectural design and impact assessment for Ontario's GHG reporting regulations as a precursor to recently announced cap and trade program to be harmonized with California's program. An overall assessment methodology was developed to evaluate potential emission and economic benefits as well as potential challenges. The Ministry of Environment is considering updating this work based on recent announcements to establish an Ontario Cap & Trade program to be harmonized with California. 2010 – ongoing.

**Confidential Client, Innovative Municipal Green Financing.** *Consultant.* Developed framework for issuing carbon credits related to demand-side energy efficiency projects. Framework served as an early model for municipal funding districts to assist with initial capital costs paid for out of energy savings and related carbon credits. Project involved identifying innovative GHG reduction and financial performance measures. 2009 – 2010.

**Regional Greenhouse Gas Initiative.** *Authorized individual bidder.* Bidder for the Regional Greenhouse Gas Initiative's "Auction 1" first round sale of emission allocations from September 2008 to present day auctions. 2008 – ongoing.

**New York City, Law Department, Superfund Cost Allocation Support.** *Technical lead.* Developed defensible polycyclic aromatic hydrocarbon (PAH) mass loading estimates for three MGP sites along the Gowanus Canal. This effort involved the reconstruction of historic MGP process to identify site-specific tar production and loss ratios. 2016 – ongoing.

**Confidential Client, Superfund Due Diligence Analysis.** *Technical lead.* Conducted comparable site cost analysis for PCB contaminated sediment cleanup. Project involved comparing estimated and actual remediation costs of similar PCB contaminated sites to the site in question. The purpose was to assess the validity of the initial due diligence cost analysis conducted at the time of site acquisition. 2016.

**Confidential Clients, Environmental Forensic Assessments.** *Technical lead.* Led facility design and site investigation assessments. The objective was to identify potential sources, timing and volumes of historic toxic releases. Innovative process modeling has been used to estimate historic mass loadings to the surrounding environment. 2015 - 2016.

**American Re-insurance, Vice President – Strategic Investment, Princeton, New Jersey.** *Capital manager.* Managed \$25 million environmental strategic investment fund resulting in more than \$3 million annual savings in avoided negative environmental and healthcare impacts. 1996 – 2002.

**American Re-insurance, Assistant Vice President, Princeton, New Jersey.** *Internal consultant.* Headed technology transfer team for largest re-insurance company in the U.S. to identify and foster commercial development of innovative environmental, healthcare and social impact technologies designed to prevent future losses and liabilities. Also assisted in establishing over \$1 billion in Environmental

Impairment Liabilities (EIL) risk reserves involving environmental site portfolio due diligence and assessment. 1993 – 1996.

**ACS Inc., Unit Manager, Bridgewater, New Jersey.** *Director.* Increased environmental management system (EMS) division revenues from zero to \$6 million in less than two years for venture-funded start-up company. 1991 – 1992.

**CEO Conference on Environmental Excellence, New York City.** *Project manager.* Managed CEO conferences on environmental excellence in conjunction with Forbes Magazine and Wharton Business School with over 30 international companies participating. These efforts resulted in being promoted to Vice President American Re-insurance Services. 1993 – 1995.

**U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response Expert Systems Development, Washington, DC.** *Expert peer reviewer.* Conducted expert peer review for EPA's Office of Solid Waste and Emergency Response Expert Systems Development. This early technical leadership laid the foundation of future decision support system efforts. 1986 – 1989.

## TEACHING EXPERIENCE

**Rutgers University Business School, Product & Service Innovation, Livingston and Newark, New Jersey.** *Adjunct professor.* Developed Rutgers' MBA program in product and service innovation, combining classical innovation theory with real-life experience. Program was consistently oversubscribed. 2002 – 2004.

## PUBLICATIONS

- Ludvigsen, P.J., "Green Bonds: Innovative Financing for Climate Change Mitigation & Adaptation Projects," Air & Water Management Association, Arlington, VA, October 2017
- Ludvigsen, P.J., "Climate Change: Emerging Standards and Best Practices," NJ Water & Environment Association, Atlantic City, NJ, May 2017
- Ludvigsen, P.J., "Innovative Investments for Low-Carbon Initiatives." Risk Transfer Management (RTM) Conference, Philadelphia, PA, April 2017
- Ludvigsen, P.J., "Art of the Green Deal – A Commentary," Environmental Finance, February 2017 [Link](#)
- Thought Leadership – "De-risking Green Bond Deals for Lawyers," Environmental Law in New

York Nexis-Lexis Newsletter and Canadian Bar Association Webinar, New York, NY. 2016.

