

Instructions for Form EIA-1605

Voluntary Reporting of Greenhouse Gases

**Revised Pursuant to 10 CFR Part 300
Guidelines for Voluntary Greenhouse Gas Reporting**

**Energy Information Administration
U.S. Department of Energy**

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Introduction

What Is the Purpose of Form EIA-1605?

Form EIA-1605 provides the means for the voluntary reporting of greenhouse gas emissions, reductions, and sequestration under Section 1605(b) of the Energy Policy Act (EPAAct) of 1992 (Public Law 102-486). The form implements the guidelines for filing voluntary reports issued on April 21, 2006 by the Department of Energy's (DOE) Office of Policy and International Affairs (71 FR 20784), Guidelines for Voluntary Greenhouse Gas Reporting (10 CFR Part 300). The purpose of the Voluntary Reporting Program is to encourage corporations, government agencies, non-profit organizations, households, and other private and public entities to submit annual reports of their greenhouse gas emissions, emission reductions, and sequestration activities. Form EIA-1605 provides a means for voluntary reporting that is complete, reliable, and consistent.

Why Report?

This voluntary reporting program gives participants the opportunity to create a public record of their emissions, emission reductions, and/or sequestration achievements. In addition, the registration of emission reductions may provide special recognition to those entities willing to meet additional requirements. Reporting also provides a mechanism for initiating an informed public debate on greenhouse gases and reduction efforts. Over time, it is anticipated that these reports will contribute to a reliable record of contributions made toward reducing greenhouse gas emissions.

How Will Your Report Be Used?

All reports submitted to the Energy Information Administration (EIA) on Form EIA-1605 will be entered into an electronic database designed to preserve data on emissions, emission reductions, and sequestration achievements. All non-confidential information reported under this voluntary program will be publicly available on a reporter-specific basis, except confidential information. Public access to these data will create a reliable record of the contributions reporting entities have made toward reducing their greenhouse gas emissions.

If there is information included in your report that is believed to be a trade secret or commercial or financial information that is exempt from public disclosure under the Freedom of Information Act (e.g., release to the public would cause substantial harm to your organization's competitive position), you may request that the information be kept confidential by checking the box on Schedule I of Form EIA-1605 for "This report contains confidential information." If you wish to request confidentiality, you must also identify data elements for which confidentiality is requested and provide a justification for why such data should be made confidential. See "What Are the Provisions Regarding Confidentiality of Your Information?" on page 20 below for more details.

What Are Greenhouse Gases?

Greenhouse gases, found in trace quantities in the atmosphere, absorb infrared energy and prevent it from leaving the atmosphere. Increasing levels of greenhouse gases in the atmosphere may contribute to an increase in average global temperatures resulting in adverse climate changes. Although many gases found in the atmosphere exhibit these properties, this reporting program focuses on the greenhouse gases most affected by human activity: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons (HFCs),

perfluorocarbons (PFCs), and sulfur hexafluoride. Chlorofluorocarbons (CFCs) and other greenhouse gases with quantifiable climate forcing effects may also be reported as long as the Department of Energy (DOE) has established a method for doing so.¹ CFCs must be reported separately and reductions associated with such gases are not eligible for registration.

What Are Emissions, Reductions, and Sequestration?

Emissions are the direct release of greenhouse gases into the atmosphere from any anthropogenic (human induced) source and certain indirect emissions (releases) specified in 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting. A reduction is a decrease in greenhouse gas emissions. Sequestration is the process by which carbon dioxide (CO₂) is removed from the atmosphere, whether through biologic or physical processes.

How Are the Instructions Organized?

This complete reporting package contains Form EIA-1605 and these instructions. The instructions are divided into three main parts:

1. General Instructions
2. Specific Instructions for Completing Form EIA-1605
3. Appendices

The reporting form is a separate document.

¹ Up to this point, DOE has only established methods for CFCs.

General Instructions

What Are the Reporting Deadlines?

To be included in the next annual report of greenhouse gas emissions, entity reports that have not been independently verified must be submitted to EIA no later than **July 1** for emissions occurring during the previous calendar year. Please note that this deadline will be delayed in the first operational year of the program (2007).

Who Can Report?

You can submit a report if you are an entity that initiates, controls, or in some other way participates in a United States based activity that results in the emission of greenhouse gases in the United States.² An entity is the whole or part of any business, institution, organization or household that:

- is recognized as an entity under any U.S. Federal, State, or local law that applies to it;
- is located and operates, at least in part, in the United States; and
- the emissions of such operations are released, at least in part, in the United States.

How Should Your Entity Be Defined?

Although DOE/EIA strongly encourages entities to define themselves at the highest level of aggregation, reporting at some lower level is permitted. However, once an entity has determined the level of corporate or institutional management at which it will report (e.g., the holding company, subsidiary, regulated stationary source, state government, agency, etc.), the entity must include all elements of the organization encompassed by that management level and exclude any organizations that are managed separately. For example, if two subsidiaries of a parent company are covered by a single report, then all subsidiaries of that parent company must also be included.

How Should Your Entity Be Named?

The name assigned to your entity should correspond closely to the scope of the operations and emissions covered by its report. For entities that intend to register reductions, the name reported on Form EIA-1605 should be the name commonly used to represent the operations being reported, as long as it is not also used to refer to a substantial operating unit not covered by the entity's reports. If an individual plant or operating unit of a corporation or subsidiary is reporting as an entity, it should be given a name that corresponds to the specific plant or unit, and not to the responsible corporate or subsidiary entity. (See the §300.3(c) of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting.)

What Can You Report?

You can report a comprehensive or partial inventory of your entity's emissions and carbon stocks, as well as reductions in emissions, as measured against a Base Period of up to four years. Form EIA-1605 gives

² As noted below, emissions and reductions on non-U.S. operations can be reported separately provided an entity has U.S. emissions and has reported data on U.S. emissions.

you the opportunity to *register* reductions for 2003 and subsequent years as well as the opportunity to *report but not register* reductions for 1991 and subsequent years.³

What Are *Registered* Reductions?

You may *register* reductions if you meet specific, stringent reporting requirements designed to increase the credibility of reported emissions and emission reductions. You can *register* reductions in emissions achieved beginning in 2003 and in subsequent years as measured against a base period of up to four years (1999-2002, or later). In order to *register* reductions, you must comply with the requirements of §300.1(c) and §300.7 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting. Upon review and acceptance of a report, EIA will notify the entity that reductions meeting the requirements have been credited to the entity as “*registered* reductions,” which can be held by the entity for use in the event a future program that recognizes such reductions is enacted into law.

Can You Report But Not Register Reductions?

To *report but not register* reductions, you need to meet less stringent and more general reporting requirements. You may *report but not register* information on greenhouse gas emissions for the baseline period of 1987 through 1990 or later, and you may *report but not register* annual reductions of greenhouse gas emissions and increases in carbon fixation realized in 1991 and subsequent years. Please note that for the sake of these instructions, EIA uses the term “reporting” (without the qualifier “but not registering”) to refer to both “registering” and “reporting but not registering” reductions.

Can You Both *Register* and *Report but Not Register* Emission Reductions?

Reporters may submit annual reports that include emission reductions for any year from 1991 onwards; however, *registered* reductions may only be included in reports for 2003 onwards. For example, a reporter may submit a Start Year report for 1990 and submit Reporting Year reports including emission reductions that are *reported but not registered* for 1991 through 2002. In addition, this reporter may submit another Start Year report for 2002 and Reporting Year reports including *registered* reductions for 2003 onwards. The Reporting Year reports containing *registered* reductions may also include reductions that are not eligible for registration, including: (1) reductions of emissions from other indirect sources, (2) reductions of CFC emissions, and (3) emission reductions calculated using the change in absolute emissions method for an entity or subentity for which emission reductions calculated using the change in emissions intensity method are also being registered. For a general overview of possible reporting options for calendar year 2007, see Figure 1 below.

What Is the Base Period?

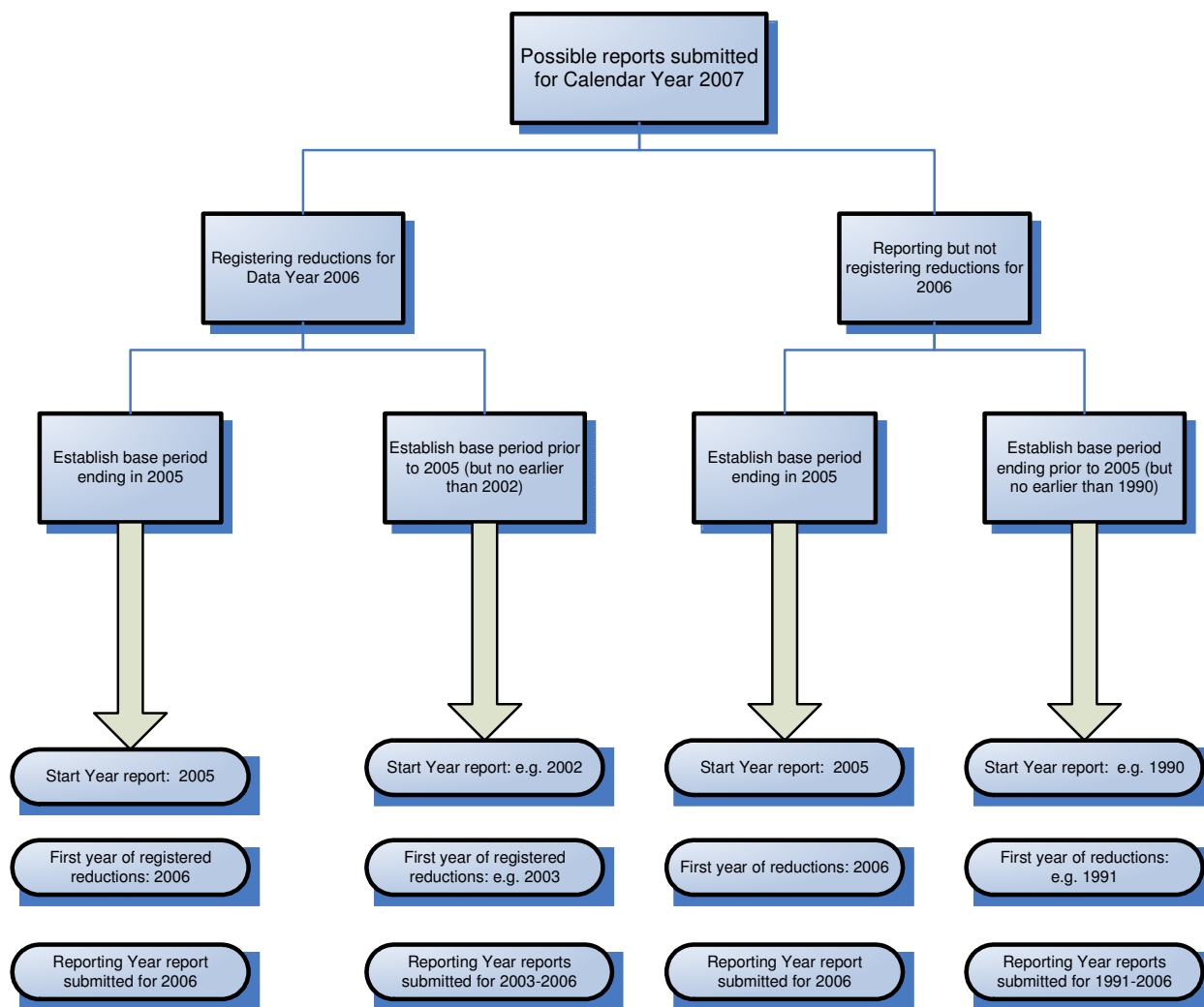
The Base Period is a period of time from one to four years in length, against which emission reductions are estimated. This period is used to determine the average annual base emissions, emissions intensity, and other values from which emission reductions are calculated.

