Greenhouse Gas Inventory Management Plan and Reporting Document (IMPRD)

Entergy Corporation
New Orleans, LA

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Original Draft: July 2005
Finalized: December 2005
Latest Update: March 2013

Entergy's GHG Commitment Snapshot
Base Year – 2000

Original Commitment Years –	2001 to 2005
Original Commitment –	Stabilize at 2000 levels direct CO_2 emissions from power plants
Original Commitment Funding –	$25 million ($5 million per year)
Second Commitment Years –	2006 to 2010
Second Commitment –	20% below 2000 levels direct CO_2 emissions & cont. purchased power
Second Commitment Funding –	$3.25 million ($650K per year)
Third Commitment Years –	2011 to 2020
Third Commitment –	20% below 2000 levels direct CO_2 emissions & cont. purchased power
Third Commitment Funding –	$10 million ($1 million per year)

Entergy Corporation Greenhouse Gas Inventory Management Plan and Reporting Document

Introduction and Background

In May 2001, Entergy publicly committed to stabilize CO_2 emissions from its power plants at year 2000 levels through 2005, and dedicated $25 million in supplemental corporate funding to achieve this target over the five-year period. This commitment was focused on CO_2 emissions from fuel combustion at the company's power plants and requires that Entergy:

- Stabilize CO_2 emissions from its U.S. power plants at year 2000 levels through 2005.
- Establish the $25 Million Environmental Initiatives Fund (EIF) in support of achieving the 2001-2005 stabilization targets.
- Document activities and annual report progress.
- Employ an independent third party organization to verify measurement of Entergy's CO_2 emissions from U.S. power plants.

Entergy joined EPA's Climate Leaders Program in 2004 (the program was discontinued in 2010) and began the process of renewing its GHG commitment by developing a detailed inventory of all GHGs resulting from its operations. The inventory development and results were documented in this Inventory Management Plan and Reporting Document (IMPRD). Entergy's second commitment included:

- Stabilize CO_2 emissions from all Entergy power generation plants plus controllable purchased power at 20% below 2000 levels through 2010.
- Commit funding of $3.25 million in support of achieving the 2005-2010 target.
- Document activities and annually report progress.

In 2011, Entergy once again renewed its commitment to stabilize GHGs with a third commitment:

- Stabilize CO_2 emissions from all Entergy power generation plants plus controllable purchased power at 20% below 2000 levels through 2020.
- Commit funding of $10 million in support of achieving the 2011-2020 target.

- Document activities and annually report progress.

Beginning in 2012, Entergy decided to conduct the third-party verification audit to the International Standards Organization (ISO) standard for GHG development and verification (ISO 14064-3:2006). As a part of this verification, this document was revised and upgraded to include several aspects required by the standard.

This IMPRD has been created and subsequently revised according to the requirements in the World Resources Institute and the World Business Council for Sustainable Development Greenhouse Gas Protocol, 2004 revised edition, and formatted according to the US EPA Climate Leaders 2004 draft checklist of IMPRD components. Additionally, the document was upgraded in 2012 to the standards contained in ISO 14064-3:2006.

This IMPRD is used to create and document an inventory that was previously reported to the Climate Leaders program and other external parties. However, EPA announced in 2010 that the Climate Leaders program was being discontinued. This IMPRD will continue to be updated and used to document Entergy's GHG Inventory methodology and results on an annual basis. Entergy has made an estimate of all emissions, including small sources, for reporting externally. Entergy registers its emissions and offset purchases to the American Carbon Registry (www.americancarbonregistry.org) and posts the GHG Inventory, along with this document, on the company's website (www.entergy.com).

The current GHG Inventory (by calendar year) is attached to this document as Attachment 1 and is referenced throughout.

Reporting Entity Information

Entergy Corporation (Entergy) 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 $11 billion (2012) and approximately 15,000 employees. Additional company information can be located at www.entergy.com.

Company address:	639 Loyola Avenue New Orleans, Louisiana 70113
IMPRD/GHG Inventory Contact:	Chuck Barlow – Vice President, Environmental Strategy & Policy Environmental Strategy & Policy (ESP) Group (504) 576-4000 cbarlow@entergy.com

Boundary Conditions

Consolidated Approach for Emissions Reporting – Entergy has elected to include all company-owned assets and those under a capital lease, consistent with "equity share" reporting under EPA and WRI reporting protocols. Where partial ownership share of an asset exists, only Entergy's owned portion of the asset/emissions is included in the inventory. Additionally, Entergy has opted to include those emissions associated with the electricity purchased to support grid operations and meet customer demand, primarily due to an increased reliance on purchased power since 2003. The GHG emissions resulting from the full life cycle of the various fuel sources are not included in the inventory.

Other emission sources (including transportation assets, sulfur hexafluoride [SF_6], building air conditioning and refrigeration equipment, losses from natural gas distribution system, etc.) that have 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. Emissions of each GHG from facilities/assets that are *de minimus* are estimated and included in the inventory for each gas and/or source. The same data are used for future years unless one of the categories of emissions changes significantly. These estimates will be recalculated approximately every five years (or as updated data becomes available), after major equipment changes, asset acquisition and/or asset divestiture in order to reconfirm *de minimus* status.

Facilities List –The majority of Entergy's emissions are from fossil-fueled electricity generation facilities. However, other sources include small sources at other company facilities, a full list of facilities included in the inventory is contained in Attachment 1. This list identifies Entergy's fossil-fueled electricity generation assets and ownership share. All other GHG emission-producing assets are assumed to be 100% owned by Entergy.

List of GHGs Included – Entergy includes the following from various sources in its inventory and management program:

- Carbon dioxide (CO_2)
- Methane (CH_4)

- Nitrous Oxide (N_2O)
- Sulfur Hexafluoride (SF_6)
- Hydrofluorocarbons (HFC)

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.

Entergy Corporation Emission Sources

Process for Identifying Emissions Sources – The Climate Leaders spreadsheet "General Emission Source Checklist" (Attachment 2), was created by Platts/E source as contractors to EPA's Climate Leaders program, and was originally utilized as an overall roadmap to help identify GHG emission sources at Entergy locations. Within each line item, a determination was made as to the applicability to Entergy's operations. The findings of this analysis are presented in the section below. Additionally, publicly-available data, previous equipment inventories, internal company data, and existing air permit information were utilized to identify GHG sources at company locations. This includes an extensive analysis and estimates of emissions from small combustion sources co-located at electrical power generating facilities or at stand alone facilities. The specific information gathered and its sources are shown in Attachment 1 and 2 and summarized in the sections below. Additionally, this information was further refined and updated based on data submitted to the EPA for the mandatory GHG reporting rule in 2011. Entergy is confident that this methodology has captured emission estimate information for the majority of small source equipment at its locations.

Direct Sources

Entergy's direct emissions are included in the following categories:

- ⇨ Stationary combustion: Entergy's direct sources of GHGs include emissions from the direct combustion of fossil-fuels in electrical generation boilers and small sources at company facilities.
- ⇨ Mobile Combustion: Fossil fuels combusted in company fleet vehicles.

- ⇨ Fugitive Emissions: Methane (CH_4) from natural gas distribution systems, SF_6 from power transmission and distribution equipment, and HFCs from building HVAC systems and district cooling operations.

Company activity data sources including contacts and information for the various emissions from and/or usage of these assets are included in Attachment 2.

Indirect Sources

Entergy's indirect sources of emissions include those from purchased electricity and electrical line transmission/conversion losses. Data sources for the various emissions from and/or usage of these assets are included in Attachment 2. All electricity consumed in the operation of generating plants and consumed in Entergy's various administrative and commercial buildings and operations are accounted for in Entergy's direct emissions for stationary combustion. Additionally, line losses for self-generated and purchased electricity are accounted for by the additional generation necessary to make-up for these losses. There are no other indirect sources included in Entergy's inventory or program.

Optional Sources

Entergy is reporting emissions associated with power purchased to meet customer demand and support grid operations. This emission source is not required under EPA and WRI reporting protocols. Entergy has elected to report these emissions because it has decreased its self generation while increasing the amount of power it purchases. Subsequently, trends in the Direct emissions category will not accurately represent the full corporate emissions footprint and trends toward a reduction goal. Including purchased power presents the most accurate representation of the emission footprint required to support grid operations and meet customer demand. Other optional sources such as employee travel and commuting are not included at this time; however, these will be evaluated for inclusion in the future.

GHG Emissions Quantification

Quantification Method and Emission Factors

The quantification methodologies used in the Entergy inventory are commonly accepted methods for measuring GHG emissions. For inventory years 2000-2004, Entergy used methodologies outlined in the EPA Climate Leaders Protocol, or methodologies proposed by Platts/E source staff and approved by EPA Climate Leaders staff. In a number of cases, Entergy has used conservative estimation methodologies for expected *de minimus* emission sources (<1% of corporate total). In all cases, these estimation methodologies were reviewed and approved by EPA Climate Leaders staff and subsequently verified by a third-party. When emissions are based on these conservative estimates, they are identified as such below.

Emission factors used for the initial inventory were derived from various sources including *USEPA Climate Leaders GHG Protocol* (derived from AP-42), US DOE, and EPA's eGRID system; these factors are updated as needed. The quantification methodologies, emission factors and their sources can be found in the GHG inventory calculation spreadsheets, accessible through Entergy's external website (www.entergy.com – see Environment/Performance).. Entergy remained engaged with the EPA Climate Leaders Program updates and staff until the program was eliminated by the agency. Entergy will monitor WRI protocol and other leading sources for updates in order to stay aware of any changes to quantification methodologies, emission factors, or protocol changes.

These approaches for emission quantifications were chosen because they represent the most accurate and, in most cases, the only data source for such an exercise. Other methods were not chosen due to the fact that other methods simply do not exist.

Direct Emissions

Entergy's direct emissions are either measured directly via a continuous emissions monitoring (CEM) system, calculated using emission factors and fuel throughput or other relevant data, or estimated using equipment capacity factors and maximum fuel throughput data. Direct GHG emissions are quantified separately for each GHG, and

then aggregated across Entergy by GHG constituent. The quantification method and data source for each major category of direct GHG sources is detailed below.

Fossil-Fuel Combustion Boilers and Gas Turbines – Entergy's electrical generation equipment is heavily regulated by state and federal agencies and is required to report emissions on a periodic basis. A continuous emission monitoring (CEM) system is used at most plants to directly monitor emissions. CO_2 is directly monitored in these systems and other GHGs, such as CH_4 and N_2O, are calculated based on the data collected by these systems. However, in some cases, CO_2 is calculated based on fuel throughput and heat rate data. However the CO_2 number is derived, it is reported to the EPA as required under various agency regulatory programs. In 2012, this category represented 68.7% of the corporate total.

Source: This GHG emissions data is reported to the ESP Group by Entergy's Fossil Environmental Support Group annually (at a minimum).

Small Sources at Company Facilities – This category includes equipment such as emergency generators, house service boilers, natural gas-fired comfort heaters, and other small combustion/emission sources not monitored by CEM systems at company facilities. Inventories for 2000 to 2010 used an available equipment inventory and information contained in facility air permits and compiled by facility personnel, small source emissions were calculated for each plant for which this data was available. This data was compiled in 1994 in the Fossil Operations Equipment Inventory.

In 2011, Entergy reported small sources to the EPA under the mandatory GHG reporting rule. These numbers were used in the 2011 inventory in order to align regulatory reporting with this voluntary inventory. Changes to the overall number were not material. In 2012, this category represented 0.9% of the corporate total.

Transportation Fleet Vehicles – Entergy's Transportation Group maintains a detailed inventory of vehicles owned and/or leased throughout the company. This

group also tracks information regarding the fleet's fuel usage and miles traveled. Additionally, Entergy's Aviation Group (part of Human Resources and Administration) maintains fuel usage information for our fleet of corporate aircraft. This information was updated with 2012 data and used to calculate GHG emissions for this equipment category. In 2012, this category represented 0.1% of the corporate total. Entergy decided not to include GHG emissions resulting from employee business travel and employee commuting; however, it may be included in the future. Fleet emissions were quantified using units of all mobile fossil fuels and default emission factors.

Source: The source of this information is the Manager, Transportation and the Aviation Group.

Fugitive Emissions: Methane – This category of emissions includes losses of methane from Entergy's natural gas distribution system and Entergy's natural gas storage facility. Losses of methane from the distribution system were estimated using the Gas Research Institute's protocol which USEPA may adopt as its standard methodology for quantifying these emissions. This protocol uses input data such as miles of pipe and number of services (steel, coated, and plastic), number of meters (commercial and residential) and gas vented to estimate methane emissions from these types of distribution systems. The emissions from the storage facility were estimated, using Tier 1 factors for natural gas storage for both vented and fugitive natural gas. In 2012, this category represented 0.2% of the corporate total.

Source: These input data were obtained from the Manager, Gas Distribution Operations and Fossil Operations, Sabine Plant.

Fugitive Emissions: HFCs – This category of emissions includes losses of HFCs from HVAC equipment at buildings which Entergy owns or for which it holds a capital lease, from Entergy's district cooling/thermal operations (chillers), and from Entergy vehicular air conditioning. For the indoor air cooling equipment, square footage of company building space was collected and an emission factor

developed by Platts/E source was applied to this number in order to estimate HFC losses from this equipment. This emission factor is based on national averages of tonnage of equipment per square foot of space and average leakage rates of common air conditioning equipment. An investigation revealed that no HFC-based air or water pre-cooling is performed at any Entergy electric power generation facilities. Conservative estimates were completed for all sources of HFC emissions; this category of emissions was determined to be *de minimus*. In 2012, this category represented less than 0.1% of the corporate total. For the district cooling operations, information regarding chiller equipment located at these facilities, along with estimates of equipment leakage rates were used to derive the initial inventory estimates. The calculations behind all factors used in estimating HFC emissions can be found in the inventory spreadsheet (Attachment 1).

Source: The source of this information was the Manager, Real Estate Operations and the Director, Thermal Operations.

Fugitive Emissions: SF_6 – This category of emissions includes operational and unintentional releases of SF_6 used in electricity transmission equipment. Emissions of this gas are estimated using a protocol similar to the protocol utilized for EPA's SF_6 Emission Reduction Partnership Program. The protocol for derivation of this emission estimate is primarily a mass balance exercise. In 2012, this category represented 0.3% of the corporate total.

Source: The source of this information is the Manager, Environmental in Entergy's Transmission and Distribution Organization. SF_6 emission estimates are reported to ESP at least once per year.

Estimates completed for each fugitive GHG emissions category above resulted in finding that **aggregated fugitive emissions from all sources across Entergy are *de minimus*.** Accordingly, a consistent quantity of emissions is included in the inventory for each emissions source category and will be carried forward annually unless a significant change in this category occurs.

Indirect Emissions

Transmission/Distribution System Line Losses – Line losses associated with power purchased to support the utility operations are considered required indirect emissions under EPA and Scope 2 Indirect under WRI reporting requirements. Emissions from T&D losses of purchased power are calculated by applying Entergy's system loss factor to the total amount of power purchased. The custom loss factor is developed using power data from the 5 utilities' FERC Form 1s (specific data noted in "purchased power" worksheet in inventory). This custom factor was calculated for 2004 data using 2004 FERC forms and applied to purchased power amounts of previous years of GHG inventories (2000-2003) rather than recalculating this factor for each prior year. This emission estimate is calculated and presented; however, it is not subtracted from the purchased power emission number described below since the bulk of purchased power is generated from within Entergy's service area. T&D line losses are already accounted for in the extra generation required to make up for these losses.

Optional Emissions

Purchased Power – This category of emissions includes those from power purchased by Entergy to supplement its own supply in order to meet customer demand and/or support utility operations. In some cases, the source of this power is known (controllable or unit-contingent purchases). The remaining sources of purchased power are either not known (non-controllable or grid purchases) or can not be controlled for some other reason. Under the EPA and WRI protocols, including emissions from power purchased by utilities is optional. Entergy has opted to include all purchased power in its GHG inventory and subsequent tracking since these purchases are required to meet customer demand and in order to fully characterize the GHG footprint of its operations. In 2012, this category represented 29.6% of the corporate total.