- Panelist – “Understanding and Managing Green Bond Risks,” Greens Bonds Americas, Bloomberg, NYC, NY, October 2016
- Ludvigsen, P.J., “External review of green bonds: lessons learned,” Environmental Finance, October 2016 [Link](#)
- Moderator – “Prospects and Opportunities for Climate Finance in Latin America,” LAC-CORE Finance Summit, October 2016, Miami
- Ludvigsen, P.J., “Advanced Topics in Green Bonds: Maximising Rewards,” Environmental Finance, June 2016 [Link](#)
- Ludvigsen, P.J., “Advanced Topics in Green Bonds: Minimising Risks,” Environmental Finance, February 2016 [Link](#)
- Ludvigsen, P.J., “Advanced Topics in Green Bonds: Rewards,” Environmental Finance, December 2015 [Link](#)
- Ludvigsen, P.J., “Advanced topics in green bonds: Risks,” Environmental Finance, November 2015 [Link](#)
- Co-Author “Sustainable Insight – Gearing up for green bond,” KPMG International, Thought Leadership, January 2015
- Board of Directors Presentation, Sheridan College, Strategic Review of Organization’s Integrated Energy and Climate Master Plan, September 2013
- Co-Author “Making an Impact: Environmental Sustainability Initiative in Canada’s Food, Beverage and Consumer Products Industry,” April 2012
- Ludvigsen, P.J., Panellist – “Forecasting Carbon Value & Pricing in Era of Uncertainty,” VerdeXchange, Toronto, June 2011
- Ludvigsen, P.J., “Carbon Measurement, Monitoring, and Verification – Rough Waters Ahead,” University of Toronto, Centre for Environment, Carbon Finance Workshop, Toronto, May 2011
- Co-author on a scoping study of assurance standards to verify agricultural GHG offset projects in Alberta, April 2011
- Ludvigsen, P.J., Keynote Speaker, “Transition to a Low-Carbon Economy,” Carleton University, Ottawa – Green Seminar, March 2011
- Ludvigsen, P.J., and Faille, M. (Gowlings Law Firm), “Carbon Credit Opportunities for Aboriginal Communities,” Managing Aboriginal Land and Water Interest, March 28-29 2011
- Ludvigsen, P.J. and Scott Robertson (Gowlings Law Firm), “The Benefits of Carbon Offset Credits for First Nations,” Assembly of First Nations, General Assembly, Economic Development Committee, December 2010
- Ludvigsen, P.J., Moderator: Carbon Strategy Session, Carbon Finance, Calgary Economic Development, Alberta, October 20, 2010
- Ludvigsen, P.J., “Renewable Energy Credits and Carbon Markets – Verification Considerations,” University of Toronto, Centre for Environment, Toronto, September 30, 2010
- Ludvigsen, P.J., Moderator: Session 2 - The Carbon Disclosure Project, Carbon Economy Summit 2010, Toronto, September 21, 2010
- Ludvigsen, P.J., Instructor CSA Standards “GHG Measuring and Reporting Your Corporate Greenhouse Gas Emissions,” designed to address Wal-Mart’s Sustainability Product Index. Nashville, TN, September 15-16, 2009.
- Ludvigsen, P.J., “Basic Aspects of Selecting GHG Inventory Boundaries.” Environmental Auditing Roundtable Fall Meeting, September 11, 2009
- Ludvigsen, P.J., “Waxman-Markey: Who Kicks the Tires?” Ecosystem Marketplace website “Top Story,” 23 August 2009
- Ludvigsen, P.J., “GHG Inventory and Offset Verification: The North American Experience.” Presented at the Electric Utility Environmental Conference, Phoenix, AZ, February 2009
- Ludvigsen, P.J., Course Developer “The Climate Registry – Essentials,” Copyrighted class presentation describing the basics of using The Climate Registry’s General Reporting Protocol, December 2008
- Ludvigsen, P.J., Instructor CSA America’s GHG Verification using ISO 14064-3 Class, Chicago, October 2008
- Ludvigsen, P.J. and Reid, P.D., “Implementing Comprehensive Carbon Reduction Plans for Airports.” Presented at the CAC Environmental Committee Meeting, Kelowna, BC, October 2008
- Ludvigsen, P.J., “Greenhouse Gas Inventory and Offset Verification: The North American Experience.” Presented at the CPANS chapter of the AWMA conference on Climate Change, Banff, Alberta, April 2008

