



Greenhouse Gas Management

Statement of Qualifications

First Environment, Inc.

2012



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Introduction to First Environment

First Environment is a strategic environmental management and engineering firm founded in 1977. In addition to our Boonton, New Jersey headquarters, the firm maintains offices throughout North America, including New York, NY; Washington, D.C.; Sacramento, California; Atlanta, Georgia; Chicago, Illinois; Jackson, Mississippi; and Vancouver, British Columbia.

Our professional staff consists of engineers, environmental scientists, business and policy analysts, economists, attorneys, and management system experts, most with advanced degrees and significant industry and consulting experience. This diverse, highly skilled multi-disciplinary workforce allows the firm to assemble customized teams to successfully execute complex and challenging projects to meet our client's needs and objectives. Our clients include both private and public entities and represent a variety of sectors, including oil and gas, power generation, mining and metals, transportation, forest products, and manufacturing. Many of our clients are multinational corporations and their environmental management programs, as well as our assistance with strategic environmental management issues, span geographic, political, and cultural boundaries.

First Environment is a Founding Reporter to The Climate Registry and is carbon neutral. The firm was a charter partner of the U.S. EPA's Climate Leaders program. In addition to these commitments, First Environment became the first US environmental engineering and consulting firm registered to the ISO 14001 Standard in 1997.

Awards

Our greenhouse gas emission verification services have received industry acknowledgements including:

- Environmental Finance's Best Verification Company for Voluntary Markets, 2011 through 2012
- Environmental Finance's Best Verifier for North American Mandatory Markets, 2008 through 2011
- Point Carbon's 2009 #1 ranked verifier in North American markets

Greenhouse Gas Management Services

First Environment provides both Technical Assistance and Validation/Verification services. **Technical Assistance** includes quantification of GHG emissions and reductions for either voluntary or mandatory reporting, and assisting clients in understanding and applying how the information affects the organization's business strategy, management of risk, improvement of operations, positions on policy, and relationships with stakeholders. **Validation/ Verification** includes verification of emission inventory reports for either voluntary or mandatory reporting, and validations of methodologies and projects designed to reduce emissions. Our validation expertise is valuable both for project developers seeking to sell GHG credits in GHG offset markets as well as buyers of credits seeking to confirm the quality and quantity of potential purchases. See our accreditations to specific registries, standards, and exchanges on the next page.

Climate Change Policy

First Environment believes that participation and involvement in dialogues on climate change policy and GHG management yield insight and perspective that is of value to our clients. Members of our firm regularly attend the United Nation's international Conference of the Parties meetings as members of business and industry non-governmental organization delegations. Our professionals were among the original stakeholders in the process that produced the World Business Council for Sustainable Development/World Resources Institute Greenhouse Gas Protocol. The president of First Environment was also a leading expert of the U.S. Technical Advisory Group to the International Organization for Standardization's development process that issued the ISO 14064, Parts 1-3, ISO 14065, and ISO 14066 standards.

Climate Change Services



ANSI ACCREDITED PROGRAM
GREENHOUSE GAS VERIFICATION
0002



Verification Body



First Environment is an accredited verifier of GHG inventories and projects under the following GHG protocols and programs:

Verified Carbon Standard (VCS)

The Climate Registry (TCR)

Chicago Climate Exchange (CCX)

American Carbon Registry (ACR)

Pacific Carbon Trust (PCT)

California Air Resources Board (CARB)

Climate Action Reserve (CAR)

Coal Mine Methane

Forest

Landfill

Livestock

Nitric Acid Production

Organic Waste Composting

Organic Waste Digestion

Ozone Depleting Substances

**FIRST
ENVIRONMENT**

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GHG Validation / Verification Accreditations

❖ First Environment is accredited by ANSI under ISO 14065:2007 and ISO 14064-3:2006 and GHG-PR-706 to *verify* assertions for the following *Organization Level Sectors*

- 1 – General
- 2 – Manufacturing
- 3 – Power Generation
- 5 – Mining and Mineral Production
- 6 – Metals Production
- 7 – Chemical Production
- 8 – Oil & gas extraction, production and refining including petrochemicals
- 9 – Waste

❖ First Environment is accredited by ANSI under ISO 14065:2007 and ISO 14064-3:2006 and GHG-PR-706 to *verify* assertions for the following *Project Level Groups*

- 1 – GHG emission reductions from fuel combustion
- 2 – GHG Emissions from industrial processes (non-combustion, chemical reaction, fugitive and other)
- 3 – Land Use and Forestry
- 5 – Livestock
- 6 – Waste Handling and Disposal

❖ First Environment is accredited by ANSI under ISO 14065:2007 and ISO 14064-3:2006 and GHG-PR-706 to *validate* assertions for the following *Project Level Groups*

- 1 – GHG emission reductions from fuel combustion
- 5 – Livestock
- 6 – Waste Handling and Disposal

Project Descriptions

Greenhouse Gas Strategy

GHG VERIFICATION PROTOCOL DEVELOPMENT

Location: Deliverables for use throughout client's market areas

Company:	Global E-Sustainability Initiative (GeSI)
Industry:	Information and Communication Technology
Scope:	Videoconference and Teleconference GHG Reduction Methodology
Demonstrates:	First Environment's expertise in travel emissions calculation and the ISO 14064 standards

First Environment was hired by the Global E-Sustainability Initiative (GeSI) to prepare methodologies to quantify GHG reductions from the implementation of videoconference and teleconference (VT) technology. GeSI is a global partnership, supported by the United Nations Environment Program (UNEP) and the International Telecommunications Union (ICT), of information and communications technologies (ICT) companies that promotes technologies for sustainable development. Working closely with GeSI representatives, First Environment prepared a project protocol for quantifying the emission reductions from the use of videoconferencing and teleconferencing (VT) when used as a substitute for face-to-face meetings. First Environment is currently working on a protocol that quantifies GHG reductions on an organizational or entity wide basis. Both protocols are developed consistent with ISO 14064. GeSI and First Environment have recently submitted the project protocol for review and consideration for use by the Chicago Climate Exchange.

In addition to the preparation of the protocols, First Environment has developed an accompanying GHG emissions reduction calculation tools to be used by the participants to calculate the amount of GHGs reduced by implementation of VT technology. To calculate the reductions, the tools calculate the travel emissions avoided, including aircraft, train, and automobile GHG emissions, and the emissions from the operation of the VT equipment.

FACILITATION OF COUNTY-WIDE CLIMATE ACTION PLAN

Location: Westchester County, New York

Government Entity:	Westchester County
Scope:	County-wide
Demonstrates:	Facilitation, Documentation, and Inventory Development for a County Climate Action Plan

Recognizing the need for the County of Westchester to address climate change, County Executive Andy Spano convened the Westchester County Global Warming Task Force (Task Force). First Environment was selected to facilitate efforts of the Task Force and document the Sustainability Action Plan (Action Plan) for the County.

The Task Force included over 40 representatives from government, business, education, communities of faith, and environmental organizations. Their mission was to identify practical steps Westchester can implement to reduce global warming and foster sustainable development, and to present this information in an Action Plan appropriate for implementation by all sectors of the community: county and municipal governments, educational institutions, businesses, and households.

First Environment consolidated the ideas set forth by the Task Force and developed the Action Plan, which translates climate change and sustainable development strategies into practical actions everyone can try.

The plan, dubbed “Westchester Action Plan 2008” is available for download at: http://www.westchestergov.com/environment_globalwarmingactionplan.htm

As part of the Action Plan, using the ICLEI Clean Air and Climate Protection Software, First Environment developed the county-wide greenhouse gas inventory.

CORPORATE GHG DISCLOSURE REPORT ASSISTANCE

Location: Madison, Wisconsin

Company:	Madison Gas & Electric
Industry:	Electric and Gas Utility
Scope:	Drafted technical, policy, and corporate strategy sections for a voluntary report on the company’s GHG management
Demonstrates:	First Environment’s experience assisting with corporate disclosure on climate change and GHG management issues

In response to the interests of its shareholders and other stakeholders, MG&E sought to develop a report that would provide information about climate change science and policy, the company’s understanding of these issues relative to its business and strategy, emissions associated with its operations, and the company’s approach to GHG management and reduction. Having previously worked with MG&E on the development of an environmental management system (EMS) for its fossil fuel-fired generation facility, First Environment was asked to assist with sections of the report addressing climate change science, policy and GHG management strategies.

The section on climate change science provided an overview of the greenhouse effect, descriptions of common greenhouse gases and their sources, and a discussion of the uncertainty regarding the impacts of climate change. Supplemental information was also provided on the issue of climate change and its relationship to weather and the intensity of weather events.

First Environment’s draft on climate change policy and regulations presented current state GHG regulations, federal voluntary programs, and international regulatory programs such as the European Union Emission Trading Scheme. The section also looked at proposed GHG legislation such as the Regional Greenhouse Gas Initiative, individual state initiatives, and several congressional proposals addressing climate change. The concluding subsection looked at the potential operational and business impacts on MG&E if it became subject to regulations

requiring reductions of GHG emissions and proposed approaches to managing and mitigating these potential impacts.

The final First Environment section for the report related MG&E's ongoing commitment to the protection of the environment as demonstrated by the development of an EMS. It explained MG&E's objectives for developing its EMS, which included facilitating coordination of environmental management among numerous groups within the organization that share responsibilities for these issues. The section also described how the EMS served as a framework for GHG management and reduction goals.

DEVELOPMENT OF CLIMATE CHANGE STRATEGY

Location: Deliverables for use by corporate office for global operations

Company:	An International Office Products Manufacturing Company
Industry:	Office Products Manufacturing
Scope:	Worldwide Operations
Demonstrates:	First Environment's support of building an organization's understanding of the issue of climate change and its relationship to its operations.

Recognizing that climate change was a significant environmental management issue, an international office products manufacturer contacted First Environment to assist with the development of a corporate action plan.

First Environment's support began with development of a white paper for the corporation that reviewed the science of climate change, industrial sources of GHG emissions, and emerging environmental policy relative to the company's operations. The company had both operations in the U.S. and throughout the world. The paper posed both potential risks, posed to facilities in countries with reduction targets under the Kyoto Protocol and therefore likely GHG regulations, and opportunities, created by facilities located in developing countries participating in the Clean Development Mechanism and likely sites for reduction credits. The paper concluded with a summary of suggestions regarding next steps for the company to prepare and position itself relative to these climate policy risks and opportunities.

Upon completion of the white paper, the client asked First Environment to look more closely at its operations in Europe. The European Union's Emission Trading Scheme was under development and the corporation's operations included facilities in various locations in Europe. First Environment was asked to review operations at the European facilities to determine which facilities would be defined installations under the emerging regulatory scheme and therefore be subject to reporting and reduction requirements. First Environment developed a questionnaire for the facilities to gather technical information and used the responses to screen the facilities to determine which had the potential to be EU ETS installations and should contact the relevant agency in their country to confirm this assessment. After one facility in Germany confirmed that it was a regulated installation under the scheme, First Environment facilitated identification of local consulting assistance and verification services to support its compliance with requirements under the scheme.

Next, during corporate proxy season, the company received a shareholder resolution requesting information on its actions relative to climate change. First Environment provided the client with contextual information on climate change shareholder resolutions including the history associated with these resolutions, information on the resolution proponent, and the results of similar resolutions. First Environment also reviewed the requests of the resolution and provided the client with expectations of actions and effort that would be necessary to address these requests. First Environment's information supported the client's discussions with the resolution proponent and the resolution was withdrawn.

Finally, the client determined that consistent with First Environment recommendations, it should conduct an initial greenhouse gas inventory of its operations. First Environment worked with the client to identify the best practice approaches to conducting an inventory, including the most recognized corporate GHG inventory standards such as the WRI/WBCSD Greenhouse Gas Protocol and ISO 14064. First Environment also consulted the client regarding the operational boundaries of the inventory as well as issues of inventory data quality. The client's efforts regarding the inventory are ongoing.

GHG VERIFICATION PROTOCOL DEVELOPMENT

Location: Deliverables for use by client local offices in 45 countries

Company:	BVQI
Industry:	Environmental Verification
Scope:	International Auditing of greenhouse gases
Demonstrates:	First Environment's expertise in developing an international GHG verification program

First Environment was hired by an international registrar with offices in 45 countries that provides certification services including those for ISO 9000 quality and 14001 environmental systems, to provide consulting on the GHG verification process, specific procedures, and supporting guidance and tools. Working in cooperation with client auditors, First Environment designed a flexible structure for managing the verification process and supported it by writing procedures for verification planning, performance and reporting. The project also included development of checklists, worksheets and forms for the auditors to use for verification projects.

The client submitted these materials in support of the organization's application to the Clean Development Mechanism Executive Board for accreditation as an Operational Entity, which would allow it to verify emission reductions from CDM activities. These verification procedures were approved during a desktop review and our client is awaiting performance of a witnessed audit to further advance the accreditation process.

SCOPING PAPER:

DEVELOP GHG VERIFIER COMPETENCE PUBLIC POLICY GUIDELINES

Location: Toronto, Canada

Company:	Environment Canada Accepted Practices Working Group
Industry:	Government
Scope:	International regulatory research, Policy/program requirements analysis, Provision of guidelines and recommendations
Demonstrates:	First Environment's expertise with GHG standards and programs

In February of 2006, First Environment, in partnership with the Canadian Standards Association (CSA) was hired by Environment Canada to provide recommendations and guidelines for accreditation of greenhouse gas verifiers and verification entities, which when adopted, will be the formal requirements for accreditation of verifiers under the Federal Offset System.

Specifically, First Environment identified appropriate competency criteria that can be used to assess GHG verification teams and individual verifiers by sector. The work was completed by:

- a) Identifying the necessary areas of competency for verification teams and individual verifiers under ISO DIS/14065, including technical competency by economic sector;
- b) Identifying other GHG programs which address these competency criteria;
- c) Listing the criteria used by other GHG programs under the competency areas identified in step a);
- d) Preparing a findings and recommendations report and GHG program criteria matrix tool; and
- e) Presenting findings and recommendations to the Accepted Practice Working Group subcommittee on Verification Body Competence.

CARBON DISCLOSURE PROJECT RESPONSE ASSISTANCE

Location Toronto, Canada

Company:	Bank of Montreal
Industry:	Financial
Scope:	Quantification of GHG emissions from available corporate data; Analysis of programs and policies to further define corporate GHG reduction initiatives; Provision of best-practice responses; Outline program for greater internal adoption of climate change associated policies; International regulatory research, Policy/program requirements analysis; Provision of guidelines and recommendations
Demonstrates:	First Environment's experience providing strategic climate change assistance

Having responded to the Carbon Disclosure Project (CDP) for three years, joining the CDP advisory board in Canada and understanding the need to improve both qualitative and quantitative components of their CDP response, the Bank of Montreal (BMO) hired First Environment to provide strategic climate change expertise and analysis.

First Environment supplied BMO with a comprehensive data requirement matrix that identified not only primary data but also secondary and tertiary methods for generating the same data so that BMO internal systems had the flexibility needed when capturing this type of data for the first time. First Environment then quantified the available data in terms of greenhouse gas emissions, reductions and equivalents. Next, in an iterative and interactive process, First Environment provided appropriate answers to the CDP questionnaire, further educating BMO to the issues and risks faced by the financial sector and assisting them in providing a robust a knowledgeable response to CDP stakeholders. As a result of this process, BMO is in the process of developing an action plan that addresses the issues, risks and opportunities associated with climate change identified across all business units.

