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Entergy Corporation  
Greenhouse Gas Inventory  
for Calendar Year 2013

Verification Report

March 7, 2014

ICF International  
9300 Lee Highway  
Fairfax, VA 22031

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## Statement of Verification

March 7<sup>th</sup>, 2014

Entergy Corporation  
Environmental Strategy & Policy Group  
Entergy Services, Inc.  
639 Loyola Ave (L-ENT-13D)  
New Orleans, LA 70113

### Scope

Entergy Corporation ("Responsible Party") engaged ICF International in cooperation with Cventure LLC ("ICF") to review Entergy Corporation's 2013 Corporate Greenhouse Gas (GHG) Inventory, and supporting evidence including Entergy's Inventory Management Plan and Reporting Document (IMPRD), detailing the GHG emissions and associated source documents over the period January 1, 2013 to December 31, 2013 inclusive. These components are collectively referred to as the "GHG Assertion" for the purposes of this report.

The Responsible Party is responsible for the preparation and presentation of the information within the GHG Assertion. Our responsibility is to express a conclusion as to whether anything has come to our attention to suggest that the GHG Assertion is not presented fairly in accordance with generally accepted greenhouse gas (GHG) accounting standards, in particular *ISO 14064 Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals (ISO, 2006)*.

### Methodology

We completed our review in accordance with the ISO 14064 Part 3: *Greenhouse Gases: Specification with guidance for the validation and verification of greenhouse gas assertions (ISO, 2006)*. As such, we planned and performed our work in order to provide limited, rather than absolute, assurance with respect to the GHG Assertion. Our review criteria were based on this ISO 14064 Part 3 guidance. We reviewed the GHG Assertion and associated documentation. We believe our work provides a reasonable basis for our conclusion.

### Conclusion

Based on our review, nothing has come to our attention which causes us to believe that the GHG Assertion is not presented fairly in accordance with the relevant criteria. The emission estimates were calculated in a consistent and transparent manner and were found to be a fair and accurate representation of Entergy Corporation's actual emissions and were free from material misstatement. ICF identified several minor, immaterial discrepancies in Entergy's greenhouse gas inventory which were corrected by Entergy during the course of the verification. ICF has verified a total of **51,180,083** metric tons of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) emissions for calendar year 2013.



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## 1 Verification Summary

Verifiers: Craig Ebert, Khalid Husain (ICF International); Kevin Johnson (Cventure)

Internal Peer Reviewer: Chris Caners, P.Eng. (ICF International)

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Verification Timeframe: December 2013 to March 2014

Objective of the verification: Limited level of assurance on Entergy's Corporate 2013 GHG Inventory

Assurance being provided to: Entergy Corporation

Verification standard: ISO 14064-3:2006 (ISO, 2006)

Verification criteria employed: Inventory prepared according to the World Resources Institute, World Business Council for Sustainable Development GHG Protocol Corporate Standard

Verification scope – Gases: Carbon Dioxide, Methane, Nitrous Oxide, Sulfur Hexafluoride, Hydrofluorocarbons

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Organization: Entergy Corporation

Location: U.S.A.

Temporal period: January 1, 2013 – December 31, 2013 (inclusive)

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## 2 Introduction

Entergy has engaged ICF International to provide a third party verification of its corporate-wide GHG emissions for calendar year 2013 for voluntary organization-wide GHG reporting purposes. Cventure LLC serves as a partner to ICF International in the verification exercise.

Entergy’s GHG emissions inventory uses an equity share approach to establishing boundaries. The 2013 GHG inventory includes the following emissions sources (as shown in the figure below):

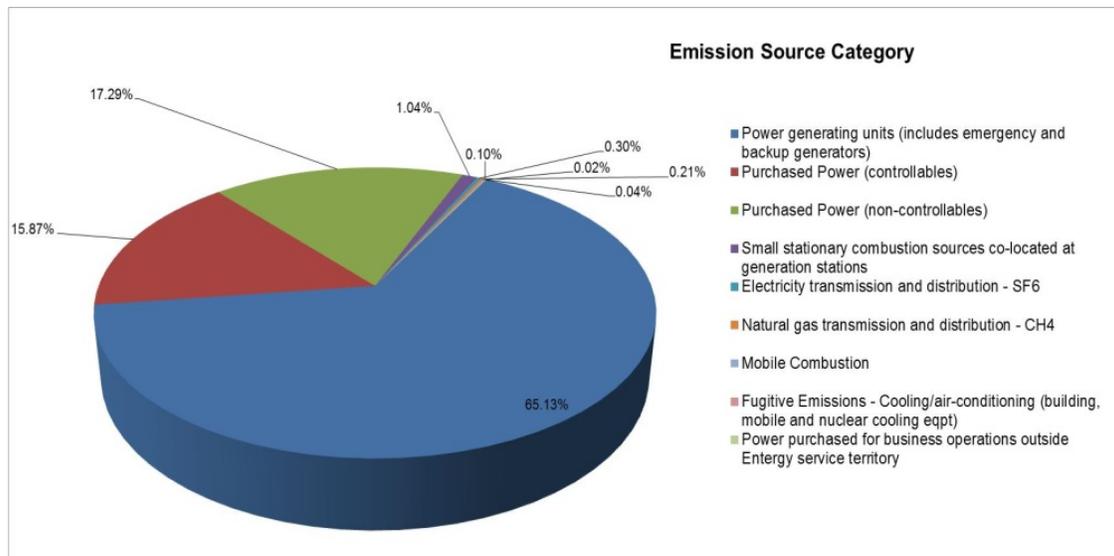
**Scope 1:** Stationary combustion in electric generating units and small sources at company facilities; mobile combustion in company fleet vehicles; fugitive methane from natural gas transmission systems; fugitive sulfur hexafluoride (SF<sub>6</sub>) from electric power transmission and distribution systems; and fugitive hydrofluorocarbons (HFCs) from building HVAC systems, district cooling operations, and vehicle air conditioning systems.

**Scope 2:** Indirect emissions associated with grid purchased power for wholesale generation plants (outside of Entergy’s regulated electricity transmission service territory).

**Scope 3:** Both controllable and non-controllable purchased power, for resale to end-users, are included and accounted for, in Entergy’s Scope 3 emissions.

GHG emissions associated with electricity used in Entergy facilities are accounted for within stationary combustion emissions. Emissions associated with line losses in electric power transmission and distribution systems are included within the stationary combustion and purchased electricity emissions. All electricity consumed in the operation of regulated utility generation plants and consumed in Entergy’s various administrative and commercial buildings and operations, in the regulated service territory, are accounted for in Entergy’s direct emissions from stationary combustion. We note from the 2013 GHG inventory that the GHG emissions resulting from the full life cycle of the various fuel sources are not included in the inventory. Per the 2013 inventory and from Entergy’s utility generation portfolio listed on the company’s website<sup>1</sup> that emissions from Louisiana Station Plant 1 are also not included in the 2013 inventory; these units exist for the sole use of ExxonMobil under a long term lease agreement.

GHG emissions from stationary combustion and total purchased power in aggregate comprise approximately 99.4% of Entergy’s total 2013 corporate GHG emissions.



<sup>1</sup> [http://entergy.com/content/operations\\_information/Utility\\_Fossil\\_and\\_Renewable\\_Portfolio.pdf](http://entergy.com/content/operations_information/Utility_Fossil_and_Renewable_Portfolio.pdf)

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### 3 Verification Execution

The scope of the verification was defined during the verification planning stage and is detailed in the Verification Plan, which is appended to this document. The Verification Plan also describes ICF's verification process that was executed through the course of the verification. The specific verification procedures that were planned and executed are described in the appended Plan. The Verification Plan has evolved during the course of the verification exercise; the final version of the Plan is in the Appendix. Verification procedures, including sampling that was carried out during this verification, are described in detail in Section 7 of the Verification Plan.

This is an ISO 14064-3 -based verification exercise, having been conducted to achieve a limited level of assurance.

The 2013 GHG inventory verification focused primarily on direct emissions from fossil fuel usage at large electric generating facilities using Continuous Emission Monitoring System (CEMS) data; indirect emissions from purchased power; and direct emissions from small stationary combustion sources at Entergy fossil and nuclear generating stations. Entergy's 2013 GHG Inventory includes small sources that are *de minimus* in nature (small stationary combustion; mobile combustion from company fleets; and fugitive emissions including CH<sub>4</sub> from natural gas transmission and distribution, SF<sub>6</sub> from electricity transmission and distribution, and air conditioning/cooling refrigerant HFC emissions). Entergy noted in its 2013 GHG Inventory Management Plan and Reporting Document (IMPRD) and in its 2013 GHG Inventory that only small stationary combustion emissions as well as overall GWP values were updated for the 2013 Inventory; data for all other minor sources are carry-overs from previous years. Given that we have followed a risk-based approach to our verification effort, we have reviewed all sources of Entergy's corporate 2013 GHG emissions with a focus on stationary combustion from electric generating units and purchased power. Other sources of emissions have also been reviewed including carry-over numbers from past years.

#### 3.1 Site Visit

A site visit was conducted during the period of January 27-30, 2014 in Texas and Louisiana. The site visit consisted of two types of meetings. One set of meetings was devoted to better understanding the operations, data gathering processes and links to data systems, management controls, and overall information systems in Entergy offices in The Woodlands, Texas and New Orleans, Louisiana. The second set of meetings included visits to selected plants (Nelson Plant; and Waterford Plant<sup>2</sup> (Units 1 and 2), both plants in Louisiana), as part of our sampling exercise in an effort to obtain data from plants and to better understand GHG information and data management systems. This included a review of all greenhouse gas emission sources and sinks in the facility through a review of the process flow, metering and data flow diagrams. Subsequently, a review of metering and data management processes was discussed with control room operations staff, including a review of meter calibration/validation procedures.

The site visit was an important step in planning and executing the verification. During the course of the office and selected plant tours, ICF interviewed key site operations personnel regarding power and fossil fuel generation plants operations and environmental data management at Entergy.

Key Entergy staff interviewed at The Woodlands and New Orleans offices included:

- Charles John, Intra-System Billing (ISB)
- Scott Celino, Generation and Fuels Accounting
- Grady Kaough, Power Trading Operations
- Ryan Trushenski, Solid Fuel Supply – System Planning and Operations (SPO)

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<sup>2</sup> A site visit was originally scheduled for Ninemile Point Plant but due to inclement weather, the verification team visited Waterford Plant instead.

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Key Entergy staff interviewed in-person during the Nelson Plant and Waterford Plant (Units 1 and 2) included:

- Rhonda Kratzer, Senior Lead Environmental Analyst (Nelson Plant)
- Richard Covers and Seth Folse, Environmental Department (Waterford Plant)
- Control Room Operators at both plants.

In addition to the site visit, ICF held conference calls with the following key personnel to gain a better understanding of Entergy's operations and data management procedures (a number of these discussions were scheduled to take place in-person but instead were switched to teleconferences due to winter storms in both Texas and Louisiana during the site visit):

- Rick Johnson, Corporate Environmental Operations
- Dave Sommers, Gas and Oil Supply
- Ryan Trushenski and Scott Marino, Coal Supply
- Tad Chenet and Minh Nguyen, Fossil Environmental Services, Emissions Monitoring and Markets
- Stanley Jaskot and K T Huang, Plant Performance Monitoring and Diagnostics (PM&D)
- Ryan Plaisance and Victoria Langley, IT Operations

### 3.2 Verification Approach

This ISO limited level of assurance verification effort involved the review of the logic and procedures used to compile the emission estimates, determine completeness and accuracy in calculations, and to assess the validity of the inventory design itself. It also focused on a review of the procedures in place and identified any missing or incorrectly calculated values. Emissions data were reviewed at a high level to detect internal inconsistencies, identify outliers and find potential errors in reporting, and included boundaries' completeness checks. Data in supporting spreadsheets and from corporate Entergy databases were also examined under this verification review.