- Ludvigsen, P.J., "Climate Change Regulations: Will They Help or Hurt the Power Utility Industry in North America?" Presented at the Electric Utility Environmental Conference, Tucson, AZ, January 2008
- Ludvigsen, P.J., "Carbon Verification – the Canadian Experience." The Auditing Roundtable Regional Meeting, Philadelphia, PA, November 1, 2007
- Ludvigsen, P.J., "Integrating Climate Change into Environmental Health and Safety Audits." CEU Course Instructor, The Auditing Roundtable National Conference, September 2007
- Ludvigsen, P.J. and Cusack, J., "Practical Considerations in Moving a College or University Toward Carbon Neutrality." Presented to the Annual meeting of Campus Safety Health and Environmental Management Association (CSHEMA), Boston, July 2007
- Ludvigsen, P.J. and Knight, J., "Potential Pitfalls for Corporate Buyers of Voluntary Carbon Offsets." Presented at the Carbon Credit Forum, Acadia University, June 2007
- Ludvigsen, P.J., "The Changing Climate of Climate Change Policy." Presented to the Philadelphia Meeting of the Society of Women Environmental Professional (SWEP), April 2007
- Ludvigsen, P.J., "Ensuring and Permanent Retirement of Carbon Offsets Against Resale and Fraud." Presented at the Electric Utilities Environmental Conference, Corporate Strategies, Tucson, AZ, January 2007

Application Renewal

# Work Product Sample



## Form 5: Work Product Sample

Attach a sample of at least one relevant work product produced in whole or part by the Applicant. The sample must consist of a final report or other material provided to a client under contract. The sample work product submitted shall not contain any proprietary information. If the original work product contained proprietary information, the work sample may be submitted, provided proprietary information is redacted from the document. The attachment must include a header that identifies it as an attachment to Form 5.

Provide a description of the attached work sample(s) in the space provided below. If the work product was jointly produced by the Applicant and another entity, include in the description an explanation of the role of the Applicant in producing the work product.

The attached report was provided to Gaston County Solid Waste and Recycling (Gaston County) as a deliverable of the Climate Action Reserve (CAR) project verification process. This report covers the verification of the Gaston County Landfill Gas Destruction Project – CAR475 (the Project) for the period from April 1 through November 17, 2018.

# Verification Report for the Gaston County Landfill Gas Destruction Project Dallas, North Carolina

Climate Action Reserve—CAR475

April 2019

Prepared by: First Environment, Inc.  
91 Fulton Street  
Boonton, New Jersey 07005



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## 1. Introduction

This report is provided to Gaston County Solid Waste and Recycling (Gaston County) as a deliverable of the Climate Action Reserve (CAR) project verification process. This report covers the verification of the Gaston County Landfill Gas Destruction Project – CAR475 (the Project) for the period from April 1 through November 17, 2018.

## 2. Objectives

The purpose of this verification was, through review of appropriate evidence, to establish that:

- the Project conforms to the requirements of the verification criteria, including all eligibility requirements discussed in Section 4 of this report; and
- the data reported are accurate, complete, consistent, transparent, and free of material error or omission.

## 3. Verification Scope

Specific scope metrics for the verification are outlined in the table below:

<b>Geographic Boundaries</b>	Gaston County Landfill, Dallas, North Carolina
<b>Emission Reduction Sources, Project Emissions, and Greenhouse Gases</b>	Emissions reductions (expressed in units of Carbon Dioxide equivalents (CO <sub>2</sub> e)) resulting from methane destruction; Project emissions of CO <sub>2</sub> from purchased electricity and fossil fuel consumption.
<b>Reporting Period</b>	April 1, 2018 through November 17, 2018
<b>Data Sources</b>	Metered Data and Emissions Reduction Calculations

## 4. Standards Used to Verify Emissions (Criteria)

The following table outlines the guidance and protocols used to conduct this verification:

<b>Standard of Verification</b>	<ul style="list-style-type: none"> <li>• Climate Action Reserve U.S. Landfill Project Protocol, Version 3.0, December 2, 2009 (CAR Protocol)</li> <li>• Climate Action Reserve Landfill Project Protocol Version 3.0 Errata &amp; Clarification, June 18, 2015 (Errata and Clarification)</li> <li>• Climate Action Reserve Program Manual, September 1, 2015</li> <li>• Applicable Climate Action Reserve Policy Memos</li> </ul>
<b>Verification Process</b>	<ul style="list-style-type: none"> <li>• Section 8 of the CAR Protocol, Version 3.0, December 2009</li> <li>• Errata and Clarification</li> <li>• Climate Action Reserve Verification Program Manual, February 8, 2017</li> <li>• ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006</li> </ul>

<b>Level of Assurance</b>	<ul style="list-style-type: none"> <li>• Reasonable assurance</li> </ul>
<b>Materiality</b>	<ul style="list-style-type: none"> <li>• Misstatements greater than one percent of the Project's emission reductions assertion are considered material</li> <li>• Qualitative non-conformities with the CAR Protocol are also considered material</li> </ul>

## 5. Overview of the Verification Process

The verification process was utilized to gain an understanding of the Project's emission sources and reductions and to evaluate and verify the collection and handling of data, the calculations that lead to the results, and the means for reporting the associated data and results.