CARBON DISCLOSURE PROJECT RESPONSE ASSISTANCE

Location, Chicago, Illinois

Company:	Northern Trust
Industry:	Financial
Scope:	Quantification of greenhouse gas emissions from available corporate data; Analysis of programs and policies to further define corporate greenhouse gas reduction initiatives; Provision of best-practice responses; Outline program for greater internal adoption of climate change associated policies
Demonstrates:	Experience providing strategic climate change assistance

Facing the need to respond to the Carbon Disclosure Project (CDP) for the first time, and requiring an understanding of climate change issues, Northern Trust hired First Environment to provide strategic climate change expertise and analysis.

First Environment first educated senior management as to the possible issues facing financial services companies; both direct risks and indirect risks from the companies and portfolios they invest in. Once the general understanding of climate change issues was established, First Environment supplied Northern Trust with a comprehensive data requirement matrix which identified not only primary data but also secondary and tertiary methods for generating the same data so that Northern Trust's internal systems had the flexibility needed when capturing this type of data for the first time. First Environment then quantified the available data in terms of greenhouse gas emissions, reductions and equivalents. Next, in an iterative and interactive process, First Environment provided appropriate answers to the CDP questionnaire, further educating Northern Trust to the issues and risks faced by the financial sector and assisting them in providing a robust a knowledgeable response to CDP stakeholders. As a result of this process, Northern Trust is in the process of developing an action plan that addresses the issues, risks and opportunities associated with climate change identified across all business units.

Inventory Development

DEVELOPMENT OF THE LOCAL GOVERNMENT AND COMMUNITY WIDE GHG INVENTORY AND ENERGY EFFICIENCY CONSERVATION STRATEGY IN SUPPORT OF THE ENERGY EFFICIENCY CONSERVATION BLOCK GRANT

Location: Oklahoma City, Oklahoma

Government Entity:	Oklahoma City
Scope:	City-wide
Demonstrates:	Local government experience, EECBG experiences, GHG inventory quantification, and strategic planning expertise

Energy Efficiency Conservation Strategy

First Environment developed a comprehensive Energy Efficiency Conservation Strategy (EECS) for the City of Oklahoma City. The EECS is required to obtain federal funding through the U.S. Department of Energy's (DOE) Energy Efficiency and Conservation Block Grant (EECBG) program. The EECS is a comprehensive plan for the utilization of 100% of the \$5,482,300 that has been allocated to the City through the EECBG program. The EECS that First Environment developed identifies and prioritizes potential changes that can reduce energy dependence, promote air and water quality, encourage dense urban infill development, relieve reliance on roadways to accommodate increasing traffic, and promote sustainable economic development.

To develop the EECS, First Environment led a team through the process of collecting stakeholder input from various groups and sectors from the broader OKC community. The process of collecting input culminated in a one-day stakeholder outreach and brainstorming event. The event was focused around six key areas:

- Energy Efficiency
- Renewable Energy
- Transportation
- Land Use
- Waste Reeducation and Recycling
- Green Procurement

Existing data, programs, ideas and the output of the stakeholder engagement session were tabulated in a format for prioritization based on cost, energy reductions, potential cost savings, and GHG reductions. The draft EECS was presented to the City Council prior to submission in early December 2009.

GHG Inventory

In support of the EECS, the First Environment team concurrently developed a GHG inventory for Oklahoma City's local government operations and community activities and operations. To ensure that resources used to collect energy data are effectively and efficiently targeted, First Environment developed a GHG Inventory Scoping Plan to direct the collection of energy data and development of the GHG inventory. The Scoping Plan includes geographical, organizational, and operational boundaries for the baseline.

Based on the defined Scope, First Environment developed data requests to City personnel to ensure that the energy use and GHG data are collected. The government inventory includes the City's physically owned and leased assets such as buildings, data centers, fleet vehicles, traffic signals, and street lighting.

Commercial and residential buildings outside the City's control are addressed as part of a community-wide assessment covering energy use, GHG emissions, and forecasts for significant sources or groups of sources. For the community-level assessment, First Environment used data available from existing sources.

The GHG inventory was calculated using ICLEI's CACP software and the latest version of the Local Government Operations Protocol.

DEVELOPMENT OF ENERGY EFFICIENCY CONSERVATION STRATEGY IN SUPPORT OF THE ENERGY EFFICIENCY CONSERVATION BLOCK GRANT

Location: City of Clifton, New Jersey

Government Entity:	Clifton, NJ
Scope:	City-wide
Demonstrates:	Local government experience, EECBG experiences, federal grant application experience

Energy Efficiency Conservation Block Grant Strategy Application

The City of Clifton has been allocated funds in the amount of \$734,300 under the Department of Energy's (DOE) EECBG program. To secure this funding, First Environment supported the City to file its initial grant application, which was approved in August 2009. In addition, First Environment filed amendment paperwork to secure the funds for various projects, including: natural gas conversions on vehicles, energy efficiency retrofits, solar and wind feasibility studies, and creating a GHG inventory.

Energy Efficiency Conservation Strategy Development

First Environment has supported the City in the development of the EECS for submission to the DOE within the 120-day period. To start, First Environment solicited input and collected ideas from the City's Project Team. Once the initial list of potential activities was developed, First Environment applied extensive technical background in economics, sustainability, energy efficiency, and greenhouse gas (GHG) emissions quantification to conduct a high level assessment of the potential benefits gained from each of the activities.

First Environment developed the City's GHG emissions inventory for year 2009. GHG emissions calculations and analysis were conducted utilizing Local Governments for Sustainability – Clean Air & Climate Protection (CACP) software. Analysis was conducted according to a scope 1 and 2 breakdown along with a departmental analysis. 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 the analysis of results. The fuel consumption and mileage of individual vehicles were tracked to determine the mobile emissions. The CACP

software along with a GHG report was provided to the client, where results were summarized and areas for improvement were identified.

The criteria used for the assessment is closely aligned with the short-term outcomes identified by the DOE. First Environment’s analysis of each activity considered the cost to implement, energy savings, job creation/retention, renewable energy capacity and generation, and emission reductions in tons of CO2 equivalents.

The review has consisted of categorizing the activities in the table as either:

- Direct actions: actions that contribute directly to energy savings, job creation, renewable energy capacity or GHG emissions reduction; or
- Capacity building actions: actions that do not contribute directly to the benefits identified above by themselves, but by their achievement enable other direct actions to achieve measurable benefits. Capacity building actions are essentially prerequisites to future activities with greater potential benefits. For instance, energy audits alone will not reduce energy consumption or improve efficiency. However, the retrofits that follow the energy audit can yield significant benefits in energy savings and GHG reduction.

Ultimately, the City’s strategy included a mix of capacity building and direct actions for submission under the EECBG. The draft strategy has been provided for review and comment, which has included the City’s proposed strategy, summary of goals and objectives, and a timetable for major milestones.

NATIONAL INSTITUTES OF HEALTH: COMPLIANCE TO EXECUTIVE ORDERS 13423 AND 13514

Location: Washington, D.C.

Organization:	National Institutes of Health (NIH)
Industry:	Federal Government
Scope:	Agency-wide
Demonstrates:	Development of a GHG inventory for a public agency

The National Institutes of Health (NIH) is one of the largest and most multi-faceted agencies within the Department of Health and Human Services. Working with First Environment, NIH began creating its first greenhouse gas (GHG) inventory in late 2010 in response to Executive Order (EO) 13514. By the January 4th deadline for inventory submission to the Council on Environmental Quality, NIH had found that creating its GHG inventory enabled the agency not only to better identify opportunities to reduce energy usage from its operations, but also to identify what otherwise might be less obvious opportunities to reduce consumption of other resources. For instance, by reviewing NIH’s list of capital assets (e.g., buildings, water infrastructure, etc.) in detail, NIH discovered an opportunity to manage its water usage better through improved energy data management. Water usage is an important metric in the context of the DHHS Strategic Sustainability Plan (SSP) and EO 13423. First Environment has supported the agency’s growing recognition that many of the processes and energy metrics necessary to meet the EO requirements are consistent with, if not the same as, NIH’s existing environmental

compliance management systems. NIH’s underlying innovation in creating and managing its GHG inventory is simple, if not obvious: develop GHG data collection and management tools for seamless incorporation into existing environmental compliance management systems. On that basis, evidence from NIH’s experience suggests that there are at least two critical elements of success in meeting multiple requirements from multiple EOs, and reaching goals and meeting targets. One element is appropriate GHG inventory design tailored to the unique needs and constraints of individual agencies. Another is designing tools for data collection, analysis, and management that support and are seamless within existing systems.

TECHNICAL ASSISTANCE FOR A SERVICE ORGANIZATION’S GHG INVENTORY

Location: Sacramento, California

Company:	California Public Employees' Retirement System (CalPERS)
Industry:	Pension fund, healthcare and other retirement services
Scope:	Corporate offices and fleet
Demonstrates:	Development of a GHG inventory for a public agency

First Environment was contracted through global real estate services firm Colliers International to develop a GHG inventory for their client, the California Public Employees' Retirement System (CalPERS), for the purposes of participating in the California Climate Action Registry. The California Public Employees’ Retirement System, established by state law in 1932 to provide retirement benefits for state employees, manages pension and health benefits for approximately 1.5 million California public employees, retirees, and their families.

The CalPERS’ GHG inventory included the Lincoln Plaza complex (the organization’s headquarters in Sacramento) and associated properties including warehouses and parking lots; a vehicle fleet; and seven regional offices throughout California. At these facilities, GHG sources included stationary combustion emissions of natural gas and diesel, fugitive emissions of HFCs from air conditioning systems and fire suppression systems, and indirect emissions from the consumption of electricity. The fleet emissions included mobile combustion emissions associated with gasoline and diesel fuels as well as fugitive emissions of HFCs from the vehicle air conditioning systems.

To develop the inventory, First Environment performed site visits of the facilities to identify all of the emissions sources that needed to be included. Emission quantification methodologies for the identified sources were selected and the data requirements of these methodologies determined. First Environment met with Colliers International staff with responsibilities for management of the facilities, and discussed the data and information that was available relative to what was needed to quantify the GHG emissions. These staff provided records containing the needed information and First Environment consolidated this data for the facilities and the entire organization using standardized spreadsheets. The summarized data was entered into the California Climate Action Registry’s CARROT emission quantification and reporting tool.

To assist with verification of the GHG inventory as well as to guide Colliers International staff with future GHG inventories for CalPERS, First Environment summarized the development of the inventory in an Inventory Management Plan document that contained its boundaries, descriptions of data collection and emissions quantification approaches, and appendices with

detailed inventory source lists. The source summary spreadsheets were also converted to “fill in the blanks” template workbooks to further facilitate the development of future GHG inventories.

TECHNICAL ASSISTANCE FOR WASTE MANAGEMENT SECTOR GHG INVENTORY

Location: Facilities throughout California

Company:	Waste Management, Inc.
Industry:	Waste Management
Scope:	Operations including collection, transfer stations, landfills, and power generation
Demonstrates:	GHG inventory development in a large, complex corporate entity

First Environment 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. Through its operating subsidiaries, Waste Management is the leading provider of comprehensive waste and environmental services in North America. 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 GHG inventory for Waste Management’s California operations, which focuses on the company’s carbon dioxide emissions, 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. The inventory also includes emissions produced by three electric generating power plants. Two of these power plants are natural gas-fired cogeneration units and one of the plants is biomass-fueled. In order to highlight Waste Management’s environmental goals, the GHG report includes optional reporting data pertaining to emissions reductions from various recycling and waste management operations.

Waste Management financial controllers provided data from its six California market areas. First Environment assisted with the development of a standardized data collection spreadsheet for these controllers. First Environment consolidated the data provided by the controllers for over 100 facilities into a single corporate GHG inventory database. The information provided was subject to several quality assurance assessments including anomaly assessments, targeted clarification inquiries, and internal auditing. The collected data for each individual facility was entered into the California Climate Action Registry’s CARROT emission quantification and reporting tool. Because the inventory included electricity generation facilities, reporting also included completion of the Registry’s sector-specific Power and Utility Protocol reporting form.

As required, the Waste Management GHG Report to the California Climate Action Registry was submitted for verification by a state-approved third-party certifier and this process is currently approaching completion. To assist with the verification process, First Environment developed an Inventory Management Plan document that contains boundary descriptions, data collection and emissions quantification approaches, and appendices with detailed inventory facility lists. First Environment also assisted with the certification by facilitating verification activities including coordinating site visits with facility contacts, requesting records for verifier review, and preparing responses to verifier requests for clarification.

PREPARATION FOR MANDATORY GHG REPORTING UNDER CALIFORNIA'S AB 32

Location: California

Company:	Confidential Mineral Extraction and Production Company
Industry:	Minerals and Mining
Scope:	Detailed gap analysis of existing GHG data management systems and mandatory GHG reporting requirements
Demonstrates:	First Environment's ability to perform detailed analyses of complex operations in preparation for compliance with mandatory GHG reporting rules

First Environment, Inc. provided GHG consulting services to a mineral and mining company located in California to assist them in meeting the requirements for mandatory reporting of greenhouse gas (GHG) emissions under the California Assembly Bill 32 (AB 32). First Environment's primary task involved assessing the company's existing GHG emissions data and data management systems and providing a detailed gap analysis indicating which systems would need to be put into place to comply with new regulations.

First Environment assessed the company's existing GHG emissions data and data management systems through a desk audit of available data and an on-site visit to its facilities. The site visit also served to confirm the emission sources present at the facilities and to identify additional sources for inclusion in the analysis.

First Environment also provided consulting support to assist the company in meeting the GHG emissions reporting requirements of AB 32 by providing guidance on installing the necessary systems and equipment to collect high quality emissions-related activity data that would later withstand the scrutiny of third-party verification, as required by the rule.

Deliverables for the project included a letter report that assessed the availability of data relative to the identified sources, identified data gaps as well as a means of obtaining data or appropriate estimates of the emissions where data gaps existed, and included an estimate of the level of investment and effort required to meet the reporting requirements of AB 32.

AVON PRODUCTS: GHG INVENTORY DEVELOPMENT/ ASSESSMENT

Location: Operations worldwide

Company:	Avon Products
Industry:	Manufacturing
Scope:	Manufacturing and distribution facilities, offices, mobile fleet and air travel
Demonstrates:	First Environment's knowledge of GHG emission sources and quantification methodologies and experience in developing and implementing GHG data management plans.

First Environment provides greenhouse gas inventory quantification support for a large, complex organization with operations world-wide. We provide inventory and data management support for manufacturing and distribution facilities as well as offices, mobile fleet and air travel. Avon's mobile fleet spans across the globe over 5,000 cars in 69 countries.

First Environment prepared an inventory of Avon’s global manufacturing GHG emissions for 2004 to 2006 through the development of a customized menu-driven Excel based GHG Emissions Tool. First Environment designed the tool to provide a flexible platform to allow for the addition of additional operations and facilities as the scope of Avon’s GHG inventory expanded, while providing for capabilities to compare GHG emissions between facilities and various operational divisions in the corporation. In order to facilitate potential future emissions verification, First Environment designed the tool with a significant level of transparency in terms of both emissions factors used and calculations performed.

The GHG Emissions Tool developed quantifies both direct GHG emissions from stationary combustion of fossil fuels and indirect GHG emissions resulting from the consumption of the electricity. The individual GHGs calculated in the tool included CO₂, CH₄, and N₂O. Because of its structure, the operational boundaries of the tool can be easily expanded to include additional source types (mobile combustion, fugitive, and process emissions) and GHGs (HFCs, PFCs, and SF₆) as Avon’s needs and objectives change. As an added feature, the GHG Emissions Tool allows the user to select the Global Warming Potentials used in the calculation of individual GHG emissions into equivalent tons of CO₂. To provide additional value for Avon, the tool was also designed to calculate and compare energy consumption data.