Both controllable and non-controllable purchase information (in terms of millions of megawatt-hours) was collected. In the case of non-controllable purchases, the SERC MS Valley emission factors from the eGRID system (2010 version using 2007 data) were used to calculate GHG emissions. In the case of controllable purchases, supplier and unit-specific emission rate information from eGRID, where available, was used to develop a supplier-specific custom GHG emissions factor. If supplier-specific GHG emission factors were not available, the regional grid factor from eGRID was used as a default.

To avoid double counting, intra-system billing (ISB) purchases were subtracted from the non-controllable purchase total. These purchases are from the Entergy unregulated generation business (Entergy Wholesale Commodities – EWC) and are already accounted for in direct emissions. This results in obtaining the "non-affiliated purchases" from the appropriate data manager.

Source: All data regarding power purchases were obtained and are available from Entergy's System Planning Group. Primary contact for the data was the Sr. Staff Engineer in the Energy Analysis and Reporting Group. Generation Accounting supplies the TOTAL purchased power number for the entire company.

Data Management

Activity Data

In all cases, the best available activity data was used to calculate or estimate emissions from a specific source. All collected data for each source is maintained by the data source identified in the previous section.

The primary source of data related to Entergy's largest category of emissions (representing 68.9% of total corporate emissions in 2012) is CEM system data. CEM system data from monitored plants is managed by Entergy's Fossil Environmental Support Group. CEM system data is closely managed and maintains a high level of quality control as required by EPA regulations (40 CFR Part 75). The Director, Fossil Environmental Support is responsible for maintaining these data; the primary contact for these data is the Supervisor, Emission Monitoring and Markets. CEMS data is sourced from the data acquisition and handling system (DAHS), which is the software package used to manage and query CEMS data. A report is generated for the annual CO_2 emissions and provided to the Manager, Corporate Environmental Operations (see further description below of how the inventory is generated).

Controllable Power purchase information is managed by the Manager, System Planning using an internally developed software package called TRADES. This system is used by the power buyers to track, validate and eventually invoice individual transactions necessary to support grid operations. Total power purchase data is sourced from the Manager, Generation and Fuels Accounting and is sourced from the General Ledger (GL). ISB feeds data into the GL on a monthly basis; accordingly, the initial source of these data is ISB through the GL. Other data categories are managed as described in the section above.

Data Management

All data required for the inventory is either reported to or collected by the Manager, Corporate Environmental Operations in the ESP Group in the January/February

timeframe. This information is maintained in electronic files and calculation spreadsheets. The specific steps of the process are described further below:

- DATA RECEIPT – the data described above are transmitted to ESP in the form of spreadsheet files via email attachment. This transmittal method is secure and reliable. Once received, the spreadsheet files are saved to a shared Directory under the 'GHG Inventory' folder.

- DATA REVIEW AND MANIPULATION – spreadsheets are accessed and reviewed for the relevant information. In some cases, the data are sorted, totaled and formatted to facilitate entry into the inventory spreadsheet. The data also is reviewed during this step to evaluate the overall magnitude to identify any obvious errors or omissions.

- DATA ENTRY – data is entered into the draft working version of the GHG inventory. During this step, an additional review for data reasonableness and completeness is performed. Any obvious errors or omissions are addressed directly with the data manager by phone or email, as needed. All of the data sources are either entered directly into the inventory or are used for further calculation of the necessary data points required to develop the overall inventory. All supporting calculations and spreadsheets are housed on the shared directory noted above.

- QA/QC AND TECHNICAL REVIEW – where data entry is required, a double check and a reverse double check is always performed. A double check review is simply another review of the numbers entered into the working draft version of the inventory, while a reverse double check is an evaluation of the data entered against the working draft version of the inventory to ensure all data points are included. Once this review is completed, the draft version is circulated to several technical reviewers within the company; feedback is used to modify the inventory as needed.

Annual inventories and IMPRD updates are published and posted on SENet, Entergy's intranet portal for all information related to Safety and Environmental issues. Additionally, Entergy posts the total inventory number, along with the verification statement and other information to its registry account with the American Carbon Registry (www.americancarbonregistry.org) and on Entergy's external website (www.entergy.com – see Environmental/Performance). Entergy will continue to use and update the inventory template in future years in order to remain as consistent as possible.

Key Performance Indicator Selection and Data Collection

Entergy's goal is to stabilize GHG emissions at 20% below 2000 levels on an absolute basis through 2020. The goal does not use emissions intensity; however, on an as needed basis, Entergy does calculate and evaluate GHG emission intensities. The primary intensity measure used is tons of emissions per megawatt hour.

Data Collection Process Quality Assurance

The owners of data identified in the previous section are responsible for maintaining data quality assurance. Every effort should be made to ensure that the data reported are accurate and complete. ESP will evaluate the data, once collected, to ensure that it is reasonable and consistent with past years. ESP will also conduct and document QA checks during the production of the inventory.

As part of the process each data manager uses for collecting GHG data, they must define and document any areas of possible error and the QA/QC actions they use to maintain accuracy. CEMS data quality is maintained in accordance with the compliance requirements contained in EPA regulations (40 CFR Part 75). Any departures from these data quality measures (i.e. non-compliance events) should be communicated to ESP. Possible errors in emissions factors and calculations are also documented with the emissions factors and calculations records. Any inconsistencies and large unexpected changes from the previous year's data should be sufficiently explained when the data is transmitted. The Manager, Corporate Environmental Operations will compare the current

year's data for each source category to the previous year's data in order to identify any large, unexpected variations. The data also is reviewed and all calculations validated to ensure that the calculations are correct.

Data Collection System Security and Integrated Tools

Data is typically transferred through Entergy's e-mail system. Security of this system is the responsibility of the IT group. Security of the data once it is collected and consolidated is the responsibility of ESP. Every effort will be made to ensure the security of the inventory information, primarily by saving this information to the shared directory in the 'GHG Inventory' folder. The shared directory is only accessible by employees in the ESP group. Entergy's external website (www.entergy.com) and the Entergy's registry account with the American Carbon Registry (www.americancarbonregistry.org) will serve as the final publication repository for the GHG inventory.

Frequency

Data will be reported to/collected by ESP on an annual basis. This information will be used to produce an updated GHG inventory each year. No later than the end of the 1st quarter of each year, ESP will produce an updated inventory for the previous calendar year. A verification audit will be conducted by an independent third-party. Beginning in 2012, this verification audit will be conducted in accordance with the international standard – ISO 14064.3. This updated inventory will be used to track progress against the reduction goal discussed above.

Base Year

Adjustment for Structural Changes – The base year (2000) will be adjusted for mergers, acquisitions, and divestitures that occur during the reporting time frame for the goal. Actual yearly emissions the acquisition of each emission-producing entity/asset that existed during the base year will be added to the base year and each year that follows. Emissions from divestitures of assets that existed during the base year will be removed from the base year and every year that follows. Mergers and capital leases on emission-producing assets will be planned in the same manner as the acquisitions to the degree that

it is practical. There are no planned adjustments for outsourcing. Mergers, acquisition, divestitures, and capital leases will be identified by ESP and integrated into the GHG inventory for the calendar year when the deal closes. Additionally, data managers should keep ESP informed of any such changes. Finally, ESP will monitor such changes through the investment approval process, which it participates in on as a subject matter expert.

Since 2000, Entergy has purchased and divested several assets. The table below shows these transactions and describes any adjustments to the base year that were required, along with a justification of such changes.

Transaction/Asset	**Year of Close**	**Year of COD**	**Comments**
Hinds County Plant (acquisition)	2012	2001	Did not exist in base year – no adjustment needed
Hot Spring Plant (acquisition)	2012	2002	Did not exist in base year – no adjustment needed
Rhode Island Plant (acquisition)	2011	2002	Did not exist in base year – no adjustment needed
Harrison County Plant (divestiture)	2011	2003	Did not exist in base year – no adjustment needed
Acadia Plant (acquisition)	2011	2002	Did not exist in base year – no adjustment needed
Ouachita Plant (acquisition)	2008	2002	Did not exist in base year – no adjustment needed
Calcasieu Plant – Unit 1 (acquisition)	2008	2000	Estimated plant emissions fall well below materiality threshold (1%) – no adjustment needed
Calcasieu Plant – Unit 2 (acquisition)	2008	2001	Did not exist in base year – no adjustment needed
Perryville Plant (acquisition)	2005	2001/2	Did not exist in base year – no adjustment needed
Spindletop Gas Storage (acquisition)	2004	Pre-2000	Estimated plant emissions fall well below materiality threshold (1%) – no adjustment needed
Thermal Plant – Houston (acquisition)	2003	Pre-2000	Estimated plant emissions fall well below materiality threshold (1%) – no adjustment needed
Thermal Plant – NOLA (acquisition)	2000	Pre-2000	Estimated plant emissions fall well below materiality threshold (1%) – no adjustment needed

Adjustment for Methodology Changes - Changes will be made to calculations and emissions factors only if justified by regulatory changes, scientific/engineering judgment, or updates to the various protocols employed. The Vice President, Environmental

Strategy & Policy will make the final decision as to whether or not make such adjustments. In cases where changes are made, the changes will be made to all years in the inventory, including the base year, so that all emissions are reported using the same basis for all years.

An **IMPRD Revision Log** is included in this document as Attachment 4 and should be used to document any structural or methodological changes to corporate greenhouse gas inventories or this IMPRD.

Management Tools

Roles and Responsibilities

The Vice President, Environmental Strategy & Policyis responsible for overall GHG program management and external reporting. This individual is also responsible for compiling the data required to update the GHG inventory on an annual basis before the end of Q1 and for evaluating the reasonableness of the GHG data.

He/she also reviews changes to the programs that Entergy participates in and updates the IMPRD as needed. These responsibilities are defined in more detail in specific sections of this IMPRD. ESP then produces and distributes needed reports summarizing the emissions inventory and progress toward the goal.

ESP also provides guidance and feedback to relevant company Managers and Directors on what sources to include in the inventory, what data to use and collect, and what emissions factors are most appropriate.

Various Managers and Directors around the company are responsible for maintaining the data necessary to complete the inventory and subsequent updates. Entergy's Environmental Leadership Team (ELT) reviews and approves the summary of each year's data.

Communication

The IMPRD will be communicated upon initial finalization and subsequently on a periodic basis, when major revisions occur or as needed. Opportunities for communication with Data Managers include when training is delivered, when data requests are made and when the IMPRD is revised.

Training

Entergy currently has no training materials available regarding GHG management or inventory. Training will be delivered on an ad hoc basis to employees involved in the process. The Manager, Corporate Environmental Operations will conduct this training as needed.

Document Retention and Control Policy

Entergy's GHG management program and all relevant records and documentation should be managed in accordance with Entergy's Records Management & Retention Policy. Entergy's external website will serve as the final publication repository for the GHG inventory. The external website is accessible via the internet. Additionally, the annual inventory, verification statement and IMPRD will be submitted to the American Carbon Registry for posting on Entergy's registry account. This is accessible to anyone via the ACR website (www.americancarbonregistry.com).

Data verification and documentation is essential for the authenticity of this program. To maintain a high standard, all records verifying the GHG inventories and registry contents will be maintained by ESP for a minimum of three years. Documentation of GHG reduction project expenditures and project close-out reports shall also be maintained for a minimum of three years.

Auditing and Verification

Internal Auditing

Internal auditing of the GHG program will be conducted by ESP staff or designee. Some of the data used to develop emission estimates are also audited through Entergy's Safety and Environment Audit Program (i.e., CEMS data/processes) administered by ESP. Findings related to the GHG Inventory will be provided to the VP, ESP who will determine the responsible individual for each finding's corrective action. The audit will include a review of the IMPRD and the latest version of the inventory. A consistency check is also performed against the prior year's data, especially in the area of direct emissions. Changes to the IMPRD driven by audit results will also be entered into the IMPRD Revision Log (Attachment 4).

External Validation and/or Verification

Entergy is committed to an external third-party audit of the GHG baseline/inventory data, calculations, and records. This third-party verification of the program will be conducted at least every other year, including 2006 and the goal year. Since 2006, Entergy has sought annual, third-party verification of the GHG Inventory. The verification statement and report are made available via the ACR website and Entergy's external website.

In 2012, Entergy decided to elevate this third-party verification audit to the ISO standard for GHG Inventory preparation and verification (ISO 14064.3). This is an expanded verification effort that requires a higher level of scrutiny and additional data review/evaluation. The verification report will include a statement regarding the type of verification, level of assurance and an uncertainty analysis. The uncertainty analysis identifies, describes and quantifies the largest sources of uncertainty for the GHG Inventory. See Attachment 3 for the full verification report.

Management Review

The GHG emissions summary data will be reviewed and approved annually by the ELT. Goal setting, progress toward meeting goals, and any additional action or options necessary to meet the goals will be covered in this management review. The VP, ESP

will verify that the information has been reviewed and found to be substantially compliant with this IMPRD. Additionally, this information will be presented to the Audit Committee of the Board of Directors during our annual reporting cycle.

Corrective Action

Any findings identified through QA/QC and internal and external reviews related to the greenhouse gas inventory or IMPRD are assigned to the appropriate Manager or Director for action by the VP, ESP. The VP, ESP will maintain a list of identified gaps related to the program, the person that is responsible for closing the gap, and the required timing for gap closure. Changes to the IMPRD driven by this process will also be entered into the IMPRD Revision Log (Attachment 4).

Any findings identified through QA/QC and internal and external audits related to the GHG emission inventory, calculations, or reporting are assigned to the VP, ESP or his designee.

Voluntary Commitment and Reduction Efforts

Voluntary Commitments

In May 2001, Entergy publicly committed to stabilize CO_2 emissions from its power plants at year 2000 levels through 2005, and dedicated $25 million in supplemental corporate funding to achieve this target over the five-year period. This commitment was focused on CO_2 emissions from fuel combustion at the company's power plants and required that Entergy:

- Stabilize CO_2 emissions from its U.S. power plants at year 2000 levels through 2005.
- Establish the $25 Million Environmental Initiatives Fund (EIF) in support of achieving the 2001-2005 stabilization targets.
- Document activities and annual report progress.
- Employ an independent third-party organization to verify measurement of Entergy's CO_2 emissions from U.S. power plants.

Entergy completed this first commitment 23 percent below year 2000 levels.

Entergy's second commitment, made in 2005, included:

- Stabilize CO_2 emissions from all Entergy operations at 20% below 2000 levels through 2010.
- Commit funding of $3.25 million in support of achieving the 2005-2010 target.
- Document activities and annually report progress.

Entergy completed this second commitment more than three percent below the target. On a cumulative basis, Entergy bettered the two commitments by over 14 percent.

In 2011, Entergy once again renewed its commitment to stabilize GHGs with a third commitment:

- Stabilize CO_2 emissions from all Entergy operations at 20% below 2000 levels through 2020.

- Commit funding of $10 million in support of achieving the 2011-2020 target.
- Document activities and annually report progress.

Additional information on these commitments can be viewed on Entergy's website.

Voluntary Reductions

Since 2001, Entergy has invested in various types of internal and external emission reduction projects. These projects range from internal plant efficiency improvements, to reforestation projects, to carbon offset purchases. These projects are described annually in the Environmental Section of Entergy's Sustainability Report.

In addition to the projects described above, Entergy owns several facilities that generate electricity without emission of GHGs. Entergy's nuclear fleet (10,101 MW), wind farms (80 MW) and hydro plants (74 MW) generate virtually emission-free electricity and constitute a major portion of Entergy's overall generation mix (more than 35% at the end of 2012).