The following verification process was used:

- conflict of interest review;
- selection of Verification Team;
- initial interaction and kickoff meeting with Gaston County;
- development of the verification and sampling plan;
- review of management and data collection system;
- site visit;
- assessment of raw data and calculations for period under review;
- follow-up interaction with Gaston County for corrective action, clarification, or supplemental data as needed; and
- final statement and report submittal.

### 5.1 Conflict of Interest Review

Prior to beginning any verification project, First Environment conducts an evaluation to identify any potential conflicts of interest associated with the Project. No potential conflicts were found for this Project. First Environment also received authorization to proceed with verification activities for the Project developer from CAR in a notification dated February 20, 2019.

### 5.2 Verification Team

First Environment's Verification Team consisted of the following individuals who were selected based on their verification experience, as well as familiarity with landfill operations.

Lead Verifier – Jeff Daley  
Senior Internal Reviewer – Jay Wintergreen

### 5.3 Verification Kick-off

The verification was initiated with a kick-off meeting on February 27, 2019 with Gaston County. The meeting focused on confirming the scope, schedule, and data required for verification.

#### **5.4 Development of the Verification Plan**

The Verification Team formally documented its verification plan as well as determined the data-sampling plan. The verification plan was developed based on the discussion of key elements of the project verification process during the kick-off meeting. Gaston County was afforded the opportunity to comment on the key elements of the plan for verification. Based on items discussed and agreed upon with Gaston County, the plan identified the First Environment project team members, project level of assurance, materiality threshold, and standards of evaluation and reporting for the verification. It also provided an outline of the verification process and established project deliverables. A separate data-sampling plan was designed to review all project elements in areas of potentially high risk of inaccuracy or non-conformance.

#### **5.5 Site Visit**

Mr. Jeff Daley conducted a site visit on July 24, 2018 during verification of the previous reporting period. During that visit Mr. Daley assessed the Project's data management systems and interviewed relevant project personnel. Because a site visit has been conducted within the previous 12 months and First Environment was able to confirm that no significant project changes have occurred, a site visit was deemed unnecessary for the current reporting period.

#### **5.6 Emissions Reduction Data and Calculation Assessment**

This assessment used information and insights gained during the previous steps to evaluate the collected data and the reported emissions reduction quantities, and identify if either contained material or immaterial misstatements.

#### **5.7 Corrective Actions and Supplemental Information**

The team issued corrective action requests during the verification process. Gaston County provided sufficient responses to all corrective action requests.

#### **5.8 Verification Reporting**

Verification reporting, represented by this report, documents the verification process and identifies its findings and results. Verification reporting consists of this report for Gaston County, a verification statement, and a list of findings, all to be submitted to the Climate Action Reserve.

### **6. Site's Conformance with Verification Criteria**

#### **6.1 Project Description**

The Gaston County Landfill is located in Dallas, North Carolina and is owned and operated by Gaston County.

The Project consists of the voluntary collection and destruction of landfill gas in two open flares and three GE Jenbacher 420 internal combustion engine generators. Gaston County completed installation of a landfill gas (LFG) well field and active gas collection and control system in 2008. Prior to this system, LFG was not collected at the landfill. The Project destroys landfill gas that otherwise would be vented to the atmosphere, resulting in a net reduction of CO<sub>2</sub>-equivalents. No combustion devices existed on site prior to the implementation of the Project activity. The baseline scenario is defined as the total release of landfill gas to the atmosphere.

## **6.2 Eligibility**

The Project meets the eligibility requirements set forth in the CAR Protocol as described below.

### **6.2.1 Ownership and Title**

Gaston County is the owner and operator of the landfill and, as such, holds title to the associated emission reduction credits. The landfill Permit to Operate identifies that the Gaston County NC Register of Deeds lists Gaston County as the legal property owner. Additionally, the relevant Air Permits identify Gaston County as the entity with authority to construct and operate the destruction devices. Purchase records for the flares and the engine generator sets were also reviewed, which all identified that Gaston County is the owner of the Project equipment.

[REDACTED] The ownership status was also confirmed at the site visit through interviews conducted with Project personnel.

Additionally, First Environment relied on the Attestation of Title completed by Gaston County for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

### **6.2.2 Project Start Date**

First Environment confirmed that the Project meets CAR's start date requirements. The Project start date is November 18, 2008, which was confirmed during the initial verification through review of the landfill's daily activity logbook and flare skid logbook records.

### **6.2.3 Additionality**

The Project passes both the Performance Standard Test and the Legal Requirements Test, as described below.

#### **6.2.3.1 Performance Standard Test**

The Project consists of the installation of a landfill gas collection and control system and therefore exceeds the performance standard defined by the CAR protocol, specifically Scenario 1 from the list provided in Section 3.4.1 of the CAR Protocol, because no collection or control system existed prior to the Project start date. It was also confirmed at the site visit that the landfill is not a bioreactor.