A detailed technical review of the methodologies, approaches, and calculations used in Entergy Corporation's inventory estimates was conducted in this verification effort. This was combined with a sampling of data sources used during the compilation of the GHG emissions inventory by Entergy. Documentation was examined, including reviews of disaggregated data, and the audit trail followed below the business entity level to raw data sources for several Entergy power generation units. The section that follows outlines the approaches used to review the main sources of the 2013 GHG inventory.

#### Stationary Combustion: Fossil Fuel Usage at Generating Facilities

The entire inventory of Entergy fossil generation units was reviewed at a limited depth, and a significant sample of data from select units was reviewed in greater detail. Generation units were selected for detailed audit trail reviews based primarily on relative contribution to the 2013 corporate GHG emissions inventory, e.g., using the 1% de minimus accounting methodology/reporting threshold of Entergy's GHG inventory, as unit selection screening priority. Other considerations in selecting units for detailed review included large, "sister" units at the same selected facility, availability of facility fuel usage validation data (for gas-fired facilities), and to account for some overlap with last year's samples (to test for any changes), as well as a selection of new samples of units not previously reviewed in depth.

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The twenty (20) generation units selected for this more detailed desktop review included the following 6 coal and 14 gas units:

**Coal**

- Big Cajun 2 – 2B3
- Independence 1
- Independence 2
- RS Nelson 6
- White Bluff 1
- White Bluff 2

**Gas**

- Attala AO1
- Attala AO2
- Baxter Wilson 1
- Baxter Wilson 2
- Hot Spring 1
- Hot Spring 2
- Little Gypsy 1
- Little Gypsy 2
- Little Gypsy 3
- Ninemile Point 4 (PM&D/Gas Burn data only)
- Ninemile Point 5 (PM&D/Gas Burn data only)
- RS Nelson 4
- Waterford 1 (CEMS QA/QC documentation only)
- Waterford 2 (CEMS QA/QC documentation only)

The following information was received from Entergy and reviewed in relation to the above samples:

- Annual CO<sub>2</sub> /flue gas flow monitors relative accuracy test audits (RATAs) for the six (6) selected coal units;
- Quarterly CO<sub>2</sub> CEM linearity checks for the six (6) selected coal units;
- Natural gas flow meter CEMS calibration/accuracy checks for twelve (12) of the fourteen (14) gas units;
- U.S. Environmental Protection Agency (EPA) emissions collection and monitoring plan system (ECMPS) quarterly feedback reports for eighteen (18) units;

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- Annual data on CO<sub>2</sub> emissions, electricity generation (MWh), heat input (total Btu), and operating time for all fifty-nine (59) Entergy units which operated in 2013 (out of the 67 total Entergy units which reported to EPA in 2013), from the EPA Clean Air Markets database;
  - Monthly data on electricity generation (MWh) and heat input (total Btu) for fifteen (15) of the Entergy-operated sampled units, from Entergy's Performance Monitoring and Diagnostics (PM&D) data historian database. PM&D data are not available on the recently acquired units at Hot Spring (1 and 2); Unit 3 which Entergy does not operate at Big Cajun 2; and the Waterford Units 1 and 2, which were late project-addition, site visit units.
  - Monthly facility-level gas burn data for all natural gas-fired electric generation facilities (from Entergy's Gas Database, maintained by the natural gas purchasing and accounting department);
  - Hourly CO<sub>2</sub> CEMS data for 2013 obtained directly from the plant's CEMS DAHS for the units at the two, on-site survey visit facilities (Waterford 1 and 2, and RS Nelson 4 and 6); and
  - Multiple days of coal burn sampling data for one (1) coal-fired unit (RS Nelson 6), and two (2) coal-fired plants (Independence and White Bluff).

The twenty (20) units above that were reviewed in greater detail represented approximately 69% of Entergy's total direct CO<sub>2</sub> emissions from power generation units; approximately 55% of Entergy's corporate GHG stabilization commitment; and approximately 45% of Entergy's total corporate GHG emissions, in 2013.

Organizational boundaries were verified using information contained in Entergy's SEC 10-K report for 2013 Entergy's 2012 Statistical Report and Investor Guide, Entergy's 2012 Annual Report, and Entergy's inventory list of generation assets. As described in Entergy's IMPRD, Entergy GHG emissions inventory boundaries are determined on an equity share basis (i.e., the percent equity share of those facilities owned by Entergy which Entergy owns jointly with other companies) which was used to calculate the GHG emissions in the inventory database for this category. These equity share values in the GHG inventory were cross-checked against the data provided in the IMPRD, and Entergy's statistical and annual reports.

CEMS reports supplied by Entergy were checked against both the GHG emissions data in their GHG inventory spreadsheets, and the EPA Clean Air Markets' air monitoring program data (AMPD) database, for the twenty (20) above selected units. Monthly and annual CO<sub>2</sub> CEMS reports were generated by ICF from queries of the AMPD database, and were checked and confirmed against the data for those twenty (20) sampled units as reported in Entergy's GHG emissions inventory spreadsheets. Annual AMPD database query report results for all Entergy fossil generation units were checked and confirmed against the Entergy GHG Inventory spreadsheets.

Associated CEM system and natural gas flow meter QA/QC supporting documentation (including relative accuracy test audits, linearity checks, and flow meter calibration tests) was reviewed for eighteen (18) of the Entergy generating units sampled. (Note: The site visit originally planned for Ninemile Point Units 4 and 5 was cancelled due to ice storms, so that plant-level QA/QC data were unavailable.) These documentary evidence verification checks were performed and confirmed that the reported GHG emissions data, and CO<sub>2</sub> emissions/flue gas flow and natural gas flow monitoring measurements and monitoring calibrations, were accurate, and the associated measurements data were reliable and reported correctly in the Entergy GHG inventory.

For each of the units sampled, various error checking tests were performed on the Entergy GHG inventory spreadsheets, and the sampled data to assess the information collected, including some examples such as record counts, missing data, re-computation, and other cross-checks. For each of the selected units, some aggregation calculation checks, and source type and equity share checks, were made and compared against database outputs/reports and the Entergy GHG inventory spreadsheets. Also, for each fuel type among the selected generating

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units, a sampling of daily CO<sub>2</sub> emissions values were checked using an alternative quantification methodology, based on activity data (e.g., fuel heat input values) and emissions factors.

Through the course of the verification program, the data management systems and controls employed in the quantification of emissions were reviewed, as detailed in the Verification Plan procedures. These systems were found to be effective in the calculation of the GHG Assertion.

### Purchased Power

The key emissions factors, sources, and calculations that Entergy used for its purchased power (comprising controllable power purchases, non-controllable power purchases, and grid-purchased power for non-fossil plants) in the 2013 inventory database were checked. Together the data from these sources correspond to approximately 33% of the total Entergy Corporate GHG emissions in 2013.

Raw data from the TRADES database containing controllable purchased power for 2013 was received from System Planning and Operations (SPO) and was cross-checked against the Entergy GHG inventory spreadsheets. In addition, a monthly breakdown of total purchased power including 2013 total year-to-date controllable and non-controllable in aggregate was obtained from Entergy's Generation and Fuels Accounting for review purposes and cross-checked against the GHG Assertion. A minor source of purchased power that was added to the annual GHG inventory, appearing for the first time in the 2013 corporate inventory, was grid-connected purchased power for five non-fossil Energy plants. Back-up data indicating total electricity consumption was provided for most of the plants. All of these processes are outlined in the IMPRD as being central to the determination of the purchased power-related emissions.

All controllable power purchases were checked against SPO's raw data for correct MWh amounts. They were also checked for correct application of CO<sub>2</sub> emissions factors from EPA's eGRID database (2014 release for year 2010 data). Wherever possible, plant-specific eGRID factors (plant annual CO<sub>2</sub> total output emission rates in lbs CO<sub>2</sub>/MWh) were applied (with the exception of sub-regional grid factors in the event that plant-specific data was not available and one plant-specific factor based on EPA's Clean Air Markets database query). A total of 37 specific sets of point of receipt were listed in the controllable purchased power raw data for 2013.

An additional comparison was performed between the total purchased power amount from Entergy's Generation and Fuels Accounting and the total purchased power amount in the Intra-System Billing (ISB). While this check was not central to the GHG Assertion, it revealed useful information on various systems and their linkages, and served as an additional exploratory check.

### Small Stationary Combustion Sources – Fossil Generating Plants

GHG emissions data for these sources (i.e., auxiliary boilers and other sources, considered 'smaller' than large fossil generating plants) were updated to reflect Entergy's CO<sub>2</sub>e 2012 estimates submitted under the EPA GHG Reporting Program (GHGRP). Since 2013 data is not due to be reported to EPA's GHGRP until later in 2014, Entergy chose to use the most recently available data, i.e., from year 2012. ICF reviewed the 2012 data submitted by Entergy to the EPA GHG Reporting Program in relation to the GHG Assertion. The data spanned 19 reports, with a focus on Subpart C: General Stationary Fuel Combustion. Checks were made for emissions listed for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O as well as for adjustments made in Entergy's 2013 GHG inventory for equity share of certain plants.

Other Sources

Entergy has a number of small sources that individually and collectively are *de minimus* in nature, as noted in the IMPRD. All other sources (except for small stationary combustion, indicated above) were carryover from past years, with the only updates being revisions to the global warming potential (GWP) based on recent EPA guidance released in early 2014. These sources included mobile combustion from company fleets; CH<sub>4</sub> from natural gas transmission and distribution; SF<sub>6</sub> from electricity transmission and distribution; and HFC emissions from Entergy facilities and vehicles. Back-up data and explanations had been provided in earlier years for each of these sources and checked by ICF against the GHG assertion.

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## 4 Data Management and Control System Review

A critical element of the verification process was for the Verification Team to gain a thorough understanding of the data management systems and controls employed by Entergy. This understanding necessitated a review of:

- The parties involved and their respective responsibilities;
- The facility data collection and automated data measurement and management systems;
- Software system configuration;
- Post-collection data manipulation;
- Quality assurance procedures employed to detect erroneous or missing data;
- Processes for updating historical data in the event that errors are detected;
- Document control and security systems, including access, and tracking of edits; and
- Changes to the data management system over time or opportunities for improvement.

### Testing Internal Controls

The Verification Team developed a sufficient understanding of the GHG information system and internal controls to determine whether the overall data management system is sound, examining it for sources of potential errors, omissions, and misrepresentations. This assessment incorporated examining three aspects of the company's internal controls: (1) the control environment, (2) the data systems, and (3) the control and maintenance procedures. The testing procedures documented in the Verification Plan included some procedures to test the effectiveness of the internal controls in place. The results of these tests influence the type and amount of activity data being sampled. Sampling procedures are included in Section 7 of the Verification Plan.

### Conducting Substantive Testing

Substantive testing procedures were used to assess the reasonability and validity of the GHG Assertion where further testing was required to assess internal controls based on the observations and preliminary findings of the Verification Team. The specific procedures are summarized in Section 7 of the Verification Plan as separate tables for each process or activity involved in the quantification and reporting of the GHG Assertion. Materiality was specified for each specific procedure and aggregate materiality was determined separately. The details of the testing of internal controls and substantive testing undertaken are described in detail in the final Verification Plan.