Attachment 1

2012 GHG Inventory – FINAL and VERIFIED

2012 Entergy Corporate GHG Emissions breakdown by category

All numbers represent CO2 equivalents (CO2e)

Unhide columns I - U for additional calculations and conversions -->

Operational Emissions Category	Emissions Source Category	Corporate emissions source	Greenhouse gas	Total emissions short tons CO2e	Total emissions in metric tons CO2e	percentage of total corporate emissions	Calculation worksheet in inventory document
Direct Emission Sources	Stationary Combustion	Power generating units (includes emergency and backup generators)	CO2	37,438,476	33,963,614	68.7%	Stationary Combustion CEM
			CH4	11,653	10,572	0.0%	Stationary Combustion CEM
			N2O	88,891	80,640	0.2%	Stationary Combustion CEM
		Small stationary combustion sources (co-located at generation stations and stand alone units)	CO2e	517,309	469,295	0.9%	All small stat cbn totals
		Biomass power generation	CO2	0	0	0.0%	NA
	Mobile Combustion	Corporate fleet	CO2	57,919	52,543	0.1%	Mobile Combustion
			CH4	63	58	0.0%	Mobile Combustion
			N2O	417	378	0.0%	Mobile Combustion
		Biomass fleet	CO2	0	0	0.0%	NA
	Fugitive Emissions	Natural gas transmission and distribution	CH4	105,216	95,450	0.2%	Fugitive CH4-NG T&D
		Electricity transmission and distribution	SF6	160,787	145,864	0.3%	Fugitive SF6
		Cooling/air-conditioning (building, mobile and nuclear cooling eqpt)	HFCs	9,883	8,966	0.0%	Fugitive HFCs
	Process emissions	none applicable	NA	0	0	0.0%	NA
Total Emissions from Direct Sources				**38,390,614**	**34,827,380**	**70.4%**	
Indirect Emission Sources	Purchased Electricity	Power purchased for utility business operations outside Entergy service territory	CO2	0	0	0.0%	NA
	T&D losses	Entergy purchased power consumed on Entergy T&D system	CO2, CH4, N2O	895,986	812,825	Note: these emissions are included within the Optional emissions	Purchased power
Total Emissions from Indirect Sources				**895,986**	**812,825**		
Optional Emissions Sources	Purchased power (controllable)	Controllable purchased power sold to customers	CO2, CH4, N2O	7,557,728	6,856,255	13.9%	Purchased power
	Purchased power (uncontrollable)	Uncontrollable purchased power sold to customers	CO2, CH4, N2O	8,548,552	7,755,115	15.7%	Purchased power
Total Emissions from Optional Sources				**16,106,279**	**14,611,371**	**29.6%**	
GHG Stabilization Commitment Total (progress toward second GHG commitment)				**45,513,512**	**41,289,164**	**83.5%**	
Total Corporate emissions				**54,496,893**	**49,438,750**	**100.0%**	

Direct Emissions from fossil fuel usage at generating facilities using CEM data

2012

Generating facility and EPA Acid Rain Unit ID	EPA Acid Rain Unit ID (Entergy ID if different)	Max capacity (MW)	State	Entergy equity share of unit	Primary fuel(s)	CO2 from CEM: Total unit CO2 (1) short tons CO2	CO2 from CEM: Entergy equity share of unit CO2 emissions short tons CO2	CH4: Entergy share CH4 emissions from generation (2) short tons CO2e	N2O: Entergy share N2O emissions from generation (3) short tons CO2e	Total Facility CO2e in short tons	Total CO2e in metric tons
Acadia	CT3			100%	Natural Gas	478475	478,475	191	287		
Acadia	CT4			100%	Natural Gas	481795	481,795	193	289		
Totals							960,270	384	576	961,231	872,014
Attala	A01		MS	100%	Gas/Oil	359853	359,853	144	216		
Attala	A02		MS	100%	Gas/Oil	359392	359,392	144	216		
Totals		0					719,245	288	432	719,964	653,140
Baxter Wilson	1	550	MS	100%	Gas/Oil	1109591	1,109,591	444	666		
Baxter Wilson	2	771	MS	100%	Gas/Oil	763851	763,851	306	458		
Totals		1321					1,873,442	749	1,124	1,875,316	1,701,258
Big Cajun 2[6]	2B3 (3)	257	LA	42%[6]	Coal	3798680	1,430,583	286	6,581		
Totals		257					1,430,583	286	6,581	1,437,450	1,304,033
Calcasieu Plant	GTG1		LA	100%	Natural gas	63205	63,205	25	38		
Calcasieu Plant	GTG2		LA	100%	Natural gas	107943	107,943	43	65		
Totals		0					171,149	68	103	171,320	155,419
Cecil Lynch	2	74	AR	100%	Gas/Oil	0	0	0	0		
Cecil Lynch	3	130	AR	100%	Gas/Oil	3235	3,235	1	2		
Totals		204					3,235	1	2	3,238	2,937
Delta	1	104	MS	100%	Gas/Oil	0	0	0	0		
Delta	2	103	MS	100%	Gas/Oil	0	0	0	0		
Totals		207					0	0	0	0	0
Gerald Andrus	1	761	MS	100%	Gas/Oil	889524	889,524	356	534		
Totals		761					889,524	356	534	890,414	807,770
Hamilton Moses	1	72	AR	100%	Gas/Oil	0	0	0	0		
Hamilton Moses	2	72	AR	100%	Gas/Oil	0	0	0	0		
Totals		144					0	0	0	0	0
Harvey Couch	1	30	AR	100%	Gas/Oil	0	0	0	0		
Harvey Couch	2	131	AR	100%	Gas/Oil	0	0	0	0		
Totals		161					0	0	0	0	0
Hinds Energy Facility[7]	H01	456	MS	100%	Gas CT	14150	14,150	6	8		
Hinds Energy Facility[7]	H02		MS	100%	Gas CT	14407	14,407	6	9		
Totals							28,557	11	17	28,586	25,933
Hot Spring Energy Facility[8]	CT-1	620	AR	100%	Gas CT	18166	18,166	7	11		

Generating facility and EPA Acid Rain Unit ID	EPA Acid Rain Unit ID (Entergy ID if different)	Max capacity (MW)	State	Entergy equity share of unit	Primary fuel(s)	Total unit CO2 (1)	Entergy equity share of unit CO2 emissions	Entergy share CH4 emissions from generation (2)	Entergy share N2O emissions from generation (3)	Total Facility CO2e in short tons	Total CO2e in metric tons
Hot Spring Energy Facility[8]	CT-2	620	AR	100%	Gas CT	27197	27,197	11	16		
							45,363	18	27	45,408	41,194
Independence	1	472	AR	56.5%	Coal	5804743	3,279,680	656	15,087		
Independence	2	332	AR	39.37%	Coal	5996078	2,360,656	472	10,859		
Totals		804					5,640,336	1,128	25,946	5,667,409	5,141,387
Lake Catherine	1	52	AR	100%	Gas/Oil	0	0	0	0		
Lake Catherine	2	51	AR	100%	Gas/Oil	170	170	0	0		
Lake Catherine	3	106	AR	100%	Gas/Oil	2253	2,253	1	1		
Lake Catherine	4	547	AR	100%	Gas/Oil	436567	436,567	175	262		
Totals		756					438,990	176	263	439,429	398,643
Lewis Creek	1	260	TX	100%	Gas/Oil	463599	463,599	185	278		
Lewis Creek	2	260	TX	100%	Gas/Oil	572374	572,374	229	343		
Totals		520					1,035,973	414	622	1,037,009	940,758
Little Gypsy	1	244	LA	100%	Gas/Oil	186369	186,369	75	112		
Little Gypsy	2	436	LA	100%	Gas/Oil	242706	242,706	97	146		
Little Gypsy	3	573	LA	100%	Gas/Oil	899743	899,743	360	540		
Totals		1253					1,328,818	532	797	1,330,147	1,206,689
Louisiana 2[4]	10		LA	100%	Gas/Oil	0	0	0	0		
Louisiana 2[4]	11		LA	100%	Gas/Oil	0	0	0	0		
Louisiana 2[4]	12		LA	100%	Gas/Oil	0	0	0	0		
Totals		0					0	0	0	0	0
Michoud	1	113	LA	100%	Gas/Oil	310	310	0	0		
Michoud	2	244	LA	100%	Gas/Oil	282892	282,892	113	170		
Michoud	3	561	LA	100%	Gas/Oil	1292723	1,292,723	517	776		
Totals		918					1,575,926	630	946	1,577,502	1,431,085
Ninemile Point	1	74	LA	100%	Gas/Oil	2331	2,331	1	1		
Ninemile Point	2	107	LA	100%	Gas/Oil	0	0	0	0		
Ninemile Point	3	135	LA	100%	Gas/Oil	126642	126,642	51	76		
Ninemile Point	4	748	LA	100%	Gas/Oil	1306867	1,306,867	523	784		
Ninemile Point	5	763	LA	100%	Gas/Oil	1453356	1,453,356	581	872		
Totals		1827					2,889,195	1,156	1,734	2,892,084	2,623,655
Ouachita Power	CTGEN1		LA	100%	Natural gas	263822	263,822	106	158		
Ouachita Power	CTGEN2		LA	100%	Natural gas	210654	210,654	84	126		
Ouachita Power	CTGEN3		LA	100%	Natural gas	198907	198,907	80	119		
Totals		0					673,382	269	404	674,056	611,493
Perryville	1-1		LA	100%	Gas/Oil	545806	545,806	218	327		

Generating facility and EPA Acid Rain Unit ID	EPA Acid Rain Unit ID (Entergy ID if different)	Max capacity (MW)	State	Entergy equity share of unit	Primary fuel(s)	Total unit CO2 (1)	Entergy equity share of unit CO2 emissions	Entergy share CH4 emissions from generation (2)	Entergy share N2O emissions from generation (3)	Total Facility CO2e in short tons	Total CO2e in metric tons
Perryville	1-2		LA	100%	Gas/Oil	581917	581,917	233	349		
Perryville	2-1		LA	100%	Gas/Oil	11207	11,207	4	7		
Totals		0					1,138,930	456	683	1,140,069	1,034,253
Rhode Island State Energy Ctr	RISEP1		RI	100%	Natural gas	511930	511,930	205	307		
Rhode Island State Energy Ctr	RISEP2		RI	100%	Natural gas	489633	489,633	196	294		
Totals							1,001,563	401	601	1,002,564	909,511
R S Cogen[5]	RS-5		LA	50%	Natural gas	808599	404,300	162	243		
R S Cogen[5]	RS-6	425	LA	50%	Natural gas	821199	410,600	164	246		
Totals		425					814,899	326	489	815,714	740,003
R S Nelson	3	146	LA	100%	Gas/Oil	142921	142,921	57	86		
R S Nelson	4	500	LA	100%	Gas/Oil	960913	960,913	384	577		
R S Nelson[9]	6	385	LA	80.9%	Coal	3887422	3,144,924	629	14,467		
Totals		1031					4,248,758	1,071	15,129	4,264,958	3,869,105
Rex Brown	1A		MS	100%	Natural gas	0	0	0	0		
Rex Brown	1B		MS	100%	Natural gas	0	0	0	0		
Rex Brown	3		MS	100%	Gas/Oil	17568	17,568	7	11		
Rex Brown	4		MS	100%	Gas/Oil	170542	170,542	68	102		
Totals		0					188,110	75	113	188,298	170,821
Robert E Ritchie	1	356	AR	100%	Gas/Oil	0	0	0	0		
Robert E Ritchie	2	544	AR	100%	Natural gas	0	0	0	0		
Totals		900					0	0	0	0	0
Sabine	1	230	TX	100%	Gas/Oil	329778	329,778	132	198		
Sabine	2	230	TX	100%	Gas/Oil	243251	243,251	97	146		
Sabine	3	420	TX	100%	Gas/Oil	478581	478,581	191	287		
Sabine	4	530	TX	100%	Gas/Oil	867480	867,480	347	520		
Sabine	5	480	TX	100%	Gas/Oil	605785	605,785	242	363		
Totals		1890					2,524,874	1,010	1,515	2,527,399	2,292,818
Sterlington	10	224	LA	100%	Gas/Oil	0	0	0	0		
Sterlington	7AB	102	LA	100%	Gas/Oil	2486	2,486	1	1		
Sterlington	7C	101	LA	100%	Gas/Oil	2303	2,303	1	1		
Totals		427					4,789	2	3	4,794	4,349
Waterford	1	411	LA	100%	Gas/Oil	107881	107,881	43	65		
Waterford	2	411	LA	100%	Gas/Oil	464868	464,868	186	279		
Waterford	4		LA	100%	Gas/Oil	1485	1,485	1	1		
Totals		822					574,234	229	344	574,807	521,456
White Bluff	1	465	AR	57%	Coal	5314862	3,029,471	606	13,936		

Generating facility and EPA Acid Rain Unit ID	EPA Acid Rain Unit ID (Entergy ID if different)	Max capacity (MW)	State	Entergy equity share of unit	Primary fuel(s)	Total unit CO2 (1)	Entergy equity share of unit CO2 emissions	Entergy share CH4 emissions from generation (2)	Entergy share N2O emissions from generation (3)	Total Facility CO2e in short tons	Total CO2e in metric tons
White Bluff	2	481	AR	57%	Coal	5897951	3,361,832	672	15,464		
Totals		946					6,391,303	1,278	29,400	6,421,982	5,825,924
Willow Glen	1	172	LA	100%	Gas/Oil	80476	80,476	32	48		
Willow Glen	2	224	LA	100%	Gas/Oil	72014	72,014	29	43		
Willow Glen	3	522	LA	100%	Gas/Oil	0	0	0	0		
Willow Glen	4	568	LA	100%	Gas/Oil	694537	694,537	278	417		
Willow Glen	5	559	LA	100%	Gas/Oil	0	0	0	0		
Totals		2045					847,027	339	508	847,874	769,178
Totals						**52,345,964**	**37,438,476**	**11,653**	**88,891**	37,539,020	34,054,826

(1) CEM data reported to EPA Acid Rain program - can be verified at EPA's Clean Air Market's Database located at http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard&EQW_datasetSelection=

(2) Emissions factor derived from CH4 (in CO2e) as percentage of emissions from CO2 for a specific fuel type. See "Emissions and Conversion Factors" for EPA emissions factors for specific fuels; emissions factor for natural gas used for all dual-fuel units as this represents the larger fuel input

(3) Emissions factor derived from N2O (in CO2e) as percentage of emissions from CO2 for a specific fuel type. See "Emissions and Conversion Factors" for EPA emissions factors for specific fuels; emissions factor for natural gas used for all dual-fuel units as this represents the larger fuel input

(4) Emissions from Louisiana Station Plant 1 (Units 1A, 2A, 3A, 4A, 5A) are not included in the inventory; these units exist for the sole use of Exxon under a long term lease agreement.

(5) Emission data for RS Cogen is obtained directly from the EPA's Database located at http://ampd.epa.gov/ampd/

(6) While Entergy owns 42% of Big Cajun 2 Unit 3, our actual consumption of the MWhs generated from this facility varies from 42% to 45%. CO2 emission number shown is based on actual consumption of MWhs received from Fossil Operations.

Small combustion sources at all generation stations

Small stationary combustion sources were initially calculated for all known equipment co-located at generating stations using parameters (such as max energy input/hour) developed in internal emissions compliance documents and assumed equipment capacity factors. These emissions totals were calculated in 2005 and are assumed to be conservative (high) estimates of emissions. These estimates were used in inventories 2000-2010, i.e. new emissions totals have not been calculated for each year.

In 2012, Entergy reported 2011 GHG (CO2e) emissions from small sources co-located at Fossil plants in compliance with the EPA Mandatory Reporting Rule. These updated values have been substituted for the older, 2005 calculations in order to be consistent with mandatory GHG reporting. Nuclear and Thermal estimates continue to rely on the 2005 calculations unless otherwise noted.