#### **6.2.3.2 Legal Requirements Test**

The landfill has a permitted capacity above the 2.5 million cubic meter threshold of municipal solid waste that triggers New Source Performance Standard (NSPS) requirements. The most recent NMOC emission rate report calculations are dated June 24, 2013 and indicated that the NMOC emissions rates were estimated to be 43.68 Mg per year in 2018. This emissions rate report is subject to 40CFR60, Subpart WWW, and indicated NMOC emissions rate estimates would remain below 50Mg./yr. for the next five years from the date the report was generated. Therefore, annual NMOC emissions rate reports are not required and a NMOC threshold of 50 Mg per year applied during the reporting period. Since the NMOC emission estimate is below the 50Mg/year threshold requiring a landfill gas collection system established by the NSPS regulation, the landfill is not required to operate an active collection system. An updated Tier II testing event and NMOC emissions rate report is scheduled to be conducted later this year.

First Environment also confirmed, through interviews with project personnel, that no additional state or local requirements mandate the active LFG collection and control system. First Environment reviewed the facility's solid waste permit, Title V permit, and water discharge permit to confirm that no other requirements for an active landfill gas collection and control system existed. This cursory review of permits, laws, and regulations indicated the voluntary nature of the Project.

Additionally, First Environment relied on the Attestation of Voluntary Implementation completed by Gaston County for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

#### **6.2.4 Regulatory Compliance**

First Environment reviewed the Air Permit, Industrial User Permit, Storm Water Permit, Permit to Operate, generated compliance reports on March 6, 2019 using the Environmental Protection Agency's (EPA) Enforcement and Compliance History Online (ECHO) database, and reviewed a North Carolina Department of Environmental Quality inspection report. The cursory review of these documents indicated that there was no evidence of non-compliance during the reporting period.

Additionally, First Environment relied on the Attestation of Regulatory Compliance completed by Gaston County for the current reporting period. The Attestation is on file with CAR and was reviewed to confirm that it was completed correctly.

### **6.3 Project Performance Against CAR Protocol and Project Management System**

The Project was implemented in conformity with the CAR Protocol. Gaston County developed and implemented a Monitoring Plan to track relevant Project parameters and data sources. The Monitoring Plan, including the Project Diagram, was reviewed to determine compliance with the protocol requirements. Based on observations made during the site visit and review of relevant Project documentation, First Environment found the Monitoring Plan and Project Diagram to meet the requirements set forth by the CAR Protocol and the Project to be implemented in accordance with the Monitoring Plan.

#### **6.3.1 Project Monitoring**

Landfill gas flow is continuously monitored using three flow meters. Flow to each flare is measured independently with dedicated flow meters, while total flow to the engines is measured with one flow meter located on the main gas header line located at the engine facility. Flow data to all destruction devices are recorded at standard conditions of 60°F and one atmosphere, respectively. The data are exported to Microsoft Excel for review and quantification.

The methane concentration of the landfill gas is continuously measured with a Siemens Ultramat 23 methane analyzer. Methane content of the landfill gas is recorded by the Yokogawa data logger. The data are exported to Microsoft Excel for review and quantification.

Both gas flow rates and methane concentration are measured on the same relative moisture basis relative to the flares. Gas flow to the engines is measured on a dry basis while associated methane concentration is measured on a wet basis (this arrangement is acceptable as per Errata & Clarification No. 13, June 18, 2015).

Engine kilowatt hour production is continuously monitored for each engine and recorded at least hourly by the plants PLC electronic chart recorder. The data are also exported to Microsoft Excel for review and quantification.

Table 1 summarizes the Project monitoring system parameters and monitoring equipment employed by the Project.

**TABLE 1: Monitoring Equipment**

Parameter	Monitoring Equipment	Frequency of Measurement	Frequency of Recording	Recording Device
Landfill gas flow	Rosemount and Yokogawa Flow Meters	Continuous	Every 10 minutes	Yokogawa digital chart recorder
Methane Concentration	Siemens Ultramat 23	Continuous	Every 10 minutes	Yokogawa digital chart recorder
Operation of Flares	Thermocouple	Continuous	Every 10 minutes	Yokogawa digital chart recorder
Operation of Engines	Electricity meter	Continuous	Every 10 minutes	PLC digital chart recorder

### 6.3.2 Instrument Quality Assurance/Quality Control

Gaston County’s instrument quality assurance/quality control (QA/QC) plan for the Project’s monitoring equipment complies with CAR Protocol’s requirements as described below.

Each flow meter is cleaned and inspected, at a minimum, quarterly with as-found/as-left conditions documented. Each flow meter is also field checked for calibration accuracy on a routine basis, including at least once within two months prior to the end of the reporting period by a third party (Process Automation Service Solutions II, LLC). First Environment reviewed all third-party field calibration checks performed during the current reporting period which indicated that all flow meters were operating within the required five percent accuracy range. The manufacturer recommended calibration frequency is greater than once every five years; therefore, the Protocol default frequency of once every five years applies. All Project flow meters are calibrated in-situ multiple times per year, which is more frequent than manufacturer recommendations and the Protocol’s default frequency of once every five years.