³ Entities that have made a commitment to reduce entity-wide emissions under the Climate Leaders or Climate VISION program may use a Start Year derived from the Base Period of the commitment, provided it is no earlier than 2000.

What Is the Start Year?

The Start Year is the year upon which the initial entity statement is based and must be the year immediately preceding the first year for which the entity intends to report reductions. It is the last year of the Base Period and can be no earlier than 2002 for *registered* reductions. An entity *registering* reductions and participating in the Climate Leaders or Climate VISION programs may use a Base Period that ends no earlier than 2000 if it corresponds to the Base Period the entity has established under either of those programs. For an entity that intends to *report but not register* reductions, the Start Year may be no earlier than 1990. All entities are required to file a separate Form EIA-1605 report for the Start Year. The Start Year report may only contain inventory data, not reductions.

Figure 1. Examples of Possible Reporting Options for Calendar Year 2007



How Must You Estimate Emission Reductions?

Emission reductions must be estimated using the following methods, which are outlined in §300.8 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting:

- changes in emissions intensity;

- changes in absolute emissions;
- changes in carbon storage;
- changes in avoided emissions; and
- action-specific emission reductions.⁴

Refer to Chapter 2 of the Technical Guidelines⁵ for detailed guidance on applying these methods.

Should Emissions and Reductions Be Calculated at the Entity Level?

Large emitters intending to *register* reductions must include all emission sources, with the exception of *de minimis* sources, in their emissions inventory and base the emission reductions they register on the total emissions for the entity. Emission reductions may be calculated using a single method applied to total entity-wide emissions. Alternately, the entity may be divided into several subentities using different emission reduction methods, output measures, or Base Periods; however, the total emissions of the subentities combined must equal the total emissions of the entity. The inventory in Schedule I, Section 2 for small emitters and all entities intending to *report but not register* reductions may be a partial inventory, reflecting a summation of the emissions of all the specific activities included in the report.

What Are Subentities?

For some entities, a single emission reduction estimation method will prove sufficient. However, in many cases entities will need to use two or more reduction estimation methods because of the disparate nature of their various emission sources. In such cases, the entity will need to define and specify the portion of the entity (i.e., the “subentity”) to which each method will be applied. A subentity is a component of any entity, and can be a discrete business line, facility, plant, vehicle fleet, or energy use system, which has greenhouse gas emissions that can be distinguished from the emissions of all other components of the same entity. The emissions for a subentity, when summed with the emissions of all the other subentities comprising the entity, equal the entity’s total emissions. If you intend to use more than one method to calculate emission reductions or intend to use different output measures for the “changes in emissions intensity” method, your entity must be divided into two or more subentities. Subentities should also be created if you are reporting emissions and reductions for operations in a foreign country (in addition to those from your entity’s domestic operations) or for new or acquired operations that must use a different Base Period than the remainder of your entity.

What Emission Sources Should You Include in the Emissions Inventory for Each Subentity?

In general, a subentity’s emissions inventory should include all emissions sources associated with the activities of the subentity. To a large extent the emissions included will depend on the method you intend to use to calculate emission reductions. Table G1 summarizes the subentity emissions inventory requirements for each emission reduction method in Addendum B.

⁴ In addition to the four emission reduction methods listed above there are 12 action-specific methods that can be used.

⁵ Specific guidelines for specific calculation methods are found on page 251 of the Technical Guidelines.

What Gases Can You Report?

Your report should cover only the following greenhouse gases:⁶

- Carbon Dioxide (CO₂)
- Methane (CH₄)
- Nitrous Oxide (N₂O)
- Hydroflourocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF₆)
- Chlorofluorocarbons (CFCs)⁷

Can You Report Foreign Activities?

Emissions from foreign activities and any associated emission reductions may be reported if the entity has U.S. emissions and has included these emissions in its report. All activities outside of the United States, its territories, and its trusts are considered foreign activities. Foreign emissions and emission reductions must be reported separately from domestic emissions and emission reductions, by establishing one or more subentities on Form EIA-1605.

Are There Minimum Reporting Requirements?

The Voluntary Reporting of Greenhouse Gases Program allows considerable flexibility in defining the activities you report. All reporters must submit an initial Start Year report including an entity statement that fully documents the legal basis and scope of the entity, its organization boundaries, and its base period emissions. All reporters must certify that the Start Year report and subsequent Reporting Year reports containing information on emission reductions are accurate and complete and the emission reductions were calculated using methods described in the revised General and Technical Guidelines.⁸ Form EIA-1605 is designed to minimize reporting burden while meeting the minimum information requirements as defined in 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting. Table G2 summarizes the reporting requirements for large emitters intending to *register* reductions, small emitters intending to *register* reductions, and any entity intending to *report but not register* reductions.

⁶ Other gases or particles have been demonstrated to have significant, quantifiable climate forcing effects when released into the atmosphere in significant quantities. DOE has not established or approved methods for estimating emissions of other gases or particles at this time.

⁷ The reporting of CFC emissions on Form EIA-1605 is optional. CFC emissions cannot be included in total inventory emissions since reliable net global warming potentials are not available for these gases. Reductions in CFC emissions may be *reported but not registered*.

⁸ 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting. These guidelines are available at <http://www.pi.energy.gov/enhancingGHGregistry/index.html>.

Table G1. Inventory Requirements for Entities and Subentities by Reduction Method

| Emission Reduction Method | Inventory Requirement |
|---|---|
| B1. Changes in Emissions Intensity | Include all emissions associated with the selected output measure except those that may be associated with one of the action-specific methods described below (B5 through B16). |
| B2. Changes in Absolute Emissions | Include all emissions associated with the activities of the subentity except those that may be associated with one of the action-specific methods described below (B5 through B16). |
| B3. Changes in Carbon Storage | Include all information on your entity's carbon fluxes and stocks in a single subentity inventory. |
| B4. Changes in Avoided Emissions | Include only stationary combustion emissions associated with energy generation in the Reporting Year. If emissions associated with energy generation occurred during the Base Period, you must use Addendum B5 (Emission Reductions from Energy Generation and Distribution) to estimate reductions for your entity or subentity. |
| B5. Energy Generation and Distribution | Include stationary combustion emissions associated with the energy generation. |
| B6. Coal Mine Methane Gas Recovery | Include emissions of methane from mine ventilation and carbon dioxide associated with the combustion of this methane. |
| B7. Landfill Methane Recovery | Include emissions of methane from the decomposition of waste. |
| B8. Geologic Sequestration | Include emissions associated with operations at the site of the geologic reservoir. <i>[Note that emissions associated with operations of a geologic reservoir do not enter into the calculation of reductions using this method.]</i> |
| B9. Electricity Transmission and Distribution Improvements | Include emissions associated with operations of the relevant transmission and distribution system. <i>[Note that emissions associated with operations of a transmission and distribution system do not enter into the calculation of reductions using this method.]</i> |
| B10. Capture of Methane From Anaerobic Digestion at Wastewater Treatment Facilities | Include emissions of methane from the decomposition of wastewater. |
| B11. Anaerobic Digestion of Animal Waste | Include emissions of methane from the decomposition of animal waste. |
| B12. Recycling of Fly Ash | Include any direct emissions associated with the recovery of fly ash and its transportation to the entity or entities using the fly ash as a substitute for Portland cement. |
| B13. Demand-Side Management and Other Reduction Programs | Include any emissions associated with the operation of the relevant demand-side management program(s). |
| B14. Combined Heat and Power | Include the stationary combustion emissions associated with producing energy at combined heat and power facilities. |
| B15. Other Action-Specific Methods | Include all emissions associated with the action-specific method. |
| B16. Destruction of Chlorofluorocarbons | Include emissions of chlorofluorocarbons. |