Plant	Capacity (total MW of all units)	CO2e Emissions reported under Mandatory Reporting Rule (short tons of all gases in 2011) [obtained from Fossil Operations unless otherwise noted]	CO2e Emissions reported under Mandatory Reporting Rule (metric tons of all gases in 2011) [obtained from Fossil Operations unless otherwise noted]
Fossil fuel generating stations			
Buras	19	21,154.9	19,191.7
A.B. Paterson	159	0.0	0.0
Acadia	578	0.0	0.0
Attala	455	0.0	0.0
Baxter Wilson	1321	0.0	0.0
Big Cajun	247	0.0	0.0
Calcasieu	310	0.0	0.0
Cecil Lynch	210	86.1	78.1
Delta	207	0.0	0.0
Gerald Andrus	761	17,469.0	15,847.9
Hamilton Moses	144	0.0	0.0
Harvey Couch	161	0.0	0.0
Independence	804	98.9	89.7
Lake Catherine	756	0.0	0.0
Lewis Creek	520	0.0	0.0
Little Gypsy	1253	4,468.0	4,053.4
Louisiana Station	354	242.9	220.4
Mablevale	56	31,843.5	28,888.4
Michoud	918	0.0	0.0
Monroe	73	0.0	0.0
Natchez	73	0.0	0.0
Ninemile Point	1827	0.0	0.0
Ouachita	770	587.1	532.6
Perryville	691	0.0	0.0
Rex Brown	354	97.1	88.1
RISEC	583	0.0	0.0
Robert Ritchie	900	0.0	0.0
RS Cogen	213	0.0	0.0
RS Nelson	1031	22,029.7	19,985.4
Sabine	1890	110,518.6	100,262.5
Sterlington	386	0.0	0.0
Waterford 1&2	822	663.1	601.6
White Bluff	946	189.8	172.2
Willow Glen	1752	148,928.8	135,108.2
Fossil fuel totals	21,544	358,377.6	325,120.2

Other small plants			
Charity boiler	capacity	total MMBtu	total
3 boilers	52.9	1,390,212	81,362

		Plant total small sources CO2e (short tons using 2005 estimate calculations)
Nuclear generating stations		
Vermont Yankee	510	2,278
Pilgrim	670	14,818
James Fitzpatrick	825	3,490
River Bend	966	687
Indian Point 2	970	18,558
Indian Point 3	980	80
Palisades [1]	811	7,757
Waterford 3	1075	7,042
Grand Gulf	1210	11,131
Arkansas Nuclear 1&2	1694	11,728
Nuclear totals	9,711	77,569
All small source totals	31,255	**517,309**

Direct Emissions from fossil fuel usage for company mobile fleet ("Mobile Combustion")

Note: The information below was collected and results calculated based on 2012 data.

Fuel Description	Fuel Code	Units consumed (gal)	Assumptions/Comments
Diesel	**D**	3,025,289	Based on 2012 Entergy data provided by Nick Greb / Bob Irving, it is assumed that totals for all bi-fuel categories are split at a 90/10 ratio between constituent fuel types and are calculated as such. Bi-fuels are separated below into its constituent fuel type category and emissions calculated. CNG is measured in Gallons of Gasoline Equivalency or GGE. One gallon of CNG or GGE has the same energy value as a gallon of gasoline. "Unknown" split evenly (50/50) between diesel and gasoline.
Gasoline	**G**	1,433,883	
BiFuel-Gasoline/Ethanol	**S**	348,393	
BiFuel-Gasoline/CNG	**A**	16,357	
BiFuel-Gasoline/LPG	**B**	1,011	
BiFuel-Diesel/Electricity	**F**	20,646	
Propane	**P**	22	
CNG	**C**	116	
LPG	**L**	80	
BiFuel-Gasoline/Electricity	**H**	1678	
Unknown	-	77,856	
Jet fuel (4 aircraft count)		539,031	Total 2012 Fuel Purchase - from Roger Burns
Total gallons consumed		**5,464,362**	

Total units of each fuel type

Fuel	Total units consumed (GALLONS) - from inputs above	conversion to energy content (MMBtu/gallon)	Total MMBtu consumed	CO2 using EPA Climate Leaders Efs: Emissions Factor (lbs CO2/MMBtu)	CO2 using EPA Climate Leaders Efs: Total CO2 Emissions (short tons)	CO2 using WRI/WBCSD Protocol Efs: Emissions Factor (kg CO2/Gallon)	CO2 using WRI/WBCSD Protocol Efs: Total CO2 Emissions (short tons)
Diesel	3,082,798	0.1387	427,584	159.68	34,138	10.15	34,491
Gasoline	1,803,506	0.1251	225,619	156.44	17,648	8.81	17,514
Ethanol (E85)	34,839	0.0843	2,937	149.59	220	5.56	214
CNG	1,752	0.1251	219	116.41	13	See note	13
LPG	181	0.092	17	138.76	1	5.79	1
Propane	22	0.092	2	138.32	0	5.79	0
Jet fuel	539,031	0.135	72,769	154.72	5,629	9.57	5,686
Totals	5,462,129		729,147		**57,649**		**57,919**

Note: Emissions from Ethanol are considered "biogenic" emissions are do not contribute to net CO2 additions to the atmosphere. They are include with fossil fuel CO2 because it is de minimus.

Direct Emissions of N2O and CH4 from mobile fleet ("Mobile Combustion")

The calculation below uses conservative N2O and CH4 emissions factors to estimate these emissions from mobile sources. The emissions factors are from EPA Climate Leaders Guidance for construction vehicles.

N2O from mobile sources					
N2O	gallons consumed	g N2O/gal fuel	total kg N2O	short tons	CO2e short tons
gasoline	1,803,506	0.22	396.77	0.446	138.13
diesel	3,082,798	0.26	801.53	0.900	279.04
total					**417.16**

CH4 from mobile sources					
CH4	gallons consumed	g CH4 /gal fuel	total kg CH4	short tons	CO2e short tons
gasoline	1,803,506	0.50	901.75	1.013	21.27
diesel	3,082,798	0.58	1,788.02	2.008	42.17
total					**63.43**

total N2O and CH4 CO2e	**480.60**

Total Estimated Emissions from Mobile Sources (short tons CO2e)	**58,400**

Direct Emissions from Fugitive CH4 from natural gas T&D operations

The calculation below uses CY2011 pipeline type data to estimate emissions from fugutive natural gas, as data for specific pipeline types was readily available. Miles of pipe have been converted to kilometers (km) as GRI provides emissions factor for km.
Data for number of services is from the DOT Natural Gas Distribution Annuals database for 2011.
Data for meters is the average for Residential and Commercial/Industrial/Governmental from 2011.
Entergy natural gas operations do not inlcude compressor stations; gas venting is minimized and not inlcuded in the calculations.

2004

Pipeline type	Miles of pipe	Conversion to km (1.609 km/mi.)	Emissions factor (metric ton CH4/km/year)	Total metric tons CH4	Total short tons CH4	Total short tons CO2e
Transmission pipe -ENO						
Bare Steel (unprotected mains)	0	0.00	0.0777	0	0	0
Coated Steel (protected mains)	35.6	57.28	0.0043	0.24	0	6
Plastic	0	0.00	0.0064	0	0	0
sub-total	35.6	57.28		0	0	6
Main pipe - ENO						
Steel (protected, coated)	868	1,396.61	0.0365	51	56	1,180
Steel (protected, bare)	0	0.00	0.0365	0	0	0
Steel (unprotected)	0	0.00	1.3111	0	0	0
Cast iron	217	349.15	2.8409	992	1,093	22,961
Plastic	593	954.14	0.1953	186	205	4,314
sub-total	1,678	2,699.90		1,230	1,356	28,455
Main pipe - EGSI						
Steel (protected, coated)	802	1,290.42	0.0365	47	52	1,090
Steel (protected, bare)	0	0.00	0.0365	0	0	0
Steel (unprotected)	0	0.00	1.3111	0	0	0
Cast iron	25	40.23	2.8409	114	126	2,645
Plastic	894	1,438.45	0.1953	281	310	6,504
sub-total	1,721	2,769.09		2,850	3,142	10,239
Services	# of services	no conversion	Emissions factor (metric ton CH4/service/year)	Total metric tons CH4	Total short tons CH4	Total short tons CO2e
Services - ENO						
Cathodically protected (coated steel)	35,406		0.0034	120	133	2,787
Unprotected (coated steel)	32,611		0.0326	1,062	1,171	24,587
Plastic	34,783		0.0002	6	7	145
sub-total	102,800	0.00				27,518
Services - EGSI						
Cathodically protected (coated steel)	44,337		0.0034	151	166	3,490
Unprotected (coated steel)	0		0.0326	0	0	0
Plastic	48,586		0.0002	9	10	202
sub-total	92,923	0.00				3,692

Total CO2e from pipeline system: 69,910

Customer meters	# meters	Emissions factor (metric ton CH4/meter/year)	Total metric tons CH4	Total short tons CH4	Total short tons CO2e
Meters - ENO					
Residential meters	138,560	0.00265	367.18	404.75	8,499.69
Commercial meters (1)	7,463	0.00092	6.87	7.57	158.94
Meters - EGSI					
Residential meters	95,397	0.00265	252.80	278.66	5,851.94
Commercial meters (1)	5,524	0.00092	5.08	5.60	117.64
sub-total	246,944			697	14,628

Spindletop Storage

Storage facilities	# storage facilities	Emissions factor (metric ton CH4/station-yr)	Total metric tons CH4	Total short tons CH4	Total short tons CO2e	
fugitive emissions from storage facilities	1	6.754E+02	675.4	745.0	15,644	See note 3
vented emissions from storage facilities	1	217.3	217.3	239.7	5,033	See note 4
sub-total					**20,678**	

Totals for fugitive natural gas: **105,216** short tons CO2e

GENERAL NOTES:

- Source for emissions factors by equipment type is the Gas Research Institute (GRI), which provides factors in metric only.

- Fugitive and oxidized CO2 are known sources of GHG emissions from a natural gas T&D system; however these were not calculated as they are determined to be de minimus compared to CH4 from this source.

SPECIFIC NOTES:

(1) Compressors are assumed to be for natural gas transmission, not storage.
(2) general emissions factor used for vented gas; GRI provides emissions factors for specific equipment venting.
(3) EF from API Table 6-1, (American Petroleum Institute, Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry.
(4) EF from GRI

Direct emissions of escaped SF6 in electricity T&D system ("Fugitive emissions")

Note: The information below was collected and results calculated based on 2012 inventory turnover data. Basically, as Entergy orders SF6, it is assumed that the ordered amount is required to replace SF6 that has been emitted.

2009 fugitive SF6 emissions		
SF6 Emissions (lbs.) (1)	**Potential (GWP) (2)**	Equivalent Emissions
13,455	23,900	**160,787**

1) Assumes 115 lbs per cylinder
2) SF6 GWP from the IPCC Third Assessment Report

Direct Emissions of Fugitive HFCs in all utility cooling and A/C equipment

This sheet contains calculations for all sources of fugitive HFCs. HFCs from all sources are considered de minimus (i.e. insignificant in the Entergy corporate total). The activity data required to provide the highest level of accuracy is difficult and impractical to obtain for such a small source. Instead, emissions factors have been created based on national averages for a number of variables to provide a rough estimate of these emissions. The methodology behind these emissions factors is found below.

These CO2e totals are calculated using data, provided in 2005, that does not change significantly between inventory years. These same data and emissions totals are used each year.

2010 Update - Facilities indicates that there is no significant change to these numbers; therefore, these numbers will continue to be carried forward each year.

2004

From all Entergy air-conditioned spaces	square footage air-conditioned	EF: fugitive HFCs (short tons CO2e/sq ft) *	Facility fugitive HFC (short tons CO2e)
Entergy owned space	2,578,000	**0.00092**	2,372
Entergy capital lease space	830,000	**0.00092**	764
Generation plant space	2,000,000	**0.00092**	1,840
Total Fugitive HFCs	5,408,000		4,975

Generation plant space assumes 50,000 sq. ft. per plant; 38 plants assumed; rounded to 2 million sq. ft.

From Nuclear facility	lbs HFC charged to equipment	EF: fugitive HFCs as CO2e (GWP=1300)	Facility fugitive HFC (short tons CO2e)
	0	1300	0

Entergy nuclear facilities **do not** use HFCs for cooling

From all Entergy-owned vehicles	Total CO2 from mobile sources (short tons)	EF: HFC as % of CO2 emissions **	Facility fugitive HFC (short tons CO2e)
Vehicular A/C	58,400	3.50%	2,044

Total CO2 from all mobile source fuels are included

From Entergy-owned district cooling operations	total charge of equipment	conservative loss factor	fugitive emissions (short tons CO2e)
NORMC (medical center) centrifugal cl	14,000	15.00%	1,365
USP (Union Station) centrifugal chillers	15,370	15.00%	1,499
			2,864

NORMC chillers have 14,000 lbs charge total
USP has 3 chillers rated at 1933 tons each; assumed 2.65 lbs. (1.2 kg) HFCs per ton cooling
Loss factor is conservative; fewer annual fugitive gas is likely

Total fugitive HFC emissions **9,883** short tons CO2e

*** Calculation for estimating fugitive HFC emissions from building space using A/C**

The calculation used in calculating the emissions factor for metric tons of CO2e fugitive HFC.	Average cooling capacity of chiller (ft2/ton of cooling capacity)	HFCs in chiller (kg HFC/tons of cooling)	Annual HFC loss factor (percent)	Total Annual HFC losses (MT HFC/1000 ft2)	Total Annual HFC losses (MT CO2e)/1000 ft2	Total Annual HFC losses (**MT CO2e**)/ ft2	Total Annual HFC losses (**short tons** CO2e)/ ft2
	280	1.2	15%	0.000642857	0.84	0.00084	**0.00092**
	Source: ASHRAE (http://www.themcdermottgroup.com/Newsworthy/HVAC%20Issues/Rule%20of%20Thumb%20Sizing.htm) Note that this is a conservative estimate - a reasonably designed building should be more like 400	Source: http://www.usgbc.org/LEED/tsac/energy.asp	Source: EPA Climate Leaders Gudance, January 2004. Note: This estimate is the source of the greatest uncertainty in the calculation, since the range is 2-15%, and the average is probably more like 5%.		This is the emissions factor that is applied to the square footage of air-conditioned space. This EF includes the global warming potential for HFC 134a (1,300).	Emissions factor for MT CO2e per ft2.	Emissions factor for short tons CO2e per ft2; conversion factor 1.1023

Calculation to estimate HFCs from mobile A/C as percentage of CO2 emissions from mobile sources using national averages for equipment leakage and miles/gallon

HFC Emissions Estimate				**CO2 Emissions Estimate**				**Emissions factor**
Vehicle type	HFC capacity (kg HFC)	annual leakage rate (percentage)	CO2 emissions (kg CO2e/yr-veh); GWP=1300	Miles per gallon	Miles per year	Emission factor (kg CO2/gal)	CO2 Emissions (kg CO2/yr-veh)	Emissions factor: HFC emissions (CO2e) to CO2 (as %)
Car	0.8	20%	208	20	15,000	8.87	6,653	**3.1%**
light truck	1.2	20%	312	15	15,000	8.87	8,870	**3.5%**

Power purchased to serve utility customers

Controllable power purchases

Code	Plant description		State	2012 Total Entergy purchased from plant (MWh)	2012 Unit-Specific Emission Factor (lbs CO2/MWh) [from eGRID2012 (v1.0 - 2009 data)]	2012 CO2 emissions from puchased power (short tons) [using eGRID Unit-Specific Factors (when available)]	Comments/Notes
[redacted]			AR	35173	983.84	17,302.3	
			AR	169223	988.06	83,601.2	
			LA	152255	1,497.19	113,977.3	
			MS	167420	1,013.16	84,811.6	
			LA	86556	1,407.10	60,896.5	
			LA	407441	2,172.93	442,670.4	
			TX	39494	766.39	15,133.9	
			LA	2804195	704.05	987,146.7	
			MS	24700	888.89	10,977.8	
			LA	25675	920.09	11,811.7	
			MS	5758	1,371.06	3,947.3	
			TX	2617028	921.66	1,206,005.0	
			LA	152951	678.18	51,864.2	
			MS	669442	813.71	272,365.8	
			LA	577	605.29	174.6	
			TX	1670269	874.82	730,592.4	
			TX	113376	1,585.03	89,852.2	
			AR	13515	900.27	6,083.6	
			LA	1215	2,067.12	1,255.8	
			TX	150039	2,229.79	167,277.7	
			AR	12990	2,169.30	14,089.6	
			AR	140380	1,154.77	81,053.3	
			AR	59510	2,118.99	63,050.5	
			LA	25812	1,328.28	17,142.8	
			LA	14874	1,640.83	12,202.9	
			AR	967263	847.18	409,722.9	
			LA	2789576	880.31	1,227,845.8	
			AR	98714	620.95	30,648.2	
			AR	19844	1,002.41	9,945.9	
			LA	14983	991.97	7,431.3	
			AR	2282251	943.67	1,076,845.9	
			TX	14115	732.68	5,170.9	
			MS	6300	1,406.84	4,431.5	
			AL	182279	2,092.50	190,709.4	
			TX	54481	735.23	20,028.0	

* - site specific emission factor not available - used SERC MS Valley Factor

Totals	15,989,674		7,528,067.1	**Total DU Power Purchases (from Utility Acctg)**	**32,982,748**
CH4 emissions from controlled purchases (SERC MS Valley eGRID 2012 factor*)	0.01945	lbs/MWh			3,265
N2O emissions from controlled purchases (SERC MS Valley eGRID 2012 factor*)	0.01065	lbs/MWh			26,395

* - some units may be in different control areas or eGRID subregions; however, impact to the overall GHG inventory is expected to be negligible.