The continuous gas analyzer is cleaned and inspected at a minimum quarterly with as-found/as-left conditions documented. The analyzer is also field checked for calibration accuracy on a routine basis, including at least once within two months prior to the end of the reporting period by a third party (Process Automation Service Solutions II, LLC). First Environment reviewed all third-party field calibration checks performed during the current reporting period which indicated that the analyzer was operating within the required five percent accuracy range. The manufacturer does not recommend a specific interval to perform calibrations on an ongoing basis; however, the gas analyzer undergoes routine calibrations multiple times per year.

First Environment confirmed that the equipment used to perform the third-party field calibration accuracy checks and calibrations of the Project flow meters was calibrated and maintained per manufacturer’s requirements. Additionally, First Environment reviewed the calibration gas

certificates for the calibration gas used to calibrate the Project methane analyzer to confirm that the calibration gas was within its recommended lifespan.

Table 2 shows the dates during the current reporting period when instrument QA/QC was performed.

**TABLE 2: Instrument QA/QC**

Monitoring Equipment	In Service Dates	Calibration	Field Checked	Inspected/Cleaned
Rosemount flow meter. (s/n 36913, Flare #1)	Entire reporting period.	6/26/2018; 10/4/2018	6/26/2018; 10/4/2018	6/26/2018; 7/9/2018; 8/8/2018; 9/5/2018; 10/4/2018
Rosemount flow meter. (s/n 36914, Flare #2)	Entire reporting period.	6/26/2018; 10/4/2018	6/26/2018; 10/4/2018	6/26/2018; 7/9/2018; 8/8/2018; 9/5/2018; 10/4/2018
Yokogawa flow meter (s/n: U1GT401583, Engines)	Entire reporting period.	6/26/2018; 10/4/2018	6/26/2018; 10/4/2018	6/26/2018; 7/9/2018; 8/8/2018; 9/5/2018; 10/4/2018
Siemens Ultramat 23 Gas Analyzer	Entire reporting period.	6/27/2018; 10/4/2018	6/27/2018; 10/4/2018	6/27/2018; 7/9/2018; 8/8/2018; 9/5/2018; 10/4/2018

### 6.3.3 Project Emissions

Project emissions sources and the associated monitoring methodology are summarized in Table 3.

**TABLE 3: Project Emissions**

Project Emissions Source	Monitoring
Consumption of Purchased Electricity	Utility Invoices
Consumption of propane	Purchase Invoices
Consumption of diesel	Facility usage records

### 6.4 Emissions Reduction Calculation Assessment

The emission reduction calculations were reviewed to ensure accuracy in the formulas used and the raw data used as inputs. The formulas were tested to ensure consistency with the calculation methodology described in the CAR Protocol.

Total landfill gas flow is computed by multiplying the average landfill gas flow rate in a given interval by the length of the interval. Flow totals are aggregated on a daily and monthly basis. Metered gas flow volumes were measured at standard conditions at one atmosphere of pressure and a temperature of 60°F by all of the flow meters. The total volume of methane destroyed by the Project was computed in daily intervals by multiplying the daily gas flow to the flares and engines by the daily average of methane concentration measurements and is converted to a mass flow using the density of methane at 60°F and one atmosphere of

pressure. The total quantity of methane destroyed by the Project is aggregated monthly and summed over the reporting period to obtain the total baseline emissions. Project emissions were calculated by multiplying activity data by appropriate emission factors. Because one flow meter is monitoring flow to all three engines, it was confirmed through review of the raw flow data that during any intervals when one or more engines was not operational, the remaining engines had the available capacity to destroy all of the available landfill gas. Additionally, it was confirmed during the site visit that the engines are designed in such a manner that it is physically impossible for gas to pass through while the engine(s) are non-operational and that each engine is equipped with an automatic safety shut-off valve. No data substitution was performed during the current reporting period. The total emission reductions were determined by subtracting the Project emissions from the baseline emissions.

Table 4 summarizes the input parameters used in the emission reduction calculations.