Table G2. Summary of Principal Reporting Requirements

| Requirement | Type of Reporter | | |
|------------------------------|---|---|--|
| | Large Emitter Registering Reductions | Small Emitter Registering Reductions | Any Entity Reporting But Not Registering Reductions |
| All Reports | | | |
| Entity Statement | Required | Required | Required |
| Define Subentities | Required if more than one emission reduction estimation method is to be used | Required if emission reductions are calculated for two or more activities using more than one distinct estimation methods | Required if emission reductions are calculated for two or more activities using more than one distinct estimation methods |
| Emissions Inventory | Entity-wide inventory required | Entity-wide estimate required for the first year and after any significant increase in emissions, any change in operations or boundaries, or every five years (in Schedule I, Section 1). Otherwise, inventory required only for activities for which reductions are being reported | The inventory should reflect selected elements of their entities, selected gases or selected sources for which the entity reports reductions |
| Minimum Data Quality | Inventory must have average rating of 3.0 or higher | Inventory must have average rating of 3.0 or higher | Inventory need not achieve average rating of 3.0 or higher but a rating must be calculated |
| Third-Party Verification | Optional | Optional | Optional |
| Self-Certification | General certification required* plus additional requirements where applicable** | General certification required* plus additional certifications** where applicable. Must certify that actions causing reductions are not likely to result in emissions increases elsewhere in the entity | General certification required* |
| Documentation | For Base Period data, verifiable records must be maintained for duration of participation in Program. For Reporting Year data, verifiable records must be maintained for at least 3 years | For Base Period data, verifiable records must be maintained for duration of participation in Program. For Reporting Year data, verifiable records must be maintained for at least 3 years | Verifiable records for Base Period and Reporting Year data must be maintained for at least 3 years |
| Start Year Report | | | |
| Start Year | 2002 or Later*** | 2002 or Later*** | 1990 or Later |
| Emission Reductions | Not reported (Base Period emissions only are reported) | Not reported (Base Period emissions only are reported) | Not reported (Base Period emissions only are reported) |
| Reporting Year Report | | | |
| First Reporting Year | 2003 or later | 2003 or later | 1991 or later |
| Emission Reductions | 2003 onwards | 2003 onwards | 1991 onwards |

*All reporters must certify accuracy, completeness, compliance with guidelines, and consistency with prior year's report.

**Additional certification requirements address (1) double counting or reporting; (2) agreements with third parties; (3) emissions shifting; (4) avoided emissions from acquired facilities; (5) retention of records; and (6) independent verification.

***Entities that have made a commitment to reduce entity-wide emissions under the Climate Leaders or Climate VISION program may use a Start Year derived from the Base Period of the commitment, provided it is no earlier than 2000.

Are There Additional Requirements for Registering Reductions?

Additional requirements for registering reductions apply to large emitters, small emitters, and aggregators.

Large Emitters

Large emitters, or entities with annual emissions exceeding 10,000 metric tons CO₂ equivalent, must provide a comprehensive entity-wide emissions inventory that meets minimum data quality standards, resulting in a quantity-weighted average quality rating of at least 3.0.⁹ They must also calculate and report net entity-wide emission reductions that reflect any increases in emissions experienced by one or more sources within the entity. In addition, large emitters must maintain verifiable records for a minimum of three years for Reporting Year data and for the duration of their participation in the 1605(b) Program for Base Period data.

Small Emitters

Small emitters or entities with annual emissions that do not exceed 10,000 metric tons CO₂ equivalent, must provide an emissions inventory only for the activities for which they intend to register emission reductions. Small emitters must meet the same minimum data quality standards for these partial inventories and use the same methods to calculate reductions as large emitters. In addition, small emitters must certify that the reductions they intend to register were not caused by actions likely to cause increases in emissions elsewhere in the entity.

Aggregators

An aggregator is an entity, such as a trade association, that submits a report on behalf of multiple non-reporting entities. The aggregator must follow the requirements that would apply to the non-reporting entities if they had themselves reported. Aggregators should follow the procedures applicable for reporting offset reductions obtained by agreement with a non-reporter (see the Instructions for Schedule I, Section 3, Emissions Offsets).

How Do You Determine if You Are a Small Emitter?

You can develop a preliminary estimate of your entity-wide emissions based on common physical indicators using EIA's Simplified Emission Inventory Tool (SEIT),¹⁰ or the methods contained in the Technical Guidelines, to demonstrate that your annual emissions do not exceed 10,000 metric tons CO₂ equivalent. The result of this estimate must be reported to EIA. Once an entity determines that it is a small emitter, its emissions must be re-estimated and reported to EIA (1) every five years, (2) whenever the operations or boundaries of the entity have changed significantly, and (3) after any significant increase in emissions. A small emitter with estimated annual emissions exceeding 9,000 metric tons CO₂ equivalent must re-estimate and submit emissions annually. See §300.5(c) of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting for information on determining and maintaining small emitter status.

⁹ See §300.6(b) of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting. Ratings are explained fully in Section 1.A.4 of the Technical Guidelines. A list of estimation methods and ratings is provided in Appendix F of these instructions.

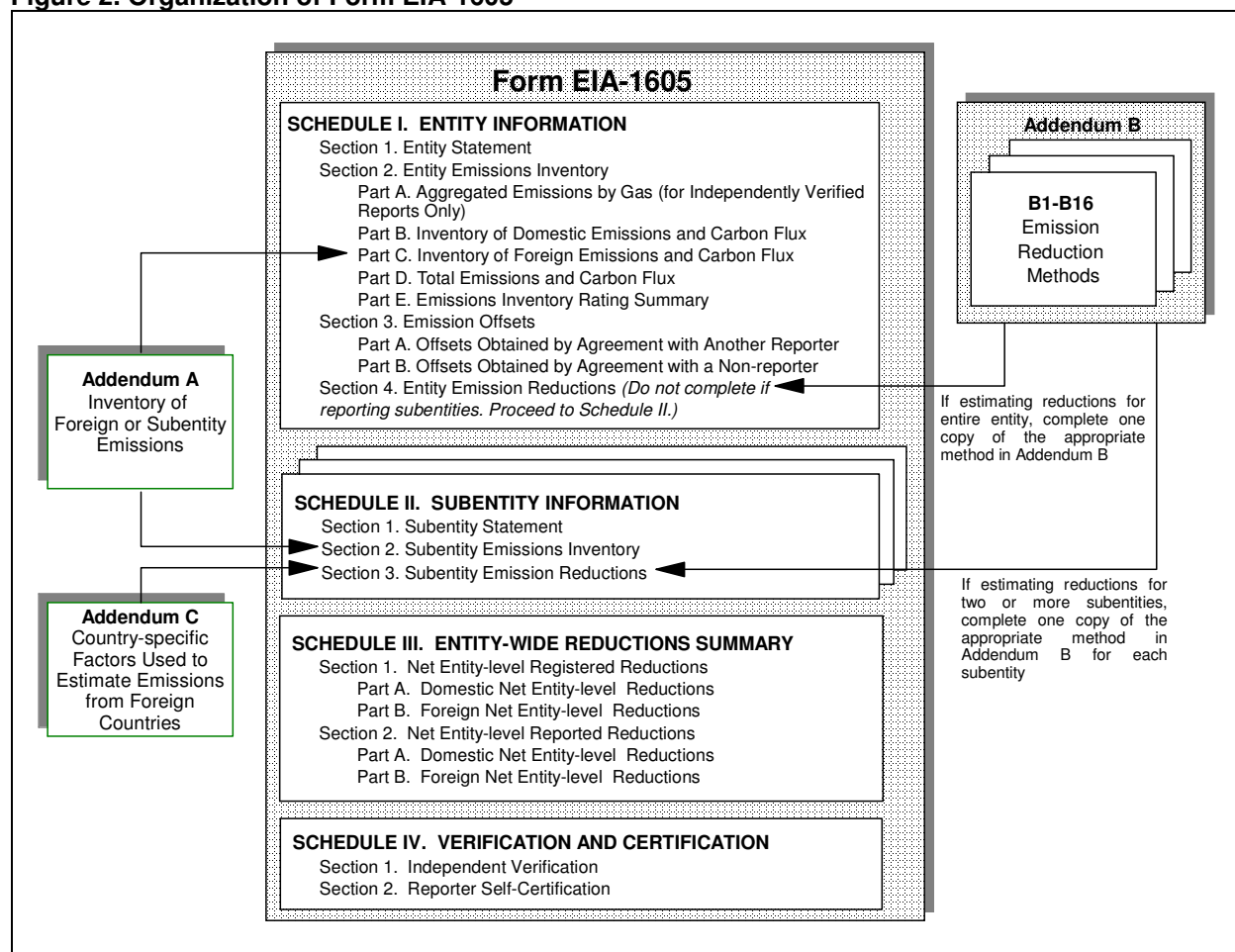
¹⁰ The SEIT tool is available at EIA's website at <http://www.eia.doe.gov/oiaf/1605/aboutcurrent.html>.

How Is Form EIA-1605 Organized?

Form EIA-1605 consists of four schedules (see Figure 2, below), which allow you to describe your entity, to characterize the different aspects of your emissions and emission reduction efforts, to certify and, if desired, to independently verify the information reported. The schedules are:

- I. Entity Information
- II. Subentity Information
- III. Emission Reductions Summary
- IV. Verification and Certification

Figure 2. Organization of Form EIA-1605



Do You Need To Complete All of Form EIA-1605?

Reporters have to complete only those portions of the reporting form applicable to the nature of their entity and their reporting objectives. The parts of Form EIA-1605 that must be completed for your entity or your report depend on the following report characteristics:

- Start Year or Reporting Year report;
- Small or a large emitter;

- Registered reductions included;
- Verified by an independent third party;
- All methods used to estimate emissions rated B or higher;
- Emissions from foreign operations included;
- Subentities included.

Once you have determined the characteristics of your report, use one of the following decision charts to identify which Schedules, Sections, and Parts of Form EIA-1605 you must complete. Select the decision chart applicable to your entity based on whether your report will be a Start Year or Reporting Year Report, whether you are a large or small emitter, and whether you intend to register emission reductions as follows:

- Use Table G3 if you are completing a Start Year report for a large emitter and intend to register reductions;
- Use Table G4 if you are completing a Reporting Year report for a large emitter and intend to register reductions;
- Use Table G5 if you are completing a Start Year report for a small emitter and intend to register reductions;
- Use Table G6 if you are completing a Reporting Year report for a small emitter and intend to register reductions;
- Use Table G7 if you are completing a Start Year report for an entity that intends to report but not register reductions; and
- Use Table G8 if you are completing a Reporting Year report for an entity that intends to report but not register reductions.