The verification team developed a thorough knowledge of the data management and control systems utilized in the organization through the review of the IMPRD, observations during the site visit, and interviews with key personnel. The following were the key data systems observed.

- TRADES – controllable power purchases tracking system: hourly purchase amounts from 1/1/2013 to 12/31/2013 inclusive were extracted and sent via Excel to ICF by Grady Kaough (via Rick Johnson).
- Generation Fuels and Accounting – Monthly purchased power totals for 2013 (12 months for 2013) in PDF form were sent to ICF by Scott Celino (via Rick Johnson).
- PM&D data – for large fossil generating stations.
- CEMS data – for large fossil generating stations (as well as for small stationary sources that have CEMS)
- Gas purchases data – monthly for all gas-fired electric generating units – from David Sommers: purchase amounts inputted into ISB.
- Coal purchases data – from Ryan Trushenski (solid fuels): purchase amounts inputted into ISB.

The following non-critical data was requested and obtained for exploratory checks and knowledge enhancement for both GHG data comparison purposes as well as for information systems:

- TRADES – a subset of non-controllable power purchases data from 1/1/2013 to 12/31/2013 inclusive was extracted and sent via Excel to ICF by Grady Kaough..
- ISB (Intra-system billing) – Purchased power data was sent by Charles John.

## 5 Verification Results

### 5.1 Discrepancies

The table below details discrepancies found during the verification process for each procedure, a discrepancy title (brief description) and final status. Further explanations of the discrepancies are shown below in the subsequent table.

Procedure	Discrepancy Title	Final Status
B1: Established Organizational Boundaries	None detected	
B2: Review of Operating Conditions	None detected	
C1: True-Up and Re-Performance Calculations	1. Minor discrepancy in CH <sub>4</sub> and N <sub>2</sub> O emissions factors for GHG emissions from Entergy's fossil plants (stationary combustion) in relation to referenced sources	Immaterial discrepancy – corrected in final inventory
	2. Inconsistent application of GWP values for CH <sub>4</sub> and N <sub>2</sub> O for purchased power.	Immaterial discrepancy –corrected in final inventory
C2: Minor/Negligible Emissions - Methodology and Documentation	None detected	
D1: Data Gathering and Quality Controls	None detected	
D2: Data Confirmation against External Sources	3. Minor discrepancy in cross-check between total purchased power numbers from two different sources (ISB and Generation Fuels and Accounting).	Immaterial discrepancy
D3: Data Migration into Inventory	None detected	
A1: Final Verification Assessment	None detected	

Discrepancy Title	Discrepancy Description
1. Minor discrepancy in CH <sub>4</sub> and N <sub>2</sub> O emissions factors for GHG emissions from Entergy's fossil plants (stationary combustion) in relation to referenced sources	<p>The N<sub>2</sub>O emissions factor for GHG emissions from coal-fired power plants is incorrect. Based on the derivations from the latest EPA guidance that is referenced and applied (<i>Federal Register, Volume 78, No.230</i>), the N<sub>2</sub>O factor should be 0.00506 kg N<sub>2</sub>O / kg CO<sub>2</sub> (not 0.0044).</p> <p>The CH<sub>4</sub> and N<sub>2</sub>O emissions factors for GHG emissions from gas-fired power plants are incorrect. Based on derivations from the latest EPA guidance that is referenced and applied (<i>Federal Register, Volume 78, No.230</i>), the CH<sub>4</sub> factor should be 0.00047 kg CH<sub>4</sub> / kg CO<sub>2</sub> (not 0.0004); and the N<sub>2</sub>O factor should be 0.00056 kg N<sub>2</sub>O / kg CO<sub>2</sub> (not 0.0005).</p>
2. Inconsistent application of GWP values for CH <sub>4</sub> and N <sub>2</sub> O for purchased power.	Incorrect GWP values were initially applied for CH <sub>4</sub> and N <sub>2</sub> O for purchased power. These were subsequently corrected so that GWP values are consistently applied across the inventory. These GWP values are from EPA's recently released guidance ( <i>Federal Register, Volume 78, No.230</i> ) on this issue.
3. Minor discrepancy in cross-check between total purchased power numbers from two different sources (ISB and Generation Fuels and Accounting)	As part of the cross-checking analysis of total purchased power, ICF reviewed annual purchased power data from Generation Fuels and Accounting and this year performed a new and additional check by comparing that annual number to total purchased power from ISB. The numbers were within 4% of each other (on a full year extrapolated basis). This is reasonable given that Generation Fuels and Accounting and ISB work together in accounting and billing functions for various items including purchased power. Entergy applied the higher number (from Generation Fuels and Accounting) and this thus represents a more conservative approach.

## 5.2 Aggregate Materiality

The sum of the immaterial discrepancies in the GHG Assertion does not result in a breach of materiality of discrepancies greater than 10% of the total GHG Assertion. This is in line with the uncertainty assessment of Entergy's inventory.

## 5.3 Other Findings

- For the twenty (20) units identified as targets for more detailed audit sampling, air monitoring program data (AMPD) monthly/annual CO<sub>2</sub> CEMS data from US EPA's Clean Air Markets database system were reviewed. These results were verified against the direct emissions reported in Entergy's GHG emissions inventory spreadsheets. No material errors or omissions associated with Entergy's GHG emissions inventory accounting and reporting were identified, as part of this US EPA CO<sub>2</sub> emissions database and Entergy GHG emissions inventory spreadsheets/supporting documentation comparisons and data checks.
- Emission factors for CH<sub>4</sub> and N<sub>2</sub>O emissions from each of the Entergy fossil generation units were also checked. Minor, immaterial discrepancies in the coal-fired CH<sub>4</sub> and N<sub>2</sub>O emission factors were identified in those checks, and were subsequently corrected by Entergy during the course of the verification program.

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- Organizational and operational boundary verification checks revealed no discrepancies or omissions.
  - A re-calculation of CO<sub>2</sub> emissions was made for two (2) of the data-sampled generating units (RS Nelson 4 and 6), based on fuel heat input data, and CO<sub>2</sub> emissions factors. For the coal-fired unit (Unit 6), daily test burn measurements data (including coal feed rates and fuel composition analyses), provided an alternative, direct measurement of fuel heat input. The results of this alternative quantification methodology comparison showed all calculated daily total CO<sub>2</sub> output values being within +/- 2% of the reported value from the CEMS system for the natural gas-fired unit. Also, the alternative quantification methodology average daily CO<sub>2</sub> agreement was within +/- 3% of the CEMS values for the coal-fired unit. This degree of agreement between two alternative emissions quantification methodologies is deemed to represent an acceptable margin of error for an ISO 14064 limited level of assurance verification program. This is further corroborated considering that compliance-based CEMS measurements are generally significantly more accurate than most emission factor-based quantification approaches (especially compared to the use of default emission factors, as opposed to site-specific factors). Therefore, the alternative quantification methodology comparison results provide additional verification confirmation of the CEM systems measurement approach and results.
  - For the seven (7) natural gas-fired facilities with generation units audit-sampled (representing 14 total gas-fired units targeted), under this verification program, monthly and annual natural gas fuel use/total heat input data from the Entergy Gas Database (which tracks gas utility purchases and pipeline deliveries to Entergy generating stations) were compared to the EPA AMPD database results. (Note: Total heat input comparisons for natural gas-fired generation units were deemed appropriate here as the CEMS emissions reported are based on natural gas fuel flow rate measurements.) The results of these cross-check comparisons showed the facility-wide deviations between the two datasets had an overall average of +5.4% difference for the seven (7) natural gas-fired facilities sampled, and the top six (6) performing facilities having an average difference of +3.2%. Only one (1) of the facilities sampled exhibited a deviation greater than +/-10% (which was one of the smallest of the gas facilities sampled, representing <10% of the natural gas emissions sampled and ~1% of Entergy's total GHG emissions, and whose natural gas fuel flow meters had the most accurate annual calibration test results of the twelve (12) Entergy natural gas units' CEMS QA/QC data sampled). Given the distinct differences between the metering characteristics (e.g., Entergy's electric generation unit-specific natural gas fuel flow meters, and the respective natural gas pipeline company's utility gas sales meter), as well as the Entergy unit fuel flow measurements aggregated across a total of 2-5 power generation units, this level of agreement provides an additional degree of confidence in the reliability of reported results for Entergy's gas-fired generation, and reduction in the associated residual risk of misstatement.
  - For the five (5) Entergy-operated coal-fired units, and ten (10) of the natural gas-fired units selected for audit data sampling, comparisons on unit-specific fuel heat input from the EPA AMPD database were made by cross-checking MMBtu values from Entergy's Plant Performance Monitoring & Diagnostics (PM&D) department. This Entergy database contains unit operational data recorded by each unit's Pi historian (i.e., the data monitoring component of Entergy's supervisory control and data acquisition [SCADA] system). Unit-specific data were supplied on a monthly basis, for fuel flow, heat input (MMBtu), and power generation (MW-hr), for fifteen (15) of the twenty (20) audit-sampled units. The results of these cross-checking comparisons between the two datasets showed the individual units having an average deviation of **-1.4%** for the five (5) coal-fired units. For the ten (10) gas units with PM&D data, the individual unit deviations between the two data sets showed an average deviation of **-1.2%**. As in the case of the Gas

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Database comparison above, the results of this cross-check add further credibility to Entergy's coal- and gas-fired generation GHG emissions inventory reporting.

- For the four (4) units with hourly data supplied by Entergy, from the plants' on-site DAHS computer database archive systems, these hourly, "raw" data sets agreed with the final EPA-approved AMPD database 2013 annual results to within 0.01 to 0.10% for each of the 4 units. Such a low QA/QC adjustment of raw data throughout the 2013 reporting year is a further indicator of the reliability of Entergy's reported CEMS data.
- ICF's review of controllable purchased power emissions led to identification of incorrect emissions factors in a few cases as well as one mismatched amount of power from controllable sources. These were subsequently corrected by Entergy during the course of the verification.
- ICF's review of GHG emissions from small stationary combustion sources led to an incorrect application of equity shares for 3 plants. These were subsequently corrected by Entergy.
- ICF undertook a series of checks on non-controllable power purchases by requesting such data from ISB and TRADES. While our understanding of how such data can be extracted, the limitations in doing so, and the linkages between these systems increased, this effort underlined that further investigation (i.e., next year or thereafter) is warranted. In the meantime, the current method for obtaining non-controllable purchased data in view of limitations around the above data sets appears to be reasonable.
- Through the course of the verification, the data management systems and controls employed in the quantification of emissions were reviewed, as detailed in the Verification Plan procedures. These systems were found to be effective in the calculation of the GHG Assertion.

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## 6 Verification Team

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ICF International has carried out numerous facility-level GHG verifications and verifications of emission reduction projects. ICF has developed the necessary internal controls to ensure qualified and competent staffing uphold the principles of the relevant standard while quality control processes are utilized to assure data integrity is maintained and safeguarded. ICF's clients choose ICF for its strong brand, technical expertise, and rigorous methodological approach.

For this verification, ICF assembled a Verification Team consisting of experienced greenhouse gas verifiers and relevant technical experts.