**TABLE 4: Input Parameters**

Input Parameter	Name	Description/ Value
$LFG_{i,t}$	Total quantity of landfill gas sent to the flares and engines	Summed daily from metered data, measured at standard conditions of 60°F and one atmosphere of pressure
$PR_{CH_4,t}$	Methane content	Averaged daily from continuously recorded data
$DE_i$	Default destruction efficiencies	93.6% - Lean Burn Engine 96.0% - Open Flare
OX	Oxidation Factor	10%
DF	Discount Factor	0
Flare Temperature Cut-off	Metered data below corresponding temperature cut-off are excluded from calculations	500°F
$EF_{FF}$	Propane emission factor	5.74 kg CO <sub>2</sub> /gal
$EF_{FF}$	Diesel emission factor	10.15 kg CO <sub>2</sub> /gal
$EF_{EL}$	Purchased electricity emission factor	805.29 lb. CO <sub>2</sub> /MWh (eGrid Region: SRVC Virginia/Carolina)
$GWP_{CH_4}$	Global warming potential of methane	25 – IPCC 4 <sup>th</sup> Assessment Report

Copies of the raw data used in the calculations, including flow data and methane content data, were compared with the data used in the final calculations and tested for transcription or mathematical errors. A representative sample of raw data sources and calculations over the entire verification period was reviewed. First Environment performed recalculations of emission reductions for the entire reporting period to assess whether they were free of material misstatement. First Environment found the emission reduction calculations to be free of material misstatement.

### 6.5 **Approved Variance or Deviations**

No variances or deviations were obtained for the Project in this verification period.

## 7. Verification Conclusion

Based on the evidence collected and the assessments performed, First Environment concludes that the Project's GHG emissions reductions achieved through the collection and combustion of landfill gas for the period April 1, 2018 through November 17, 2018 can be considered with a reasonable level of assurance:

- in conformance with the verification criteria, and
- without material discrepancy.

Verified results show:

April 1 to November 17, 2018	Total
Baseline Emissions (tCO <sub>2</sub> e)	78,587
Project Emissions (tCO <sub>2</sub> e)	374
Emissions Reductions (tCO <sub>2</sub> e)	78,213

## 8. Lead Verifier Signature



Jeff Daley  
Environmental Specialist

## 9. Senior Internal Reviewer Signature



Jay Wintergreen  
Senior Associate

Application Renewal  
**Professional  
Liability Insurance**



## Form 6: Documentation of Professional Liability Insurance

Provide documentation in the fields below of professional liability insurance held by the Applicant in an amount not less than one million (\$1,000,000) U.S. dollars. Attach a copy of the insurance certificate and other documentation as may be required to document the relationship between a related entity that holds the insurance and the Applicant. The attachment(s) must include a header that identifies it as an attachment to Form 6.

Name of Insurer:	Nautilus Insurance Company
Policy Number:	ECP2023870-11
Amount of Coverage (US\$):	4,000,000
Policy Expiry Date:	09/01/2019
Deductibles (if any):	BI/PD Ded- \$2,500
Exclusions (if any):	N/A
Name of the entity under which the insurance is held:	First Environment, Inc.
If the insurance coverage is held under the name of a related entity, describe the financial relationship between the Applicant and the related entity and attach supporting documentation:	N/A

# Form 6: Documentation of Professional Liability Insurance



## CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

8/30/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> Arthur J. Gallagher Risk Management Services, Inc. One Jericho Plaza Suite 200 Jericho NY 11753	<b>CONTACT NAME:</b> Myvrose Chery <b>PHONE (A/C. No. Ext):</b> 516-745-0800 <b>E-MAIL ADDRESS:</b> Myvrose_Chery@ajg.com		<b>FAX (A/C. No):</b> 516-745-0082
	<b>INSURER(S) AFFORDING COVERAGE</b>		<b>NAIC #</b>
<b>INSURED</b> First Environment, Inc. 91 Fulton Street Boonton NJ 07005	<b>INSURER A :</b> Nautilus Insurance Company		17370
	<b>INSURER B :</b> Great Divide Insurance Company		25224
	<b>INSURER C :</b>		
	<b>INSURER D :</b>		
	<b>INSURER E :</b>		

**COVERAGES**

**CERTIFICATE NUMBER:** 838571467

**REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> <b>COMMERCIAL GENERAL LIABILITY</b> <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC <input checked="" type="checkbox"/> OTHER: Ded. - \$2,500			ECP2023870-11	9/1/2018	9/1/2019	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 25,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 1,000,000 PRODUCTS - COMP/OP AGG \$ 1,000,000 \$
B	<input type="checkbox"/> <b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input checked="" type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY			BAP2027068-10	9/1/2018	9/1/2019	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
A	<input type="checkbox"/> <b>UMBRELLA LIAB</b> <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> <b>EXCESS LIAB</b> <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$			FFX2023871-11	9/1/2018	9/1/2019	EACH OCCURRENCE \$ 5,000,000 AGGREGATE \$ 5,000,000 \$
B	<input type="checkbox"/> <b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) <input type="checkbox"/> Y/N If yes, describe under DESCRIPTION OF OPERATIONS below		N/A	WCA2027069-10	9/1/2018	9/1/2019	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
A	Professional Liability Contractors Pollution Liability			ECP2023870-11 ECP2023870-11	9/1/2018 9/1/2018	9/1/2019 9/1/2019	Each Claim 4,000,000 Each Poll. Condition 2,000,000 Deductible 2,500

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)  
 Evidence of Coverage

**CERTIFICATE HOLDER**

**CANCELLATION**

First Environment, Inc. 91 Fulton Street Boonton NJ 07005	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.  AUTHORIZED REPRESENTATIVE 
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# Application Renewal Attestations



## Form 7: Attestations

The following attestations must be made.