Total CO2e from Controllable Purchases **7,557,728** short tons

Non-controllable - system power purchases

			Total Entergy uncontrolled power purchases (MWh)	CO2 emissions (short tons CO2e)
CO2 emissions from non-controllable purchases (SERC MS Valley eGRID 2012 factor)	1002.4119	lbs/MWh	16,993,074	8,517,030
CH4 emissions from non-controllable purchases (SERC MS Valley eGRID 2012 factor)	0.01945	lbs/MWh		3,470
N2O emissions from non-controllable purchases (SERC MS Valley eGRID 2012 factor)	0.01065	lbs/MWh		28,051
				8,548,552

* - some units may be in different control areas or eGRID subregions; however, impact to the overall GHG inventory is expected to be negligible.

Compare totals

	2009 total emissions tons CO2	% of total	2009 total pchsd power MWh	% of total	intensity (tons/MWh)
Controllable	7,557,728	46.92%	15,989,674	48.48%	0.473
Non-controllable	8,548,552	53.08%	16,993,074	51.52%	0.503
	16,106,279		32,982,748		

Indirect Emissions associated with purchased power	Total pchsd power MWh	Loss factor %	Total power lost MWh	emissions factor lbs GHG/MWh	Total CO2e - losses short tons
CO2 emissions from T&D losses of purchased power on Entergy system	32,982,748	5.4%	1,781,068	1002.4119	892,682
CH4 emissions from T&D losses of purchased power on Entergy system				0.01945	364
N2O emissions from T&D losses of purchased power on Entergy system				0.01065	2,940
Total CO2e from losses from purchased power					**895,986**

T&D Loss factor calculation using 2004/Q4		
	Energy losses (1)	Total power (2)
	1,859,155	35,922,997
	1,203,122	17,331,394
	2,440,212	48,539,917
	473,629	9,073,068
	2,058,894	38,393,526
	8,035,012	149,260,902
loss factor		**5.4%**

(1) data from FERC form 1 lines 18 and 27
(2) data from FERC form 1 lines 9,10, and 16

EPA Climate Leaders Emissions Factors for Fossil Fuel and Biomass Combustion

The emissions factors below have been updated from the EPA Climate Leaders GHG inventory Protocol, October 2004.

				CO2 Emissions -- kg			CO2 Emissions -- lbs			CH4 Emissions				N20 Emissions			
Fuel type	Heating Value (HHV): custom heating values should be used if available	Carbon content coefficient (kg C/MMBtu) (based on HHV)	Fraction oxidized	EPA emission factor (kg CO2/MMBtu (HHV)*	EPA emission factor (kg CO2/mass or volume unit)	EPA emission factor (kg CO2/mass or volume unit)	EPA emission factor (lbs CO2/MMBtu (HHV)*	EPA emission factor (lbs CO2/mass or volume unit)	EPA emission factor (lbs CO2/mass or volume unit)	EPA emission factor (g CH4/MMBtu)	EPA emission factor (kg **CO2e**/MMBtu) GWP=21	EPA emission factor (lbs **CO2e**/MMBtu)	CH4 (**CO2e**) emissions factor (**lbs** CO2e CH4/**lb** CO2)	EPA emission factor (g N20/MMBtu)	EPA emission factor (kg **CO2e**/MMBtu) GWP=310	EPA emission factor (lbs **CO2e**/MMBtu)	N2O (**CO2e**) emissions (**lbs** CO2e N2O/**lb** CO2)
Liquid fossil	**MMBtu/bbl**				kg CO2/gallon	kg CO2/bbl		lbs CO2/gallon	lbs CO2/bbl								
Gasoline / petrol	5.253	19.34	0.99	70.95	8.79	369.18	156.44	19.38	814.04								
Kerosene	5.670	19.72	0.99	71.58	9.66	405.88	157.84	21.31	894.97	Note: CH4/N2O emissions factors for all mobile sources are dependent on many variables; for mobile sources consult the EPA Guidance Protocol							
Jet Fuel	5.670	19.33	0.99	70.17	9.47	397.74	154.72	20.88	877.02								
Aviation gasoline	5.048	18.87	0.99	68.50	8.23	345.66	151.04	18.15	762.18								
Distillate fuel (# 1,2,4, diesel)	5.825	19.95	0.99	72.42	10.08	423.36	159.68	22.23	933.51	1.8 (ind) 2.7 (elect gen)	0.038 0.057	0.083 0.125	0.0005 0.0008	.54 (ind) .54 (elect gen)	0.1674 0.1674	0.369 0.369	0.0023 0.0023
Residual fuel oil (#5,6)	6.287	21.49	0.99	78.01	11.68	490.44	172.01	25.75	1,081.42	1.8 (ind) 2.7 (elect gen)	0.038 0.057	0.083 0.125	0.0005 0.0007	1.8 (ind) 2.7 (elect gen)	0.1674 0.1674	0.369 0.369	0.0021 0.0021
LPG	3.861	17.25	0.99	62.62	5.65	237.45	138.07	12.47	523.58								
Propane	3.824	17.2	0.99	62.44	5.71	239.90	137.67	12.59	528.98								
Ethane	2.916	16.25	0.99	58.99	4.12	172.91	130.07	9.08	381.27								
n-Butane	4.326	17.72	0.99	64.32	6.66	279.80	141.83	14.69	616.96	Note: CH4/N2O emissions factors for all mobile sources are dependent on many variables; for mobile sources consult the EPA Guidance Protocol							
Isobutane	4.162	17.75	0.99	64.43	6.42	269.52	142.07	14.15	594.29								
E85	ee EPA Guidance					0.00	0.00		0.00								
CNG	1,027	14.47	0.995	52.79	.054 /cf			.12 /cf									
LNG					5.91 /gal			13.01 /gal									
Petroleum coke	6.024	27.85	0.99	101.10	609.00		0.00	0.00									
Gaseous fossil	**MMBtu/mcf**				cu. ft.			cu. ft.									
Natural gas (dry)	1.027	14.47	0.995	52.79	0.0542		116.41	0.1195		4.75 (ind) 0.95 (elect gen)	0.100 0.020	0.220 0.044	0.0019 0.0004	0.095 (ind) .095 (elect gen)	0.029 0.029	0.065 0.065	0.0006 0.0006
Solid fossil	**MMBtu/short ton**				short ton			short ton									
Anthracite	25.09	28.26	0.99	102.58	2,573.83		226.20	5,675.30		10.0 (ind) 1.0 (elect gen)	0.210 0.021	0.463 0.046	0.0022 0.0002	1.4 (ind) 1.4 (elect gen)	0.43 0.43	0.96 0.96	0.0046 0.0046
Bituminous coal	24.93	25.49	0.99	92.53	2,306.74		204.03	5,086.36		% of "unspecified coal"				% of "unspecified coal"			
Sub-bituminous coal	17.25	26.48	0.99	96.12	1,658.11		211.95	3,656.13		Use the CH4/N2O emissions factors above for all coal types							
Lignite	14.21	26.3	0.99	95.47	1,356.61		210.51	2,991.33									
Coke	24.80	27.85	0.99	101.10	2,507.17		222.92	5,528.31									
Unspecified (elec gen)	20.63	25.98	0.99	94.31	1,945.56		207.95	4,289.96									
Unspecified (indus)	23.03	25.75	0.99	93.47	2,151.84		206.11	4,744.81									
Biofuels																	
Wood and wood waste	15.38 MMBtu /short	25.6	0.995	92.93	1,429.23 /short		204.91	3,135.2 /short		30.1 (ind/elect gen)	0.632	1.394	0.0068	4 (ind/elect gen)	1.24	2.74	0.0134
Landfill gas (50/50)	502.5 Btu/cu ft.	14.2	0.995	51.81	.0260 /cf		114.24	.05733 /cf		Note: CH4 and N2O factors for wood are significant. All fossil fuels are less than 1% compared to the factors for CO2.							
Biodiesel					9.29 /gal			20.48 /gal	860.35 /gal	the EPA Guidance Protocol							
Ethanol (100)	3.539 MMBtu/bbl	17.99	0.99	65.30	5.5 /gal		143.99	12.13 /gal	509.46 /bbl								

Note: it is assumed the combustion of biomass and biofuels does not contribute to net CO2 emissions. As a result, Partners are required to list biomass CO2 emissions in terms of total gas but the emissions are not included in the overall CO2-equivalent emissions corporate inventory.

Conversion Factors used in this inventory

Mass			
1 pound (lb)	453.6 grams (g)	0.4536 kilograms (kg)	0.0004536 metric tons (tonne)
1 kilogram (kg)	2.205 pounds (lb)		.0011023 short tons
1 short ton (ton)	2'000 pounds (lb)	907.2 kilograms (kg)	.9072 metric tons
1 metric ton	2'205 pounds (lb)	1'000 kilograms (kg)	1.1023 short tons (tons)
Volume			
1 cubic foot (ft^3)	7.4805 US gallons (gal)	0.1781 barrel (bbl)	
1 cubic foot (ft^3)	28.32 liters (L)	0.02832 cubic meters (m^3)	
1 US gallon (gal)	0.0238 barrel (bbl)	3.785 liters (L)	0.003785 cubic meters (m^3)
1 barrel (bbl)	42 US gallons (gal)	158.99 liters (L)	0.1589 cubic meters (m^3)
1 litre (L)	0.001 cubic meters (m^3)	0.2642 US gallons (gal)	
1 cubic meter (m^3)	6.2897 barrels (bbl)	264.2 US gallons (gal)	1'000 liters (L)
Energy			
1 kilowatt hour (kWh)	3412 Btu (btu)	3'600 kilojoules (KJ)	
1 megajoule (MJ)	0.001 gigajoules (GJ)		
1 gigajoule (GJ)	0.9478 million Btu (million btu)	277.8 kilowatt hours (kWh)	
1 Btu (btu)	1'055 joules (J)		
1 million Btu (million btu)	1.055 gigajoules (GJ)	293 kilowatt hours (kWh)	
1 therm (therm)	100'000 btu	0.1055 gigajoules (GJ)	29.3 kilowatt hours (kWh)
Other			
kilo	1'000		
mega	1'000'000		
giga	1'000'000'000		
tera	1'000'000'000'000		
1 psi	14.5037 bar		
1 kgf / cm^3 (tech atm)	1.0197 bar		
1 atmosphere (atm)	0.9869 bar	101.325 kilo pascals	14.696 pounds per square inch (psia)
1 mile (statue)	1.609 kilometers		
1 metric ton CH_4	21 metric tons CO_2 equivalent		
1metric ton N_2O	310 metric tons CO_2 equivalent		
1 metric ton carbon	3.664 metric tons CO_2		

Global Warming Potentials and Atmospheric Lifetimes (years)		
Gas Atmospheric Lifetime GWP[a]		
Greenhouse Gas	**Atmospheric Lifetime**	**Global Warming Potential**
Carbon dioxide (CO2)	50-200	1
Methane (CH4)b	12 +/- 3	21
Nitrous oxide (N2O)	120	310
HFC-23	264	11,700
HFC-125	32.6	2,800
HFC-134a	14.6	1,300
HFC-143a	48.3	3,800
HFC-152a	1.5	140
HFC-227ea	36.5	2,900
HFC-236fa	209	6,300
HFC-4310mee	17.1	1,300
CF4	50,000	6,500
C2F6	10,000	9,200
C4F10	2,600	7,00
C6F14	3,200	7,400
SF6	3,200	23,900

Source: IPCC 1996; Second Assessment Report (SAR). Although the GWPs have been updated by the IPCC in the Third Assessment Report (TAR), estimates of emissions presented in the US Inventory will continue to use the GWPs from the Second Assessment Report.

a 100 year time horizon

b The methane GWP includes the direct effects and those indirect effects due to the production of tropospheric ozone and stratospheric water vapor.

The indirect effect due to the production of CO2 is not included.

Color key to calculations in the Entergy GHG Inventory

The colored heading cells in each worksheet of this GHG inventory enable inventory managers and users update and understand the role of each step of the calculation process.

Yellow	Specific fuel or gas calculated	This heading identifies the fuel and emissions being calculated below it.
Red	Annual activity data input	This is an input cell for company activity or usage data related to this emissions source for a given facility, source or even corporate-wide. Examples of input data are gallons of gasoline, lbs of CO2 (provided as CEM data), or square footage of building space occupied by the company. This activity data is currently identified in the units provided during the completion of PNM's GHG inventory for years 2001-2003. For some de minimus emissions sources (such as fugitive HFCs from building space
Orange	Calculation constant	This cell contain as constant (coefficient) such as a conversion factor or unit measurement and does not to be changed annually unless there is a change to an emissions factor, input units or facility status.
Green	Calculation conversion subtotal	This figure is calculated automatically and is a subtotal or unit conversion resulting from a spreadsheet calculation such as MMBtu converted from mcf or gallons. This cell contains an emissions or conversion factor in its formula.
Blue	Emissions source total	This figure is calculated automatically and is a total of CO2e (CO2-equivalent) for a given emissions source (e.g. a facility or equipment type) and the sum of individual sources is carried into the annual corporate emissions table. This cell contains an emissions or conversion factor in its formula.
123.45	Emissions source total	Bolded cells contain a figure for total emissions in CO2e for that source and are carried to the corporate emissions totals sheet for emissions source comparison.