For the past three years, First Environment has analyzed data and communicated results related to emission reporting requirements for Avon Product’s inventory, which includes a large vehicle fleet, thousands of business air travel flights, and dozens of manufacturing and distribution facilities across the globe. First Environment staff serve as experts in this role and are hired to advise them and to provide them with options and recommendations on complex issues, including how to define operational control boundaries related to complex organizational structures. First Environment is often charged with providing policy options to managers and senior staff and creating technical guidance documents for managers. The results of our work often have significant financial implications and are critically important to senior management. Our work includes preparation of Carbon Disclosure Project survey responses , emission reports, and inventory management plans.

GHG INVENTORY DEVELOPMENT FOR MAJOR SCRAP METAL RECYCLER

Location: Various locations with the United States

Company:	Confidential Major Scrap Metal Recycler
Industry:	Scrap Recycling
Scope:	US east coast operations; 7 facilities
Demonstrates:	First Environment’s knowledge of GHG emission sources and quantification methodologies in the scrap metal industry and experience in developing and implementing GHG data management plans.

First Environment was retained by a major scrap metal recycler to assist in the development of its GHG inventory and related management systems. The scope of First Environment’s work included the development of organizational and operational boundaries for the inventory; identification of GHG emission sources; selection of appropriate quantification methodologies and creation of calculation tools for emissions estimates; and the development of a corporate inventory management plan to guide GHG inventory development in future years.

GHG INVENTORY ASSISTANCE FOR INTERNATIONAL PETROLEUM CORP.

Location: Deliverables for use by corporate office for global operations

Company:	Hess Corporation
Industry:	Oil and Gas
Scope:	International corporate assets including North America, Europe, Africa and Asia
Demonstrates:	First Environment's support of the development of a corporate GHG inventory

First Environment assisted an international petroleum company in the development of its first third party verifiable GHG inventory. Though the corporation had been tracking GHG emissions for several years, advancements in inventory best practices and increasing importance of this information in the industry resulted in interest in developing an enhanced inventory program that could support further GHG management activities. Because of its involvement in GHG inventory protocol development, particularly the ISO 14064 GHG quantification, reporting and verification standard, First Environment was asked to support development of an international inventory for the organization.

Initial work included strategic consulting on the inventory approach based on our firm's GHG experience and guidance provided in widely accepted GHG protocols and other reference documents. Initial deliverables included specific recommendations for developing an overall GHG inventory structure and a white paper on pitfalls of inventory development efforts.

First Environment then assisted this organization with the development of its GHG inventory system and associated documentation. One focus of work was a customized GHG inventory protocol in which the organization defined its inventory boundaries, identified calculation methodologies and established a reporting process. The structure of the inventory program consisted of international facilities reporting production information and operations activity data to the corporation to enable GHG quantification, reporting and verification.

GHG PROGRAM COMPARATIVE ANALYSES

Location: Deliverables for use by policymakers in Sacramento, California

Organization:	California Air Resources Board
Industry:	State Regulatory Agency
Scope:	Policy/program requirement analysis
Demonstrates:	First Environment knowledge of existing/emerging GHG programs and value to policy development process

Under a subcontract arrangement with MEG LLC, First Environment assisted in the development of a comparative analysis of greenhouse gas reporting requirements for existing GHG regulatory and voluntary programs. These comparative analyses were provided to staff at California Air Resources Board as reference materials to inform the development of GHG reporting regulations under California's Global Warming Solutions Act of 2006 (known as Assembly Bill 32).

First Environment's scope of work in the overall project was focused on reporting requirements for the California Climate Action Registry and the Northeast states' Regional Greenhouse Gas Initiative. Through document review and interviews with program contacts, these comparative

analyses identified requirements relative to key issues including but not limited to reporting scope, organizational, and operational boundaries; establishment of a base year for reporting; data submission and reporting schedules; and data quality management and verification. The California Climate Action Registry assessment included review of its General Reporting Protocol, General Verification Protocol, and sector-specific protocols for the Power/Utility and the Cement industries. The Regional Greenhouse Gas Initiative assessment included review of the Memorandum of Understanding between the RGGI states and the program's Model Rule.

Deliverables for the project included summaries of program requirements relative to these key issues, followed by selected excerpts from program source documents to support and clarify these summaries.

Project Development

TECHNICAL ASSISTANCE FOR POWER GENERATION EMISSION REDUCTION PROJECT

Location: Confidential location in Latin America

Company:	Intergen
Industry:	Power Generation
Scope:	Combined cycle natural gas power generation facility
Demonstrates:	GHG emissions estimation and calculations

An international energy provider hired First Environment to perform a technical and financial assessment of greenhouse gas credits for a combined-cycle natural gas power plant that the client is constructing and operating in a developing country. The study evaluated the net present value (NPV) of certified greenhouse gas (GHG) emission reductions that might be attributed to the project under the proposed structure of the Clean Development Mechanism (CDM) of the Kyoto Protocol. As one of the first GHG studies of this type to be performed, this project required First Environment's team of technical and financial experts to address each of these issues:

- Estimation of the project host country's current and future mix of energy technologies and the average power plant GHG emissions per unit of output of electricity associated with these energy mixes,
- Calculation of our client's power plant GHG emissions, and
- Market valuation of the identified emission reductions.

Using operating parameters and the emissions profile provided by the client, the technical group was able to propose a GHG emissions rate for the combined-cycle plant that allowed the calculation of total annual GHG emissions. With the facility's emissions profile and a host country baseline calculated, the technical team was able to determine the emission reduction units that could be associated with the introduction of the combined-cycle project into the developing country's electric power sector. The financial experts on the team applied the technical information to assess how the emissions reductions that had been identified would impact the project's overall financial return. Part of this analysis focused on emission reduction prices in the market. Because of the immature state of the GHG emission reduction market and uncertainty about evolving policy, research into recent documented trades and discussions with brokers suggested the range of prices that were considered.

LIFE CYCLE ASSESSMENT OF GREENHOUSE GAS EMISSION REDUCTIONS OF A CLEAN COAL POWER GENERATION TECHNOLOGY

Location: North America

Company:	Global New Energy
Industry:	Power generation technology
Scope:	Life cycle assessment and evaluation of the effectiveness of a new technology
Demonstrates:	First Environment's experience in applying its expertise to verify the accuracy of another organization's estimates and calculations.

First Environment assisted an energy technology developer with assessing the GHG benefits that could be associated with a clean coal technology that it was offering to the North American power generation market. To determine the greenhouse gas benefits that could be associated with the new technology, First Environment conducted a life-cycle inventory of a conventional coal-fired power plant and a cement factory, as well as the clean coal process, which includes the new technology.

The assessment began by defining the life cycle of the conventional processes that corresponded to the new technology. A proprietary life-cycle application was used to model both the old and the new processes. Next, First Environment identified an inventory that quantified the raw material inputs as well as emission outputs of the processes. This preliminary data was then processed under various assessments with regards to environmental impacts. For greenhouse gas emissions, First Environment's assessment was based on the IPCC calculation methodology. Comparison of the combined convention and new technologies suggested that GHG emission reductions in terms of CO₂ equivalents of approximately seven percent could be associated with the implementation of the client's technology.

PROJECT DEVELOPMENT DOCUMENT FOR CANADIAN GOVERNMENT

Location: Canada

Company:	logen Corporation
Industry:	Biofuels
Scope:	Bioethanol production from cellulosic biomass
Demonstrates:	GHG emissions estimation and calculations

First Environment was hired by logen Corporation to develop a project development document for its proposed bioethanol plant in Ontario, Canada. The document was designed to meet the requirements of the Government of Canada's Technology Early Action Measures (TEAM) program, so that the company would be eligible for the pre-commercialization funding the government was providing.

The project consisted of a new ethanol plant that used wheat straw as a feedstock, and consisted of a cogeneration plant, an enzyme plant and an ethanol plant. The document included:

- A detailed description of the project, its social and environmental impacts, and an evaluation of the barriers to the implementation of the project;
- An estimation of the greenhouse gas emissions for the life cycle of the project – from agricultural production, through ethanol production, to combustion in a standard automobile;
- An estimation of the greenhouse gas emissions for the life cycle of the baseline – from petroleum extraction, through gasoline production, to combustion in a standard automobile;
- A calculation of the greenhouse gas reductions from substituting ethanol for 10 percent of the gasoline in a vehicle, in terms of the net annual output of the logen facility and in terms of a liter of ethanol produced.

The document was based on a biofuels for transportation project methodology developed by First Environment for the Canadian Government. A detailed calculation tool was also provided to the government, which validated the report prior to acceptance.

PROJECT DEVELOPMENT DOCUMENT FOR CANADIAN GOVERNMENT

Location: Canada

Company:	Confidential Technology Startup
Industry:	Fuels
Scope:	Dehydration of ethanol stream
Demonstrates:	GHG emissions estimation and calculations

First Environment was hired by a Canadian start-up company to develop a project development document for its new ethanol dehydration technology. The document was designed to meet the requirements of the Government of Canada’s Technology Early Action Measures (TEAM) program, so that the company would be eligible for the pre-commercialization funding the government was providing. The technology consisted of a polymer membrane that had significantly better efficiency than the standard molecular sieve technology. The greenhouse gas emissions reductions came from a reduction in steam load required during the dehydration process. The deliverables included:

- A detailed description of the project, its social and environmental impacts, and an evaluation of the barriers to the implementation of the project;
- An estimation of the greenhouse gas emissions for the life cycle of the project, which included production of the raw materials used in the dehydrator, production of the fuel to generate steam and use of the steam in the fermentation process;
- An estimation of the greenhouse gas emissions for the life cycle of the baseline which included production of the fuel to generate steam and use of the steam in the fermentation process;
- A calculation of the greenhouse gas reductions from switching dehydration technologies from the molecular sieve to the new polymer technology, in terms of annual ethanol production and per liter of ethanol produced.
- A detailed calculation tool, which validated the report prior to acceptance.

Inventory Verification

VERIFICATION OF GREENHOUSE GAS EMISSIONS REPORT

Location: New York, NY

Company:	New York Power Authority
Industry:	Power Generator
Scope:	CO ₂ emissions from stationary combustion from all facilities in North America
Demonstrates:	First Environment's experience with the country's largest state public power organization

First Environment performed the verification of NYPA's 2009 and 2010 GHG report to The Climate Registry. Verification focused on identification of emission sources, assessment of data management systems, and recalculation of reported emissions. The scope of the verification covered CO₂ emissions from stationary combustion from all facilities in North America.

CORPORATE GHG INVENTORY VALIDATION AND VERIFICATION

Location: Operations in North America, South America and Europe

Company:	Georgia-Pacific Corporation
Industry:	Pulp and Paper
Scope:	Verification of GHG inventory data for facilities in North America, South America and Europe.
Demonstrates:	First Environment's pulp and paper industry experience, ability to assess large amounts of data and documentation, knowledge and expertise with varying GHG calculation methodologies and protocols, and its ability to conduct a large scale verification for a multinational corporation.

Georgia-Pacific Corporation (G-P), one of the world's largest forestry products companies, developed its own GHG inventory guidelines, which are based on the WBCSD/WRI GHG Protocol. After developing its Protocol, G-P conducted a GHG inventory study in 2000 of its facilities in North America, Europe, Argentina and Chile. In 2002, G-P commissioned First Environment to validate its Protocol and verify its base year GHG Inventory data. The purpose of this initial validation and verification was to provide an independent third party assessment of the Protocol and the inventory to confirm G-P's confidence in its 2000 base year GHG Inventory with regard to overall design; specific methods employed; implementation and executing; and resulting quality of the inventory. In 2004, G-P again commissioned First Environment to validate and verify the company's 2002 GHG inventory draft report, and 2004 Edition Protocol.

Validation Tasks

First Environment conducted a review and analysis of G-P's GHG Protocol to confirm whether their protocol reflects good practice when compared against similar documents such as WBCSD / WRI GHG Protocol, California Climate Action Registry Protocol and ISO 14064. The First Environment compared, on a topic-by-topic basis, G-P's protocol to these others and identified any best practices, differences, and possible areas of improvement.

For the second validation task, First Environment confirmed that G-P's data collection mechanisms reflect good practice for fuel and electricity consumption and determination of energy consumption. The third validation task involved confirming that the emission factors used by G-P for conventional fossil fuel, electricity, and steam imports reflect good practice. For the fourth validation task, First Environment worked to determine if the estimations of specific industry and company biomass fuel emissions were well founded and based on sound chemical engineering process calculation methods.

Verification Tasks

For both the 2000 and 2002 verification, First Environment completed several verification tasks. To begin, the team verified that the GHG inventory was conducted along the guidance of the G-P GHG Protocol. The Protocol was revised in 2004, so the second verification was compared against the revised version of the Protocol. To do this, the verification team conducted an independent internal review of both the G-P GHG Protocol and the resulting data. The team then performed a point-by-point comparison identifying best practices, inconsistencies and opportunities for improvement. In cases where it was not clear whether the Protocol was followed, the verification team developed questions for further investigation, which were posed to G-P's Climate Change Working Group members.

Next, First Environment verified that the emission information being reported for a sample of calculations was reasonable. The team first reviewed data and calculation spreadsheets provided by G-P, then reviewed the overall framework of data within the GHG Emissions Workbook, checking that the formulas and units of measurement were correct. Based on evaluation of the spreadsheets and summary documents, First Environment then selected areas for more in-depth evaluation that presented the greatest risk to the accuracy of reported emissions and developed a series of questions for each area.

In the next verification task, First Environment determined whether the protocols and inventories contained an acceptable level of uncertainty with respect to current practices. First Environment considered two major forms of uncertainty affecting GHG management protocols and inventories: inherent and systemic uncertainty.

GHG MANAGEMENT SYSTEM ASSESSMENT OF INTERNATIONAL ELECTRONICS MANUFACTURER

Location: Deliverables for use by Asian corporate office and auditors of global manufacturing facilities

Company:	International Electronics Manufacturer
Industry:	Consumer Electronics Manufacturing
Scope:	GHG Management System Assessment and Pilot Site Audit of U.S. Manufacturing Facility
Demonstrates:	First Environment's evaluation of a corporate GHG management system including a web-based GHG data reporting tool

As part of a larger management system assessment for a global electronics manufacturer, First Environment was asked to focus specifically on GHG management issues and GHG emissions reporting undertaken by the company. The assessment also evaluated the effectiveness of the

corporate web-based environmental reporting tool which collected data associated primarily with energy and vehicle use and was used to calculate GHG emissions.

The First Environment team reviewed the company's GHG management system and emissions reporting considering relevant standards and best practices. A site visit to one of the company's facilities was performed to examine the system in practice. Interviews with facility staff discussed the implementation and operation of the GHG activity data reporting process and the online tool.

Using the information gathered, our team provided a master protocol by which both internal and external auditors could assess GHG management issues at facilities as part of system audits. In addition, our report identified recommendations for enhancement of the GHG data reporting process and improvements to the web-based reporting tool.

ALUMINUM INDUSTRY GHG INVENTORY VERIFICATIONS

Location: Province of Quebec, Canada

Company:	Three Confidential Firms in Canada
Industry:	Aluminum manufacturing
Scope:	Emissions inventory audits of three companies, 15 sites
Demonstrates:	First Environment's experience in applying its expertise to verify the accuracy of another organization's estimates and calculations.