When you have selected the appropriate decision table, trace the responses to the questions in the Report Characteristics columns to find the row identifying the Schedules, Sections, and Parts of Form EIA-1605 that must be completed for your entity.

Who Must Certify Your Report?

You are required to certify the accuracy of the information you report with the signature of the certifying official of the entity. A report submitted on behalf of a household may be certified by one of its members. All other reports must be certified by the chief executive officer, agency head (in the case of a government agency), or the officer or employee of the entity who is responsible for reporting the entity's compliance with environmental regulations. An aggregator or reporter of emission offsets is required to obtain and submit certifications on the accuracy of the information provided by each non-reporting entity on whose behalf they are reporting from an eligible certifying individual representing each non-reporting entity from which reduction offsets have been obtained.

Table G3. Decision Chart for a Start Year Report for a Large Emitter Intending To Register Reductions

| Report Characteristics | | Reporting Requirements | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|----------------------------|------------------------|------------------------------|------------------|--|--|--|---------------------------------|----------------|-------------------|----------------------------------|---------------------|--|--|---|----------------------|-----------------------|--|--------------------------|--------------------|-----|-----|----|
| | | Schedule I | | | | | Schedule II | | | | | Schedule III | | Schedule IV | | | | | | | | | |
| | | Sec. 1 | Part A | Part B | Part C | Part D | Part E | Sec. 3 | Sec. 4 | Sec. 1 | Sec. 1 | Part A | Part B | Part C | Sec. 3 | Sec. 1 | Sec. 2 | Sec. 1 | Sec. 2 | | | | |
| Independent Verification? | All A- or B-Rated Methods? | Foreign Emissions? | Entity-Wide Reductions Only? | Entity Statement | Aggregated Emissions by Gas (Domestic and Foreign) † | Emissions Inventory by Source - Domestic | Emissions Inventory by Source - Foreign (Addendum A) | Total Emissions and Carbon Flux | Rating Summary | Emissions Offsets | Entity-Level Emission Reductions | Subentity Statement | Aggregated Emissions by Gas for Subentities (Add. A) | Emissions Inventory by Source for Subentities (Addendum A) | Total Emissions and Carbon Flux for Subentities | Subentity Reductions | Registered Reductions | Reported But not Registered Reductions | Independent Verification | Self Certification | | | |
| | | | | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| Yes | No | Yes | No | Yes | Yes | | | Yes | | | | Yes | Yes | | Yes | | | | Yes | | Yes | | |
| | | | | No | No | | | Yes | | | | | | | Yes | Yes | | Yes | | | | Yes | |
| No | Yes | Yes | No | Yes | Yes | Yes | | Yes | | | | Yes | Yes | | Yes | | | | | | | | |
| | | | | No | No | | | Yes | | | | | | Yes | Yes | | Yes | | | | | | |

†Include aggregate emissions by gas for domestic and foreign sources separately.

Table G4. Decision Chart for a Reporting Year Report for a Large Emitter Intending To Register Reductions

| Report Characteristics | | Reporting Requirements | | | | | | | | | | | | | | | | | | |
|---------------------------|----------------------------|------------------------|------------------------------|------------------|--|--|--|---------------------------------|----------------|-------------------|----------------------------------|---------------------|--|--|---|----------------------|-----------------------|--|--------------------------|--------------------|
| | | Schedule I | | | | | Schedule II (For Each Subentity) | | | | | Schedule III | | Schedule IV | | | | | | |
| | | Sec. 1 | Part A | Part B | Part C | Part D | Part E | Sec. 3 | Sec. 4 | Sec. 1 | Part A | Part B | Part C | Part C | Sec. 3 | Sec. 1 | Sec. 2 | Sec. 1 | Sec. 2 | |
| Independent Verification? | All A- or B-rated Methods? | Foreign Emissions? | Entity-Wide Reductions Only? | Entity Statement | Aggregated Emissions by Gas (Domestic and Foreign) † | Emissions Inventory by Source – Domestic | Emissions Inventory by Source – Foreign (Addendum A) | Total Emissions and Carbon Flux | Rating Summary | Emissions Offsets | Entity-Level Emission Reductions | Subentity Statement | Aggregated Emissions by Gas for Subentities (Add. A) | Emissions Inventory by Source for Subentities (Addendum A) | Total Emissions and Carbon Flux for Subentities | Subentity Reductions | Registered Reductions | Reported But not Registered Reductions | Independent Verification | Self Certification |
| | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Yes | Yes | Yes | No | Yes | ✓ | | | ✓ | | * | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ** | ✓ | ✓ |
| | | | | No | ✓ | | | ✓ | | * | | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ** |
| No | No | Yes | No | Yes | ✓ | | | ✓ | ✓ | * | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ** | ✓ | ✓ |
| | | | | No | ✓ | | | ✓ | | * | | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ** |
| Yes | Yes | No | No | Yes | ✓ | ✓ | ✓ | ✓ | | * | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ** | ✓ | ✓ |
| | | | | No | ✓ | ✓ | ✓ | ✓ | | * | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ** |
| No | No | Yes | No | Yes | ✓ | ✓ | ✓ | ✓ | ✓ | * | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ** | ✓ | ✓ |
| | | | | No | ✓ | ✓ | ✓ | ✓ | | * | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ** |

†Include aggregate emissions by gas for domestic and foreign sources separately.

*Complete Part A if offsets were obtained by agreement with another reporting entity and Part B if offsets were obtained by agreement from a non-reporter.

**Reporters registering reductions using the Change in Emissions Intensity method (Addendum B1) may also report but not register reductions using the Change in Absolute Emissions method Addendum B2. Reporters registering reductions may report but not register reductions of other indirect emissions and emissions of CFCs.

Table G5. Decision Chart for a Start Year Report for a Small Emitter Intending To Register Reductions

| Report Characteristics | | | | Reporting Requirements | | | | | | | | | | | | | | | | |
|----------------------------|-----|--------------------|-----|------------------------|--|--|--|---------------------------------|----------------|-------------------------------------|----------------------------------|---------------------|--|--|---|----------------------|-----------------------|--|--------------------------|--------------------|
| | | | | Schedule I | | | | | | Schedule II (For Each Subentity) | | | | | | Schedule III | | Schedule IV | | |
| | | | | Sec. 1 | Part A | Part B | Part C | Part D | Part E | Sec. 3 | Sec. 4 | Sec. 1 | Part A | Part B | Part C | Part C | Sec. 3 | Sec. 1 | Sec. 2 | Sec. 1 |
| Independent Verification? | | | | | | | | | | | | | | | | | | | | |
| All A- or B-rated Methods? | Yes | Foreign Emissions? | Yes | Entity Statement | Aggregated Emissions by Gas (Domestic and Foreign) † | Emissions Inventory by Source – Domestic | Emissions Inventory by Source – Foreign (Addendum A) | Total Emissions and Carbon Flux | Rating Summary | Emissions Offsets | Entity-Level Emission Reductions | Subentity Statement | Aggregated Emissions by Gas for Subentities (Add. A) | Emissions Inventory by Source for Subentities (Addendum A) | Total Emissions and Carbon Flux for Subentities | Subentity Reductions | Registered Reductions | Reported But not Registered Reductions | Independent Verification | Self Certification |
| | | | | No | Yes | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| Yes | No | Yes | No | Entity Statement | Aggregated Emissions by Gas (Domestic and Foreign) † | Emissions Inventory by Source – Domestic | Emissions Inventory by Source – Foreign (Addendum A) | Total Emissions and Carbon Flux | Rating Summary | Emissions Offsets | Entity-Level Emission Reductions | Subentity Statement | Aggregated Emissions by Gas for Subentities (Add. A) | Emissions Inventory by Source for Subentities (Addendum A) | Total Emissions and Carbon Flux for Subentities | Subentity Reductions | Registered Reductions | Reported But not Registered Reductions | Independent Verification | Self Certification |
| | | | | Yes | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |
| No | Yes | Yes | No | Entity Statement | Aggregated Emissions by Gas (Domestic and Foreign) † | Emissions Inventory by Source – Domestic | Emissions Inventory by Source – Foreign (Addendum A) | Total Emissions and Carbon Flux | Rating Summary | Emissions Offsets | Entity-Level Emission Reductions | Subentity Statement | Aggregated Emissions by Gas for Subentities (Add. A) | Emissions Inventory by Source for Subentities (Addendum A) | Total Emissions and Carbon Flux for Subentities | Subentity Reductions | Registered Reductions | Reported But not Registered Reductions | Independent Verification | Self Certification |
| | | | | No | Yes | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |

†Include aggregate emissions by gas for domestic and foreign sources separately.

*Inventory may be limited to specific activities for which reductions are to be registered.