### Verifiers

Craig Ebert is a Managing Director in ICF's Los Angeles Office, and supports commercial and public clients internationally on strategic management of the risks and opportunities posed by climate change and attendant impacts on shareholder value. He has worked for a wide variety of public and private clients, including most recently Yahoo!, News Corporation, eBay, Time Warner, Exelon, Duke, Fidelity, TransCanada, El Paso, World Bank, Lafarge, Repsol, Aracruz, and Petrobras. He has directed ICF's support to the US EPA as its primary climate change contractor, including support to about 50 countries under the US Country Studies Program, compilation of the official US greenhouse gas inventory to meet international commitments under the United Nations Framework Convention on Climate Change, and analysis of the cost and availability of options to reduce US emissions in support of international climate negotiations. His support includes assessing the cost and availability of various offset classes for different public and private sector clients and helping clients unlock the financial value of potential emission reduction projects in both voluntary and compliance markets.

Khalid Husain is a Manager for climate change mitigation and sustainability issues in ICF's Environmental and Social Sustainability Division within ICF's Energy, Environment and Transportation (EET) Practice. He has approximately 13 years of experience in climate change, energy and environmental issues in both public and private sector capacities. His current work involves a range of technical assistance on greenhouse gas management issues. Mr. Husain brings strong knowledge and experience in GHG inventory development and verification, as well as in corporate sustainability at large through work with diverse clients. He has carried out verification of GHG inventories against the Alberta's Specified Gas Emitters Regulation, California Climate Change Registry (CCAR), EPA Climate Leaders Protocol and the Carbon Disclosure Project. He has also worked on EPA Task Orders and is knowledgeable of international GHG emissions measurement and verification protocols. His experience also includes advisory and analytical services on carbon offsets, on both the buy and sell sides, for both voluntary and CDM projects. Services include undertaking feasibility studies, conducting risk assessments and due diligence, drafting and revising project design documents (PDDs), and reviewing methodologies for offsets. Mr. Husain holds a Masters degree in International Affairs, joint focus in Economic & Political Development & Environmental Studies from Columbia University, and a B.Sc. (Honors) degree in Earth and Planetary Sciences from McGill University.

Kevin Johnson (Cventure LLC) has over 25 years energy and environmental consulting experience, focusing over the last decade on climate change, greenhouse gas (GHG) and CO<sub>2</sub> emissions inventories, sustainability programs, and verification. In 2005, he founded Carbon Solutions, Inc., an independent consulting services firm, and in 2007 co-founded Cventure LLC. Mr. Johnson was a primary author of the “*Corporate GHG Verification Guideline*”, a CDP-approved verification standard, prepared for the US EPA Climate Leaders program. He also drafted the verification guidelines for the American Carbon Registry (ACR); and conducted dozens of verification projects, for various US companies’ GHG inventories, and carbon offset projects. Mr. Johnson has also led the development of a carbon offset project evaluation and quality rating software tool. Prior to forming Carbon Solutions, Inc., he previously served as the leader of URS Corporation’s corporate GHG/climate change practice. Some of his other project management experience includes sustainability report reviews and verification, corporate strategy development, carbon offset project/technology due diligence assessments and feasibility studies, GHG emission inventories/protocols, environmental management information system (EMIS) implementations, ERC verification and trading support, benchmarking, and life cycle analysis. Some climate change clients include Exelon, Eni, El Paso, Bloomberg LP, NewsCorp, Broadridge Financial Solutions, Compuware, Wal-Mart, Marathon, Unocal, Conoco, BlueSource, EDF, U.S. DOE, GRI, U.S. EPA, and several independent oil producers.

#### Internal Peer Reviewer

Chris Caners is a Professional Engineer in the Province of Ontario, and holds a Master of Science in Engineering from Queen’s University, as well as a Bachelor of Applied Science from the University of Toronto. He has completed supplementary verification training, receiving a certificate of training for ISO 14064. Chris has acted as the Lead Verifier for numerous facilities under Alberta’s Specified Gas Emitters Regulation, and British Columbia’s Greenhouse Gas Reporting Regulation, including power generating stations, natural gas linear facility operations, natural gas compressor stations, cogeneration plants, and SAGD facilities. Chris has also led third-party assurance and reassurance engagements for several offset projects under the Alberta Offset System, including wastewater treatment, wind electricity generation, aerobic composting, acid gas injection, and energy efficiency.

#### Conflict of Interest

ICF has conducted a review of any real or perceived conflicts of interest resulting from advocacy, intimidation, self-review, self-interest or familiarity. No threats to independence, either real or perceived, have been identified.

#### Statement of Qualifications

The information contained within this document and this statement of qualifications is complete and correctly represents the qualifications of ICF and the members of the Verification Team described herein. Dated this seventh day of May, 2014.



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Appendix

Verification Plan



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## Verification Plan

Entergy Corporation

March 7, 2014

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### 1 Introduction

This document provides details on the verification scope and process that was used to conduct a limited level verification of the 2013 organization-wide GHG inventory (“GHG Assertion”) for Entergy Corporation (“Entergy”). The GHG Assertion made by Entergy required the quantification of the emissions produced during calendar year 2013, and related primarily to stationary combustion of fossil fuels and from purchased power, as well as from a number of minor sources. An overview of operations for the organization is provided in the Verification Report. The Verification Plan evolved during the course of verification. The plan was updated through the course of the verification as additional information became available. This version of the Verification Plan is the final version of the document.

A Verification Risk Assessment was conducted during the verification planning stage; the results are provided in Section 6 of the Verification Plan. Verification procedures, including sampling that was carried out during this verification, are described in detail in Section 7 of the Verification Plan.

### 2 Verification Scope

#### 2.1 Objective

The primary objective of this verification engagement was to provide assurance to Entergy that the GHG Assertion is reliable, and of sufficient quality for:

- Internal purposes, namely tracking towards internal reduction targets as well as annual reports, corporate social responsibility (CSR) reports, and other disclosures;
- External voluntary reporting, primarily to the American Carbon Registry (ACR), the Carbon Disclosure Project (CDP), and the Dow Jones Sustainability Index (DJSI).

#### 2.2 Parties and Users

The person or persons responsible for the provision of the GHG Assertion and the supporting information, as defined in Section 2.23 of ISO 14064-1:2006, is the “Responsible Party”. For this verification, Entergy is the Responsible Party.

ICF International was engaged to provide a third-party verification of the GHG Assertion. Experts from ICF International as well as from Cventure comprised the “Verification Team”.

The “Intended User,” is defined in Section 2.24 of ISO 14064-1:2006 as the individual or organization identified by those reporting GHG-related information that relies on that information to make decisions. Entergy (and the public at large) are the intended users of the information contained in this verification.

### 2.3 Scope

The verification was conducted in accordance with *ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions*. The verification was carried out at a *limited level of assurance*.

The following table defines the scope elements specified for the organization.

Scope Element	ISO 14064-3 Definition
Boundary	The organization's corporate-wide boundary, including legal, financial, operational and geographic boundaries
Infrastructure and Activities	The physical infrastructure, activities, technologies and processes of the organization
GHG Sources	GHG sources to be included
GHG Types	Types of GHGs to be included
Reporting Period	Time period to be covered

The manner in which each of the above scope elements apply to Entergy's GHG Assertion are described below.

#### Boundaries

During the initial verification planning, the organizational boundaries and the sources, sinks and reservoirs ("SSRs") which would be required to be included in the emissions inventory quantification were explored. The procedures utilized to review the GHG Assertion were designed to support a *limited level* of assurance. These procedures systematically reviewed:

- the emissions sources included in the quantification procedures;
- the methodology employed in the quantification procedures;
- data handling, information and management system and associated controls, and quality assurance / quality control activities;
- any changes in the quantification methodology, or to organizational boundaries due to acquisitions or divestitures, as compared to previous corporate GHG emissions reports;
- the GHG Assertion

Entergy has chosen to include all company-owned assets and those under a capital lease consistent with *'equity share'* reporting under EPA and WRI/WBCSD GHG reporting protocols.

#### Infrastructure and Activities

According to Entergy's website<sup>3</sup>, "Entergy Corporation is an integrated energy company engaged primarily in electric power production and retail distribution operations. Entergy owns and operates power plants with approximately 30,000 megawatts of electric generating capacity, including more than 10,000 megawatts of nuclear power, making it one of the nation's leading nuclear generators. Entergy delivers electricity to 2.8 million utility customers in Arkansas, Louisiana, Mississippi and Texas. Entergy has annual revenues of more than \$10 billion and approximately 15,000 employees."

<sup>3</sup> Accessed on January 13, 2014 at [http://www.entergy.com/about\\_entergy/](http://www.entergy.com/about_entergy/)

### GHG Sources

The following key sources comprise the 2013 GHG inventory categorized by Entergy as follows:

<u>Entergy Category</u>	<u>Emissions Source Category</u>	<u>Corporate Emissions Source</u>	<u>GHGs Included</u>
Direct Emissions	Stationary Combustion	Power Generating Units	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O
		Small Stationary Combustion	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O
	Mobile Combustion	Corporate Fleet	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O
	Fugitive Emissions	Natural Gas Trans. & Dist.	CH <sub>4</sub>
		Electricity Trans. & Dist.	SF <sub>6</sub>
		Cooling/Air-Conditioning	HFCs
Indirect Emissions	Power purchased for business operations outside Entergy service territory	Power purchased for business operations outside Entergy service territory	CO <sub>2</sub>
	T&D Losses	Entergy Purchased Power Consumed on Entergy T&D Losses	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O
Optional Emissions Sources	Purchased Power (Controllable)	Controllable Purchased Power Sold to Customers	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O
	Purchased Power (Uncontrollable)	Uncontrollable Purchased Power Sold to Customers	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O

### GHG Types

The emission portion of the assertion accounts for the following greenhouse gases:

- Carbon Dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous Oxide (N<sub>2</sub>O)
- Hydrofluorocarbons (HFCs)
- Sulphur Hexafluoride (SF<sub>6</sub>)

Perfluorocarbons are not included in Entergy's inventory given the nature of its business and that this class of chemicals is not used in any of Entergy's operations in any sizeable amount.

The final inventory is expressed in both short metrics tons of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) as well as in metric tons CO<sub>2</sub>e.

### Reporting Period

The GHG Assertion covers the 2013 calendar year, namely 1 January 2013 to 31 December 2013 inclusive.

## 2.4 Materiality

During the course of the verification, individual errors, omissions or misrepresentations (collectively referred to as discrepancies) or the aggregate of these discrepancies were evaluated qualitatively and quantitatively.

Materiality defines the level at which discrepancies in the GHG Assertion or any underlying supporting information precludes the issuance of a limited level of assurance.

The verification team was responsible for applying professional judgment to determine if *qualitative* discrepancies could adversely affect the GHG Assertion and subsequently influence the decisions of the Intended User, in which case, the discrepancies were deemed to be material.

*Quantitative* discrepancies were calculated individually to determine the impact of the discrepancy as a percentage of the GHG Assertion.

All discrepancies that were outstanding at the conclusion of the verification were documented in the Verification Report and classified on an individual basis as either material or immaterial

### Materiality Threshold

In the framework of a corporate entity-wide GHG inventory, the concept of materiality was defined in the context of the overall uncertainty in the reported data. A quantity, in this case errors and/or uncertainties associated with reported results, was typically considered to be “material” if it would influence any decision or action taken by users of the information. This definition of materiality was consistent with verification guidelines and goals for the reliability of reported data.