In 2002, the Aluminum Association of Canada and the Government of Quebec signed a Covenant on voluntary reduction goals of an additional 200,000 tonnes of GHG emissions by the end of 2007. The Government also signed individual agreements with three aluminum firms in the province. The Covenant proposes gradual, permanent reductions that allows for growth in the industry, and acknowledges the contribution to the collective effort to reduce GHG emissions.

As part of this agreement, each company was required to have its emissions inventory verified by a certified third-party auditor prior to submission to the government. First Environment, along with its local partner Bureau de Normalisation du Quebec, was chosen by all three companies to complete these audits. The Québec government provided a broad framework by which to design the audit process. First Environment conducted a detailed audit of each company, visiting a total of 15 sites in a period of two months.

First, we developed an understanding of the systems used to calculate, aggregate and report GHG emissions data at the corporate level. We then performed a top-level review of all of the GHG emissions data reported by the sites in Québec. To ensure the completeness and accuracy of the data used to calculate GHG emissions, we conducted visits to certain facilities and tested the controls and procedures used by site management. During each visit, First Environment conducted detailed testing by obtaining evidence supporting the amounts and disclosures in the GHG statement, testing the mathematical formulas used, testing the methodologies used to aggregate data, and assessing significant estimates made by management.

For the sites not visited, First Environment conducted desktop reviews of GHG data, based on an understanding of those sites' operations and procedures. In order to identify any issues that

could impact the rollup of the company's GHG emissions, we correlated findings from the site audits and reviews with our knowledge of both the aluminum industry and the company's operations. We tested the integrity and accuracy of the central level GHG emission data aggregation process.

AES CORPORATION'S CALIFORNIA CLIMATE ACTION REGISTRY GHG REPORT CERTIFICATION

Location: California, United States

Company:	AES Corporation
Industry:	Electric Power Generation
Scope:	Verification of a multi-power plant GHG report consistent with sector-specific reporting protocols
Demonstrates:	First Environment's performance of GHG report verification consistent with the California Climate Action Registry's Power and Utility Protocol

First Environment conducted the verification of AES Corporation's 2006 GHG Report to the California Climate Action Registry (CCAR). As a company operating power-generating facilities, AES reported to the Registry using the CCAR sector-specific Power and Utility Protocol (PUP). First Environment possesses special Registry approval to verify PUP reporters' GHG inventories, which consist of both the standard CARROT report as well as a supplementary PUP spreadsheet identifying electricity generation data and power generation and delivery emission metrics.

Since it was the organization's first year of Registry reporting, the 2006 AES CCAR report was limited to carbon dioxide emissions from the corporation's California operations, which mainly represented the AES Southland subsidiary. The scope of the verification consisted of nine generating facilities, including four natural gas-fired power plants, two biomass-fired facilities, and three wind generating operations.

Consistent with the requirements of the Registry's certification protocol, First Environment's verification objectives included identifying emissions sources, understanding management systems and estimation methods used, and verifying emissions estimates. The verification process used a combination of onsite and desktop evaluation techniques. Site visits were conducted at four facilities: three representing natural gas-fired operations and one wind generating facility. During the site visits, auditors toured facilities and operations included in the GHG reports and conducted interviews with individuals associated with GHG reporting.

The desktop stage of the verification consisted of reviews of records and summary spreadsheets supporting emissions calculations for 15 reported emission sources, especially those associated with turbine natural gas combustion, as these comprised the majority of reported emissions. This desktop review also included limited assessments of de minimis sources such as mobile combustion emissions from facility vehicles and indirect emissions from purchased electricity.

First Environment documented the results of the verification process, both for the CARROT report as well as the PUP forms, in a report that was provided only to AES. First Environment's final opinion of "verified without qualification" was submitted to the Registry after AES approval.

BENTLEY PRINCE STREET'S CALIFORNIA CLIMATE ACTION REGISTRY GHG REPORT CERTIFICATION

Location: California, United States

Company:	Bentley Prince Street (subsidiary of Interface, Inc.)
Industry:	Manufacturing (Textile)
Scope:	Verification of a multi-facility corporate GHG inventory report for state-specific operations (California)
Demonstrates:	First Environment's performance of GHG report verification consistent with the California Climate Action Registry's Certification Protocol

In August 2004, First Environment completed the certification of Bentley Prince Street's (www.bentleyprincestreet.com) 2002 and 2003 Greenhouse Gas (GHG) Reports to the California Climate Action Registry (CCAR). The CCAR (www.climateregistry.org) is a state-established GHG emissions registry which offers participants potential protection of early GHG reductions from future climate change regulations. The completion of this certification ensured Bentley Prince Street's compliance with the CCAR 2002 reporting deadline and also made Bentley Prince Street the first certified reporter of 2003 data to the CCAR. The submission of Bentley Prince Street's GHG Reports and First Environment's certification opinions were performed through the Registry's Climate Action Registry Reporting Online Tool (CARROT).

Bentley Prince Street is a manufacturer of floor coverings for commercial and residential interiors. The company is a subsidiary of Interface, Inc. (www.interfaceinc.com), a global provider of commercial and residential floor coverings and textiles, recognized for its corporate commitment to pursuing sustainability. Consistent with this commitment, Bentley Prince Street was the first charter member of the CCAR. Bentley Prince Street also operates a 448 panel 100 kW photovoltaic solar energy generation installation at its manufacturing facility further reflecting the proactive steps it takes toward environmental management.

Bentley Prince Street's GHG report certification was conducted consistent with the California Climate Action Registry's Certification Protocol which specifies a standard by which certification activities must be performed. The Protocol identifies a report minimum quality standard of 95 percent accuracy and no material misstatements. The Protocol's certification process includes identifying emission sources, reviewing methodologies and management systems, and verifying emission estimates.

First Environment's performance of the certification process included the assessment of the company's California emissions including direct and indirect emission from three facilities and several corporate vehicles. A site visit at Bentley Prince Street's City of Industry, CA, manufacturing facility included interviews with representatives of operations and environmental management and included attendance by CCAR staff. Though the certification process identified no material misstatement associated with Bentley Prince Street's report, allowing an unqualified opinion, First Environment provided a list of suggested enhancements to GHG report completeness and transparency for Bentley Prince Street's consideration.

EASTMAN KODAK COMPANY'S CALIFORNIA CLIMATE ACTION REGISTRY GHG REPORT CERTIFICATION AND NON-U.S. GHG REPORT VERIFICATION

Location: U.S. and Non-U.S. Operations

Company:	Eastman Kodak Company
Industry:	Manufacturing (Photographic Equipment and Supplies)
Scope:	Verification of multi-year multi-facility corporate GHG inventory reports for U.S. operations and non-U.S. operations
Demonstrates:	First Environment's performance of GHG report verification consistent with the California Climate Action Registry's Certification Protocol

In February 2006, First Environment completed the certification of Eastman Kodak Company's (www.Kodak.com) 2002, 2003, and 2004 Greenhouse Gas (GHG) Reports to the California Climate Action Registry (CCAR). The CCAR (www.climateregistry.org) is a state-established voluntary GHG emissions registry, which allows participants to establish corporate GHG emissions baselines against which any future GHG emission reduction requirements may be applied. The certification ensured that Kodak complied with reporting requirements for participation in the CCAR. The submission of Kodak's GHG Reports and First Environment's certification opinions were performed through the Registry's Climate Action Registry Reporting Online Tool (CARROT).

In addition to performing the CCAR certification for Kodak, the scope of First Environment's verification also included performing a similar assessment on reports that quantified emissions from Kodak's non-U.S. facilities. At the time of the verification, the CCAR did not accept GHG reports from facilities outside the U.S.

Both verifications were performed according to the Registry's Certification Protocol using the CCAR General Reporting Protocol as the standard of verification. The Certification Protocol establishes a minimum quality standard of 95 percent and allows five percent of the total emissions to be identified as de minimis emissions.

For the CCAR U.S. reports, Kodak operations including five manufacturing facilities as well as non-manufacturing and photo processing facilities which were reported in aggregated terms. The non-U.S. report covered thirteen manufacturing facilities. The reports included emissions representing all six Kyoto gases (CO₂, CH₄, N₂O, HFCs, PFCs and SF₆) and direct source categories of stationary combustion, mobile combustion, process and fugitive emissions, as well as indirect emissions from electricity use. Individual reported sources upon which the verification assessments focused included Kodak Park's coal-fired power plants, industrial wastewater treatment and thermal oxidizer emissions at various facilities, SF₆ containing breakers at a non-U.S. facility, and vehicle fleets in the U.S. and abroad.

Consistent with the requirements of the Certification Protocol, First Environment conducted site visits at a sample of Kodak's facilities. In the U.S., the site visits included Kodak Park in Rochester, NY, and the Kodak Colorado Division, in Windsor, CO. For the non-U.S. facilities, First Environment conducted site visits of Kodak facilities in Guadalajara, Mexico and Chalon, France. The site visits included inspection of major site sources, interviews with site staff with inventory responsibilities, and review of site documents and records.

First Environment used a proprietary GHG verification tool during the audit to manage the complex data contained in the inventory. In addition to allowing assessment of the inventory through trending and other comparison analyses, the tool facilitates evaluation of the inventory reports against the minimum quality standards specified by the Registry Protocol.

First Environment provided a report to Kodak that established the verification scopes, detailed verification activities, and identified its audit findings as well as corrective action requests. After the resolution of outstanding issues, First Environment finalized the verification reports and provided opinion statements for both inventory reports. First Environment also completed the certification reporting to the CCAR, including CARROT online submissions.

EVALUATION OF CORPORATE EMISSIONS CALCULATIONS

Location: Confidential location in North America

Company:	A North American Healthcare Supply and Information Technology Company
Industry:	Healthcare
Scope:	Corporate emissions calculations for voluntary reporting
Demonstrates:	First Environment's evaluation of emissions quantification methodologies and calculations

First Environment was contracted to conduct an assessment of CO₂, SO_x and NO_x emission calculations for a North American healthcare supply company. The emission quantities were intended for use in the company's corporate sustainability report. First Environment's assessments included evaluating whether the quantification methodologies selected were reasonable approaches relative to current best practices. First Environment also reviewed the associated calculations performed to assess they had been performed accurately. First Environment provided a client a statement communicating its findings regarding these assessments.

STRATEGIC REVIEW FOR UTILITY CCAR GHG REPORT VERIFICATION

Location: San Francisco, California

Organization:	Pacific Gas & Electric
Industry:	Gas & Electric Utility
Scope:	Analysis of GHG inventory management systems
Demonstrates:	First Environment's expertise in GHG inventory management systems and understanding of utility industry GHG issues

Under a subcontract arrangement with strategic alliance partner and PG&E's certifier, SGS, First Environment assisted with the verification of PG&E report to the California Climate Action Registry. First Environment's scope of the overall project was focused on conducting the 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.

The strategic review then included a day of interviews at PG&E headquarters with PG&E representatives holding primary responsibility for the company's GHG management, inventory and reporting. The interviews began with a discussion on PG&E's overall business activities, its GHG management programs, and the company's 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.

First Environment provided SGS with a report detailing its findings, which included 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 to SGS also included First Environment's 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.

POWER PURCHASE EMISSIONS ASSESSMENT FOR UTILITY CCAR GHG REPORT VERIFICATION

Location: San Francisco, California

Organization:	Pacific Gas & Electric
Industry:	Gas & Electric Utility
Scope:	Analysis of GHG emissions of power purchases
Demonstrates:	First Environment's expertise in GHG emissions quantification and data management.

As a subcontracted specialist under strategic alliance partner and PG&E's certifier, SGS, First Environment performed a review of the reporting of purchased fossil, biogenic, geothermal, and other renewable generation, and the corresponding GHG emissions resultant 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.

Project Verification

WORLD BANK'S BUS RAPID TRANSIT SYSTEM: LEAD VERIFICATION BODY

Location: Mexico City, Mexico

Company:	World Bank
Industry:	Transportation
Scope:	All Bus Rapid Transit system components
Demonstrates:	First Environment's experience in evaluating an emission reduction project against crediting program requirements

From 2009-2010, First Environment served as Lead Verifier for World Bank's Bus Rapid Transit (BRT) energy efficiency and emission reduction project in Mexico City. For this project, First Environment provided an engineering-based audit of data collection and management systems related to the fuel use at the site and the benefits of modal shift (people shifting from the use of car to bus) for an energy efficiency project that dedicates two lanes through the Mexico City for buses only. Our team assessed all system components against protocols and methodologies developed by the World Bank and Mexico City Metrobus. Our assessment was used to fulfill requirements of the Spanish Carbon Fund related to this emission reduction project.

LANDFILL GAS DESTRUCTION CREDIT VERIFICATION

Location: Several landfill locations in the United States

Company:	Confidential Waste Management Company
Industry:	Waste Management
Scope:	Various landfills across the United States
Demonstrates:	First Environment's experience in evaluating an emission reduction project against crediting program requirements

First Environment provides independent verification services for a member of the Chicago Climate Exchange (CCX) that wants to provide greenhouse gas emission reduction credits for sale to other members. This global waste management company collects gas at a number of its municipal landfills and burns it to generate CO₂. This methane gas destruction process allows them to apply for an emission reduction credits to sell on the CCX.

In order to verify the emissions from each landfill, First Environment reviews and critically analyzes the company's raw data collection processes as well as the emissions calculations to ensure that they are accurate and in conformance with the applicable CCX protocols. The analysis of the data collection process is critical, since uncertainty related to data collection has the potential to greatly affect the final results. The method of recording the flow of landfill gases and estimating the amount of methane in the landfill gas is reviewed through an examination of the original circle charts, spreadsheets, and interviews with key personnel. The final calculations are also reviewed to ensure conformity with the CCX protocols and accuracy. Personnel responsible for this final step are also interviewed to identify any potential process issues.

For the most recent project that was verified, First Environment also identified ways for the company to improve its data collection process in order to provide greater transparency moving forward. In addition, inaccuracies in the final calculations were identified which were corrected prior to submitting the final statement to the CCX.

GHG EMISSION REDUCTION PROJECT EVALUATION

Location: Confidential location in South America

Company:	Global pulp and paper corporation
Industry:	Forest products manufacturer
Scope:	Emission reduction project
Demonstrates:	First Environment's experience in evaluating an international emission reduction project against crediting program requirements

First Environment assisted with the evaluation of a boiler fuel switch project which a global pulp and paper corporation is planning for one of its South American facilities. The evaluation focused on the project's suitability as a Clean Development Mechanism (CDM) project under the Kyoto Protocol.

First Environment compared the project design document against CDM standards and guidance on the project description, baseline and monitoring, among other areas. First Environment's deliverables for the project identified areas of improvement needed for the project to meet the standards necessary for potential project validation under the existing rules of the evolving Clean Development Mechanism.

CLEAN DEVELOPMENT MECHANISM (CDM) PROJECT VALIDATION

Location: Confidential location in South America

Company:	South American Iron Manufacturing Facility
Industry:	Iron Manufacturing
Scope:	Emission reduction project validation
Demonstrates:	First Environment's experience with CDM project validation

First Environment was contracted by a designated operational entity to serve on a team undertaking the validation evaluation of a proposed CDM project. The proposed small-scale CDM project used blast furnace gas that would otherwise simply be vented to generate electricity. This electricity would then offset other sources of electricity produced for the local regional grid and therefore reduce associated emissions.