Table G6. Decision Chart for a Reporting Year Report for a Small Emmitter Intending To Register Reductions

| Report Characteristics | | Reporting Requirements | | | | | | | | | | | | | | | | |
|---------------------------|-----|------------------------|--|--|--|---|-------------------------------------|-------------------|----------------------------------|---------------------|--|--|---|----------------------|-----------------------|--|--------------------------|--------------------|
| | | Schedule I | | | | | Schedule II (For Each Subentity) | | | | | Schedule III | | Schedule IV | | | | |
| | | Sec. 1 | Part A Gas (Domestic and Foreign) † | Part B Emissions Inventory by Source – Domestic | Part C Emissions Inventory by Source – Foreign (Addendum A) | Part D Total Emissions and Carbon Flux | Part E Rating Summary | Sec. 3 | Sec. 4 | Sec. 1 | Part A Aggregated Emissions by Gas for Subentities (Add. A) | Part B Emissions Inventory by Source for Subentities (Addendum A) | Part C Total Emissions and Carbon Flux for Subentities | Sec. 3 | Sec. 1 | Sec. 2 | Sec. 2 | |
| Independent Verification? | | Entity Statement | Aggregated Emissions by Gas (Domestic and Foreign) † | Emissions Inventory by Source – Domestic | Emissions Inventory by Source – Foreign (Addendum A) | Total Emissions and Carbon Flux | Rating Summary | Emissions Offsets | Entity-Level Emission Reductions | Subentity Statement | Aggregated Emissions by Gas for Subentities (Add. A) | Emissions Inventory by Source for Subentities (Addendum A) | Total Emissions and Carbon Flux for Subentities | Subentity Reductions | Registered Reductions | Reported But not Registered Reductions | Independent Verification | Self Certification |
| | Yes | ✓ | ✓ | | | ✓ | | *** | | ✓ | ✓ | | ✓ | ✓ | ✓ | **** | ✓ | ✓ |
| | Yes | ✓ | ✓ | | | ✓ | | *** | ✓ | ✓ | | | ✓ | ✓ | ✓ | **** | ✓ | ✓ |
| | No | ✓ | ✓ | | | | ** | *** | | ✓ | ✓ | | ✓ | ✓ | ✓ | **** | ✓ | ✓ |
| | No | ✓ | ✓ | | | ✓ | ✓ | *** | ✓ | ✓ | | | ✓ | ✓ | ✓ | **** | ✓ | ✓ |
| | Yes | ✓ | ✓ | * | * | * | | *** | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | **** | | ✓ |
| | Yes | ✓ | ✓ | ✓ | | ✓ | | *** | ✓ | | | | ✓ | ✓ | ✓ | **** | | ✓ |
| | No | ✓ | | * | * | * | ** | *** | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | **** | | ✓ |
| | No | ✓ | | ✓ | | ✓ | ✓ | *** | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | **** | | ✓ |
| | No | ✓ | | ✓ | | ✓ | ✓ | *** | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | **** | | ✓ |
| | No | ✓ | | ✓ | | ✓ | ✓ | *** | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | **** | | ✓ |
| | No | ✓ | | ✓ | | ✓ | ✓ | *** | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | **** | | ✓ |

† Include aggregate emissions by gas for domestic and foreign sources separately.

* Inventory may be limited to specific activities for which reductions are being registered. (A small emitter must complete an estimate of entity-wide inventory every five years, whenever the operations or boundaries of the entity have changed significantly, after any significant increase in emissions, or if its estimated annual emissions exceed 9,000 metric tons CO₂ equivalent. If required, this estimate should be reported in Schedule 1, Section 1, Question 3.

** Ratings summary required if entity-wide inventory is submitted.

*** Complete Part A if offsets were obtained by agreement with another reporting entity and Part B if offsets were obtained by agreement from a non-reporter.

**** Reporters *registering* reductions using the Change in Emissions Intensity method (Addendum B1) may also *report but not register* reductions using the Change in Absolute Emissions method Addendum B2. Reporters *registering* reductions may *report but not register* reductions of other indirect emissions and emissions of CFCs.

Table G7. Decision Chart for a Start Year Report for All Entities Intending To Report But Not Register Reductions

| Report Characteristics | | Reporting Requirements | | | | | | | | | | | | | | | | | | | |
|---------------------------|----------------------------|------------------------|------------------------------|------------------|---|--|--|---------------------------------|----------------|-------------------|----------------------------------|---------------------|--|--|---|----------------------|-----------------------|--|--------------------------|--------------------|---|
| | | Schedule I | | | | | Schedule II | | | | | Schedule III | | Schedule IV | | | | | | | |
| | | Sec. 1 | Part A | Part B | Part C | Part D | Part E | Sec. 3 | Sec. 4 | Sec. 1 | Part A | Part B | Part C | Sec. 3 | Sec. 1 | Sec. 2 | Sec. 1 | Sec. 2 | | | |
| Independent Verification? | All A- or B-rated Methods? | Foreign Emissions? | Entity-Wide Reductions Only? | Entity Statement | Aggregated Emissions by Gas (Domestic and Foreign)† | Emissions Inventory by Source – Domestic | Emissions Inventory by Source – Foreign (Addendum A) | Total Emissions and Carbon Flux | Rating Summary | Emissions Offsets | Entity-Level Emission Reductions | Subentity Statement | Aggregated Emissions by Gas for Subentities (Add. A) | Emissions Inventory by Source for Subentities (Addendum A) | Total Emissions and Carbon Flux for Subentities | Subentity Reductions | Registered Reductions | Reported But not Registered Reductions | Independent Verification | Self Certification | |
| | | | | ✓ | ✓* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Yes | Yes | No | Yes | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| No | No | Yes | No | ✓ | ✓* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Yes | Yes | No | Yes | ✓ | ✓* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| No | No | Yes | No | ✓ | ✓* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

†Include aggregate emissions by gas for domestic and foreign sources separately.

*Inventory may be limited to specific activities for which reductions are to be reported but not registered.

**Ratings summary required if optional entity-wide inventory is submitted.

Table G8. Decision Chart for a Reporting Year Report for All Entities Intending To Report But Not Register Reductions

| Report Characteristics | | Reporting Requirements | | | | | | | | | | | | | | | | | | |
|---------------------------|----------------------------|------------------------|------------------------------|------------------|---|--|--|---------------------------------|----------------|-------------------|----------------------------------|---------------------|--|--|---|----------------------|-----------------------|--|--------------------------|--------------------|
| | | Schedule I | | | | | Schedule II | | | | | Schedule III | | Schedule IV | | | | | | |
| | | Sec. 1 | Part A | Part B | Part C | Part D | Part E | Sec. 3 | Sec. 4 | Sec. 1 | Sec. 1 | Part A | Part B | Part C | Sec. 3 | Sec. 1 | Sec. 2 | Sec. 1 | Sec. 2 | |
| Independent Verification? | All A- or B-rated Methods? | Foreign Emissions? | Entity-Wide Reductions Only? | Entity Statement | Aggregated Emissions by Gas (Domestic and Foreign)† | Emissions Inventory by Source – Domestic | Emissions Inventory by Source – Foreign (Addendum A) | Total Emissions and Carbon Flux | Rating Summary | Emissions Offsets | Entity-Level Emission Reductions | Subentity Statement | Aggregated Emissions by Gas for Subentities (Add. A) | Emissions Inventory by Source for Subentities (Addendum A) | Total Emissions and Carbon Flux for Subentities | Subentity Reductions | Registered Reductions | Reported But not Registered Reductions | Independent Verification | Self Certification |
| | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Yes | Yes | Yes | No | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | *** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | *** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Yes | No | Yes | No | ✓ | ✓ | ✓ | ✓ | ✓ | ** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | *** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| No | Yes | No | Yes | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| No | No | Yes | No | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| No | No | No | No | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

†Include aggregate emissions by gas for domestic and foreign sources separately.

*Inventory may be limited to specific activities for which reductions are to be reported but not registered.

**Ratings summary required if optional entity-wide inventory is submitted.

***Complete Part A if offsets were obtained by agreement with another reporting entity and Part B if offsets were obtained by agreement from a non-reporter.

Must an Independent Third Party Verify Your Report?

Although DOE encourages reporters to have their annual reports verified by an independent third party, this is not a requirement for reporting on Form EIA-1605. If you do choose to have your report independently verified, you must meet the requirements outlined in §300.11 of the General Guidelines.

What Are the Provisions Regarding the Confidentiality of Your Information?

Information reported on Form EIA-1605 will not be treated as confidential and will be publicly released in identifiable form. In addition to the use of the information by EIA for statistical purposes, the information may be used for any non-statistical purposes such as administrative, regulatory, law enforcement, or adjudicatory purposes.

The information reported on Form EIA-1605 may be treated as confidential if a respondent makes a written request that its information is financial or commercial information and is confidential or privileged, and they are able to satisfy the criteria for exemption under the Freedom of Information Act (FOIA), 5 U.S.C. §552, the DOE regulations, 10 C.F.R. §1004.11, implementing the FOIA, and the Trade Secrets Act, 18 U.S.C. §1905.

To assist us in this determination, respondents should demonstrate to the DOE that, for example, their information contains trade secrets or commercial or financial information whose release would be likely to cause substantial harm to their company's competitive position. A letter accompanying the submission should explain (on an element-by-element basis) the reasons why reporting this information would be likely to cause substantial competitive harm if released to the public.

Do You Have Questions or Comments?

If you have questions about the forms and instructions or would like assistance in quantifying your emissions reductions, please contact the Voluntary Reporting of Greenhouse Gases Program at the above mailing address or at:

Telephone: 1-800-803-5182

Facsimile: (202) 586-3045

E-mail: infohgh@eia.doe.gov

Internet: <http://www.eia.doe.gov/oiaf/1605/frntvrgg.html>

Do You Have Any Suggestions?

You are invited to provide suggestions for improving the form and these instructions. Please limit comments and suggestions to one page and include them with your submission.

Specific Instructions for Completing Form EIA-1605

Instructions for Schedule I, Entity Information

Please begin by entering the Reporting Year. The reporting year is the calendar year for which emissions are being reported. If this is a Start Year report, enter the Start Year, which is the last calendar year of the initial Base Period.

All reporters must complete Schedule I, Section 1.

Section 1. Entity Statement

1. **Enter Entity Identification.** Please provide the entity's legal name and complete address. In addition, include a website and/or a Tax Payer Identification Number if applicable.
2. **Enter Contact Information.** Provide the name and complete contact information, including title, address, phone number, fax, and email address, of a person who can answer questions regarding the content of the submitted form. If the contact person's address is identical to the entity's address, please check the relevant box, and leave the Address, City, State, and Zip lines blank. Enter the phone number, fax, and e-mail address for the contact.
3. **Enter Report Characteristics.**
 - a. **Report Type.** Check the appropriate box to indicate whether this is a Start Year report or a Reporting Year report. You must submit a Start Year report as the first submission to the program; subsequent submissions will be Reporting Year reports.
 - b. **Entity Type.** Indicate by checking the appropriate box whether your entity is
 - a large emitter (annual emissions exceed 10,000 metric tons CO₂ equivalent) intending to *register* emission reductions.
 - a small emitter (annual emissions are 10,000 metric tons CO₂ equivalent or less) intending to *register* emission reductions. If this is a Start Year report, enter the entity's total estimated entity-wide annual average emissions for Base Period in the space provided. Small emitters must estimate and report entity-wide emissions in the Start Year and at least every 5 years thereafter. If this is a Reporting Year report and a estimate of entity-wide emissions for the Reporting Year and indicate by checking the appropriate check box the reason the estimate is being submitted. If this report includes an estimate of entity-wide emissions, indicate how this estimate was prepared by checking the appropriate box. This entity-wide emissions estimate must be prepared using either the Simplified Emissions Inventory Tool (SEIT) or methods specified in Chapter 1 of the Technical Guidelines to estimate entity-wide emissions. (See "How Do You Determine If Your Are a Small Emitter?" in the General Instructions for further clarification.)
 - an emitter intending to *report but not register* emission reductions.
 - c. **Scope of Inventory.** Indicate by checking the appropriate box whether the report contains an entity-wide or partial inventory. If a partial inventory, indicate which elements of the entity are included in the inventory in the space provided.