Materiality is not the same as a *de minimus* emissions threshold for either the exclusion of specific sources from the inventory, or the use of estimated values without ongoing, annual collection of associated activity data. While a *de minimus* exclusion from the inventory would contribute to overall uncertainty, completeness is only one component contributing to overall uncertainty.

Entergy's current GHG inventory management plan and reporting document (IMPRD) states that “..emissions estimated to be less than 1% of the total inventory are considered *de minimus* unless they are anticipated to change dramatically and grow above this threshold.” Given the nature and relative magnitude of the various types of emissions sources in Entergy's GHG inventory, such a *de minimus* size threshold for Entergy's quantification methodology approach was chosen by Entergy. However, for its GHG inventory verification program, an appropriate materiality threshold had to be devised in line with uncertainty and risk estimates. Based on those assessments, a materiality threshold for an initial ISO verification program, conducted to achieve a limited level of assurance, was agreed upon at 10%. This materiality threshold may be breached by individual errors, or the aggregate of the absolute sum of multiple errors detected in the various SSRs, but that the overall materiality threshold should be maintained at 10%.

Individual discrepancies and the aggregate of individual discrepancies were analyzed to determine if the materiality threshold has been breached.

## 2.5 Principles

ISO 14064-3:2006 defines six principles that should be upheld in the development of the GHG Assertion. These principles are intended to ensure a fair representation and a credible and balanced account of GHG emissions. The verification procedures developed and executed during the course of this verification presented evidence such that each of these principles was satisfied.

### Relevance

Appropriate data sources are used to quantify, monitor, or estimate GHG sources. Appropriate minimum thresholds associated with emissions levels, i.e., from *de minimus* sources, are used to justify the exclusion or the aggregation of minor GHG sources or the number and/or frequency of data points monitored.

### Completeness

All sources within Entergy's boundaries (as defined earlier) are included within an identified source category.

### Consistency

Uniform calculations are employed between the base year and current accounting/reporting periods. Emission calculations for each source are calculated uniformly. If more accurate procedures and methodologies become available, documentation should be provided to justify the changes and show that all other principles are upheld.

### Accuracy

Measurements and estimates are presented, without bias as far as is practical. Where sufficient accuracy is not possible or practical, measurements and estimates should be used while maintaining the principle of conservativeness.

### Transparency

Information is presented in an open, clear, factual, neutral, and coherent matter that facilitates independent review. All assumptions are stated clearly and explicitly and all calculation methodologies and background material are clearly referenced.

### Conservativeness

Appropriate parameters affecting the sources are utilized in the calculation of the GHG Assertion. When parameters or data sources are highly uncertain, the choice of a specific parameter, data source, or estimated or default value to be utilized, results in an overestimation of the GHG Assertion (i.e., total annual emissions would be overstated for the sake of conservativeness, and to avoid the risks associated with understating reported emissions).

## 2.6 Limitation of Liability

Due to the complex nature of the operations within the organization and the inherent limitations of the verification procedures employed, it is possible that fraud, error, or non-compliance with laws, regulations, and relevant criteria may occur and not be detected.

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### 3 Verification Team

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ICF International has carried out numerous facility-level GHG verifications and verifications of emission reduction projects. ICF has developed the necessary internal controls to ensure qualified and competent staffing uphold the principles of the relevant standard while quality control processes are utilized to assure data integrity is maintained and safeguarded. ICF's clients choose ICF for its strong brand, technical expertise, and rigorous methodological approach.

For this verification, ICF assembled a Verification Team consisting of experienced greenhouse gas verifiers and relevant technical experts. The roles of the Verification Team and Internal Peer Reviewer are provided below, followed by relevant bios.

#### Lead Verifier

The Lead Verifier was responsible for all activities conducted within the verification, including overseeing the development of the Verification Plan and the execution of the verification procedures. The Lead Verifier was the lead author of the Verification Report and executed the Verification Statement at the conclusion of the engagement.

#### Technical Expert(s),

The Verification Team was supported by the Technical Expert(s), who reviewed the Verification Risk Assessment and provided advice on the development of the Verification Plan to ensure risks are addressed with rigorously designed verification procedures. The Technical Expert was also available to the Verification Team through the course of the verification to provide assistance with any issues as they arise.

#### Internal Peer Reviewer<sup>4</sup>,

The Internal Peer Reviewer was not a member of the Verification Team and did participate in the verification until the draft Verification Report and draft Verification Statement were prepared. The Internal Peer Reviewer conducted an internal assessment of the verification to ensure the verification procedures were completed, the results of the verification thoroughly documented, any issues or discrepancies investigated and the verification evidence was sufficient to reach the verification conclusion described in the Verification Statement.

#### Verifiers

Khalid Husain is a Manager in the Climate Change Mitigation and Sustainability group of ICF's Energy, Environment and Transportation (EET) Practice. A LEED-EB accredited professional, he has approximately 13 years of experience in climate change, energy and environmental issues in both public and private sector capacities. His current work involves a range of technical assistance on greenhouse gas management issues. Mr. Husain brings strong knowledge and experience in GHG inventory development and verification, as well as in corporate sustainability at large through work with diverse clients. He has carried out, or is in the process of conducting, verification of GHG inventories under ISO 14064, Alberta's Specified Gas Emitters Regulation, California Climate Change Registry (CCAR), EPA Climate Leaders Protocol and the Carbon Disclosure Project. He has also worked on EPA's Task Order 70 and is knowledgeable of international GHG protocols for the EU ETS, CDM and JI. His

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<sup>4</sup> Note: the Internal Peer Reviewer is not a member of the Verification Team, but is listed here to keep the list of personnel involved in the engagement in one place.

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experience also includes advisory and analytical services on carbon offsets, on both the buy and sell sides, for both voluntary and CDM projects. Services include undertaking feasibility studies, conducting risk assessments and due diligence, drafting and revising project design documents (PDDs), and reviewing methodologies for offsets. Mr. Husain holds a Master's degree in International Affairs, joint focus in Economic & Political Development & Environmental Studies from Columbia University, and a B.Sc. (Honors) degree in Earth and Planetary Sciences from McGill University.

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#### Internal Peer Reviewer

Chris Caners is a Professional Engineer in the Province of Ontario (Canada), and holds a Master of Science in Engineering from Queen's University, as well as a Bachelor of Applied Science from the University of Toronto. He has completed supplementary verification training, receiving a certificate of training for ISO 14064. Chris has acted as the Lead Verifier for numerous facilities under Alberta's Specified Gas Emitters Regulation, and British Columbia's Greenhouse Gas Reporting Regulation, including power generating stations, natural gas linear facility operations, natural gas compressor stations, cogeneration plants, and SAGD facilities. Chris has also led third-party assurance and reassurance engagements for several offset projects under the Alberta Offset System, including wastewater treatment, wind electricity generation, aerobic composting, acid gas injection, and energy efficiency.

## 4 Verification Process

The ICF approach for conducting verification of a GHG Assertion followed the tasks outlined in the following diagram. Although these tasks are generally completed sequentially, the order was modified according to circumstances such as scheduling and data availability.

Pre-Engagement	Approach	Execution of Verification	Completion
<b>1.</b> Selection of Lead Verifier <b>2.</b> Initiate Conflict of Interest Procedure <b>3.</b> Pre-Engagement Planning <b>4.</b> Contract Execution <b>5.</b> Initiate Verification Tracking	<b>6.</b> Selection of Verification Team <b>7.</b> Communication with Client/Responsible Party <b>8.</b> Kick-off Meeting <b>9.</b> Assess GHG Program & Revise Procedures as Required <b>10.</b> Draft Verification Plan (including sampling procedures) <b>11.</b> Verification Risk Assessment	<b>12.</b> Site Visit(s) <b>13.</b> Conduct Verification Procedures <b>14.</b> Issue Clarification & Data Request <b>15.</b> Revise & Finalize Verification Plan <b>16.</b> Address and Evaluate Outstanding Issues	<b>17.</b> Evaluate Evidence <b>18.</b> Hold Verification Findings Meeting (if necessary) <b>19.</b> Draft Verification Report & Statement <b>20.</b> Internal Peer Review <b>21.</b> Issue Verification Report & Statement <b>22.</b> Close Verification File <b>23.</b> Develop and Issue Management Memo

### 4.1 Pre-Engagement

Prior to submitting a proposal to conduct this verification, the following pre-planning steps were taken:

- The results of any previous business engagements or verifications with the Responsible Party were reviewed to determine if any previous unresolved conflicts may preclude ICF from engaging in the verification;
- The client's motivation for completing the verification was established; and
- A Conflict of Interest procedure was initiated that documents whether any perceived or real conflicts were found when considering threats due to:
  - Advocacy
  - Financial Interest
  - Familiarity/Sympathy
  - Intimidation
  - Self-Review
  - Incentives

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Following the acceptance of the proposal and signing of a contract for services, the Verification Team was selected. The Verification Team for this engagement is comprised of the individuals identified in Section 3.

## 4.2 Approach

An extensive knowledge of the Responsible Party's business, the relevant industry, and the details of the Responsible Party itself are required to conduct a thorough verification that can lead to a conclusion. The initial information collected about the Responsible Party and the Facility formed the basis of the preliminary draft Verification Plan. The development of the final Verification Plan was an iterative process; that is, the document was revised through the course of the verification and the resulting plan was updated as new information became available.

There are three types of risk associated with the GHG Assertion defined in ISO 14064-3:

- Inherent Risk
- Control Risk
- Detection Risk

The process of designing the Verification Plan involved the development of Verification Risk Assessment for the Responsible Party. The steps in this process included:

- Reviewing the GHG Assertion, and the methodologies employed by the Responsible Party;
- Assessing the likelihood that a material misstatement might exist in the GHG Assertion, if no controls were used to prevent misstatements in the GHG Assertion (i.e. inherent risk);
- Assessing the control environment and the corporate governance process (i.e. control risk); and
- Reviewing each emission source identified by the Responsible Party, and evaluating the contribution of each source to the GHG Assertion and the associated potential material discrepancy for each.

The results of the Verification Risk Assessment inform the development of the verification procedures, which are documented in Section 7 of the final Verification Plan. A summary of the Verification Risk Assessment is provided in Section 6.

Given that the verification team has conducted corporate GHG inventory verifications for Entergy the last four years, a key principle that has guided the verification is the importance of improvement both with regard to the inventory (and the data it contains and underlying calculations) as well as the information systems, data management procedures and QA/QC protocol that Entergy employs in the process of developing the 2013 inventory..

## 4.3 Execution of Verification

With the Verification Plans in place, the verification procedures were executed. This process involved collecting evidence, testing internal controls, conducting substantive testing, and developing a review file. Over the course of the verification, the Verification Plan evolved.

### Site Visit

The site visit was conducted by Khalid Husain and Kevin Johnson from January 27-30, 2014 inclusive in Texas and Louisiana. During the course of the site visit, ICF:

- a) interviewed key site operations personnel regarding the operations and data management of a selected coal plant (RS Nelson) and gas plant (Waterford Plant, Units 1 and 2), both plants in Louisiana to cross-check GHG data as well as gain a deeper understanding of GHG information systems and controls at plant levels.

- b) undertake discussions with the ISB, TRADES, Coal Supply, Gas Supply, PM&D Unit, CEMS Unit (all of these in the Woodlands, TX) as well as Generation and Fuel Accounting and Operations IT systems (these two in New Orleans, LA) regarding data they supply for purposes of the GHG Assertion as well as related data and information management systems;
- c) discuss in depth the verification approach, data review procedures and other aspects of the verification with the Entergy point of contact for the verification, Rick Johnson.