Attachment 2

Entergy Corporation General Emissions Source Checklist

Entergy Corporation General Emission Source Checklist

Emissions source category	GHG	Emissions source	Data Source/Comments
Direct emissions			
Stationary Combustion			
Fossil fuels	CO2	Boilers	CEMS data from Fossil Environmental Support Group
		Emergency/Backup Generation and other Small Sources	An inventory of all potential emission sources at Entergy locations was performed in 1994. The package of information for each Fossil site that includes a summary table of potential emission sources and maximum heat input for each non-boiler combustion source. This information was supplemented by information in air permits.
		cogeneration	RS Cogen is the only cogeneration plant in Entergy. CEMS data for this site is available from public sources. Ownership share was accounted for.
	CH4	CH4 from stationary combustion	Calculated from CEMS data
	N2O	N2O from stationary combustion	Calculated from CEMS data
Mobile Combustion			
Fossil Fuels	CO2	employee transportation in company vehicles	See spreadsheet for fuel activity by year, mileage driven by year, number of vehicles by type (car, light truck, heavy trucks, etc.) and by fuel. These data, along with emission factors, were used to estimate emissions from these sources. Source is Mic Cowart, Entergy's Manager of Transportation (8-633-2142)
		company service vehicles	
	CH4	CH4 from mobile combustion	
	N2O	N2O from mobile combustion	
Fugitive Emissions			
Gas Distribution System Line Losses	CH4	Leaks in or venting of gas distribution system in New Orleans and Baton Rouge	Lost and Unaccounted for Gas (LUFG) for 2000 - 2004 from the Statistical Report is one source of this data; however, it may not be accurate enough. Subsequently, an alternative equipment-based calculation was used for estimating emissions (see below) Gas Distribution Operations provided these data and they can also be found in the Statistical Report. (Line Losses (LUFG)) - Mike Leger - Manager, Gas Distribution Operations Support (8-567-3579) Basically, these numbers represent the starting inventory + purchases -

Entergy Corporation General Emission Source Checklist

			sales. However, it is likely that the majority of this is attributed to meter inaccuracy, company uses, and other factors which introduce uncertainty. Mike Leger, Entergy's Gas Distribution Operations Support Manager, estimates that at most, 30% of these numbers represent actual, physical losses. An equipment-based quantification methodology was used for these emissions. Mike Leger also provided a spreadsheet that contains a list of gas distribution assets (miles of pipe and what type, number of meters, etc.) and Platts used a GRI protocol to develop emission estimates. Mike Leger has subsequently been replaced by Keith McInerney, current Manager, Gas Distribution Operations.
T&D Equipment Gas Loss	SF6	Leakage of SF6 from certain types of T&D equipment	2003 1605(b) report SF6 Management Program – Rick McCabe established as the SME for this particular gas – provided 2004 emissions 1997 - 1082.42 lbs 1998 - 649.62 lbs 1999 - 649.62 lbs 2000 – NO DATA 2001 – NO DATA 2002 - 30,360 lbs 2003 – NO DATA 2004 – 22700 lbs Rick McCabe (T&D Environmental Management) has developed a protocol to derive these emissions.
Cooling Operations	HFC	Building cooling/air conditioning	Owned square footage: 2,578,000 Capital leased square footage: 830,000 These numbers do not include power plants, estimate 25,000 - 50,000 square feet per power plant Source is Ken Looper - Manager, Real Estate (576-4505)
		Mobile air conditioning	Derived from vehicle usage information – see item above. Emission factor used to estimate HFC emissions from this source
		District Cooling Operations	Information regarding equipment/coolant ratings and capacities obtained from the Director, Thermal Operations (John Carlson – 8-561-2120). Emission factors used to estimate emissions.
Indirect Emissions			
Fossil Fuels	CO2	purchased electricity	2000 – 24.05 million MWh 2001 – 19.32 million MWh 2002 – 27.16 million MWh 2003 – 37.57 million MWh (Controllable = 6.61; balance is UC) 2004 – 38.05 million MWh (Controllable = 9.23; balance is UC) Information regarding specific sources of purchased power was not tracked in 2000 - 2002; therefore, unit-specific data required to calculate emissions is not available for this timeframe. However, unit-specific data is available for 2003 and 2004. All of this information obtained from System Planning and Operations (Jim Lanning 504-576-6337)
	CH4	purchased electricity	
	N2O	purchased electricity	
Transmission and Distribution	CO2	Losses from electricity T&D for purchased power only	USEPA/Climate Leaders is currently developing a protocol to calculate these emissions. Currently, this is not included in Entergy's GHG inventory.
Green power		Purchased Green Power (non-biomass)	2000 - 488,922 MWh In 2000, Entergy owned and operated 3 hydro facilities totaling 150 MW. Additionally, Entergy purchased power from other hydro assets…this total is shown. This information was obtained from Entergy's 1605(b) report.

Attachment 3

2012 GHG Inventory Verification Statement and Report

Entergy Corporate Greenhouse Gas Inventory for Calendar Year 2012

Verification Report

March 8, 2013

ICF International
620 Folsom Street, 2nd Floor
San Francisco, CA 94107
(415) 677-7100

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Statement of Verification

March 8th, 2013

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 *2012 Corporate Greenhouse Gas (GHG) Inventory*, and supporting evidence including Entergy's Inventory Management Planning and Reporting Document (IMPRD), detailing the GHG emissions and associated source documents over the period January 1, 2012 to December 31, 2012. 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 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 49,438,750 metric tons of CO_2 equivalent (CO_2e) emissions for calendar year 2012.

Craig Ebert
Senior Vice President
601 W. 5th St., Suite 900
Los Angeles, CA 90071, USA
Email: craig.ebert@icfi.com
Tel.: (202) 276-2054

1 Verification Summary

Verifiers:	Craig Ebert, Khalid Husain (ICF International); Kevin Johnson (Cventure)
Internal Peer Reviewer:	Aaron Schroeder, P.Eng.
Verification Timeframe:	December 2012 to March 2013
Objective of the verification:	Limited level of assurance on Entergy's Corporate 2012 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 and World Business Council for Sustainable Development GHG Protocol Corporate Standard.
Verification scope – Gases:	Carbon Dioxide, Methane, Nitrous Oxide, Sulfur Hexafluoride, Hydrofluorocarbons
Organization:	Entergy Corporation
Location:	U.S.A.
Temporal period:	January 1, 2012 – December 31, 2012
Main Contact	Craig Ebert Senior Vice President 601 W. 5th St., Suite 900 Los Angeles, CA 90071, USA Email: craig.ebert@icfi.com Tel. (213) 312-1792
Main Contact	Rick N. Johnson Manager, Corporate Environmental Operations Environmental Strategy & Policy Group Entergy Services, Inc. 639 Loyola Ave (L-ENT-13D) New Orleans, LA 70113 rjohn15@entergy.com (504) 576-5246 (office)

2 Introduction

Entergy has engaged ICF International to provide a third party verification of its corporate-wide GHG emissions for calendar year 2012 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 2012 GHG inventory includes the following emissions sources:

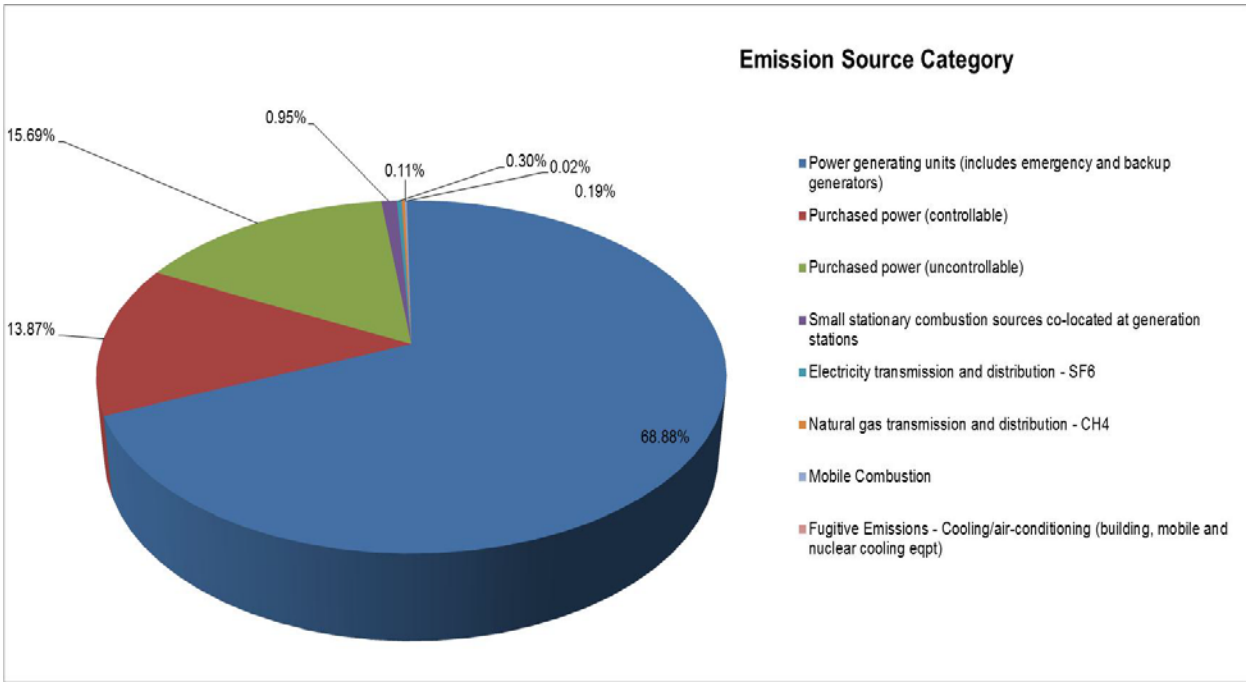
Scope 1**:** Stationary combustion in electric generating units and small sources at company facilities; mobile combustion in company fleet vehicles; fugitive methane from natural gas transmission systems; fugitive sulfur hexafluoride (SF_6) from electric power transmission and distribution systems; and fugitive hydrofluorocarbons (HFCs) from building HVAC systems, district cooling operations, and vehicle air conditioning systems.

Scope 2: Indirect emissions associated with both contract and spot market purchased electricity.

Scope 3: Purchased electricity for resale to end-users.

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 generating plants and consumed in Entergy's various administrative and commercial buildings and operations are accounted for in Entergy's direct emissions from stationary combustion. The GHG emissions resulting from the full life cycle of the various fuel sources are not included in the inventory.



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 Sampling Plan.

This is an ISO 14064-3 -based verification exercise, having been conducted to achieve a limited level of assurance. Given the status of Entergy Corporation's GHG emissions inventory and management system, and that this was only the second verification activity under the ISO 14064 guidelines and specifications, a limited level of assurance verification was appropriate for this project.

The 2012 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 facilities; and direct emissions from small stationary combustion sources at Entergy fossil and nuclear generating stations. Entergy's 2012 GHG Inventory includes small sources that are *de minimus* in nature (small stationary combustion; mobile combustion from company fleets; and fugitive emissions including CH_4 from natural gas transmission and distribution, SF_6 from electricity transmission and distribution, and air conditioning/cooling refrigerant HFC emissions). Entergy noted in its 2012 GHG Inventory Management Planning and Reporting Document (IMPRD) and also in its 2012 GHG Inventory that all of these small sources except HFC-related emissions were updated for the 2012 Inventory. As such, our verification efforts have included a review of these small sources except HFC emissions as this sector's emissions was a carry-forward from previous years, and they were already reviewed in prior year verifications.

3.1 Site Visit

A site visit was conducted during the period of January 21-23, 2013 in Arkansas. 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 other data systems, management controls, and overall information systems at the System Operations Control (SOC) center in Pine Bluff, Arkansas, as well as at the Arkansas-Transmission Operations Center (TOC) in Little Rock, Arkansas. The second set of meetings included visits to pre-selected plants (White Bluff Plant and Lake Catherine Plant, both in Arkansas), 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 Pine Bluff SOC and Little Rock TOC included:

- Cameron Warren and Frank Bowers, Pine Bluff SOC
- James (Von) Puska, Little Rock TOC

Key Entergy staff interviewed in-person during the White Bluff Plant and Lake Catherine Plant included:

- Barry Snow, Senior Environmental Specialist (White Bluff Plant)
- Tommy Gunn, Chemistry/Environmental Specialist (Lake Catherine Plant)
- Tracy Johnson, Fossil Environmental Manager for Entergy Arkansas accompanied the verification team to both plants.
- 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:

- Rick Johnson, Corporate Environmental Operations
- Charles John and Diane Mehra, Intra-System Billing (ISB)
- Scott Celino, Generation and Fuels Accounting
- Grady Kaough, Power Trading Operations
- Scott McMahan, Pine Bluff System Operations Center (SOC)
- Cameron Warren, Pine Bluff System Operations Center (SOC)
- Ryan Trushenski, Solid Fuel Supply – System Planning and Operations (SPO)
- Dave Sommers and Jeff Hogsett, Gas and Oil Supply
- Tad Chenet and Minh Nguyen, Fossil Environmental Services, Emissions Monitoring and Markets
- Juan Jones, Transmission 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 and power purchase agreements. The section that follows outlines the approaches used to review the main sources of the 2012 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 2012 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 also to account for some overlap with last year's samples (to test for any changes), as well as a selection of new samples.

The nineteen (19) generation units selected for this more detailed desktop review included the following six (6) coal and thirteen (13) gas units:

Coal

- Big Cajun 2 – 2B3
- Independence 1
- Independence 2

- RS Nelson 6
- White Bluff 1
- White Bluff 2

Gas

- Acadia CT4
- Baxter Wilson 1
- Baxter Wilson 2
- Gerald Andrus 1
- Lake Catherine 4
- Lewis Creek 1
- Lewis Creek 2
- Michoud 3
- Ninemile Point 4
- Ninemile Point 5
- Perryville Power Station 1-1
- Perryville Power Station 1-2
- RS Nelson 4

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

- Annual CO_2 /flue gas flow monitors relative accuracy test audits (RATAs) for the six (6) selected coal units;
- Quarterly CO_2 CEM linearity checks for the six (6) selected coal units;
- Natural gas flow meter CEMS calibration/accuracy checks for all thirteen (13) gas units;
- EPA emissions collection and monitoring plan system (ECMPS) quarterly feedback reports for all nineteen (19) units;
- Annual data on CO_2 emissions, electricity generation (MWh), and heat input (total Btu) for all nineteen (19) units (from EPA Clean Air Markets database);
- Monthly data on electricity generation (MWh) and heat input (total Btu) for seventeen (17) of the Entergy-operated units (from Entergy's Performance Monitoring and Diagnostics [PM&D] data historian database; PM&D data are not available on the combustion turbines at Acadia, and Entergy does not operate Big Cajun 2);
- 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_2 CEMS data for 2012 obtained directly from the plant's CEMS DAHS for the two units at the on-site survey visit coal-fired facility (White Bluff 1 and 2); 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 nineteen (19) units above that were reviewed in greater detail represented approximately 73% of Entergy's total direct CO2 emissions from power generation units, and approximately 50% of Entergy's total corporate GHG emissions, in 2012.

Organizational boundaries were verified using information contained in Entergy's SEC 10-K report for 2012, Entergy's 2011 Statistical Report and Investor Guide, Entergy's 2011 Annual Report, and Entergy's inventory list of generation assets. As described in Entergy's GHG Inventory Management Planning and Reporting Document (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 10-K reports.

CEMS reports supplied by Entergy were checked against both the GHG emissions data in their GHG inventory spreadsheet database, and the EPA Clean Air Markets' air monitoring program data (AMPD) database, for the nineteen (19) above selected units. Monthly and annual CO_2 CEMS reports were generated by ICF from queries of the AMPD database, and were checked and confirmed against the data for those nineteen (19) 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 all nineteen (19) Entergy generating units sampled. These documentary evidence verification checks were performed and confirmed that the reported GHG emissions data, and CO_2 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 units, a sampling of daily CO_2 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 Sampling 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 and Non-Controllable Power Purchases) in the 2012 inventory database were checked. Together the data from these two sources correspond to approximately 30% of the total Entergy Corporate GHG emissions in 2012.

A monthly breakdown of total purchased power was obtained from Entergy's Generation and Fuels Accounting for review purposes and cross-checked against the GHG Assertion. In addition, raw data from the TRADES database containing controllable purchased power for 2012 was received from System Planning and Operations (SPO) and was cross-checked against the Entergy GHG inventory spreadsheets. These two processes were outlined in the IMPRD as being central to the determination of the purchased power-related emissions.

This year, 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), as well as with data extracted from the Pine Bluff SOC. While these checks were not central to the GHG Assertion, they 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_2e 2011 estimates submitted under the U.S. Environmental Protection Agency's (EPA) Mandatory Reporting Rule. ICF reviewed the 2011 data submitted by Entergy to the EPA GHG Reporting Program in relation to the GHG Assertion.

Other Sources

Entergy has a number of small sources that individually and collectively are *de minimus* in nature, as noted in the IMPRD. Nonetheless, Entergy did update all of those small sources' emissions for its 2012 GHG Inventory except air conditioning/cooling refrigerant emissions, which were a carryover from past years. Sources that were updated included small stationary fossil; mobile combustion from company fleets; CH_4 from natural gas transmission and distribution; and SF_6 from electricity transmission and distribution. Back-up data and explanations were provided for each of these sources and checked by ICF against the GHG assertion. Telephone calls were held with Entergy's Environmental Manager to discuss the methods used and data employed in the updates.

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 Sampling 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.