The undersigned Applicant acknowledges and will comply with and be bound by the following:

1. The undersigned Applicant shall provide any verification services to offset Project Sponsors in accordance with 6 NYCRR Subpart 10.
2. The undersigned Applicant shall use suitably qualified personnel and devote and employ sufficient resources and labor to ensure that high-quality verification services are provided.
3. The undersigned Applicant shall ensure that for any verification services undertaken by the Applicant:
  - (a) a Verification Team Leader identified in the *Accreditation Application* directs, supervises, and leads the undertaking of those services and signs all written reports or opinions to be provided by the accredited verifier;
  - (b) verification services are undertaken by a Team Leader and Key Personnel identified in the *Accreditation Application*; and
  - (c) any other staff, employees, or contractors used by the accredited verifier in connection with verification services:
    - (i) are used only to assist any Verification Team Leader and Key Personnel identified in the *Accreditation Application*; and
    - (ii) shall work under the direct control, supervision, and direction of a Verification Team Leader and Key Personnel identified in the *Accreditation Application*.
4. The undersigned Applicant shall ensure that each Verification Team Leader and Key Personnel identified in the *Accreditation Application* maintain the qualifications identified in the *Accreditation Application*, including any identified qualifications, licenses, and certifications.
5. The undersigned Applicant shall ensure that each Verification Team Leader and Key Personnel identified in the *Accreditation Application* undertake and complete any training or other qualifications as may be required by the Department to demonstrate competence in the provision of verification services for individual offset categories specified at 6 NYCRR Subparagraph 242-10.6(a)(1)(vii).
6. The undersigned Applicant acknowledges that the Department or its agent may conduct a performance review of an accredited verifier to evaluate whether the accredited verifier remains qualified and is providing verification services in accordance with the requirements of 6 NYCRR Subpart 242-10. As part of a performance review, the Applicant will provide access to any reports, documents, or other information related to the provision of verification services by the Applicant pursuant to 6 NYCRR Subpart 242-10 required by the Department or its agent.
7. The undersigned Applicant acknowledges that prior to engaging in verification services for an offset Project Sponsor, the Applicant shall disclose all relevant information to the Department to allow for an evaluation of potential conflict of interest with respect to an offset project, offset project developer, offset Project Sponsor or project sponsor organization, or any other party with a direct or indirect financial interest in an offset project that is seeking or has been granted approval of a Consistency Application under the Program or another state's CO<sub>2</sub> Budget Trading Program, including information concerning the Applicant's ownership, past and current clients, related entities, as well as any other facts or circumstances that have the potential to create a conflict of interest.
8. The undersigned Applicant acknowledges that it shall have an ongoing obligation

to disclose to the Department any facts or circumstances that may give rise to a conflict of interest with respect to an offset project, offset project developer, offset Project Sponsor or project sponsor organization, or any other party with a direct or indirect financial interest in an offset project.

- 9. The undersigned Applicant acknowledges that it shall have an ongoing obligation to maintain one million (\$1,000,000) U.S. dollars of professional liability insurance throughout the period for which it is accredited.
- 10. The undersigned Applicant acknowledges that the Department may revoke the accreditation of a verifier at any time, for any of the following:
  - (a) failure to fully disclose any issues that may lead to a conflict of interest situation with respect to an offset project, offset project developer, or offset Project Sponsor;
  - (b) the verifier is no longer qualified due to changes in staffing or other criteria;
  - (c) negligence or neglect of responsibilities pursuant to the requirements of 6 NYCRR Subpart 242-10; and
  - (d) intentional misrepresentation of data or other intentional fraud.

I certify that the undersigned is authorized to make these attestations on behalf of the Applicant. I am authorized to make this submission on behalf of the Applicant for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

  
\_\_\_\_\_  
Signature of Authorized Representative

July 11, 2019  
\_\_\_\_\_  
Date

Arthur Clarke, JD  
\_\_\_\_\_  
Name in Print

Senior Associate  
\_\_\_\_\_  
Title

Sworn and subscribed before me on this 11<sup>th</sup> day of July, 2019

**MELISSA A. KRENEK**  
**NOTARY PUBLIC OF NEW JERSEY**  
Comm. # 50084283  
My Commission Expires 8/12/2023  
*Melissa Krenek*



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