Key Entergy personnel interviewed include:

- Rick Johnson, Manager, Corporate Environmental Operations (based in New Orleans but accompanying the ICF team during this trip)
- Rhonda Kratzer, RS Nelson Plant
- Richard Covers and Seth Folse, Environmental Department (Waterford Plant)
- Grady Kaough, TRADES
- Charles John, ISB
- Ryan Trushenski and Scott Marino, Coal Supply
- David Sommers, Gas Supply
- Tad Chenet and Minh Nguyen, CEMS Unit
- Stanley Jaskot and K T Huang, PM&D
- Scott Celino, Generation and Fuel Accounting
- Ryan Plaisance, Operations IT

During the site visit all major GHG emission sources for the RS Nelson and Waterford plants were reviewed to ensure appropriate identification and categorization. A review of process flow and metering diagrams was followed by physical observation of the facilities, collection of relevant data and confirmatory checks (as possible) on meters and other equipment.

#### Collecting Evidence and Review of Documentation

Sufficiency and appropriateness are two interrelated concepts that are fundamental to the collection of verification evidence. The decision as to whether an adequate quantity (sufficiency) of evidence has been obtained is influenced by its quality (appropriateness).

Through the execution of the verification procedures (including sampling that was conducted) as described in Section 7, the Verification Team reviewed key forms of evidence including physical, documentary and testimonial.

- Management documentation: policies, programs, and procedures related to the collection, safeguarding, and management of the data supporting the GHG Assertion;
- Records: records comprise time-sensitive data, correspondence, and files.
- Interviews: the interviews will provide information regarding operations and data management and will provide evidence to support the sufficiency of data controls; and
- Computer systems: data systems used to capture and manage the GHG-related data and to calculate the GHG Assertion.

The following are the key data systems that were reviewed:

- TRADES – controllable power purchases tracking system: hourly purchase amounts from 1/1/2013 to 12/31/2013 inclusive were extracted and sent via Excel to ICF by Grady Kaough (via Rick Johnson).
- Generation Fuels and Accounting – Monthly purchased power totals for 2013 (12 months for 2013) in PDF form were sent to ICF by Scott Celino (via Rick Johnson).

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- PM&D data – for large fossil generating stations.
  - CEMS data – for large fossil generating stations (as well as for small stationary sources that have CEMS)
  - Gas purchases data – monthly for all gas-fired electric generating units – from David Sommers: purchase amounts inputted into ISB.
  - Coal purchases data – from Ryan Trushenski (solid fuels): purchase amounts inputted into ISB.

The following non-critical data was requested and obtained for exploratory checks and knowledge enhancement for both GHG data comparison purposes as well as for information systems:

- TRADES – a subset of non-controllable power purchases data from 1/1/2013 to 12/31/2013 inclusive was extracted and sent via Excel to ICF by Grady Kaough..
- ISB (Intra-system billing) – Purchased power data was sent by Charles John.

### Testing and Assessment of Internal Controls

The Verification Team developed a sufficient understanding of the GHG information system and internal controls to determine whether the overall data management system is sound and if it supports the GHG Assertion. This assessment sought to identify any weakness or gaps in the controls that pose a significant risk of not preventing or correcting problems with the quality of the data and examining it for sources of potential errors, omissions, and misrepresentations. It incorporated an examination of three aspects of the Responsible Party's internal controls: (1) the control environment, (2) the data systems, and (3) the control and maintenance procedures.

### Assessment of Data

Substantive testing procedures were used to assess the reasonability and validity of the GHG Assertion. Both quantitative and qualitative analysis were performed to achieve the desired level of assurance. The verification procedures (including sampling) are described in Section 7 as separate tables for each process or activity involved in the quantification and reporting of the GHG Assertion. The verification procedures included verification activities designed to:

- Review the Responsible Party's boundary, including a review of the completeness of emission sources identified;
- Review the Responsible Party's data sources to ensure the GHG Assertion is calculated based on metered or estimated data;
- Re-calculate the GHG Assertion, which demonstrates transparency and accuracy; and
- Review the GHG Assertion to ensure the emissions calculated by the Responsible Party has been accurately reported.

### Information and Data Log

To facilitate information flow between the Verification Team and the Responsible Party and to track meetings and associated requests for information and clarification, a documents log was developed through the course of the verification and issued to the Responsible Party. This log was used to track the request and receipt of documents.

### Developing a Review File

A review file (the "File") comprised of documents, records, working papers and other evidence collected and created during the course of the review that support the review conclusions will be developed for this verification. This evidence stored in hard copy and/or electronic format w served to provide support for the verification conclusion, provided evidence that the verification was conducted in accordance with the criteria set forth in this document, and aided the Verifier in conducting current and future reviews.

The File included:

- The GHG Assertion and supporting documentation, as submitted to Entergy;

- Decisions on the level of materiality and the results of the Verification Risk Assessment;
- Documentation on the Responsible Party's internal controls;
- Descriptions of the controls assessment work and results;
- Documentation of the substantive testing procedures that were carried out and the results;
- Copies of any correspondence with the Responsible Party or other parties relevant to the review;
- The Verification Team's working papers;
- The Clarification and Data Request with documented responses from the Responsible Party; and
- Client data (copies of relevant records, spreadsheets, and other data files).

#### 4.4 Completion

This engagement was formally closed after the verification was executed and the Verification Report finalized.

#### Preparing the Verification Report

The purpose of the Verification Report is to document the verification findings. All discrepancies are described and compared to the materiality threshold individually and in aggregate. The Verification Statement, which presents ICF's verification conclusion, is included in the Verification Report.

#### Internal Peer Review Process

Prior to releasing the Verification Report and Verification Statement, an internal review process was conducted by the Internal Peer Reviewer. This process ensured that:

- All steps identified as being required to complete the verification were completed;
- Any identified material or immaterial discrepancies identified have been either:
  - corrected by the Responsible Party and reflected in the GHG Assertion; or
  - documented in the Verification Report, if discrepancies persist at the conclusion of the verification.
- All required documentation detailing the verification process has been prepared, delivered, and retained.

#### Closing the Engagement

The verification engagement will be closed out upon delivery of the final Verification Report.

### 5 Verification Schedule

The following schedule was planned for the verification (subject to change with agreement between the Verifier and the Responsible Party).

Description	Scheduled Date
Verification Kick-Off Meeting	December 12, 2013
Draft Verification Plan to Responsible Party	January 20, 2014
Site Visits	January 27-30, 2014
Preliminary Data Requests	Late December 2013/Jan. 2014
Initial GHG Assertion & Data Requests	February 7, 2014
Clarifications on GHG Assertion	February 28, 2014
Draft Verification Statement and Report	March 5, 2014
Final Verification Statement and Report	March 7, 2014

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## 6 Verification Risk Assessment

There are three types of risk associated with the GHG data management system and the GHG Assertion defined in ISO 14064-3:

- Inherent Risk
- Control Risk
- Detection Risk

The assessed level of risk for this verification dictates the degree of rigor planned for the verification procedures described in Section 7. Our established audit procedures and documentation systems ensured a thorough treatment of any risk identified, including determination of magnitude and sensitivity of that risk, during the assessment process. A qualitative risk assessment was completed based on observations made by reviewing and assessing accompanying documentation, as well as assessing available information such as the GHG inventory file, interviewing key personnel, and reviewing supporting documents.

The *inherent* risk in Entergy's corporate-wide 2013 GHG inventory emanated from the large and complex nature of the company, the number of parties involved in managing their emissions inventory and developing their assertion, the number of emission sources, a large number of natural gas, oil and coal plants used in the process, and a large number of power purchases occurring throughout the year. Entergy Corporation is an integrated energy company engaged primarily in electric power production and retail distribution operations. Entergy owns and operates power plants with approximately 30,000 megawatts of electric generating capacity, including more than 10,000 megawatts of nuclear power, making it one of the nation's leading nuclear generators. For the large CEMS-equipped generation units, because there are so many of them in Entergy's system (~50 units with significant operations in 2013), there would have to be multiple, long duration control failures to create errors which could lead to a material misstatement of Entergy's entity-wide inventory. (For example, in the 2010 case of two highly unusual CEM system failures, which each went undetected for several months, while they affected 2010 GHG emissions of each unit by 5-10%, their collective impact on Entergy's overall 2010 corporate GHG inventory was less than 1%.)

Another inherent risk that was new in 2013 (and thus a factor the verification team considered during the course of this exercise) is the extent to which the transition to MISO in late 2013 (Dec. 19, 2013 onwards) may have affected SOC's operations. In particular, the verification team tried to determine if any of the underlying data that forms the 2013 GHG Assertion, and/or the information management systems that produce such data, may have been affected by this transition. It was concluded that it is highly unlikely that the underlying data was incorrect or incomplete, since the method of tracking and recording purchased power did not materially change; furthermore, the transition only affected the last 12 days of 2013. We note that MISO, going forward from December 2013, is now making the power demand forecasts, and dictating to Entergy to purchase given amounts of power, from specific independent power plants during specific time periods; but MISO is not responsible for the tracking/data management of that power which is purchased by Entergy.

Due to these reasons, the inherent risk has been assessed to be medium for Entergy's 2013 GHG inventory.

*Control risk* relates to the likelihood that a material misstatement in the 2013 GHG inventory was not prevented or detected by Entergy's internal control and data management systems. Control risks were assessed primarily by reviewing data controls and management systems for large fossil generating units and purchased power, both comprising in aggregate approximately 98% of total company-wide emission as noted in the 2013 GHG Assertion. This percentage has remained largely the same over the last three years. The largest control risk in relation to the 2013 GHG assertion was the manual transcription method in which the inventory was prepared (i.e., emissions values are extracted from various sources and manually entered into an Excel spreadsheet; this is true for all emissions sources including the largest ones, namely stationary combustion and purchased power). For purchased power, a number of data systems (such as TRADES and non-controllable oil/gas and coal purchases) feed into ISB

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(intra-system billing system). Both the individual data systems that comprise data input into ISB, as well as ISB itself, undergo QA/QC checks numerous times, both on a monthly and on an annualized basis. This year, the verification team requested ISB to send data extract from 2013 and triangulate it with data from TRADES and other sources for confirmatory checks. When extrapolated to a full-year basis, we found an approximate 4% difference, hence close. For all of the large, CEMS-equipped fossil fuel electric generation units, which contribute approximately 65% of Entergy's total GHG emissions inventory, there are very rigorous measurement, monitoring, and reporting (MMR) requirements established by the U.S. EPA. These CEMS MMR programs, and their robust associated QA/QC activities, serve as the basis for demonstrating regulatory compliance with various federal Clean Air Act and state air permit compliance requirements. Also, the equipment utilized in these CEM systems are well established technologies with demonstrated track records of accuracy, precision, and reliability. Because of all of these reasons, the control risk was assessed to be low.

The *detection risk* is a measure of the risk that the verification evidence collected and reviewed will fail to detect material misstatements, should such misstatements exist. Unlike *inherent* and *control* risk, which are typically attributes of the facility types and technologies employed therein, *detection* risk is variable but can be maintained at a low level by designing an appropriate number of tests, and collecting an adequate sample size. ICF conducted a number of sampling tests, focused on large fossil electric generation units and purchased power facilities. These tests are outlined in Section 7 of the Verification Plan. Overall, the verification team's procedures were designed to minimize detection risk. Our final assessment is that detection risk was low (in line with previous years' verification exercises), given the large number and appropriateness of the verification sampling/checking tests which are focused on the largest GHG inventory segments, i.e., CEMS units and power purchases (by relative magnitude), of Entergy's 2013 GHG Assertion.