First Environment was responsible for evaluating the project against requirements established for CDM projects in general as well as specific requirements for the approved small-scale methodology that the project was applying to its activities. In particular, First Environment assessed:

- the additionality of the project;
- the baseline methodology;

- the emission reduction calculation methodology associated with the offset electricity in the regional grid, and;
- the monitoring plan for project data.

First Environment provided a report to the DOE’s lead verifier regarding its findings with respect to these issues that was considered in the development of the DOE’s opinion regarding the validation of the project.

VALIDATION & VERIFICATION OF CARBON NEUTRAL PRODUCT CLAIM

Location: Corporate Headquarters: Atlanta, Georgia and data from global facilities

Company:	Interface, Inc.
Industry:	Carpet and Flooring
Scope:	LCA and GHG Validation and Verification
Demonstrates:	First Environment’s expertise in LCA methodology, GHG verification, and evaluation of GHG offsets

As a subcontractor to SGS, First Environment was retained to validate and verify the climate neutrality claim of Interface, Inc.’s (Interface) Cool Carpet™ Program. The validation and verification consisted of a three part process that entailed a thorough review and evaluation of the life cycle assessment methodology, including the estimated annual weighted emissions per unit of product for each business unit; a verification and review of carpet sales under the Cool Carpet™ Program for the second half of 2007; and a verification of the amount of GHG offsets purchased as compared to the total GHG footprint of all Cool Carpet™.

The specific purposes of this validation and verification exercise were, by review of objective evidence, to independently review:

- The soundness and validity of the LCA methodology applied by Interface.
- Whether the estimated annual weighted emissions per unit of product for each business unit were appropriately determined.
- Whether the sales data multiplied by the weighted emission factor are accurate, complete, consistent, transparent and free of material error or omission.
- Whether the amount of GHG offsets purchased equates to the total amount of GHG emissions modeled.
- The validity of offsets purchased.

The validity of emission reduction credits were confirmed by checking the availability of validation and verification reports projects identified by Interface.

Resumes of Key Personnel

Name: B. TOD DELANEY, PH.D., P.E., BCEE

Firm Employed: First Environment, Inc.
Boonton, NJ

Years of Relevant Experience: 30+

Degrees/Majors: Ph.D., Environmental Health Engineering — The University of Texas at Austin
M.B.A., Business Administration — Pepperdine University
M.S., Chemical Engineering — University of New Mexico
B.S., Chemical Engineering — University of New Mexico

Professional Licenses and/or Certifications: Professional Engineer: New York, New Jersey, Florida, Mississippi, Georgia, Texas, Iowa, Ohio, Illinois, Pennsylvania, Connecticut, Alabama, Indiana, Nebraska, South Carolina, Colorado
Accredited by California Air Resource Board as a Lead Verifier, August 2009
Certified Principal Environmental Auditor: Institute of Environmental Management and Assessment (IEMA), England
Certified Lead Auditor: California Climate Action Registry

Professional Associations: Panel Member: California Green Ribbon Science Panel
Chairman Emeritus of the Board: Business Council for Sustainable Energy
Conservation Commission Appointee: Town of Cornwall, New York
Chair of the Environmental Division: American Institute of Chemical Engineers (AIChE), 1998

Summary of Experience: President of First Environment, Dr. Delaney is a Chemical and Environmental Health Engineer with an MBA and over 30 years of environmental and industry experience. Over the course of his career, he has worked for and consulted to hundreds of clients in the energy, plastics, electronics, pulp and paper, aluminum, consumer products, pharmaceuticals, aerospace and chemicals, and services sectors as well as numerous public entities. A dynamic teacher and trainer, he has taught graduate and undergraduate college courses in chemical and environmental engineering over the past 20 years. He is the author and coauthor of numerous reports, presentations and publications addressing a wide variety of subjects in environmental engineering and management.

Dr. Delaney provides strategic oversight on all of First Environment's greenhouse gas management projects.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **Business Council for Sustainable Energy (BCSE).** In 1997, Dr. Delaney joined 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 United States. Dr. Delaney, Chairman Emeritus of the Board of Directors of BCSE, has consistently attended COP meetings to represent the interests of U.S. clean energy companies at the UNFCCC talks.
- **ISO 14000 Series of Standards Participation (Life Cycle Assessment).** In 1995, Dr. Delaney actively participated in the 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.
- **ISO 14000 Series of Standards Participation (Climate Change).** Dr. Delaney served as the American National Standards Institute's representative to the Ad Hoc Group on Climate Change of International Organization for Standardization's Technical Management Board and the Chairman of ANSI's Virtual Technical Advisory Group on climate change. In addition, he was appointed as Co-Chair to the ISO's US TAG Climate Change Taskforce. He represented the U.S. in this position at the 2002 Meeting of ISO's TC207 on Environmental Management standards in Johannesburg, South Africa. In October of 1999, Dr. Delaney briefed the U.S. Department of State's Climate Change Team on how to use the ISO 14000 Standards to promote international conformity in the clarification, verification and certification of emissions, before the team left to negotiate in Bonn, Germany.

Dr. Delaney served as a technical expert for the U.S. team regarding ISO 14064, a standard for emission measurement, verification and reporting. He was the international coordinator and a technical expert for the team concerning ISO 14064 Part I, which focused on *entity* emission measurement, verification and reporting. He was also the lead expert for the U.S. on the portion of the standard that deals with *project* emission measurement, verification and reporting. He was the as-needed co-facilitator for Working Group 5 at international meetings about Part 2. Dr. Delaney served as one of two U.S. experts for ISO 14065, which deals with accreditation. He currently serves as the International Convener for the new ISO 14066 standard involving competency requirements for validators and verifiers.

- **Confidential Major Oil and Gas Company (strategy).** 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 (verification).** As the leader of the verification team, Dr. Delaney 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 (verification).** Served as Senior Internal Reviewer for First Environment’s certification of the client’s 2002 through 2005 GHG reports to the California Climate Action Registry. Verifications have included addressing the company’s onsite solar electricity generation, purchases of RECs, and emissions from its sales staff vehicle fleet.
- **Eastman Kodak (verification).** Served as Senior Internal Reviewer for First Environment’s verification of Kodak’s 2002, 2003, 2004, and 2005 California Climate Action Registry GHG reports covering its U.S. operations as well as reports of GHG emissions from non-U.S. operations.
- **Waste Management, Inc. (verification).** Served as lead verifier for numerous verification reports that were provided to Waste Management as a deliverable of the Chicago Climate Exchange’s project verification process.
- **Air Emissions Measurement and Estimation.** Dr. Delaney began his career primarily in the air emissions field. His work has included the development and execution of extensive field data collection programs (ambient and stack as well as associated meteorological data); atmospheric dispersion modeling; and the conceptual, preliminary, and final designs of air emissions control equipment. Dr. Delaney has executed extensive emission stack testing programs for automobile manufacturers, sugar refineries, electrical utilities, cement kilns, cogeneration facilities, and many other industrial establishments.
- **Large Petroleum Company,** Dr. Delaney had responsibility for the measurement of emissions and development of emission factors for refinery and chemical plant pumps and valves. He also performed dispersion modeling to evaluate the effects of releases from refinery safety valves. He served as a member of an American Petroleum Institute Committee and had responsibility for the development of a test program and a data analysis program to evaluate tanker emissions during all phases of operations, including loading and unloading. Prior to his involvement with air emissions in the petroleum industry, he also worked in oil field and refinery operations.
- **Consultant for the Air Force.** Dr. Delaney was a member of a team that developed a dispersion model to simulate airbase emissions. Sources modeled included jet aircraft, fueling, operations, fueling storage tanks, support vehicles, and maintenance. He was also part of the team that collected field emissions to calibrate the model. Along with this work, he developed a three-dimensional model, which simulates the downward transport and dispersion of an aircraft's exhaust products during climbout and approach. Also in connection with his Air Force consulting, he drafted a field data collection manual for gathering the required input data for the airbase model.
- **Auditor Certification Board of Registered Accreditation member.** Dr. Delaney is an experienced EMS Lead Auditor. He led and directed the project team that performed the EMS audit for a division of a large Northeast utility. He has also developed and presented EMS auditor training courses for Government Institutes, as well as training internal auditors for companies to which First Environment provides EMS implementation services. This EMS auditing experience is strengthened by 30 years of practice as an industrial site auditor and as an environmental regulatory compliance auditor. In recognition of his knowledge and experience in environmental and management systems auditing, Dr. Delaney was recently made a member of the Auditor Certification Board of Registered Accreditation, the primary accreditation body of quality and environmental systems auditors.

Name: JAMES T. WINTERGREEN

Firm Employed: First Environment, Inc.
Sacramento, California

Years of Relevant Experience: 14

Degrees/Majors: M.E.M., Masters in Environmental Management – Duke University
B.A., English – Dickinson College

Professional Licenses and/or Certifications Accredited by California Air Resource Board as a Lead Verifier and as a sector-specific verifier of cement and electricity transactions; August 2009

CAR-approved lead verifier for landfill/livestock, organic waste digestion, organic waste composting, forest and urban forest, nitric acid production, ozone depleting substances, and coal mine methane project verification

Summary of Experience: California Climate Action Registry-approved Lead Verifier
James Wintergreen is a Senior Associate at First Environment with a background in environmental policy, economics and law. His current activities include the development of corporate climate change strategies and GHG management programs, and technical and financial evaluations of GHG management projects. He also supports First Environment's GHG verification services, especially international projects. Mr. Wintergreen offers his expertise in climate policy, corporate GHG management and verification to First Environment's GHG Team.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **Hess Corporation (strategy, inventory).** Advised the international oil & 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.
- **Confidential Office Products Manufacturer (strategy).** Advised multinational corporate client on potential regulation of facilities under the EU 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 (strategy).** 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.
- **Eastman Kodak Company (verification).** As the 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 reports 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.
- **BVQI (strategy).** Consulted the international registrar on the developing market for GHG verification and specific opportunities related to the EU ETS and the Clean Development Mechanism. Designed the 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 the 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.
- **Intergen (reduction project).** Supported evaluation on a developing country energy project to determine feasibility for registration under the Clean Development Mechanism. 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 (verification).** 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.
- **Bentley Prince Street (verification).** Served as lead certifier and project manager for First Environment’s certification of the client’s 2002 through 2005 GHG reports to the California Climate Action Registry. His responsibilities for the certification 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.
- **Pacific Gas and Electric (verification).** As a 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.
- **Georgia Pacific (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.

- **Brazilian CDM Projects (verification).** As a 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.
- **First Environment & U.S. EPA Climate Leaders (inventory).** 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.
- **Regional Greenhouse Gas Initiative and the RGG Registry (policy).** Participant in the stakeholder process since the initial 2004 meetings. Provided presentation to stakeholder meeting on application of ISO 14064, Part 2 and Part 3 to projects under the program. Submitted comments on initial registry protocols based on knowledge of best practices and insights from CCAR experiences.
- **Canadian Offset System (policy).** 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 V&V experts representing Environment Canada and Natural Resources Canada, as part of national capacity-building efforts.
- **UNFCCC Conference of the Parties (policy).** 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.
- **Greenhouse Gas Reporting Program Comparative Analyses (policy).** As a 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 California Air Resources Board 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 (Technical Assistance).** 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 (Technical Editing at previous employer).** 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.

Name: RONALD C. TAI, PH.D.

Firm Employed: First Environment, Inc.
Boonton, NJ

Years of Relevant Experience: 25

Degrees/Majors: Ph.D., Bio/Fluid Engineering, State University of New York at Buffalo, Buffalo, New York
M.S., Civil/Fluid Engineering, State University of New York at Buffalo, Buffalo, New York
B.S., Hydraulic Engineering Chen Kung University, Tainan, Taiwan

Professional Certifications: Certified Indoor Environmentalist
Indoor Air Quality Association Membership

Summary of Experience: Dr. Tai has expertise and technical responsibilities in the areas of air emission assessment, evaluation, monitoring, measurement, inventory and modeling. Dr. Tai has extensive experience in air quality and impact assessment associated with air permitting, environmental impact statement, and hazardous and solid waste management. Dr. Tai's experience also includes air emission health risk assessment, air dispersion modeling, and continuous emission monitoring and compliance testing for stationary sources. During his career, he has managed, directed and conducted numerous projects, studies and tasks in consulting areas for industrial facilities as well as public organizations. Dr. Tai is experienced in teaching and training through offering college level engineering and environmental courses and supervising and directing field and office activities. He has authored and coauthored numerous reports, publications and presentations in engineering and environmental areas.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- Air emissions data management responsibilities have included the quality assurance and quality control review of emission data generated from field sampling and measurement for numerous projects for continuous emission monitoring systems (CEMS) certification for CO, CO₂, O₂, and THC, and compliance emission testing. These testing projects include many types of sources such as waste incineration facilities, cogeneration systems, coating industry and manufacturing facilities, and landfill recovery systems for various volatile/semi-volatile organic compounds, metals, particulates, and other toxic and hazardous chemicals. Also managed and conducted ambient air monitoring programs for addressing the impact of local traffic generated emissions on a proposed commercial development project.
- Managed a number of air permitting projects for industrial processing systems and site remediation facilities with volatile organic compound emissions. Reviewed site-specific data and information and formulated appropriate strategy for preparing applications to meet regulatory requirements while incurring the least cost and minimizing control equipment.

- In the area of air emission data analysis, he has performed emissions data evaluations associated with air permitting and reporting for industrial processing and manufacturing facilities and site remediation facilities. He has also conducted emission data evaluations for assessing emission control efficiency based on field measurement data and chemical process information for foam and chemical manufacturing facilities. With respect to air emissions reporting, he has managed and conducted monthly and quarterly emission monitoring data collection and reporting for cogeneration systems and utility boilers for private and federal facilities. He has conducted annual emission reporting for a batch chemical manufacturing facility to meet regulatory compliance.
- **Gas Turbine Cogeneration Facilities.** Completed performance specification (CEMS) and compliance testing at two gas turbine cogeneration facilities located in New Jersey. These power plants provided electricity and steam for heating two large institutions. Both facilities required testing under Federal New Source Performance Standard (NSPS) for Small industrial-Commercial-institutional Steam Generating Units and Stationary Gas Turbines. Based on the initial testing information on NO_x and CO, Dr. Tai provided assistance for the installation, debugging and operations start up of the continuous emissions monitoring system (CEMS) that measured and recorded CO and O₂ levels. In accordance with the NJDEP approved protocols for the CEMS equipment, Performance Specification testing of CEMS, and compliance testing, Calibration Drift (CD) analysis and the Relative Accuracy (RATA) testing for the CEMS were completed. The actual compliance testing required analysis of particulates (PM), Carbon Monoxide (CO), Total Non Methane Hydrocarbons (THC), Nitrogen Oxides (NO_x), and fuel bound Sulfur. The gaseous measurement parameters based on EPA reference test methods included Oxygen (O₂), Carbon Dioxide (CO₂), Carbon Monoxide (CO), Nitrogen Oxides (NO_x), and Total Hydrocarbons (THC). The maximum allowable operating range for emission controls was determined based on the test results. A full test report was prepared and submitted to the NJDEPE to demonstrate compliance to the NSPS requirements as well as the state permit conditions.
- **Large foil printer in New Jersey.** Performed tests to demonstrate the destruction efficiencies of two thermal oxidizers and to evaluate the installed continuous emissions monitoring system (CEMS). The initial task was to validate the Carbon Monoxide (CO) continuous emission monitors over an extended period in order to isolate a response problem associated with the surges in CO emissions during this operation. A portable combustion gas analyzer to provide real time data over an eight-hour shift without supervision at multiple locations. This approach served as an excellent diagnostic tool while providing the data to support the permit application. Particulate analysis was performed following NJ Air Method I (similar to USEPA Method 5). The test results were used for resubmitting an air permit that complied with State requirements while justifying a capital expenditure to upgrade the existing system.
- **Major Hazardous Waste Site in Upstate New York.** Designed, implemented, and managed a field sampling and analysis program. The program involved extensive indoor and outdoor air sampling and field laboratory analysis for assessing the habitability of the neighborhoods which had contaminated groundwater, soil, and air as a result of leakage from a hazardous waste landfill. State-of-the-art air sampling techniques such as sorbents, bags, and stainless steel canisters were investigated and selected for use in the field. A mobile analytical laboratory unit was successfully used for field screening analysis. Results were confirmed positively by a conventional laboratory.
- **Specialty lubricant manufacturer.** Conducted equipment and emission inventory for a variety of emission sources associated with the processes and operations for the production of specialty lubricants. The sources included batch mixing/reaction systems, surface coating processes, storage vessels as well as fugitive emissions. Developed methodologies and procedures for emission evaluation of different types of emission sources. Material balance and scientific principles were used as the basis of emission calculations. The results of the emission inventory were the basis of submission to the New Jersey Department of Environmental Protection as the annual emission statement for the facility.