- d. Subentities. Indicate by checking the appropriate box whether or not the report includes subentity reports.
 - e. Independent Verification. Indicate by checking the appropriate box whether or not an independent third party has verified the report.
- 4. Indicate Any Significant Changes to Previous Entity Statement.** Complete this question if this is a Reporting Year report. Describe any significant changes your entity has undergone since the previous year's report. Check the applicable boxes and provide descriptive information where requested. Skip this question if this is a Start Year Report.
- 5. Identify the Entity's Primary Economic Activities.** Enter the primary (and, if applicable, the secondary) 3-digit North American Industrial Classification System (NAICS) code for the entity. (For a list of NAICS codes, see Appendix A.)
- 6. Enter the Entity Category.** Check the applicable boxes to describe the entity. If none of the listed categories applies to your entity, check "Other" and briefly describe the nature of your entity in the space provided. (Note that an S corporation is a domestic corporation that can avoid double taxation—once to the shareholders and again to the corporation. Generally, an S corporation is exempt from federal income tax other than tax on certain capital gains and passive income. See Internal Revenue Service Publication 583¹¹ for more information.)
- 7. Describe the Entity Organization.** Use the check box to indicate whether the entity is a holding company, and if not, enter the name of the entity's Parent or Holding Company if applicable.
- 8. Describe the Entity's Organizational Boundaries.** Use questions 8a through 8d to define the organizational boundaries of your entity and to indicate which method was used to draw these boundaries.
- a. Method for Determining Organizational Boundaries. Check the box to indicate your method for defining the organizational boundaries of your entity. As discussed in the General Guidelines, the primary basis for defining organizational boundaries should be financial control, although entities retain the flexibility to use other approaches, such as equity share or operational control if necessary. For all boundary definition approaches except financial control, please provide an explanation of the approach. If your entity chooses to use an approach other than financial control, equity share, or operational control, please check the "Other" box, list the other method where indicated, and describe how the use of this other approach results in organizational boundaries that differ from those resulting from using the financial control approach. Definitions for these Organizational Boundary terms can be found in the Glossary of Selected Terms.
 - b. List All Large Wholly Owned Subsidiaries. List all large wholly owned subsidiaries included in this report, by name and NAICS code. (For a list of NAICS codes, see Appendix A.)
 - c. List Any Large Partially Owned Subsidiaries, Joint Ventures, and Leased or Operated Sources. For any large partially owned subsidiary, joint venture, and leased or operated emissions source included in your report, provide the following information:
 - Name or Description of Emissions Source;
 - Relationship to Entity (subsidiary, joint venture, leased, operated under contract, other);
 - Partners, Percent Interest Held by Entity;

¹¹ Department of the Treasury, Internal Revenue Service, Publication 583, Starting a Business and Keeping Records, Rev. March 2006, Cat. No. 15150B, p. 3. <http://www.irs.gov/businesses/small/article/0,,id=98263,00.html>

- Method for Determining Inclusion in Report (financial control, equity share, operational control, other); and
 - Percentage of Emissions Included in This Report.
- d. **Additional Description of Organizational Boundaries.** Provide any additional description of organizational boundaries, including criteria used for excluding any emissions sources, if applicable (pursuant to §300.5(d)(3)(ii) of 10 CFR Part 300, General Guidelines for Voluntary Greenhouse Gases Reporting).
- 9. Describe the Geographic Scope of Activities:** Check the appropriate box to indicate whether this report covers only U.S. activities or U.S. and non-U.S. activities. In either case, please also check the applicable box regarding the scope of your entity's activities in the U.S. using the following criteria:
- Nationwide:*** Check the box for Nationwide if your entity has operations in at least one state in each of the 10 U.S. Census regions. The U.S. Census Regions are identified in Appendix B.
- Multiple States:*** Check the box for Multiple States if your entity has operations in more than one State but does not meet the criteria for Nationwide. List the States in which your entity has operations using the two-letter abbreviations listed in Appendix B.
- Single State:*** Check the box for Single State if your entity has operations in only one State. Identify the state in the space provided using the two-letter abbreviations listed in Appendix B.
- If this report covers U.S. and Non-U.S. activities, please also list all foreign countries in which reported activities occurred, and using the 3-digit codes found in Appendix C, enter the NAICS code that best corresponds to the primary activity of the operations in each country.
- 10. Describe the Scope of Emissions Inventory:** If your report includes an emissions inventory, check the applicable box for each of the emissions sources included.
- 11. Describe the Entity Base Period:** Check the box indicating the number of years in the Base Period, and enter the last year in Base Period. Also, if you are reporting subsidiaries that use a different base period from the entity, please check the box where indicated.
- 12. Describe Any Entity Program Affiliation(s):** Using the codes referenced in Appendix D, list any domestic or foreign initiatives, registries, and exchanges with which the entity has an affiliation. If you are a participant in a program not specified in Appendix D, please list program affiliations under "Other."
- 13. Request Confidentiality of Entity Information:** If your report contains information you deem confidential please check the box. Checking this box will alert EIA that you are seeking to have your entire report classified as confidential and not be made publicly available. Use the space provided to explain, on an element-by-element basis, the reasons why your report should be made confidential. The information contained in the report will be kept confidential and not disclosed to the public to the extent that it satisfies the criteria for exemption under the Freedom of Information Act (FOIA), 5 USC §552; the DOE regulations, 10 CFR §1004.11, implementing the FOIA; and the Trade Secrets Act, 18 USC §1905.
- 14. Enter Supplementary Information for Entity:** Use this space to provide any supporting information you feel should be included in your entity's report. Attach additional sheets if necessary.

Section 2. Entity Emissions Inventory

Use Section 2 to report the emissions inventory for your entity. All large emitters intending to *register* reductions are required to complete an entity-wide emissions inventory using methods that meet the quality requirements established by §300.6(b) of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting. Small emitters intending to *register* emission reductions must submit at least an inventory of the portion or portions of their entity associated with each of the activities associated with registered emission reductions. Entities intending to *report but not register* reductions may choose to report their emissions inventory on an entity-wide basis or for selected elements of their entities, selected gases, or selected sources.

Check the box at the beginning of Section 2 if all methods used to estimate emissions and sequestration have a B rating or higher. If the box is checked, do not complete “Weighted Rating” column of Parts A, B, C, and D and skip Part E completely.

Part A. Aggregated Emissions by Gas (for Independently Verified Reports Only)

1. Enter Aggregated Emissions by Gas (for independently verified reports only). If your report has been independently verified, you may limit your inventory report to emissions by gas and source (direct emissions, indirect emissions from purchased energy, and carbon fluxes). For each Item (A1 through G) defined by source (Column 2) and gas (Column 3), enter the following in the data table provided in Part A, Question 1:

- **Units (Column 4).** Enter the units (i.e., kilograms, metric tons) for the gas quantities reported in Column 4.
- **Base Period Emissions or Carbon Flux (Columns 5-9).** If this is a Start Year report, enter the emissions for Base Period years 1 through 4 in Columns 5-8. Calculate and enter the Base Period Average emissions by summing the emissions for years 1 through 4 and dividing by the number of years in the Base Period. Enter the result in Column 9. If this is a Reporting Year report, complete Columns 5-9 only if the Base Period emission data have been revised to correct errors or to reflect changes to the entity, such as acquisitions and divestitures.
- **Reporting Year Emissions or Carbon Flux (Column 10).** If this is a Reporting Year report, enter the Reporting Year emissions or carbon flux in Column 10. If this is a Start Year report, leave Column 10 blank.
- **Weighted Rating (Column 11).** Calculate and enter the emission-weighted rating for each item using the equation below. If this is a Start Year report, the weighted rating should be based on the Base Period Average emissions. If this is a Reporting Year report, the weighted rating should be based on Reporting Year emissions.

$$R_W = [(E_A * 4) + (E_B * 3) + (E_C * 2) + (E_D * 1)] / (E_A + E_B + E_C + E_D)$$

Where R_W = Weighted Rating

E_A = Emissions from sources estimated with an A-rated method

E_B = Emissions from sources estimated with an B-rated method

E_C = Emissions from sources estimated with an C-rated method

E_D = Emissions from sources estimated with an D-rated method

Enter the above emissions data for the following sources in the appropriate rows of the data table provided:

- **Direct Emissions (Items A1-A7).** Enter direct emissions of carbon dioxide under Item A1, direct methane emissions under Item A2, direct nitrous oxide emissions under Item A3, and direct sulfur hexafluoride emissions under Item A4. If you are entering direct emissions of HFCs, PFCs, and CFCs, specify the gas in Column 3 using the codes provided in Appendix E and enter the values under Items A5-A7. If you wish to enter data for more than four gases in the Other Greenhouse Gas category, complete and attach additional copies of this data table.
 - **Indirect Emissions of CO₂ From Purchased Energy (Inventory), (Items B1-B3).** Enter indirect emissions of CO₂, CH₄, and N₂O from Purchased Energy under Items B1, B2, and B3, respectively. Use the electricity end-use factors for emission inventories from Appendix F to calculate Items B1-B3.
 - **Indirect Emissions of CO₂ From Purchased Energy (Reductions), (Item C).** Enter indirect emissions from Purchased Energy under Item E in metric tons CO₂e. Use the electricity end-use factors for emission reductions from Appendix F to calculate Item C. Only complete this item if you are calculating reductions at the entity level using Addendum B1 or B2.
 - **Carbon Flux (Item D).** Enter carbon flux under Item D in units of carbon dioxide. Enter positive flux (increases in carbon stored in a carbon sink) as negative values (i.e., negative emissions).
 - **Other Indirect Emissions (Items E1-E7).** Enter other indirect emissions of carbon dioxide under Item E1, other indirect methane under Item E2, other indirect nitrous oxide emissions under Item E3, and sulfur hexafluoride under Item E4. If you are entering indirect emissions of other gases (HFCs, PFCs, or CFCs), specify the gas in Column 3 using the codes provided in Appendix E and enter the values under Items E5-E7. If you wish to enter data for more than four gases in the Other Greenhouse Gas category, complete and attach additional copies of this data table.
 - **Captured CO₂ Sequestered in an Onsite Geologic Reservoir (Item F).** Enter the quantities of CO₂ sequestered in an onsite geologic reservoir. Report emissions in carbon dioxide equivalents if you want to include the trace quantities of methane or nitrous oxide in the captured CO₂.
 - **Captured CO₂ Transferred to Another Entity for Sequestration in a Geologic Reservoir (Item G).** Enter the quantities of CO₂ transferred to another entity for storage in a geologic reservoir under Item G. Report emissions in carbon dioxide equivalents if you want to include the trace quantities of methane or nitrous oxide in the captured CO₂.
2. **Enter Aggregated Foreign Emissions by Gas (for independently verified reports only).** Use the instructions for Question 1 to complete Question 2 if your entity includes foreign operations.

Part B. Inventory of Emissions and Carbon Flux

Complete Part B if you are a large emitter that is *registering* reductions and your report has not been independently verified. Small emitters, if their report has not been independently verified, should also complete Part B, at a minimum, for those activities for which they are *registering* reductions. Small emitters, if required to complete Part B, can, at their option, complete the emissions inventory for all emission sources, not just those relative to activities submitted for registered reductions. Part B is optional for an entity *reporting but not registering* reductions. Part B is also optional for independently verified reports.

The data tables comprising the entity-level emissions inventory in Part B, Questions 1 through 3 have a similar structure. The following instructions provide general guidance for completing the columns of each of these tables. These instructions are followed by specific instructions for completing the line items in each table.

General Instructions for Part B

For each item that your entity emits, as defined by Source (Column 1) and Gas (Column 2), enter the following information in the remaining columns in the emissions data tables:

- **Units (Column 3).** Enter the units (i.e., kilograms, metric tons) in Column 3 for the gas quantity reported in subsequent columns.
- **Base Period Emissions (Columns 4-8).** If this is a Start Year report, enter the emissions for Base Period years 1 through 4 in Columns 4-7. Calculate and enter the Base Period Average emissions by summing the emissions for years 1 through 4 and dividing by the number of years in the Base Period. Enter the result in Column 8. If this is a Reporting Year report, complete Columns 4-8 only if the Base Period emission data have been revised to correct errors or to reflect changes to the entity, such as acquisitions and divestitures.
- **Reporting Year Emissions (Column 9).** If this is a Reporting Year report, enter the Reporting Year emissions or carbon flux in Column 9. If this is a Start Year report, leave Column 9 blank.
- **Estimation Method (Column 10).** Identify the method in Column 10 used to estimate the emissions for each item using the codes listed in Appendix G. If more than one method was used, enter the code for multiple methods from Appendix G.
- **Rating (Column 11).** Enter the numeric rating for the method(s) used to estimate each emissions source, where A = 4, B = 3, C = 2, and D = 1. If multiple methods with different ratings were used, calculate and enter the weighted rating for each item using the equation below. If this is a Start Year report, the rating should be based on the Base Period Average emissions. If this is a Reporting Year report, the rating should be based on Reporting Year emissions, even if you have revised Base Period emissions.

$$R_W = [(E_A * 4) + (E_B * 3) + (E_C * 2) + (E_D * 1)] / (E_A + E_B + E_C + E_D)$$

Where R_W = Weighted Rating

E_A = Emissions from sources estimated with an A-rated method

E_B = Emissions from sources estimated with an B-rated method

E_C = Emissions from sources estimated with an C-rated method

E_D = Emissions from sources estimated with an D-rated method

Specific Instructions for Part B

1. Enter Direct Emissions

- a. Stationary Combustion.** For this section of the form, rather than spelling out each individual fuel source that can be used for stationary combustion, fuel sources are lumped together into the following four categories—“Fossil Fuel Combustion,” “Nonstandard Fuel Combustion,” “Waste Fuels Combustion,” “Biomass Combustion,” and “Nonfuel Use of Fossil Fuels.” It is the reporters’ responsibility to sum up all of their emissions by fuel source category and enter the total into the appropriate row. For example, total Carbon Dioxide (CO₂) emissions from all fossil fuel combustion (e.g. natural gas, coal, oil, etc...) would be accounted for in the first Fossil Fuel Combustion row of the table.

There are generally three different methods for estimating greenhouse gas emissions from stationary source combustion—direct measurement, mass balance, and inference. These three methods are described in more detail in the Technical Guidelines (1.C.2). If you used mass balance methods, you may use the default fuel emission factors from Appendix H.

CO₂ from stationary combustion that is captured and stored in an onsite reservoir must be identified in your emissions inventory but excluded from total inventory emissions.

Follow the General Instructions in Part B above to fill out the different columns for each of the following fuel sources:

Fossil Fuel Combustion. The following fuel types should be included in this category—coal, natural gas, middle distillates, heavy fuel oil, and liquefied petroleum gases (LPG). Specific directions for estimating CO₂ emissions from the stationary combustion of coal can be found in section 1.C.3.1 of the Technical Guidelines. Here you will find the ratings for different estimation methods along with some default emissions factors for different types of coal. Similar information can be found for natural gas (1.C.3.2), middle distillates and heavy fuel oil (1.C.3.3), and LPG (1.C.3.4) in the Technical Guidelines. Estimation methods, ratings, and generic emissions factors for methane (CH₄) and nitrous oxide (N₂O) emissions from coal, petroleum, and natural gas can be found in section 1.C.4— “Common Sources: Methane and Nitrous Oxide” of the Technical Guidelines.

Nonstandard Fuel Combustion. Greenhouse gas emissions from the direct stationary combustion of nonstandard fuels should include emissions from the following fuels: refinery gas (1.C.5.1), petroleum coke (1.C.5.2), and natural gas / crude oil flaring (1.C.5.3). See the referenced sections of the Technical Guidelines for estimation method ratings and default emissions factors (in most cases) for each fuel type.

Waste Fuels Combustion. Direct emissions from waste fuels include the combustion of a range of specialized waste and by-product fuels, including used lubricating / motor oil and used tire-derived fuel. Emissions factors and ratings for these fuel types can be found in section 1.C.5.4, “Petroleum-Based Waste and By-Product Fuels,” of the Technical Guidelines.

Biomass Combustion. Greenhouse gas emissions from the combustion of biomass are described in the sections for biogenic fuels (1.C.5.5) and municipal solid waste and landfill gas (1.C.5.6) of the Technical Guidelines. CO₂ emissions from biogenic fuels, including bagasse, wood, wood waste, ethanol, black liquor, and municipal greenwaste, should be omitted from your emissions

inventory as they are not considered to be anthropogenic emissions. Thus, only the CO₂ emissions resulting from the combustion of material of anthropogenic origin in municipal solid waste (e.g. plastics) must be included in your inventory (under Waste Fuels Combustion). However, biomass combustion yields emissions of CH₄ and N₂O, which should be reported.

Nonfuel Use of Fossil Fuels. There are a number of applications where fossil fuels are not combusted directly, but are used for industrial purposes. These applications include:

- Lubricants, asphalt, and petroleum-based solvents;
- Natural gas, LPG, and petroleum products as chemical feedstocks;
- Coke and related products as reducing agents in metals manufacture;
- Fossil fuels as a carbon source in products (e.g. carbon black); and
- Transformation of lower value hydrocarbon into a higher value hydrocarbon (synthetic fuels).

Where possible, these emissions should be reported elsewhere in the form (i.e. Schedule I, Section 2, Part B, Question 1c, Sector-Specific Industrial Process Emissions). In these special situations it is the reporter's responsibility to accurately calculate a material balance. This process should enable the reporter to identify whether the non-fuel use of the fossil fuel is sequestering, non-sequestering, or partially sequestering. Generally, carbon that is sequestered in a product is not a reportable emission. More detail on how to calculate these emissions, along with ratings for different estimation methods, are described in section 1.C.6 of the Technical Guidelines.

Subtotal. Using the Global Warming Potential (GWP) values found in Appendix E, convert your Base Period emissions and Reporting Year emissions into units of carbon dioxide equivalent (CO₂e). Sum those CO₂e values for each column 4 through 9 and place the totals at the bottom of each column in the Subtotal row. It is not necessary to include an estimation method or rating in this row.

- b. Mobile Source Combustion.** Mobile source greenhouse gas emissions include carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) from fuel combustion, and hydrofluorocarbons (HFC) from mobile air-conditioning and refrigeration system leakage. Sources include highway vehicles, off-road vehicles, marine vessels, aircraft, and mobile refrigeration and air-conditioning units.

To date there have been no carbon dioxide capture projects involving mobile sources, but if any of a reporter's carbon dioxide emissions from mobile sources were subsequently captured for storage in a geologic reservoir, the reporter should include these quantities in the emissions total by fuel source category. In addition, the reporter should document the quantity of carbon dioxide emissions that were captured in Question 1f, Captured CO₂ Emissions. Use Addendum B8 to report reductions associated with capturing CO₂ and storing it in a geologic reservoir.