These tests were designed and targeted at the greatest risk areas within Entergy's overall GHG inventory information management and data quality control system, namely the manual parts of the process.

## 7 Verification Procedures

### Summary of Procedures:

#### Organization Boundaries and Definition

B1: Organization Boundaries, Infrastructure and Activities

B2: Review of Operating Conditions

#### Calculation

C1: True Up and Re-Performance Calculation

C2: Minor/Negligible Emissions – Methodology and Documentation

#### Data Sources and Supporting Data

D1: Data Collection and Quality Controls

D2: Data Confirmation against External Sources

D3: Data Migration into Inventory

#### Assertion

A1: Final Verification Assessment

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## Procedure Definition Table Explained

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Z1 – Example Procedure Category – Example Procedure Title	
Introduction: This introduction serves to explain the reason the Verification Team is undertaking the procedures described below. For instance, the inclusion of all emission sources ensures that that quantification of the total direct emission satisfies the principle of completeness.	
Type of Evidence	The Type of Evidence can usually be grouped as: Physical Examination, Confirmation, Documentation, Observation, Inquiries of the Client, Re-performance, or Analytical Procedures.
Data Sources	The <i>Data Sources</i> describes the form in which the evidence is presumed or is known to be available to the verification team. Specific Documents or Assigned Positions, for example.
Objective (specific principles)	The objective serves to focus the procedure as pursuant to one or more of the audit principles of: <i>Relevance, Completeness, Consistency, Accuracy, Transparency, or Conservativeness</i> .
Specific Activities	<ul style="list-style-type: none"> <li>• In bullet form;</li> <li>• The <i>Specific Activities</i> are outlined here.</li> </ul>
Error Conditions	<ul style="list-style-type: none"> <li>• Again in bullet form;</li> <li>• The anticipated <i>Error Conditions</i> are listed here to aid the verification team;</li> <li>• As the Verification Plan is a living document until the end of the verification process, additional error conditions may be identified during the execution of the procedures.</li> </ul>

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## Facility Boundaries and Definition

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B1 – Facility Boundaries, Infrastructure and Activities	
Introduction: This procedure evaluates the boundaries defined by the Responsible Party against the GHG Assertion.	
Type of Evidence	Documentation, Observation, Inquiries of the Client, Physical Examination
Data Sources	Inventory Management Plan (IMP), Process Flow Diagrams, GHG Assertion, Previous GHG Assertions, Facility Operations Personnel, 10-K, Annual Reports
Objective (specific principles)	<i>Completeness, Consistency</i>
Specific Activities	<ol style="list-style-type: none"> <li>1. Compare the GHG emission sources listed for the organization in the GHG Assertion against GHG emission sources listed in previous GHG Assertions;</li> <li>2. Compare the GHG emission sources listed for the organization in the GHG Assertion against relevant annual reports, 10-K submissions, Entergy's website regarding operations and assets, and any relevant process flow diagrams for completeness;</li> <li>3. Compare the GHG emission sources listed for the organization in the GHG Assertion against observations made during site tour for completeness;</li> <li>4. Interview operations personnel regarding changes to equipment inventory or changes in operation that have occurred in the current reporting period;</li> <li>5. Interview relevant operations personnel regarding completeness of equipment inventory described in the GHG Assertion;</li> <li>6. Evaluate the appropriateness and quantification of any negligible emission sources.</li> </ol>
Error Conditions	<ul style="list-style-type: none"> <li>• GHG emission sources that are not reported in the GHG Assertion.</li> </ul>

B2 – Review of Operating Conditions	
Introduction: This procedure utilizes analytical procedures to identify changes in the scope of the GHG Assertion. This procedure was largely completed during the verification planning stage.	
Type of Evidence	Analytical Procedures, Inquiries of the Client, Documentation (i.e. IMP)
Data Sources	GHG Assertion, Operations Personnel, Data from major sources such as fossil generation units and purchased power
Objective (specific principles)	<i>Consistency, Completeness</i>
Specific Activities	<ol style="list-style-type: none"> <li>1. Interview operations personnel regarding any operational issues that may have caused a significant change to the reported emissions (e.g. planned or unplanned shutdown, change in production, change in process);</li> <li>2. Compare total emissions for each GHG emission source in the current period against prior periods;</li> </ol>
Error Conditions	<ul style="list-style-type: none"> <li>• Significant changes in emissions (including wide variances between 2013 data vs. earlier years, particularly for fossil units, such as CEMS data, or purchased power amounts, through TRADES) do not constitute an error condition, but do warrant further investigation and clarifications.</li> </ul>

Calculation

C1: True Up and Re-Performance Calculations	
<p>Introduction: As part of verification procedures, ICF will check calculations for each emissions source, with an emphasis on purchased power, large stationary fossil plants (CEMS units), and small stationary units which together comprise over 98% of total corporate-wide GHG emissions for 2013. In order to ensure the accuracy of the GHG Assertion, the objective of this procedure is re-perform the calculations independent from the calculations performed by Entergy.</p>	
Type of Evidence	Documentation, Re-performance
Data Sources	<p>2013 GHG Inventory Management Plan and Reporting Document (IMPRD) In addition:</p> <ol style="list-style-type: none"> <li>1. Purchased power:                             <ol style="list-style-type: none"> <li>a. Controllable trades (on daily basis from 1/1/2013 to 12/31/2013 from Grady Kaough) from TRADES (Excel extracts), as well as sorted and purchased totals from Rick Johnson (also in Excel) as double-check.</li> <li>b. Total purchased power (monthly basis from January to December 2013) in the form of ISB extracts (12 PDFs) from Scott Celino.</li> </ol> </li> <li>2. Large stationary fossil plants:                             <ol style="list-style-type: none"> <li>c. Selected CEMS reports, 20 in total (from Tad Chenet/Minh Nguyen; the plant site visit contacts at RS Nelson and Waterford; and the PM&amp;D group); sampling is at the smallest units corresponding to ~1% of total direct emissions (~0.5% of total ETR emissions), expected to represent in total approximately 69% of Entergy power generation direct emissions. These are:                                     <p><u>Coal</u></p> <ul style="list-style-type: none"> <li>• Big Cajun 2 – 2B3</li> <li>• Independence 1</li> <li>• Independence 2</li> <li>• RS Nelson 6</li> <li>• White Bluff 1</li> <li>• White Bluff 2</li> </ul> <p><u>Gas</u></p> <ul style="list-style-type: none"> <li>• Attala AO1</li> <li>• Attala AO2</li> <li>• Baxter Wilson 1</li> <li>• Baxter Wilson 2</li> <li>• Hot Spring 1</li> <li>• Hot Spring 2</li> <li>• Little Gypsy 1</li> <li>• Little Gypsy 2</li> <li>• Little Gypsy 3</li> <li>• Ninemile Point 4</li> <li>• Ninemile Point 5</li> </ul> </li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>• RS Nelson 4</li> <li>• Waterford 1</li> <li>• Waterford 2</li> </ul> <p>d. Coal purchasing (Ryan Trushenski) and two (2) short-term test burns data for three (3) coal plants.</p> <p>e. Gas purchasing (Dave Sommers) gas burn data – all plants – monthly basis.</p> <p>f. Plant performance monitoring and diagnostics (PM&amp;D) data: monthly fuel use, boiler heat input, and gross power generation for most of the auditing sample selected units. CEMS supporting documentation and QA/QC back-up data for selected audit sample units.</p> <p>3. Small stationary combustion: 2012 data reported to EPA's GHG Reporting Program (GHGRP) through Sub-Part C.</p> <p>4. All other sources: carry-over from previous years with updated GWP values</p>
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Objective (specific principles)	<i>Accuracy, Transparency</i>
Specific Activities	<p><u>General</u></p> <ol style="list-style-type: none"> <li>1. Review documentation for completeness;</li> <li>2. Recalculate emissions numbers.</li> <li>3. Perform checks</li> </ol> <p><u>Emissions Factors</u></p> <ol style="list-style-type: none"> <li>4. Calculate emissions from each emission source category from each sampled Facility</li> <li>5. Confirm and re-calculate (if applicable) emission factors against independent reference material.</li> </ol>
Potential Error Conditions	<p><u>General</u></p> <ul style="list-style-type: none"> <li>• Disagreement between calculated and reported values;</li> <li>• Incorrect application of significant figures in calculation;</li> <li>• Disagreement between allocated values or inconsistent methodology.</li> </ul> <p><u>Emissions Factors</u></p> <ul style="list-style-type: none"> <li>• Incorrect or out of date emissions factors and global warming potential (GWP) factors</li> </ul>
Sample Unit	<p><u>1. Purchased Power:</u></p> <ol style="list-style-type: none"> <li>a. All controllable trades (daily) extract in Excel</li> <li>b. Emissions totals for total purchased power on monthly and year-to-date basis</li> </ol> <p><u>2. Large stationary fossil plants:</u></p> <ol style="list-style-type: none"> <li>a. 20 units selected for sampling in relation to PM&amp;D data (request sent to Stanley Jaskot) and EPA CAM checks, representing ~45% of total Entergy corporate emissions, and ~55% of Entergy's Stabilization Commitment emissions levels, including:</li> </ol> <p><u>Coal Units</u></p> <ul style="list-style-type: none"> <li>• Big Cajun 2 – 2B3</li> <li>• Independence 1</li> <li>• Independence 2</li> <li>• RS Nelson 6</li> <li>• White Bluff 1</li> <li>• White Bluff 2</li> </ul> <p><u>Gas Units</u></p> <ul style="list-style-type: none"> <li>• Attala AO1</li> <li>• Attala AO2</li> <li>• Baxter Wilson 1</li> <li>• Baxter Wilson 2</li> <li>• Hot Spring 1</li> <li>• Hot Spring 2</li> <li>• Little Gypsy 1</li> <li>• Little Gypsy 2</li> <li>• Little Gypsy 3</li> </ul>