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 were summarized in the Sampling 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 Sampling Plan.

The verification team developed a thorough knowledge of the data management and control systems utilized in the organization through the review of the Report (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 1/1/2012 to 12/31/2012 inclusive were extracted and sent via Excel to ICF by Grady Kaough (via Rick Johnson).
- Generation Fuels and Accounting – Monthly purchased power totals for 2012 (12 months for 2012) in PDF form were sent to ICF by Scott Celino (via Rick Johnson)
- ISB (Intra-system billing) – Purchased power data was sent by Charles John.
- 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 Karen McIlvoy's group: purchase amounts inputed 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 1/1/2012 to 12/31/2012 inclusive was extracted and sent via Excel to ICF by Grady Kaough (via Rick Johnson).
- SOC – a subset of power purchases data from 1/1/2012 to 12/31/2012 inclusive was extracted and sent via Excel to ICF by Cameron Warren (via Rick Johnson).

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_4 emissions factors for fugitive emissions from natural gas transmission and distribution in relation to published and latest sources	Immaterial discrepancy
C2: Minor/Negligible Emissions - Methodology and Documentation	None detected	
D1: Data Gathering and Quality Controls	None detected	
D2: Data Confirmation against External Sources	2. 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 CH4 emissions factors for fugitive emissions from natural gas transmission and distribution in relation to published and latest sources	The CH_4 emissions factors for fugitive emissions from natural gas transmission and distribution did not exactly match published factors from the *API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and the Natural Gas Industry* (2009). The values employed in the GHG Assertion were indicated as being referenced from the Gas Research Institute (GRI) but a specific source was not given. The difference in emissions for this sector (based on what was employed and what could have been applied from API) was 0.24%, and 0.0005% of the total inventory. This is reasonable given that API factors have drawn from the experience of GRI work in this area.

Discrepancy Title	Discrepancy Description
2. 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 2% of each other. 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 nineteen (19) units identified as targets for more detailed audit sampling, air monitoring program data (AMPD) monthly/annual CO_2 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_2 emissions database and Entergy GHG emissions inventory spreadsheets/supporting documentation comparisons and data checks.

- Emission factors for CH_4 and N_2O emissions from each of the Entergy fossil generation units were also checked. A minor, immaterial discrepancy in the coal-fired CH_4 emission factor was identified in those checks, and was subsequently corrected by Entergy during the course of the verification program.

- Organizational and operational boundary verification checks revealed a significant, yet immaterial discrepancy in Entergy's equity share of the RS Nelson 6 unit's GHG emissions. This error was corrected by Entergy during the course of the 2012 GHG inventory verification program. Also, verification checks of the Entergy stationary combustion CEM spreadsheet identified the omission of two newly acquired facilities (Hines and Hot Spring, in December 2012), from the Entergy corporate entity-wide aggregation total GHG emissions. These immaterial omissions were corrected by Entergy during the course of the 2012 GHG inventory verification program.

- A re-calculation of CO_2 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_2 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_2 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_2 agreement was within +/- 2% 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 nine (9) natural gas-fired facilities with generation units audit-sampled under this verification program, monthly and annual 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 +0.2% difference for the nine (9) facilities, with only one (1) of those facilities exhibiting a deviation greater than +/- 5% (-6.1%). 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 natural gas fuel flow meters' measurements aggregated across a total of 2-5 units (except for Gerald Andrus 1), 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 twelve (12) 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 seventeen (17) of the nineteen (19) audit-sampled units. The results of these cross-checking comparisons showed individual unit deviations between the two datasets having an average deviation of -3.1% for the five (5) coal-fired units, with only two (2) coal units' deviations being greater than +/-5% (e.g., -6.7% and -7.5%, respectively). For the twelve (12) gas units with PM&D data, the individual unit deviations between the two data sets showed an average deviation of +0.1%, with only two (2) units having deviations greater than +/-5% (+8.5% and -11.9%, respectively). As in the case of the Gas Database comparison above, the results of this cross-check add further credibility to Entergy's coal- and gas-fired generation GHG emissions inventory reporting.

- ICF's review of controllable purchased power emissions led to identification of incorrect emissions factors in a few cases as well as two omitted and one mismatched amounts of power from controllable sources. These were subsequently corrected by Entergy during the course of the verification.

- ICF undertook a series of checks on non-controllable power purchases by requesting such data from ISB, TRADES and SOC. 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.

- Emissions factors for CH_4 and N_2O were initially inconsistent in some cases with latest published sources for mobile combustion. This was an immaterial finding but was corrected during the course of verification by Entergy.

- Total CO_2 emissions for small stationary combustion were initially slightly inconsistent in relation to 2011 GHG reports to EPA in a few cases. This was an immaterial finding but was corrected during the course of verification by Entergy.

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

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.

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Internal Peer Reviewer

Aaron Schroeder is a Professional Engineer in the Province of Alberta and holds a BSc. in Engineering from the University of Saskatchewan. He has completed supplementary training in ISO 14064 as well as Auditing and Assurance Engagements through the University of Toronto, School of Continuing Studies. Aaron has acted as lead verifier on third-party assurance assignments for multiple compliance periods under Alberta's Specified Gas Emitters Regulation. These projects included work at SAGD facilities in Alberta's oil sands, a complex sour gas processing facility, two of Alberta's largest natural gas pipelines and combined-cycle electric generating facilities. Additionally, Aaron has completed numerous verifications as lead verifier for emission reduction (offset) projects in agricultural tillage management, wind electricity generation, and acid gas injection projects.

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 eighth day of March, 2013.

Senior Vice President
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Los Angeles, CA 90071, USA
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Appendices

Verification Plan

Sampling Plan

Verification Plan

Entergy

1 Introduction

This document provides details on the verification scope and process that is planned to conduct a limited level verification of their assertion, namely the 2012 organization-wide GHG inventory, for Entergy Corporation ("Entergy"). The GHG Assertion made by Entergy requires the quantification of the emissions produced during, and related primarily to stationary combustion of fossil fuels and purchased power, as well as a number of minor sources. An overview of operations for the organization will be provided in the Verification Report.

A Verification Risk Assessment will be conducted during the verification planning stage. Additionally, the results of the Risk Assessment will inform the development of the Sampling Plan, which will be included in the Verification Report.

The Verification and Sampling Plans will be updated through the course of the verification as additional information becomes available.

The verification conclusion will be documented in the Verification Statement and the verification findings will be further described in the Verification Report. The Verification and Sampling Plans will be appended to the Verification Report to provide information related to the verification scope and process.

2 Verification Scope

2.1 Objective

The primary objective of this verification engagement is 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 has been engaged to provide a third-party verification of the GHG Assertion. Experts from ICF International as well as from CVenture compose 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 will be conducted in accordance with *ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions.* The verification will be 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 Facility 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 will be explored. The procedures utilized to review the GHG Assertion were designed to support a *limited level* of assurance. These procedures systematically review:

- 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 reporting protocols.

Infrastructure and Activities

According to Entergy's website[1], "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 $11 billion and approximately 15,000 employees."

[1] Accessed on January 9, 2013 at http://www.entergy.com/about_entergy/

GHG Sources

The following key sources comprise the 2012 GHG inventory categorized by Entergy as follows:

Entergy Category	Emissions Source Category	Corporate Emissions Source	GHGs Included
Direct Emissions	Stationary Combustion	Power Generating Units	CO_2, CH_4, N_2O
		Small Stationary Combustion	CO_2, CH_4, N_2O
	Mobile Combustion	Corporate Fleet	CO_2, CH_4, N_2O
	Fugitive Emissions	Natural Gas Trans. & Dist.	CH_4
		Electricity Trans. & Dist.	SF_6
		Cooling/Air-Conditioning	HFCs
Indirect Emissions	Purchased Electricity		
	T&D Losses	Entergy Purchased Power Consumed on Entergy T&D Losses	CO_2, CH_4, N_2O
Optional Emissions Sources	Purchased Power (Controllable)	Controllable Purchased Power Sold to Customers	CO_2, CH_4, N_2O
	Purchased Power (Uncontrollable)	Uncontrollable Purchased Power Sold to Customers	CO_2, CH_4, N_2O

GHG Types

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

- Carbon Dioxide (CO_2)
- Methane (CH_4)
- Nitrous Oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Sulphur Hexafluoride (SF_6)

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.

Reporting Period

The GHG Assertion covers the 2012 calendar year, namely 1 January 2012 to 31 December 2012 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 will be 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 is 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 are deemed to be material.

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

All discrepancies that are outstanding at the conclusion of the verification will be 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 is 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, is typically considered to be "material" if it would influence any decision or action taken by users of the information. This definition of materiality is 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 is reasonable. However, for its GHG inventory verification program, an appropriate materiality threshold needs to be devised in line with uncertainty and risk estimates. Based on those assessments, we suggest that such a materiality threshold for an ISO verification program, conducted to achieve a limited level of assurance, be established as 10%. Note that this materiality threshold may be breached by individual errors, or the sum of multiple errors detected in the various SSRs.

Individual discrepancies and the aggregate of individual discrepancies will be 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 will present evidence such that each of these principles is 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.

3 Verification Team

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4 Verification Process

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

Pre-Engagement	Approach	Execution of Verification	Completion
1. Selection of Lead Verifier **2.** Initiate Conflict of Interest Procedure **3.** Pre-Engagement Planning and Proposal Development **4.** Contract Execution **5.** Assess GHG Program & Revise Procedures as Required **6.** Initiate Verification Tracking	**7.** Selection of Verification Team **8.** Communication with Client/Responsible Party **9.** Kick-off Meeting **10.** Verification Risk Assessment **11.** Draft Verification and Sampling Plan	**12.** Site Visit(s) **13.** Conduct Verification Procedures **14.** Issue Clarification & Data Request **15.** Revise & Finalize Verification and Sampling Plan **16.** Address and Evaluate Outstanding Issues	**17.** Evaluate Evidence **18.** Hold Verification Findings Meeting (if necessary) **19.** Draft Verification Report & Statement **20.** Internal Peer Review **21.** Independent Review of Impartiality **22.** Issue Verification Report & Statement **23.** Close Verification File **24.** Develop and Issue Management Memo(s)

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

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 is an iterative process; that is, the process will be completed several times through the course of the verification and the resulting plan will be 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 will involve the development of Verification Risk Assessment for the Responsible Party. The steps in this process include:

- 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.

4.3 Execution of Verification

With draft Verification and Sampling Plans in place, the verification procedures will be executed. This process involves collecting evidence, testing internal controls, conducting substantive testing, and developing a review file. Over the course of the verification, the draft Verification and Sampling Plans may change; the final Verification and Sampling Plans provided in the Verification Report reflect the verification parameters and procedures that were actually executed.

Site Visit

The site visit will be conducted by Khalid Husain and Kevin Johnson from January 21-23 inclusive in Arkansas. During the course of the site tour, ICF will:

a) interview key site operations personnel regarding the operations and data management of a selected coal plant (White Bluff) and gas plant (Lake Catherine) to cross-check GHG data as well as gain a deeper understanding of GHG information systems and controls at a plant level.
b) undertake discussions with the Pine Bluff systems operation center (SOC) and Little Rock transmissions operations center (TOC) staff for these functions at Entergy; and
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 staff to be interviewed on-site include:

- Rick Johnson, Manager, Corporate Environmental Operations (based in New Orleans but accompanying the ICF team during this trip)
- Barry Snow, White Bluff Coal Plant
- Tommy Gunn, Lake Catherine Gas Plant
- Scott McMahan and Cameron Warren, Pine Bluff SOC
- James (Von) Puska, Little Rock TOC

During the site visit all GHG emission sources for the White Bluff and Lake Catherine facilities will be reviewed to ensure appropriate identification and categorization. A review of process flow and metering diagrams will be followed by physical observation of the facilities.

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 described in the final Verification Plan, the Verification Team will review 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 will be reviewed:

- TRADES – controllable power purchases tracking system: hourly purchase amounts from 1/1/2012 to 12/31/2012 inclusive.
- Generation Fuels and Accounting – Monthly purchased power totals for 2012 (12 months for 2012) in PDF form by Scott Celino.
- ISB (Intra-system billing) – Total purchased power data by Charles John.
- 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 Karen McIlvoy: purchase amounts inputed into ISB.
- Coal purchases data – from Ryan Trushenski (solid fuels): purchase amounts inputted into ISB.

The following non-critical data will be 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 1/1/2012 to 12/31/2012 to be sent via Excel to ICF by Grady Kaough (via Rick Johnson).
- SOC – a subset of power purchases data from 1/1/2012 to 12/31/2012 inclusive to be sent via Excel to ICF by Cameron Warren (via Rick Johnson).

Telephone and videoconference interviews will be held with staff involved in the above systems in order to review procedures and obtain relevant data.

Testing and Assessment of Internal Controls

The Verification Team will develop 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 will seek 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 will incorporate 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 will be used to assess the reasonability and validity of the GHG Assertion. Both quantitative and qualitative analysis will be performed to achieve the desired level of assurance. The verification procedures are described in the final Verification Plan as separate tables for each process or activity involved in the quantification and reporting of the GHG Assertion. The verification procedures include 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.

Clarification and Data Request

To facilitate information flow between the Verification Team and the Responsible Party, a consolidated request for additional information will be developed through the course of the verification and issued to the Responsible Party. This "Clarification and Data Request" will be used to document information requests and summarize the responses. It will also be used to document the Verification Team's assessment of each response.

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 will serve to provide support for the verification conclusion, provide evidence that the verification was conducted in accordance with the criteria set forth in this document, and aid the Verifier in conducting current and future reviews.

The File will include:

- 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 will be formally closed after the verification has been executed and the Verification Report has been 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 is conducted by the Internal Peer Reviewer. This process ensures 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 is planned for the verification (subject to change with agreement between the Verifier and the Responsible Party).

Description	Scheduled Date
Verification Kick-Off Meeting	December 19, 2012
Draft Verification Plan to Responsible Party	January 10, 2013
Site Visit	January 21-23, 2013
Preliminary Data Request	January 18, 2013
Final Clarification & Data Request	January 28, 2013
Clarifications on GHG Assertion	February 22, 2013
Draft Verification Statement and Report	March 6, 2013
Final Verification Statement and Report	March 8, 2013

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 the accompanying Sampling Plan. Our established audit procedures and documentation systems ensure a thorough treatment of any risk identified, including determination of magnitude and sensitivity of that risk, during the assessment process. A qualitative risk assessment will be 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 2012 GHG Assertion will emanate 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 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. Because of these reasons, in particular the sheer magnitude of Entergy's GHG footprint, the inherent risk is likely to be medium.

Control risk relates to the likelihood that a material misstatement in the 2012 GHG Assertion will not be prevented or detected by Entergy's internal control and data management systems. Control risks will be assessed primarily by reviewing data controls and management systems for large fossil generating units and purchased power, both comprising in aggregate nearly 99% of total company-wide emission as noted in the 2012 GHG Assertion. This percentage has remained largely the same over the last three years. The largest control risk in relation to the 2012 GHG assertion is likely to be the manual transcription method in which the inventory is prepared (i.e., emissions values are extracted from various sources and manually entered into an Excel spreadsheet). For purchased power, a number of data systems (such as TRADES and gas and coal purchases) feed into ISB (intra-system billing system). Both the individual data systems that comprise data input into ISB as well as ISB itself undergo QA/QC checks several times on an annualized basis. For all of the large, CEMS-equipped fossil fuel electric generation units, which contribute approximately 70% 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 is likely 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 the sampling plan. Our assessment is that detection risk is likely low, given the large number and appropriateness of the tests which have focused on the largest sector (by relative magnitude) of Entergy's 2012 GHG Assertion.

These tests have been 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. Also, for the large CEMS-equipped generation units, because there are so many of them in Entergy's system (~50), there would have to be multiple, long duration undetected control failures to create errors which would lead to material misstatement of Entergy's entity-wide inventory. (For example, in the 2010 case of two highly unusual CEM system failures, which went undetected for several months, while they affected GHG emissions of each unit by 5-10%, their collective impact on Entergy's overall corporate GHG inventory was less than 1%.)