- **Compac Corporation.** Reviewed, assessed and evaluated air emissions for a variety of processes for manufacturing adhesive tapes. One of the objectives for the evaluation was to minimize the emissions from the manufacturing processes. The results of the evaluation were used for regulatory permitting of the facility.
- **James Alexander Corporation.** Managed and conducted emission evaluation for mixing processes involving a variety of raw materials containing different degrees of volatility and emission characteristics. The first phase of the evaluation process was to design a methodology to quantify the emission from the mixing vessels under different conditions. The emission data resulted in a successful permitting of the mixing operation for the facility.
- **New York Hospital.** In order to address the emission impact from a boiler on a high-rise building on the property, Dr. Tai reviewed the amount of emissions from the stationary source and the local wind conditions for the evaluation of ambient air quality impact at the receptors. Local meteorological data were reviewed for determining the frequency of events of direct impact. Wind speed and wind direction data were used to predict the potential impact at the receptors.
- **USPS.** For projecting the potential air quality impact from the vehicular activities associated with the expansion of multiple mail facilities in midtown Manhattan, Dr. Tai conducted emission inventory and dispersion modeling. The study and analysis were based on the results of an extensive traffic study for projecting the future years operations of the mail facilities. Mobile emission models were used for the evaluation of emissions of different future operation scenarios. The emission inventory and the predicted potential air quality impact were the basis for determining the feasibility of the proposed future operation scenarios.
- **County airport in NY.** For the expansion of a county airport, Dr. Tai obtained in-depth operational data for review and the projection of the future scenario. Extensive efforts in the evaluation of airport emissions from aircrafts, vehicular traffic and stationary sources on the airport property were made for compiling emission inventory using the AQAM model. Various operational modes of the aircraft types associated with the airport were modeled. The results of the emission inventory and dispersion modeling were the basis for addressing the potential air quality impact for the proposed expansion. The expansion plan was approved and eventually implemented.
- **Heliport in Manhattan, NY.** For the expansion of a heliport in midtown Manhattan, NY, Dr. Tai obtained and reviewed existing heliport operational data for the projection of the future operational scenario. Helicopter emissions under different maneuvers entering, exiting and staging at the heliport were modeled using standard and specific emission factors for the various helicopter types proposed to be present in the future. Emission inventory for the existing and future operation scenarios were evaluated for addressing the potential impact of the proposed actions. The expansion plan was not implemented as a result of the predicted potential environmental impacts.
- **Major medical center in midtown Manhattan, NY.** For the construction of a new medical research laboratory high-rise building in midtown Manhattan, Dr. Tai managed and conducted the emission evaluation and air dispersion analysis for the proposed system of laboratory hood exhausts located on the rooftop of the new building. The assessment of impact consisted of both the air quality impact at specific receptor locations in the vicinity of the new building and the indoor air quality impact inside the building due to the re-entrainment of the emission plume from the air intakes for the building ventilation system. The design and configuration of the rooftop hood exhausts were re-evaluated and modified such that the resulting impact would be within the acceptable limits set in the regulations. The analysis involved the realistic application of the air dispersion model and the meteorological conditions to properly address the impact in both the ambient and indoor air.

- **Heliport in Manhattan, NY.** To address the potential impact of the expansion of heliport operations, Dr. Tai conducted a detailed emission evaluation and air quality impact analysis. The line, point and area emission sources associated with the ingress, egress and hovering of the helicopters of different types were modeled based on the geometric patterns of the emission sources defined by the operational mode and paths of the helicopters. The analysis was performed in support of the preparation of an environmental impact statement for the City approval. Noise monitoring and modeling of noise impact were also parts of the study.
- **Major pharmaceutical company.** In support of the application for the prevention of significant deterioration of air quality, a comprehensive air quality impact analysis was conducted to address the long-term and short-term air quality impact of multiple gas turbine units on the surrounding environment. Multiple years of meteorological data were reviewed and used for the impact analysis utilizing ISC model. The results of analysis lead to the successful installation of the units.
- Evaluated the potential air quality impact for the boiler emissions on a neighboring high-rise building, using SCREEN3 model. Maximum impact was assessed considering various meteorological conditions and emission modes.
- **Chemical manufacturing facility in NC.** Conducted air dispersion modeling to evaluate the potential air quality impact and health risks for the air emissions from the groundwater treatment system for volatile organic chemicals. The results of impact study verified the proper locations for the on-site remediation system.
- Dr. Tai managed and conducted the adaptation of simple and complex air dispersion models for the application for complicated emission source patterns and geometries. This methodology was used for the dispersion modeling analysis of aircraft and helicopter flight patterns. The same approach was also used for addressing the noise impact for similar sources.
- For the purpose of developing emission patterns for aircraft and helicopters, information on flight patterns and operational maneuvers were collected and reviewed. The summarized information was further simplified to be feasible for the application of dispersion analysis.

Name: JOHN A. MOSHEIM, P.E.

Firm Employed: First Environment, Inc.
Washington, D.C.

Years of Relevant Experience: 19

Degrees/Majors: B.S. Chemical Engineering – The University of Texas at Austin
B.S. Geology – University of Costa Rica
Graduate Certificate in Administration and Management – Harvard University

Professional Certifications: Licensed Professional Engineer in Ohio and Maryland
RABQSA Certified Provisional EMS Auditor

Summary of Experience: John Mosheim has worked in the environmental engineering and management fields for 18 years. His project experience encompasses design of industrial wastewater treatment and water recycling facilities, stormwater pollution control systems, pollution prevention and sustainability consulting, ISO 14001 EMS gap assessments and training, greenhouse gas inventories/climate change, and GHG financial opportunity assessments. John has a varied background working for clients in sectors such as electronics, mining, steel manufacturing, auto parts manufacturing, aerospace, water utilities, chemicals, energy, and legal firms. He has facilitated carbon credit generation project opportunities in the US and Central America. John is fluent in Spanish and has worked extensively in Mexico. As a recent addition to the First Environment team he leverages his experience and training to provide maximum benefits to his clients.

Experience Relevant to CLIMATE CHANGE AND SUSTAINABILITY

- **Global e-Sustainability Initiative (GeSI).** Assisted in the development of Excel-based software for the quantification of GHG (CO₂) reductions resulting from travel vs. teleconference for the telecommunications industry. The tool compared emissions from various travel modes to teleconference based events to generate the resulting emission reductions. This macro driven software tool consisted of a data entry module and pivot table based analysis modules.
- **Consulting Services Organization, USA.** Managed and performed a baseline carbon inventory for a consulting services organization encompassing the use of WRI/WCSD GHG Protocol and ISO-14064 Part 1 standard. Developed and wrote stakeholder communications, surveys for data and perceptions analysis, and carbon dioxide inventory report. Project encompassed Scope 1, 2, and 3 emissions quantification as well as identification of energy and carbon footprint reduction opportunities.
- **Sanmina, USA.** Designed and implemented pollution prevention facilities for this major electronics manufacturer including design of water treatment and recycling facilities and systems for solid waste reduction and heavy metals recovery. Implemented multi-technology facilities encompassing reverse osmosis, ion exchange, selective ion removal, electrowinning, degassing, and conventional water treatment technologies. Performed financial evaluations to determine payback period in high water rate locations.

- **Metals Sector Organization, USA.** Facilitated and assisted in organizing efforts of a major group of companies involved in metals production to explore and identify opportunities for implementing GHG reduction projects in combination with proposed tax incentives. Made climate change opportunities and risks presentations to group and raised awareness of monetary benefits associated with energy efficiency project investments in combination with GHG projects. Assisted in launching an energy efficiency service to assist the metal production companies.
- **Various Semiconductor Manufacturers.** In support of sustainability initiatives of large manufacturers of integrated circuits, designed water recycling and solid waste reduction facilities for operations in the US and the Far East resulting in 70% water conservation. Facilities included state-of-the-art water treatment technology as well as conventional water treatment systems. Projects encompassed development of PFDs, mass and energy balances, P&IDs, equipment specifications, control system definition and instrumentation selection, testing protocols, and installation and O&M manuals as well as developing the projects' ROI and NPV.
- **Bandeco.** Assessed and contributed in reducing the environmental footprint of this major banana producer in Costa Rica including definition of its solid waste and wastewater discharges. Developed a modular pollution prevention framework to implement at the plantation level. Identified and provided recommendations for the reduction of plastic waste discharges to surface waters and the ocean and provided recommendations for reuse of plastic waste opportunities. This project also included assessing methane generation opportunities derived from banana waste
- **Various Organizations:** Performed project and investment financial analysis to determine project financial performance vis-à-vis environmental metrics as well as capital investment determinations for projects of up to \$120 million. Some of these projects encompassed development of lease models and rate schedules for build, own, and operate initiatives in both the US and Latin America.

Name: MARY PAT CAMPBELL, P.E.

Firm Employed: First Environment, Inc.
Chicago, IL

Years of Relevant Experience: 10

Degrees/Majors: B.S., Chemical Engineering, University of Notre Dame, South Bend, IN, May 2001
Master of Environmental Management, Duke University, Durham, NC, December 2009

Professional Certifications: Registered Professional Engineer, Illinois
Certified Hazardous Materials Manager, Master Level

Summary of Experience: Air and Waste Management Association
Society for Women in Engineering
Women in Environmental Management

Ms. Campbell has significant experience in environmental compliance including air emissions reporting, permitting and testing; hazardous waste profiling, contingency planning and disposal; stormwater pollution prevention and oil pollution prevention. She has acquired a level of familiarity working in industrial environments as evidenced by her air sampling, RCRA waste and refinery experience. Additionally, she has worked with environmental management systems including ISO14001 and environmental management information systems including ESS.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **Compliance Support, Paper Mill.** Assessed corporation's compliance with the EPA Greenhouse Gas Reporting Rule requirements, including Monitoring Plan assessment, six on-site audits and review of compliance plan.
- **Compliance Support, Petroleum Product Management Company.** Assessed compliance with the EPA Greenhouse Gas Reporting Rule requirements for several of the Corporation's smaller companies. Compliance assistance included Monitoring Plan assessment, on-site audits and review of compliance plan.
- **Compliance Support, Food and Beverage Manufacturing Facilities.** Developed a Monitoring Plan template consistent with the requirements of the EPA GHG Reporting Rule (the Rule) for implementation at all of the Corporation's manufacturing facilities. Also, assessed compliance of two manufacturing facilities against the requirements of the Rule. Compliance assessment and assistance included review of the Monitoring Plan, on-site audits, review of compliance plan and reporting of facility emissions.
- **Management Systems Support, Utility Company.** Assisted in developing a management systems framework for management of a large utility company's greenhouse gas data and reporting obligations.

- **GHG Inventory Support, Food and Beverage Company.** Co-managed the development of a Greenhouse Gas inventory for a large food and beverage company in accordance with The Climate Registry's General Reporting Protocol. Inventory development included data collection, on-site audits, review and revision of a calculation tool and quality assurance reviews of the calculated emissions.
- **GHG Inventory Support, Entertainment Corporation.** Assisted in the verification of greenhouse gas emissions projections for The Climate Registry's General Reporting Protocol by a large entertainment corporation; specifically reviewed the corporations data management systems for determining and confirming how various miscellaneous emissions sources are allocated.
- **Environmental Resources Management.** Project Engineer
 - Successfully responded to EPA audit findings and implemented changes at a metals processing facility for inadequate hazardous waste contingency planning and manifesting procedures
 - Managed environmental compliance projects including air permitting (Title V, FESOP), oil pollution prevention programs, hazardous waste and storm water management for local chemical and manufacturing facilities
 - Performed life cycle assessments for pharmaceutical containers for international pharmaceutical company.
 - Assisted with MACT MON compliance re-certification for two miscellaneous organic chemical manufacturers
 - Determined 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, process literature review, discussions with process engineers and field verification at local refinery
 - Determined BACT for NSR and Title V permits for new coal to gas facility
- **Science Applications International Corporation.** Systems and Compliance Analyst
 - Conducted hazardous waste determinations for investigation derived waste from an annual groundwater sampling event at a RCRA Hazardous Waste Site (based on lab results)
 - Completed manifests, coordinated and oversaw hazardous waste pickups for investigation derived waste from groundwater sampling events at multiple LUST sites.
 - Completed internal training in hazardous waste management and appropriate manifest procedures
 - Performed full requirements analysis for design of environmental management information systems (EMIS) for LUST data, including individual modules for spill prevention and hazardous waste management, for a nationwide telecommunications corporation.
 - Managed and conducted air emissions inventories at 15 armed forces bases in the Midwest region
 - Conducted final reviews and coordinated report submittal for nationwide environmental, health and safety compliance program

■ **Clean Air Engineering.** Field Engineer

- Performed air emissions sampling at a variety of industrial facilities using EPA approved, conditional testing and experimental mercury test methods including power plants, waste energy facilities, pharmaceutical manufacturers, hospitals, chemical plants, aluminum smelters and oil refineries.
- Assisted with all aspects of sampling event planning, conduct and reporting including initial client consultations, project protocol preparation, equipment and chemical preparation and packing; setup, sampling, recovery and analysis of samples on site, shipping of hazardous chemical samples, data analysis and reporting

Name: MICHAEL M. CARIM

Firm Employed: First Environment, Inc.
New York, NY

Years of Relevant Experience: 6

Degrees/Majors: Master of Public Administration in Environmental Science and Policy 2007, School of International and Public Affairs, Columbia University
Bachelor of Arts 2003, Wesleyan University, Majors: Economics (with Honors), Government

Professional Certifications: CAR-approved lead verifier for landfill/livestock, organic waste digestion, organic waste composting, ozone depleting substances, and coal mine methane project verification
CCAR-approved lead verifier for General Reporting Protocol
CCAR-approved cement verifier
ARB-approved lead verifier, including electricity transaction sector specialist