	<ul style="list-style-type: none"> <li>• Ninemile Point 4</li> <li>• Ninemile Point 5</li> <li>• RS Nelson 4</li> <li>• Waterford 1</li> <li>• Waterford 2</li> </ul> <p>For the selected units ICF would like to receive the following unit-specific, reported data from a query of the PM&amp;D database of historical data, for calendar year 2013:</p> <ul style="list-style-type: none"> <li>• Fuel flow: MCF for gas or tons for coal</li> <li>• Heat input: MMBtu</li> <li>• Power generation: MW-hr</li> <li>• Average heat rate for aggregation period: Btu/kw-hr</li> <li>• Aggregation period for reporting totalized activity data on fuel flow, heat input, and power generation on a <u>monthly</u> basis.</li> </ul> <p>b. CEMS reports – for the following coal-fired and gas-fired units– request made to Tad Chenet/Minh Nguyen at Fossil Environmental; to the Entergy site visit environmental contact; or to the Entergy liaison for non-ETR-operated facilities:</p> <p><u>Coal</u></p> <ul style="list-style-type: none"> <li>• Big Cajun 2 – 2B3</li> <li>• Independence 1</li> <li>• Independence 2</li> <li>• RS Nelson 6</li> <li>• White Bluff 1</li> <li>• White Bluff 2</li> </ul> <p><u>Gas</u></p> <ul style="list-style-type: none"> <li>• Attala AO1</li> <li>• Attala AO2</li> <li>• Baxter Wilson 1</li> <li>• Baxter Wilson 2</li> <li>• Hot Spring 1</li> <li>• Hot Spring 2</li> <li>• Little Gypsy 1</li> <li>• Little Gypsy 2</li> <li>• Little Gypsy 3</li> <li>• Ninemile Point 4</li> <li>• Ninemile Point 5</li> <li>• RS Nelson 4</li> <li>• Waterford 1</li> <li>• Waterford 2</li> </ul> <p>For each of the above CEMS-equipped gas or coal-fired units, ICF will request the following information for calendar year 2013:</p>
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	<ul style="list-style-type: none"> <li>• Gas flow meter accuracy test/CEMS gas flow transmitter calibration analysis (gas-fired units)</li> <li>• CO<sub>2</sub> and stack gas flow meter CEMS relative accuracy test audit (RATA) annual test results (coal-fired units)</li> <li>• CO<sub>2</sub> CEMS quarterly linearity checks (coal-fired units)</li> <li>• CO<sub>2</sub> quarterly electronic data reports (EDRs)</li> <li>• ECPMS (emissions collection and monitoring plan system) feedback reports: Q1 – Q4</li> </ul> <p>For the coal and gas units, respectively, at RS Nelson and Waterford, ICF will request similar information as above from the respective plant managers/environmental managers on site, including hourly CO<sub>2</sub> data for 2013 from the RS Nelson and Waterford on-site CEMS data acquisition and handling systems (DAHS).</p> <p>3. <u>Small stationary plants</u> – check “fossil fuel generating stations” emissions against EPA GHGRP data for 2012 (whichever is most recent and available) for confirmatory checks against data and emissions numbers in the 2013 GHG Assertion.</p> <p>4. <u>All other sources</u>: Carry-over value from previous years with updated GWPs</p>
<p>Sample Size</p>	<p>All emissions sources and values for:</p> <ul style="list-style-type: none"> <li>- Purchased power, broken out by controllable trades and total purchased power (to account for non-controllable trades).</li> <li>- Large stationary fossil plants:</li> <li>- Small stationary combustion (fossil generating plants only)</li> <li>- All other sources (carry-over values from previous years with updated GWPs)</li> </ul>
<p>Materiality Threshold</p>	<p>10% of the GHG Assertion; qualitative errors will be reviewed on a case by case basis for materiality.</p>

<b>C2 – Minor/Negligible Emissions - Methodology and Documentation</b>	
Introduction: In order to ensure that all relevant emission sources are included in the GHG Assertion, it is necessary to confirm that any negligible emission sources have been appropriately excluded.	
Type of Evidence	Documentation, Discussions with Entergy's Environmental Manager
Data Sources	2013 GHG Assertion, IMP
Objective (specific principles)	<i>Accuracy, Transparency</i>
Specific Activities	<ol style="list-style-type: none"> <li>1. Review minor/negligible sources and discuss with Entergy environmental manager</li> <li>2. Compare to earlier year inventories (2009, 2010, 2011, and 2012)</li> </ol>
Potential Error Conditions	Material emission source(s) improperly excluded from GHG Assertion
Sample Unit	N/A
Sample Size	Minor/negligible emission categories and sources
Materiality Threshold	Qualitative and quantitative errors will be reviewed on a case by case basis for materiality

<b>C3 – Re-Performance of Calculations</b>	
Introduction: In order to ensure the accuracy of the GHG Assertion, this procedure re-performs the calculation independent from the calculations performed by the Responsible Party.	
Type of Evidence	Re-performance, Inquiries of the Client
Data Sources	Original Facility or Third-Party Activity Data
Objective (specific principles)	<i>Accuracy, Conservativeness</i>
Specific Activities	<ol style="list-style-type: none"> <li>1. Calculate emissions from each emission source category from each Facility;</li> <li>2. Confirm and re-calculate (if applicable) emission factors against independent reference material.</li> </ol>
Error Conditions	<ul style="list-style-type: none"> <li>• Disagreement between recalculated and reported values;</li> <li>• Incorrect application of significant figures in calculation;</li> <li>• Incorrect or out of date emission factors</li> </ul>

## Data Sources and Supporting Data

<b>D1 – Data Collection and Quality Controls</b>	
Introduction: This procedure is intended to systematically review the Responsible Party's internal procedures and controls that are used to calculate the GHG Assertion.	
Type of Evidence	Documentation, Confirmation, Observation, Inquiries of the Client, Analytical Procedures
Data Sources	Data systems personnel, Operations personnel, Standard Operating Procedures and Manuals
Objective (specific principles)	<i>Completeness, Consistency, Accuracy, Transparency, Conservativeness</i>
Specific Activities	<ol style="list-style-type: none"> <li>1. Observe or interview operations personnel regarding the operation of data transfer systems, including manual data entry procedures and associated controls;</li> <li>2. Review or interview operations personnel regarding on-site sampling, laboratory and other analytical procedures;</li> <li>3. Compare original data sources to data in calculation systems for consistency.</li> <li>4. Assess the conformance of the GHG information systems and controls with the verification criteria.</li> <li>5. Discuss during a teleconference with Ryan Plaisance on IT systems: <ul style="list-style-type: none"> <li>• OIT's major activities, e.g., database queries for SPO/SOC/TOCs, data systems management, data QA/QC and validation checks, etc.</li> <li>• EMS database: overall system description, major inputs/outputs, and system linkages to other ETR supporting databases</li> <li>• Generation Management Systems: systems used to collect, record, and track power generation, fuel use, and purchased power data <ul style="list-style-type: none"> <li>○ SPO system</li> <li>○ SOC system</li> <li>○ Associated primary queries/data outputs and major reports</li> </ul> </li> <li>• Other related, key supporting ETR data systems of interest, and their relation, if any, to the EMS: <ul style="list-style-type: none"> <li>○ SCADA systems/Pegasus; control room data</li> <li>○ TRAKR (EA)</li> <li>○ System Data Exchange (SDX)/Historical Data Retriever</li> <li>○ TRADES/ETAG-RoboTag system(s)</li> <li>○ ISB</li> <li>○ Gas/Coal Supply Purchasing</li> <li>○ Generation and Fuel Accounting</li> </ul> </li> <li>• Primary repository(-ies) of regulatory/revenue quality-level data (e.g., for power generation, fuel use, and purchased power)</li> <li>• ETR responsible party(-ies) for NERC/FERC regulatory reporting on fossil power generation-related data (e.g., unit heat rate, reliability, etc.)</li> </ul> </li> </ol>
Error Conditions	<ul style="list-style-type: none"> <li>• Inconsistency between raw data and data supporting the GHG Assertion</li> <li>• Inconsistency and/or unclear links between information management systems that are of the most relevance to the underlying data for the 2013 GHG Assertion</li> </ul>

<b>D2 – Data Confirmation against External Sources</b>	
Introduction: Where possible, this verification procedure is used to provide further evidence to the data used to calculate emissions and production quantities reported.	
Type of Evidence	Confirmation, Analytical Procedures
Data Sources	<p>Inventory Report and supporting external data/information:</p> <p><u>1. Large fossil generating stations:</u></p> <p>a. PM&amp;D data – monthly (all 12 months for 2013).</p> <p>b. CEMS data – ECMPS reports (for 20 gas and coal-fired units (representing ~69% of Entergy power generation direct emissions, and ~45% of total Entergy emissions), and EPA CAM emissions database query reports.</p> <p>c. Gas and coal burn data – monthly for all gas units (all 12 months for 2013); two sets of select daily burn data for RS Nelson, White Bluff, and Independence plants.</p> <p>d. All CEMS-related QA/QC documentation for RS Nelson and Waterford units, and hourly CO<sub>2</sub> data for each of those plants' individual generation units (RS Nelson 4 and 6, and Waterford 1 and 2, respectively).</p> <p><u>2. Purchased Power</u></p> <p>a. ISB back-up transactions information and other relevant records from Charles John.</p> <p><u>3. Small stationary combustion sources – 2012 (or later) EPA GHG Reporting Program data submitted for all fossil generating stations - annual</u></p>
Objective (specific principles)	<i>Accuracy, Conservativeness</i>
Specific Activities	<p>1. Review use of external data sources in GHG inventory for appropriateness;</p> <p>2. Compare reported/metered values to those provided by secondary sources</p>
Potential Error Conditions	<ul style="list-style-type: none"> <li>Unexplained, major discrepancy between metered/reported values and secondary source (including purchased power data cross-checks with ISB data);</li> </ul>
Sample Unit	Typically monthly or annual data primarily, limited cross-checks on daily data
Sample Size	<p><u>1. Large fossil generating stations:</u></p> <p>a. PM&amp;D data – for 15 units (representing ~40% of total Entergy corporate-wide GHG emissions).</p> <p>b. CEMS data – ECMPS reports – for 20 gas and coal-fired units (representing ~69% of Entergy power generation direct emissions, and ~45% of total Entergy corporate-wide GHG emissions).</p> <p>c. Gas and coal burn data – monthly (all 12 months for 2013) – for all gas units, and two sets of select daily data for White Bluff and Independence plants, and for RS Nelson 6.</p>

	<p>d. All CEMS-related QA/QC documentation and hourly DAHS CO<sub>2</sub> emissions data for RS Nelson and Waterford units.</p> <p><u>2. Purchased Power – All data with a focus on controllable vs. non-controllable data from ISB, as a means of cross-checking with data from Generation and Fuels Accounting.</u></p> <p><u>3. Small stationary combustion sources – 2012 (or later) EPA GHG Reporting Program data submitted for all fossil generating stations – annual</u></p>
Materiality Threshold	Quantitative errors will be reviewed on a case by case basis for materiality.

<b>D3 – Data Migration into Inventory</b>	
Introduction: This procedure is intended to review the transfer of data from calculations into the final GHG inventory (“GHG Assertion”), including any summary calculations that were required.	
Type of Evidence	Documentation, Re-Performance
Data Sources	Inventory Report, IMP, discussions with Entergy's Environmental Manager
Objective (specific principles)	<i>Accuracy, Transparency</i>
Specific Activities	<ol style="list-style-type: none"> <li>1. Recalculate summary calculations performed by Entergy;</li> <li>2. Compare calculated values to those in the GHG Assertion for transcription accuracy;</li> </ol>
Potential Error Conditions	<ul style="list-style-type: none"> <li>• Discrepancy between summary totals and individual sector values reported in GHG Assertion</li> </ul>
Sample Unit	Data reported in the final GHG Assertion
Sample Size	All relevant information and emissions values
Materiality Threshold	Any discrepancies

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## Assertion

<b>A1 – Final Verification Assessment</b>	
Introduction: This procedure is intended as a final review of Entergy's 2013 GHG Assertion to ensure all required information is complete and all required documentation is attached.	
Type of Evidence	Documentation
Data Sources	GHG Assertion
Objective (specific principles)	<i>Completeness</i>
Specific Activities	<ol style="list-style-type: none"> <li>1. Review each page of the GHG Assertion and IMP for completeness and current information;</li> <li>2. Provide Responsible Party with documentation, namely a verification statement and report, required for submission to voluntary reporting protocols</li> </ol>
Potential Error Conditions	<ul style="list-style-type: none"> <li>• Incomplete, inaccurate, or missing information in the GHG Assertion</li> </ul>
Sample Unit	Data fields in the GHG Assertion
Sample Size	All fields in the GHG Assertion
Materiality Threshold	Any incomplete, inaccurate, or missing information