Sampling Plan

Entergy's 2012 GHG Inventory Verification

Objective:

The Sampling Plan describes the procedures that will be conducted within the verification to review Entergy's 2012 GHG Inventory, specifically the GHG Assertion. These procedures have been developed in accordance with the verification principles described in the Verification Plan and customized for Entergy.

Testing Procedures:

The specific verification activities are summarized in separate tables for each procedure that has been designed to review the evidence supporting the GHG Assertion. As relevant, materiality is specified for each specific procedure. Aggregate materiality is determined separately.

Summary of Procedures:

Note that the following procedures are not necessarily performed in a sequential manner and may be dictated by the receipt of appropriate data sources. These procedures may also be conducted in an iterative manner as required. While it is appropriate to correct any errors or omissions as identified by the Verification Team, the Responsible Party must perform any required corrections to avoid the threat of self-review to the Verification Team.

Organizational Boundaries and Definition

B1: Established Organizational Boundaries

B2: Review of Operating Conditions

Calculation

C1: True-up and Re-Performance Calculations

C2: Minor / Negligible Emissions - Methodology and Documentation

Data Sources and Supporting Data

D1: Data Gathering and Quality Controls

D2: Data Confirmation against External Sources

D3: Data Migration into Inventory

Assertion

A1: Verification Assessment

Procedure Definition Table Explained

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 emissions 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 *Data Sources* 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: *Relevance, Completeness, Consistency, Accuracy, Transparency, or Conservativeness*.
Specific Activities	• In bullet form; • The *Specific Activities* are outlined here.
Error Conditions	• Again in bullet form; • The anticipated *Error Conditions* are listed here to aid the verification team; • As the Sampling Plan is a living document until the end of the verification process, additional error conditions may be identified during the execution of the procedures.

Organizational Boundaries and Definition

B1 – Established Organizational Boundaries	
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 Planning and Reporting Document (IMPRD), Process Flow Diagrams, GHG Assertion, Previous GHG Assertions, Facility Operations Personnel
Objective (specific principles)	*Completeness*, *Consistency*
Specific Activities	1. Compare the GHG emission sources listed for the organization in the GHG Assertion against GHG emission sources listed in previous GHG Assertions; 2. Compare the GHG emission sources listed for the organization in the GHG Assertion against the process flow diagrams for completeness; 3. Compare the GHG emission sources listed for the organization in the GHG Assertion against observations made during site tour for completeness; 4. Interview operations personnel regarding changes to equipment inventory or changes in operation that have occurred in the current reporting period; 5. Interview operations personnel regarding completeness of equipment inventory described in the GHG Assertion; 6. Evaluate the appropriateness and quantification of any negligible emission sources.
Error Conditions	• Above *de minimus* threshold GHG emission sources, within the declared boundaries, which are not reported in the GHG Assertion.

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 (e.g., IMPRD)
Data Sources	GHG Assertion, Operations Personnel
Objective (specific principles)	*Consistency*, *Completeness*
Specific Activities	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); 2. Compare total emissions for each GHG emission source in the current period against prior periods;
Error Conditions	• Significant changes in emissions do not constitute an error condition, but do warrant further investigation.

Calculation

C1: True Up and Re-Performance Calculations	
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 99% of total corporate-wide GHG emissions for 2012. 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.	
Type of Evidence	Documentation, Re-performance
Data Sources	2012 GHG inventory and Report (IMPRD) In addition: 1. Purchased power: a. Controllable trades (on daily basis from 1/1/2012 to 12/31/2012 from Grady Kaough) from TRADES (Excel extracts), as well as sorted and purchased totals from Rick Johnson (also in Excel) as double-check. b. Total purchased power (monthly basis from January to December 2012) in the form of ISB extracts (12 PDFs) from Scott Celino c. ISB back-up transactions information and other relevant records from Charles Johns 2. Large stationary fossil plants: d. Selected CEMS reports, 19 in total, (from Tad Chenet/Minh Nguyen), sampling is at the smallest units corresponding to ~2% of total direct emissions (~1.5% of total ETR emissions), expected to represent approximately 73% of Entergy power generation direct emissions . These are: **Coal** • Big Cajun 2 – 2B3 • Independence 1 • Independence 2 • RS Nelson 6 • White Bluff 1 • White Bluff 2 **Gas** • Acadia CT4 • Baxter Wilson 1 • Baxter Wilson 2 • Gerald Andrus 1 • Lake Catherine 4 • Lewis Creek 1 • Lewis Creek 2 • Michoud 3 • Ninemile Point 4 • Ninemile Point 5

C1: True Up and Re-Performance Calculations	
	• Perryville Power Station 1-1 • Perryville Power Station 1-2 • RS Nelson 4 e. Inquiries about information regarding and data from the System Control and Data Acquisition (SCADA) database from System Operations; f. Coal purchasing (Ryan Trushenski) and two (2) short-term test burns data for one plant g. Gas purchasing (Karen McIlvoy) burns data – all plants – monthly basis. h. Plant performance monitoring and diagnostics (PM&D) data: monthly fuel use boiler heat input for most of the auditing sample selected units. i. CEMS supporting documentation and QA/QC back-up data for selected audit sample units 3. Small stationary combustion: 2011 data reported to EPA's GHG Reporting Program.

C1: True Up and Re-Performance Calculations	
Objective (specific principles)	*Accuracy, Transparency*
Specific Activities	General • Review documentation for completeness • Recalculate emissions numbers • Perform checks Emissions Factors • Calculate emissions from each emission source category from each Facility • Confirm and re-calculate (if applicable) emission factors against independent reference material
Potential Error Conditions	General • Disagreement between calculated and reported values; • Incorrect application of significant figures in calculation; • Disagreement between allocated values or inconsistent methodology. Emissions Factors • Incorrect or out of date emissions factors
Sample Unit	1. Purchased Power: a. All controllable trades (daily) extract in Excel b. Emissions totals for total purchased power on monthly basis 2. Large stationary fossil plants: a. 19 units selected for sampling in relation to PM&D data (request to be sent to Stanley Jaskot) and EPA CAM checks representing ~50% of total Entergy emissions, including: **Coal Units** • Big Cajun 2 – 2B3 • Independence 1 • Independence 2 • RS Nelson 6 • White Bluff 1 • White Bluff 2 **Gas Units** • Acadia CT 4 • Baxter Wilson 1 • Baxter Wilson 2 • Gerald Andrus 1 • Lake Catherine 4 • Lewis Creek 1 • Lewis Creek 2 • Michoud 3 • Ninemile Point 4 • Ninemile Point 5 • Perryville Power Station 1-1

C1: True Up and Re-Performance Calculations	
	• Perryville Power Station 1-2 • RS Nelson 4 For the selected units ICF would like to receive the following unit-specific, reported data from a query of the PM&D database of historical data, for calendar year 2012: • Fuel flow: MCF for gas or tons for coal • Heat input: MMbtu • Power generation: MW-hr • Average heat rate for aggregation period: Btu/kw-hr • Aggregation period for reporting totalized activity data on fuel flow, heat input, and power generation on a monthly basis. b. CEMS reports – for the following coal-fired and gas-fired units– request made to Tad Chenet/Minh Nguyen at Fossil Environmental: **Coal** • Big Cajun 2 – 2B3 • Independence 1 • Independence 2 • RS Nelson 6 • White Bluff 1 • White Bluff 2 **Gas** • Acadia CT4 • Baxter Wilson 1 • Baxter Wilson 2 • Gerald Andrus 1 • Lake Catherine 4 • Lewis Creek 1 • Lewis Creek 2 • Michoud 3 • Ninemile Point 4 • Ninemile Point 5 • Perryville Power Station 1-1 • Perryville Power Station 1-2 • RS Nelson 4 For each of the above CEMS-equipped gas or coal-fired units, ICF will request the following information for calendar year 2012: • Gas flow meter accuracy test/CEMS gas flow transmitter calibration analysis (gas-fired units) • CO_2 and stack gas flow meter CEMS relative accuracy test audit (RATA) annual test results (coal-fired units) • CO_2 CEMS quarterly linearity checks (coal-fired units)

C1: True Up and Re-Performance Calculations	
	• CO_2 quarterly electronic data report (EDRs) • ECPMS (emissions collection and monitoring plan system) feedback reports: Q1 – Q4 For the on-site sampled coal and gas units, respectively, at White Bluff and Lake Catherine, ICF will request similar information as above from the respective plant managers / environmental managers on site, including hourly CO_2 data for 2012 from the White Bluff on-site CEMS data acquisition and handling system (DAHS). 3. Small stationary plants – check "fossil fuel generating stations" emissions against EPA GHG Reporting Program data for 2011 . "Nuclear generating stations" and "other small plants" emissions are carryovers from 2005.
Sample Size	All emissions sources and values for: - Purchased power, broken out by controllable trades and total purchased power (to account for non-controllable trades). - Large stationary fossil plants. - Small stationary combustion (fossil generating plants only).
Materiality Threshold	10% of the GHG Assertion; qualitative errors will be reviewed on a case by case basis for materiality.

C2 – Minor/Negligible Emissions - Methodology and Documentation	
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	2012 GHG Assertion, IMP
Objective (specific principles)	*Accuracy, Transparency*
Specific Activities	1. Review minor/negligible sources and discuss with Entergy environmental manager 2. Compare to earlier year inventories (2009, 2010 and 2011)
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

Data Sources and Supporting Data

D1 – Data Collection and Quality Controls	
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)	*Completeness, Consistency, Accuracy, Transparency, Conservativeness*
Specific Activities	1. Observe or interview operations personnel regarding the operation of data transfer systems, including manual data entry procedures and associated controls; 2. Review or interview operations personnel regarding on-site sampling, laboratory and other analytical procedures; 3. Compare original data sources to data in calculation systems for consistency. 4. Assess the conformance of the GHG information systems and controls with the verification criteria.
Error Conditions	• Inconsistency between raw data and data supporting GHG Assertion

D2 – Data Confirmation against External Sources	
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	Inventory Report and supporting external data/information: <u>1. Large fossil generating stations:</u> a. PM&D data – monthly (all 12 months for 2012) b. CEMS data – ECMPS reports (for 19 gas and coal-fired units (representing ~73% of Entergy power generation direct emissions, and ~50% of total Entergy emissions), and EPA CAM emissions database query reports c. Gas and coal burn data – monthly for all gas units (all 12 months for 2012); two sets of select daily burn data for White Bluff and Independence plants, and one set of daily burn data for RS Nelson 6. d. All CEMS-related QA/QC documentation for White Bluff and Lake Catherine units, and hourly CO_2 data for White Bluff units; <u>2. Small stationary combustion sources –</u> 2011 (or later) EPA GHG Reporting Program data submitted for all fossil generating stations – annual. <u>3. Purchased power:</u> In addition to expected data from TRADES (hourly controllable purchased power for all of 2012) and from Generation Fuels and Accounting (monthly purchased power totals), ICF will request the following as an external check: • ISB (Intra-system billing) – Purchased power data will be sent by Charles John. In addition, the following non-critical data will be 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-controllables power purchases data from 1/1/2012 to 12/31/2012 inclusive via Excel to ICF by Grady Kaough (via Rick Johnson). • SOC – a subset of power purchases data from 1/1/2012 to 12/31/2012 inclusive via Excel to ICF by Cameron Warren (via Rick Johnson).
Objective (specific principles)	*Accuracy, Conservativeness*
Specific Activities	1. Review use of external data sources in GHG inventory for appropriateness; 2. Compare reported/metered values to those provided by secondary sources

D2 – Data Confirmation against External Sources	
Potential Error Conditions	• Unexplained, major discrepancy between metered/reported values and secondary source.
Sample Unit	Typically monthly or annual data primarily, with some cross-checks on daily data as relevant
Sample Size	1. Large fossil generating stations: a. PM&D data – for 17 units (representing ~47% of total Entergy emissions) b. CEMS data – ECMPS reports – for 19 gas and coal-fired units (representing ~73% of Entergy power generation direct emissions, and ~50% of total Entergy emissions) c. Gas and coal burn data – monthly (all 12 months for 2012) – for all gas units, and two sets of select daily data for White Bluff and Independence plants, and one set of select daily data for RS Nelson 6. d. All CEMS-related QA/QC documentation for White Bluff and Lake Catherine units, and hourly DAHS CO_2 emissions data for White Bluff. 2. Small stationary combustion sources – 2012 (or later) EPA GHG Reporting Program data submitted for all fossil generating stations - annual 3. Purchased power: In addition to data from TRADES (hourly controllable purchased power for all of 2012) and from Generation Fuels and Accounting (monthly purchased power totals), ICF will request the following as an external check: • ISB (Intra-system billing) – Purchased power data was sent by Charles John. In addition, the following non-critical data will request and obtain for exploratory checks and knowledge enhancement for both GHG data comparison purposes as well as for information systems: • TRADES – a subset of non-controllables power purchases data from 1/1/2012 to 12/31/2012 inclusive via Excel to ICF by Grady Kaough (via Rick Johnson). • SOC – a subset of power purchases data from 1/1/2012 to 12/31/2012 inclusive via Excel to ICF by Cameron Warren (via Rick Johnson).
Materiality Threshold	Quantitative errors will be reviewed on a case by case basis for materiality.

D3 – Data Migration into Inventory	
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/Spreadsheets, IMPRD, discussions with Entergy's Environmental Manager
Objective (specific principles)	*Accuracy*, *Transparency*
Specific Activities	1. Recalculate summary calculations performed by Entergy; 2. Compare calculated values to those in the GHG Assertion for transcription accuracy;
Potential Error Conditions	• Discrepancy between summary totals and individual sector values reported in GHG Assertion
Sample Unit	Data reported in the final GHG Assertion
Sample Size	All relevant information and emissions values
Materiality Threshold	Any discrepancies

Assertion

A1 – Final Verification Assessment	
Introduction: This procedure is intended as a final review of Entergy's 2012 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)	*Completeness*
Specific Activities	1. Review each page of the GHG Assertion and IMPRD for completeness; 2. Provide Responsible Party with documentation, namely a verification statement and report, required for submission to voluntary reporting protocols
Potential Error Conditions	• Incomplete, inaccurate, or missing information in the GHG Assertion
Sample Unit	Data fields in the GHG Assertion
Sample Size	All fields in the GHG Assertion
Materiality Threshold	Any incomplete, inaccurate, or missing information

Attachment 4

IMPRD Revision Log

Entergy GHG IMP and Reporting Document Revision Log

Revision No	Revision Date	Reason for Revision	Additional Comments
1	July 2005	Original DRAFT	
2	8/16/05	Revised Draft	Editorial/technical comments from Fossil Operations, Nuclear Operations, and T&D included
3	9/30/05	FINAL DRAFT	Editorial/technical comments from Platts/E source
4	12/21/05	FINAL VERSION	Changes made to reflect approved GHG reduction goal – 2nd commitment
5	10/10/06	Revised based on comments from Climate Leaders and E-source	Clarified various data sources and communication requirements in document
6	04/28/09	Revsied based on findings during verification of 2006 and 2007 GHG Inventories	Various editorial changes; added Thermal facilities and Spindletop to facilities list
7	08/25/09	Revised based on findings during verification of 2008 GHG Inventory	Revised fugitive emissions methodology for SF_6; other minor editorial changes
8	04/01/10	Revised based on findings during verification of 2009 GHG Inventory	Various editorial changes; noted need to subtract EAM from total purchases (ISB); updated facility list; enhanced QA/QC discussion
9	3/10/11	Revised based on findings during verification of 2010 GHG Inventory	Various editorial changes; updated status of EPA Climate Leaders Program; clarified review requirements, QAQC measures and training
10	03/09/12	Revised to comply with ISO 14064-3:2006 and based on findings during verification audit of 2011 GHG Inventory	Major revision – expanded document to include aspects necessary to comply with ISO standard. Expanded discussions of data management, quantification methods, targets, actions, base year adjustments and uncertainty.
11	03/08/13	Revised based on findings during verification audit of 2012 GHG Inventory	Various editorial changes; updated plant acquisitions during 2012