Summary of Experience: Mr. Carim is an Associate with a background in environmental economics, policy, and management, concentrating on climate change issues. Mr. Carim is part of the team providing First Environment's greenhouse gas (GHG) management services, primarily GHG inventory and offset project verification and technical assistance. His work focuses on verification of methane destruction projects, GHG inventory development and verification, and strategic GHG management.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **Livestock Methane Emission Reduction Projects (validation/verification)** – Performed over 50 validations and verification for projects utilizing various manure management techniques to control methane emissions from manure waste. Project verified include the use of such technologies as anaerobic digesters (covered lagoon, complete mix, and plug flow) and volatile solids separation. 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. Validation and verification activities have been performed under the Verified Carbon Standard (VCS) and the Climate Action Reserve (CAR) programmes. Performed the first two Livestock project verifications under the Climate Action Reserve programme.
- **Renewable Energy Emission Reduction Projects (validation/verification)** – Provided validation and verification services to over a dozen renewable power projects utilizing various resources to include wind, biomass, hydro, and municipal solid waste (waste-to-energy). Validation and verifications have been performed using the VCS standard. provided VCS validation and verification services for first two waste-to-energy facilities to register emission reduction credits in the US.
- **Landfill Gas Emission Reduction Projects (validation/verification)** – Provided validation and verification services to methane destruction projects at over 50 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, and

drafting and issuance of verification reports. Validations and verifications have been conducted against the Climate Action Reserve (CAR), Verified Carbon Standard (VCS), and Chicago Climate Exchange, methodologies and protocols. Also

- **Methodology Validation** – Served as lead auditor for four validations performed under the VCS Double Approval Process for new methodologies and methodology revisions. Projects included methodologies in the mining, transportation, fuel combustion, transportation, and energy demand sectoral scopes.
- **GHG Inventory Verification** – Served as the Lead Verifier or Internal Reviewer on over 25 verifications of GHG inventory reports to CCAR, TCR, and CARB. Client industrial sectors include electric power generation and/or transmission/distribution, manufacturing, iron and steel, and general office/administrative operations. Scopes of verification also included review of specific GHG performance metrics for clients in the electric power sector and verifications of electric power transactions.
- **GenOn Energy Management** – Served as Internal Reviewer for the verification of GenOn Energy Management’s 2010 GHG Report to the California Air Resources Board. Facilities included three electric power generating facilities and one energy trading facility. Scope of verification for energy trading facility including electric power transactions and reviews of e-tags. Served as team member the verification of GenOn’s 2009 GHG Report to CARB.
- **New York Power Authority (verification)** Served as lead verifier the verification of NYPA’s 2009 GHG report to The Climate Registry. Verification focused on identification of emission sources, assessment of data management systems, and recalculation of reported emissions. The scope of the verification covered CO₂ emissions from stationary combustion from all facilities in North America.
- **Eastman Kodak Company** – Served as Lead Verifier for Kodak’s 2007 CCAR GHG report covering all six “Kyoto” GHGs from its U.S. operations as well as reports of GHG emissions from non-U.S. operations from stationary combustion, mobile combustion, process emission sources, and fugitive emission sources. Provided data management support for the verification of 2006 report.
- **AES Southland LLC** – Verification of AES’s 2010 GHG Report to the California Air Resources Board for three electric generating facilities. Verification activities including assessment of the client’s GHG report against the requirement of the AB-32 mandatory reporting regulation. Lead Verifier for verification of AES’s 2007 CCAR GHG report for its California operations. Provided data management support and assessments of emissions estimates for CCAR verification of AES’s 2006 report.
- **USG Corporation** – Lead Verifier for verification of USG’s 2007 CCAR GHG report for its California operations. Provided data management support and assessments of emissions estimates for CCAR verification of USG’s 2004, 2005, and 2006 reports.
- **TAMCO Steel** – Lead verifier for verification of TAMCO’s 2007 CCAR GHG report for GHG emissions at its steel milling facility in California. Verification activities included identification emission sources, review of management systems, and assessment of emission calculations. In particular, verification focused on the calculation of process emissions from the steel charging and tapping in an electric arc furnace.
- **Confidential Client** – Assisted a major coal mining corporation with development of GHG inventories for operations at a surface and an underground mine in the western United States. Identified quantification methodologies for emission sources and produced associated calculation spreadsheets and emission estimates.

- **Confidential Client** – Assisted a major scrap metal recycler with the development of its GHG inventory and related management systems for its operations in the eastern United States. Developed an Excel based calculation tool, consistent with The Climate Registry’s reporting requirements, to allow the client to quantify emissions from raw data inputs.
- **Confidential Client** – Assisted a global food and beverage manufacturer with the development of its 2006 and 2007 GHG inventories covering all US operations. Provided data collection and management support and developed an Excel based calculation tool to quantify and sort emissions for all facilities within the inventory.
- **Verso Paper** – Assisted a pulp and paper manufacturer with GHG inventory development for four mills across the US. Technical assistance focused on the creation and implementation of a GHG inventory management plan and recommendations for best practice emission quantification techniques.
- **Landfill Gas Emission Reduction Projects (technical assistance)** – Provided technical assistance to clients seeking to commercialize emissions reduction activities related to methane destruction. Utilized his knowledge of emission reduction protocols to guide clients in registering landfill gas projects to earn offset credits under programs such as the Voluntary Carbon Standard and the Chicago Climate Exchange. Core activities include estimation of project emission reductions and the development of monitoring plans and project design documentation
- **EPA, Region 2** – Led 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 Puerto Rico. 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.

Name: ELLEN R. REID, P.G.

Firm Employed: First Environment, Inc.
Atlanta, Georgia

Years of Relevant Experience: 13

Degrees/Majors: B.A., Geology, Hanover College, Hanover, Indiana
Graduate Studies, Secondary Ed. Science, - State University of
West Georgia, Carrollton, Georgia

Professional Certifications: Georgia Registered Professional Geologist – No. 1379
Level II Certified Design Professional in Georgia – No. 7218

Summary of Experience: Ms. Reid is a geologist with over 13 years of environmental consulting experience at DOD, RCRA, and UST sites. Ms. Reid's experience includes project start-up and planning, client interface, management (budget and personnel) of environmental investigations for the FAA and other federal clients, Phase I and Phase II environmental site assessments, hazardous waste assessment/remediation projects, auditor for environmental management systems and compliance, and verification of methane destruction at landfills. She has performed over 250 environmental studies for private and public sector clients. Ms. Reid also has experience as a petroleum geologist in the development and production of natural gas and oil wells in the Black Warrior Basin of Alabama and Mississippi.

Experience Relevant to GREENHOUSE GAS MANAGEMENT, SUSTAINABILITY AND EMS

- **Landfill Gas Emission Reduction Projects (verification)** – Provided verification services to methane destruction projects at landfills in the Southeastern 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 data collection/data management system, the drafting and issuance of verification reports.
- **Morgan County, GA** – Provided methane monitoring and control at closed sanitary landfill. Responsibilities included management of field personnel and subcontractors, preparation of quarterly reports and a final Corrective Action Plan for methane control.
- **National Park Service, Grand Canyon, AZ** – Conducted extensive methane surveys at several closed landfills to determine methane emissions and the need for installation of clay caps to comply with state regulations. Survey methodologies included the installation of soil vapor probes, collection of vapor samples, and analysis of samples in a mobile laboratory.

Experience Relevant to PROJECT MANAGEMENT

- **Federal Aviation Administration (FAA)**; Multiple Radar and Aircraft Navigation System Facilities; Alabama, Georgia, Tennessee, North Carolina, South Carolina, Mississippi, and Florida – Program Manager. Ms. Reid was responsible for contract administration, client liaison, supervision of subcontractors and 15+ employees, soil and groundwater assessment and nearly all other facet of work at over 140 UST sites. Prepared closure reports for submittal to the various state environmental agencies.

- **U.S. Air Force Eglin Air Force Base, Florida – Project Manager.** Ms. Reid was responsible for field supervision of multiple teams conducting subsurface assessment activities at two tank farms including a large aircraft refueling hydrant system. Assessment methodologies included soil vapor assessment, GeoProbe/hydropunch points, permanent monitoring wells, and hand auger soil borings. Several sites included sediment sampling in adjacent wetland areas. Post field duties included the preparation of contamination assessment reports (CARs).
- **Major Oil Companies; Multiple Retail Gasoline Service Stations; Alabama, Georgia, Tennessee, North Carolina, and South Carolina – Project Manager and geologist** responsible for the supervision of personnel and closure assessment activities, soil and groundwater assessments, and remedial actions including soil vapor extraction, aquifer air sparging, and free product recovery at over 100 service stations and bulk gasoline distribution terminals. Work was performed for Exxon and Chevron under regional contract over a four-year period. Duties included oversight of O&M programs, monthly NPDES DMR preparation, quarterly groundwater monitoring and reporting, and interfacing with client and state agency personnel.
- **Confidential Client, Superfund Site, Mobile, Alabama – Quality Assurance/Quality Control Officer** for Superfund site. Implemented auditing systems to assure company's compliance with federal, state, and local regulatory agencies during soil and water sampling activities.
- **U.S. Air Force Kessler AFB, Mississippi – Project Manager** responsible for pre-mobilization planning, in-field supervision of subcontractors and tracer gas testing of underground storage tanks throughout the base
- **Sequa Chemicals Site, Chester, SC – Senior geologist** for assessment at a Chemical Manufacturing Plant in South Carolina for a tetrachloroethene plume in fractured crystalline bedrock aquifer. Ms. Reid supervised a 4-man field crew conducting well installation and field analyses of water/soil samples. She oversaw the construction of the enhanced insitu bioremediation and the insitu chemical oxidation remediation systems.
- **Robins AFB, Warner-Robbins, GA - Project manager** for multi-tasked project pertaining to base-wide management of UST systems at Robbins Air Force Base in GA. Supervised the logistics, personnel, and subcontractors conducting baseline UST release detection monitoring at several USTs. Conducted soil and groundwater assessments at aircraft refueling system and vehicle motor pool areas. Prepared assessment reports, as well as CAP-A and CAP-B risk assessments for risk-based site closure reports for submittal to Georgia EPD.

Name: PHILIP H. GERHARDT, P.E.

Firm Employed: First Environment, Inc.
Boonton, NJ

Years of Relevant Experience: 7

Degrees/Majors: M. Eng., Environmental Engineering, Yale University
B.S., Environmental Engineering, Yale University

Professional Licenses and/or Certifications Registered Professional Engineer, NJ
California Climate Action Registry-approved Lead Verifier
40 Hour HAZWOPER 29 CFR 1910.120(e)
8-Hour Site Supervisor Training

Summary of Experience: Mr. Gerhardt is part of First Environment's Greenhouse Gas (GHG) support team, Environmental Management System (EMS) support team, and Site Investigation and Remediation (SIR) field team. He has provided technical assistance and verification services for commercial and industrial GHG reporting according to the California Climate Action Registry (CCAR) General Reporting Protocol. Mr. Gerhardt's EMS experience includes assisting in the Westchester County Department of Environmental Facilities certification to the ISO 14001 standard, as well as providing on-going support as the ISO coordinator for the largest of the DEF facilities.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **Eastman Kodak Company, 2007 (verification).** Provided technical support for the First Environment verification team for all U.S. and international Eastman Kodak greenhouse gas emissions for the California Climate Action Registry (CCAR). Also responsible for the verification of GHG emissions resulting from mobile emissions in the United States and Canada. The fleet emissions included source emissions resulting from the mobile combustion of gasoline, diesel, and alternative fuels such as ethanol.
- **Griffith Energy, LLC, 2007 (verification).** Assisted in the verification of carbon dioxide emissions of a combined cycle natural gas electricity generation plant located in Golden Valley, AZ to the California Climate Action Registry Certification Protocol (July 2003) and the Power/Utility Certification Protocol (PUP) (April 2005). To complete the verification, emissions were calculated and compared based on various methods and data including the facility metered natural gas data, metered electricity data, and the emissions calculated by the Continuous Emissions Monitoring System (CEMS) data. Mobile emissions for various plant equipment, such as a utility hauler, manlift, and fire pumps, were also verified.

- **Central Contra Costa Sanitary District, 2007 (verification).** Assisted in the verification of carbon dioxide emissions resulting from wastewater collection and treatment facilities in Martinez, CA for CCAR. Emission sources included a multiple hearth furnace, landfill gas combustion, and natural gas and landfill gas cogeneration operations, among others. To account for carbon dioxide emissions resulting from the addition of lime to the process stream before the centrifuge and furnace, Mr. Gerhardt completed a thorough analysis of the waste stream components before and after the centrifuge and furnace based on laboratory analytical data collected at the facility to determine if emissions were calculated correctly.
- **Colliers International, 2007 (inventory).** Provided technical assistance for the development of a greenhouse gas inventory according to the CCAR General Reporting Protocol, and provided necessary tools and training for subsequent annual reporting. Tasks included identification of sources of stationary and mobile combustion, fugitive emissions, and indirect emissions, and calculation of carbon dioxide equivalence and baseline emissions.
- **Air Emissions / Air Quality Control.** During his undergraduate and graduate engineering coursework at Yale, Mr. Gerhardt completed courses in air quality control and engineering process design, including topics such as process optimization, pollutant dispersion modeling, and emission control equipment design.

Name: JEFFREY DALEY

Firm Employed: First Environment, Inc.
Chicago, Illinois

Years of Relevant Experience: 6

Degrees/Majors: B.S Northern Illinois University, DeKalb, Illinois. May 2005
Meteorology with a minor in Geography

Summary of Experience: Jeff Daley has experience in environmental compliance including Form R, Tier 2, and Hazardous Waste reporting, along with experience in preparation of spill prevention control and countermeasure (SPCC) plans. Mr. Daley has extensive experience working in industrial environments as evident by his field work and refinery experience.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **Landfill Gas Emission Reduction Projects (verification)** – Provided verification services for multiple methane destruction projects at landfills throughout the United States. Verification activities included review of project documentation, raw data and emission reduction calculations, review of supporting documents and calibration records, and drafting verification reports. Familiarity with the Chicago Climate Exchange, Climate Action Reserve, and Voluntary Carbon Standard methodologies and protocols.
- **Renewable Energy Emission Reduction Projects (validation/verification)** – Provided validation and verification services for waste to energy facilities under Voluntary Carbon Standard in the United States. Activities included assessing project design and monitoring methods and reviewing project eligibility documentation and emission reduction estimates.
- **Carbon Disclosure Project Reporting** – Assisted a large, international corporation with the quantification of greenhouse gas emissions for the 2010 Carbon Disclosure Project questionnaire.
- **GHG Inventory Development for the National Institutes of Health (NIH).** - 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.
- **Compliance Support, Food and Beverage Manufacturing Facilities.** Developed a tool consistent with the requirements of the EPA GHG Reporting Rule (the Rule) for calculating and tracking GHG emissions at two of the Corporation’s manufacturing facilities. Compliance assessment and assistance included reporting of facility emissions.

■ **Environmental Resources Management.** 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 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.

■ **Murray & Trettel Inc.** 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.

Name: IRIS G. CALDWELL, P.E.

Firm Employed: First Environment, Inc.
Chicago, IL

Years of Relevant Experience: 6

Degrees/Majors: B.S. Iowa State University, Ames, Iowa May 2006
Civil Engineering with Environmental Emphasis

Professional Certifications: Licensed Professional Engineer, Illinois
CAR-approved lead verifier for landfill, livestock, organic waste digestion/composting, nitric acid production, and ozone-depleting substances project types

Summary of Experience: Iris Caldwell is an Engineer on First Environment's team providing climate change management services, with a focus on inventory development, offset project verification/validation, and technical assistance. Ms. Caldwell has developed GHG inventories in accordance with The Climate Registry's General Reporting Protocol and the Local Government Operations Protocol and provided project validation and verification services under the Chicago Climate Exchange, Climate Action Reserve, GE-AES, American Carbon Registry, and Voluntary Carbon Standard registries.

Ms. Caldwell has a wide range of knowledge in environmental management and compliance, including waste management, storm water and spill pollution prevention, and air pollution management. She has worked in the manufacturing, metal finishing, and wet corn milling industries and served as auditor on multiple environmental management system and compliance audits.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **Landfill Gas Emission Reduction Projects (validation/verification)** – Provided validation and verification services for multiple methane destruction projects at landfills throughout the United States. Validation and verification activities included review of project documentation, raw data and emission reduction calculations, review of supporting documents and calibration records, site visits, and development of verification reports. Familiarity with the Chicago Climate Exchange, Climate Action Reserve, GE-AES, American Carbon Registry, and Voluntary Carbon Standard methodologies and protocols.
- **Renewable Energy Emission Reduction Projects (validation)** – Provided validation services for several small-scale biomass fuel switch projects under the Voluntary Carbon Standard in the United States and Canada, including the first Voluntary Carbon Standard project in Québec and the first small-scale project in the United States to apply the Clean Development Mechanism-approved methodology AMS-I.C. under the Voluntary Carbon Standard. Activities included assessing project design and monitoring methods and reviewing project eligibility documentation and emission reduction estimates.

- **Confidential Client** – Prepared local government operations and community greenhouse gas inventories for a large U.S. city (population greater than 500,000). Activities included collecting fuel and utility consumption data and managing data in the Clean Air Climate Protection (CACP) tool published by the International Council for Local Environmental Initiatives – Local Governments for Sustainability (ICLEI).
- **Avon Products, Inc.** – Assisted with the development of the 2008 greenhouse gas inventory. Activities included quantifying global mobile fleet emissions and preparing an inventory management plan and summary emissions report.
- **Carbon Disclosure Project Reporting** – Assisted two large, international corporations with the quantification of greenhouse gas emissions and development of written responses for the 2009 Carbon Disclosure Project questionnaire (CDP7).
- **Confidential Client** – Performed data management and quantification of greenhouse gas emissions for a global food and beverage manufacturer. Greenhouse gas inventory activities included gathering facility-level data from manufacturing, distribution, and office locations throughout North America, quantifying associated greenhouse gas emissions per industry best practices, and preparing an inventory management plan.
- **John Deere** – Served as facility environmental engineer at John Deere facility in Iowa. Prepared quarterly inventories of facility greenhouse gas emissions. Quantified greenhouse gas emissions associated with Title V air permit. Coordinated energy reduction projects at facility. Provided awareness training to employees regarding greenhouse gas management and energy reduction.

Name: MONIKA KOWALCZYKOWSKI

Firm Employed: First Environment, Inc.

Years of Relevant Experience: 5

Degrees/Majors: Master of Public Administration in International Economic Policy 2008, School of International and Public Affairs, Columbia University

Bachelor of Arts 2004, Rutgers University (Majors: Mathematics, Computer Science, Political Science)

Summary of Experience: Ms. Kowalczykowski is an Environmental Specialist with a background in environmental economics, policy, and management, concentrating on climate change issues. Ms. Kowalczykowski is part of the team providing First Environment's climate change management services, primarily greenhouse gas inventory, regulatory compliance, carbon regulatory risk, and offset project verification and technical assistance. Her work focuses on GHG inventory development and verification, as well as strategic GHG management.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **GHG Inventory Development for the National Institutes of Health (NIH).** Provided technical assistance for the development of a 2008 and 2010 emissions inventory using the Federal Greenhouse Gas Accounting and Reporting Guidance for the calculation of greenhouse gas emissions and the FEMP tool. 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 drafting an Inventory Management Plan and Strategy to reduce emissions, and implementing the EPA Mandatory Reporting Rule.
- **GHG Inventory Development for Congoleum,** a manufacturing company. Provided technical assistance for the development of a 2006 and 2009 emissions inventory utilizing TCR's General Reporting Protocol for the calculation 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, and the analysis of results.
- **GHG Inventory Development for Morris County.** Provided technical assistance for the development of a 2009 emissions inventory using TCR's General Reporting Protocol. 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 the analysis of results.
- **GHG Inventory Development for the City of Clifton.** Provided technical assistance for the development of a 2009 emissions inventory through the use of TCR's General Reporting Protocol and the ICLEI software for the calculation 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 the analysis of results.

- **GHG Inventory Development for Westchester County.** Provided technical assistance for the development of a 2009 emissions inventory using the use of TCR's General Reporting Protocol and the ICLEI software for the calculation 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 the analysis of results.
- **Carbon offset project development (consulting)** – Provided carbon offset portfolio recommendation report and PowerPoint presentation to client in electric power industry undergoing considering of entering the carbon offset market. Formulated strategic plan along various levels, including developer, marketer, and partner, complete with an assessment of benefits and risks, which were tailored toward the client's needs and natural advantages in the market. Analyzed protocols, guidelines, constraints, and incentives for carbon offset projects and determined financial and regulatory risk for each.
- **Carbon Regulatory Risk (consulting)** – Provided consulting services for financial company to calculate carbon regulatory risk across multiple sectors for Fortune 500 companies. Carbon risk estimates were used to determine compliance and expansion costs and further distributed to clients to aid their investment making decisions. Companies in various industries were ranked in relation to their peers to determine carbon footprint and included analysis of emissions history, improvements, and energy efficient measures.
- **Climate Change Regulations (consulting)** – Provided consulting services for financial company to research and analyze various countries' green house gas emission regulations. This focused on the United States and Europe and consisted of assessing target reductions and emissions trading schemes for various internationally and domestically binding commitment periods, 2008-2012, 2013-2020, and 2020-2050. This research was supplemented with summaries of climate change legislation and active energy efficiency programs.
- **Confidential Client** – Provided historical, legal, and policy research for contaminated site from uranium tailings. Conducted corporate history research for past and current owners, as potential PRPs, and corresponded with local, state, and federal government agencies including the National Archives and Records Agency, The National Park Service, The Bureau of Land Management, The Nuclear Regulatory Commission, The Arizona Department of Mines, and other agencies, to obtain relevant government documents. Research included tracing historic mining operations to Source Material Licenses issued by the Atomic Energy Commission and various leases and contracts authorizing the mine to operate. Also accessed and worked with various databases for corporate and legal research.
- **Earth Institute** – Conducted research in the areas of climate change, energy efficiency, renewable energy, and sustainable manufacturing for publication. Also analyzed company and government case study sustainability practices. Provided data management and research support for various climate change research projects, grants, and seminars.
- **Congressional Aide** – Consulted with various federal, state, and local agencies to resolve policy, regulatory, and compliance issues, including environmental issues: Teterboro Airport Pollution and Noise and Meadowlands Conservation.
- **Confidential Client** – Provided data management support and analysis for state government agency to determine public opinion and necessary improvements in service, including efficiency measures.

Name: ROSS MACWHINNEY

Firm Employed: First Environment, Inc.
New York, NY

Years of Relevant Experience: 4

Degrees/Majors: Master of Public Administration in Environmental Science & Policy 2007, Columbia University, School of International & Public Affairs
Bachelor of Science in Information and Decision Systems 2000
Carnegie Mellon University, School of Humanities and Social Sciences

Summary of Experience: Mr. MacWhinney is an Environmental Specialist with a background in GHG verification, carbon markets, and climate change policy. He has provided technical assistance and verification services in numerous verification projects based on the Climate Action Reserve (CAR), the Voluntary Carbon Standard (VCS), the Chicago Climate Exchange (CCX), and the American Carbon Registry (ACR). Mr. MacWhinney has also performed and verified GHG inventories based on The Climate Registry (TCR). He also provided consulting services for GHG inventory and management system development. Prior to working for First Environment, Mr. MacWhinney worked for two years as a Carbon Market Analyst for an international brokerage firm for environmental commodities such as carbon credits, renewable energy certificates, biofuels, and others. In this role, Mr. MacWhinney tracked developments in climate policy at global, federal, and local levels and worked with project owners and offset buyers to facilitate sales for high quality carbon offsets, with a particular focus on the markets for forest carbon offsets. Mr. MacWhinney is part of the First Environment team providing climate change management services, primarily greenhouse gas inventory and offset project verification and technical assistance.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **National Institute of Health (consulting)** Prepared a GHG inventory for all 27 of NIH's institutes and centers for mandatory reporting under Executive Order 13514. Identified emission sources, information sources, performed GHG emission calculations and reported GHG emissions. Currently developing a database system for GHG data management to automate the inventory process in future years.
- Verified GHG emission reduction projects for a broad range of technologies, including landfill gas capture and storage, livestock management systems, waste to energy facilities, and renewable power generation from wind.
- Calculated and reported First Environment's inventory of GHG emissions under The Climate Registry for 2009 and 2010.

- Wrote a Project Design Document for a GHG emissions reduction project which was successfully validated under the Voluntary Carbon Standard.
- **Evolution Markets**, White Plains, NY. Carbon Market Analyst for an international brokerage firm for environmental commodities such as carbon credits, renewable energy certificates, biofuels, and others.
 - Worked with project owners and offset buyers to facilitate sales for high quality carbon offsets, with a particular focus on the markets for forest carbon offsets.
 - Researched the developing international and domestic markets, standards, and policy landscape for VERs, CERs, and forest carbon offsets.
 - Provided advisory services to clients in the offset project development cycle, including pricing information and recommendations on standards, consultants, and verifiers.
 - Wrote updates and briefings for clients covering carbon market developments at all levels of government and within the voluntary market. Issues included:
 - UNFCCC negotiations in Bali
 - International competitiveness in US climate bill debates
 - International and United States based HFC-23 offset projects
 - Pricing differentiations by VER standards and offset project region
 - Contributed analyses on the state of various areas of the carbon markets for groups including the World Bank, the Ecosystem Marketplace, and other groups.

Name: HOWARD KANTER

Firm Employed: First Environment, Inc., New York, NY

Years of Relevant Experience: 3

Degrees/Majors: B.S., Chemical Engineering with a minor in Mathematics, University of Rochester, Rochester, NY. May 2010

Professional Licenses and/or Certifications: Engineer in Training (EIT) status – Fundamentals of Engineering (FE Exam) Spring 2010

Summary of Experience: Howard Kanter, EIT, is an Environmental Specialist on First Environment’s greenhouse gas team. Mr. Kanter has provided landfill and renewable energy project validation and verification services under the Climate Action Reserve and Verified Carbon Standard registries. He has also assisted in the assessment of GHG entity inventories in accordance with The Climate Registry’s General Reporting Protocol. Mr. Kanter has a background in general sustainability practices and initiatives with experience conducting energy audits and benchmarking city-wide sustainability initiatives.

Experience Relevant to GHG MANAGEMENT

- **GHG Inventory Development for Nuclear Energy Institute** – Provided technical assistance for the development of the client’s 2010 greenhouse gas inventory in preparation for Batch Verification under The Climate Registry’s General Reporting Protocol. Activities included the collection of activity data for all stationary and mobile sources, compilation and quantification of greenhouse gas emissions from all sources, and the entry of data into CRIS reporting software.
- **GHG Report Verification for the Beulah Municipal Landfill** – Assisted in the verification of the Beulah Municipal Landfill’s 2010 GHG Report to the Climate Action Reserve (CAR). Verification activities conducted include assessment of GHG emission calculations from combustion of landfill gas and electricity consumption to determine compliance with CAR’s Landfill Project Protocol.
- **Energy Audit Project for University of Rochester office** – Provided auditing services for energy use from office lighting and heating to the University of Rochester. Auditing activities included identifying major sources of energy use, conducting site visits, gathering relevant data, analyzing data, and presenting results.
- **Sustainability Assessment for City of Rochester** – Assisted in assessing and benchmarking current city-wide sustainability initiatives. Worked with city leaders, business professionals, and community stakeholders to offer guidance for future sustainability initiatives and projects.

Name: NATALI Y. GANFER
Firm Employed: First Environment, Inc., New York, NY
Years of Relevant Experience: 2
Degrees/Majors: M.S, Earth & Environmental Engineering, Columbia University.
B.S., Chemical Engineering, University of Buenos Aires.
Summary of Experience: Natali Ganfer is an Engineer on First Environment’s greenhouse gas team, with a focus on landfill projects. Ms. Ganfer has broad technical experience, having done intense research on upgrades of landfill gas, waste to energy plants, and industrial processes design at Columbia University. She is pursuing a M.S. in Earth and Environmental Engineering from Columbia University. As part of her thesis, Ms. Ganfer is conducting a technical study for the InterAmerican Development Bank on the feasibility to implement Waste-To-Energy facilities in Latin America, including carbon credits for the cost analysis as well.

As part of the Greenhouse Gas Management team, Ms. Ganfer assists with validation and verification activities that involve greenhouse gas inventories, regulatory compliance, emission reduction calculations, QA/QC monitoring, and other project documentation review.

Experience Relevant to GREENHOUSE GAS MANAGEMENT

- **GHG Report Verification for TerraPass, Inc.** Assisted in the verification of various TerraPass’ 2010 GHG Reports under the Climate Action Reserve’s Landfill Project Protocol. Activities included the review of reduced emission calculations from the project, including the project emissions in the calculations; assessment of continuous emissions monitoring systems; analysis of QA/QC procedures; regulatory compliance confirmation; evaluation of materiality compliance with reported emissions; and preparation of the final report.
- **GHG Emissions Reductions Calculations for Wilshire Stanford Offsets, LLC.** Assisted in the development of Wilshire’s 2010 inventory of greenhouse gas emissions to report under Climate Action Reserve’s U.S. Ozone Depleting Substances Protocol. Activities included the calculation of emissions reductions, including the projects emissions in the calculations.
- **GHG Inventory Development for Waste Management, Inc.** Assisted in the development of Waste Management’s 2010 inventory of greenhouse gas emissions to report under Climate Action Reserve’s Landfill Project Protocol. Activities included the calculation of emissions reductions, including the projects emissions in the calculations, regulatory compliance review, assessment of continuous emissions monitoring systems; analysis of QA/QC procedures; and preparation of the verification package.
- **GHG Report Verification for Geosyntec.** Assisted in the verification of Wicomico County Landfill’s 2010 and 2011 GHG Report under the Climate Action Reserve’s Landfill Project Protocol. Activities included the review of reduced emission calculations from the project, including the project emissions in the calculations; assessment of continuous emissions monitoring systems; analysis of QA/QC procedures; regulatory compliance confirmation; evaluation of materiality compliance with reported emissions; and preparation of the final report.

- **GHG Report Verification for PPL.** Assisted in the verification of PPL's 2009 and 2010 GHG Report under The Climate Action Reserve's Landfill Project Protocol. Activities included the review of reduced emission calculations from the project, including the project emissions in the calculations; assessment of continuous emissions monitoring systems; and evaluation of materiality compliance with reported emissions.
- **GHG Report Verification for Commonwealth Bethlehem Energy LLC (CBE).** Assisted in the verification of CBE's 2010 GHG Report under the American Carbon Registry (ACR) Standard. Activities included the review of reduced emission calculations from the project, including the project emissions in the calculations; assessment of monitoring systems; evaluation of materiality compliance with reported emissions; and report writing.
- **Landfill Gas Research at Columbia University.** Researched on enhancement of landfill gas as engine fuel, producing less emissions and improving the engine performance. Activities included the upgrade of the equipment setup, conduction of the experiments, and data analysis.
- **Waste-To-Energy (WTE) Research for Columbia University and the InterAmerican Development Bank.** Researched the feasibility of implementation of WTE facilities in Latin America. Activities included research and analysis of the on-going waste management system, data collection, technical analysis, cost analysis including carbon credits and tip fees estimation.

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