For mobile sources, the mass balance method is most frequently used for estimating carbon dioxide and HFC emissions based on fuel combustion and refrigerant use, respectively. Methane and nitrous oxide emissions are commonly estimated by inference using activity data (e.g., distance traveled or fuel consumption) and emission factors developed from sample emissions measurement. Inferred emissions can generally be expected to be less accurate, but are acceptable for estimating minor emissions from methane and nitrous oxide. Mass balance or inference methods may be used to estimate HFC emissions resulting from leakage.

For more information on emissions from mobile sources, see Chapter 1, Part D of the Technical Guidelines. For source-specific guidance on estimating emissions, see section 1.D.3 of the Technical Guidelines.

Follow the General Instructions in Schedule I, Section 2, Part B of this document to fill out the information requested for Columns 3 through 11 for each of the following sources:

Highway Vehicles. This category includes a variety of vehicles such as on-road and light- and heavy-duty vehicles, which consume a number of different fuels. Within this category, on-road light- and heavy-duty vehicles using conventional fuels (gasoline or diesel) include: passenger vehicles, hybrid-electric vehicles, motorcycles, light-duty trucks (vans, pick-up trucks and sport utility vehicles), heavy-duty trucks (delivery trucks), and buses. Also included in this category are on-road vehicles using alternative fuels (e.g., compressed natural gas, propane, methanol), which include passenger vehicles, light-duty trucks, heavy-duty trucks, and buses.

Off-Road Vehicles. The off-road vehicle category includes a wide variety of vehicles operating on conventional fuels such as gasoline, diesel, and fuel oil. Vehicles within this category include: construction equipment, agricultural equipment, off-road recreational vehicles, snowmobiles, and diesel locomotives. Most off-road vehicles will burn un-taxed (red-dyed) diesel fuel (off-highway No. 2-D), which is generally very similar to the taxed fuel, while locomotives use a special “railroad” diesel. Conventional snowmobiles and some other recreational off-road vehicles have two-stroke spark-ignition engines that burn a gasoline-lubricant mixture, though some relatively new snowmobiles may operate using four-stroke spark-ignition engines that combust gasoline only.

Marine Vessels. Water borne vessels include recreational boats, patrol boats, cruise ships, large freight vessels, container ships, and many other types of vessels with various purposes. In general, very small boats (often less than 50 feet in length) have spark ignition inboard, sterndrive (inboard/outboard or inboard/outdrive), or outboard engines that burn gasoline. Some boats less than 50 feet in length may have inboard compression ignition (i.e., diesel-cycle) engines that burn diesel fuel or another distillate, residual or intermediate blend. Nearly all commercial shipping vessels and cruise ships have large diesel engines that burn residual fuel or an intermediate distillate-residual blend, but it is possible that some of these compression ignition engines burn a kerosene-based fuel. Some ships (especially high-speed ferries and military vessels) have gas turbine engines that burn kerosene-based jet fuel.

Aircraft. This category includes all aircraft running on kerosene jet fuel and non-jet-engine planes that burn aviation gasoline, or less commonly, motor gasoline. The vehicle types include turbine- and piston-engine-driven aircraft, turbine-powered transport and air cargo aircraft. Within this category, reporters will consider all civil commercial uses of airplanes (international and domestic) consisting of scheduled and chartered flights for passengers and freight. This category also includes civil commercial use of airplanes and helicopters for agricultural purposes, instructional flying, business and pleasure flying, aerial work, and other flying.

Mobile Refrigeration and Air-Conditioning. This source refers to mobile refrigeration and air-conditioning units, with emissions of HFC-134a from leakage.

Subtotal. Using the Global Warming Potential (GWP) values found in Appendix E, convert your Base Period emissions and Reporting Year emissions into units of carbon dioxide equivalent (CO₂e). Sum those CO₂e values for each column 4 – 9 and place the totals at the bottom of each

column in the Subtotal row. It is not necessary to include an estimation method or rating in this row.

- c. Sector-Specific Industrial Process Emissions.** Entities that have emissions from any type of industrial process should provide their emissions data in the table provided. Reporters should ensure that the same emissions are not “double counted,” or recorded elsewhere in Schedule I, Section 2, Part B. In particular, where the primary purpose of an industrial process is energy production (in the form of heat or electricity), emissions should be attributed to stationary combustion (see Schedule I, Section 2, Part B, Question a, Stationary Combustion).

Carbon dioxide captured from industrial process sources and stored offsite must be treated as an emission in the emissions inventory of the entity within which the capture occurs. Captured CO₂ emissions stored in an onsite reservoir must be identified in your emissions inventory but should be excluded from total inventory emissions. If this captured CO₂ was subsequently stored in a geologic reservoir, the reporter should document the quantity of CO₂ emissions captured in Question 1f, Captured CO₂ Emissions and use Addendum B8 to report reductions associated with capturing CO₂ and storing it in a geologic reservoir.

Reporters should include all substantial process emissions and fugitive emissions resulting from their industrial processes. Reporters need not include sources determined to be *de minimis*, which are sources that, in aggregate, are less than or equal to 3 percent of the total annual carbon dioxide equivalent emissions of the entity. *De minimis* emissions must be recorded in Section 2, Part B, Question 5.

For more information on sources of process and fugitive emissions see Chapter 1, Part E of the Technical Guidelines. For sector-specific guidance on estimating process and fugitive emissions, see section 1.E.4 of the Technical Guidelines.

Follow the General Instructions in Schedule I, Section 2, Part B above to fill out the information requested in Columns 3 through 11 for each of the following sources:

Industrial Processes

Adipic Acid Production. Adipic acid is a white, crystalline powder used primarily for the manufacture of synthetic nylon fibers. Adipic acid is also used in the production of gelatins, beverages, oils, snack foods, plasticizers for polyvinyl chloride and polyurethane resins, wire coatings, adhesives, lubricants and dyes. Nitrous oxide (N₂O) is the primary greenhouse gas emitted during the production of adipic acid and is pre-entered on Form EIA-1605.

Aluminum Production (CO₂ only). Aluminum is produced through a complex set of processes, some of which generate emissions. A number of these processes can be completed using different technologies, each of which may feature more than one emission estimation method. Reporters should begin by familiarizing themselves with the types of facilities (and their accompanying processes) for which they will be estimating emissions. Greenhouse gases emitted from the various processes include carbon dioxide resulting from the oxidation of carbon electrodes in an electrolytic process. (Enter emissions of perfluorocarbons sulfur hexafluoride and under Aluminum Production in the High GWP Gases section of this table.)

Ammonia Production. Most ammonia (NH₃) production processes emit carbon dioxide through the catalytic reformation of fossil fuels. Carbon dioxide (CO₂) is the primary greenhouse gas emitted during the production of ammonia and is pre-entered on Form EIA-1605.

Cement Production. Cement production releases carbon dioxide both during the production of clinker (from the calcination of limestone) and from discarded bypass and/or cement kiln dust (CKD). Carbon dioxide (CO₂) is the primary greenhouse gas emitted during the production of cement and is pre-entered on Form EIA-1605.

Hydrogen Production. Hydrogen is similar, in many respects, to ammonia production. As in the case of ammonia, a hydrocarbon feedstock (usually natural gas) is reformed into a carbon monoxide-hydrogen synthesis gas. In this case, the hydrogen is separated and used for other purposes (usually to boost light product output in oil refineries, occasionally directly as a transportation fuel). Reporters should only treat carbon dioxide produced as a byproduct of hydrogen production as an industrial process emission if it is emitted into the atmosphere. Carbon dioxide (CO₂) is the primary greenhouse gas emitted during the production of hydrogen and is pre-entered on the form.

Iron and Steel Production. The majority of carbon dioxide emissions from iron and steel production are generated during the consumption of the reducing agent and of additives (typically plastics) used to minimize the quantity of reducing agent used. Consumption of carbonate fluxes is also a significant source of carbon dioxide, but these emissions should be calculated using the methods outlined under "Limestone and Dolomite Use." Carbon dioxide (CO₂) is the primary greenhouse gas emitted during the production of Iron and Steel and is pre-entered on Form EIA-1605. However, methane is also produced in iron and steel production and should be reported in Question 1c.

Lime Production. Lime production refers to the manufacture of high calcium lime, dolomitic lime, and hydraulic lime. In all three processes, carbon dioxide is released by thermally decomposing, or "calcining," calcium carbonate (CaCO₃) into lime (CaO) and carbon dioxide. Calcining calcium carbonate produces high calcium and hydraulic lime, while dolomitic lime is produced by the calcination of dolomite. Reporters need not include carbon dioxide from the Kraft pulping process of lime production in their emissions inventories, as the carbon dioxide released is a biogenic source. Carbon dioxide (CO₂) is the primary greenhouse gas emitted during the production of lime and is pre-entered on Form EIA-1605.

Limestone and Dolomite Use. The method for estimating carbon dioxide emissions from limestone use (see above) is largely analogous to that used to estimate emissions from lime production. The primary difference between the methods is that estimates for lime production are based on the quantity of the calcium-bearing product whereas emissions from limestone and dolomite use are estimated using the quantity of calcium-bearing raw materials. Carbon dioxide (CO₂) is the primary greenhouse gas emitted during the use of lime and dolomite and is pre-entered on the form.

Methanol Production. Methanol production is similar to ammonia production (see above), in that methanol production begins with reforming of a hydrocarbon feedstock (usually natural gas) into a carbon monoxide-hydrogen synthesis gas. In this case, however, most of the carbon is embodied in the product (CH₃OH). Methanol in the United States is mostly used as a gasoline additive, though there is also a large market for methanol as a chemical feedstock. Carbon dioxide (CO₂) is the primary greenhouse gas emitted during the production of methanol and is pre-entered on Form EIA-1605.

Methane Emissions From Production of Other Petrochemicals. The production of carbon black, ethylene, ethylene dichloride, and styrene all generate small amounts of methane emissions.

Nitric Acid Production. Nitric acid (HNO_3) is an important primary ingredient of nitrogen-based synthetic fertilizers. Other important applications include adipic acid production, production of explosives, metal etching, and processing of ferrous metals. The primary greenhouse gas emitted from the production of nitric acid is nitrous oxide. Nitrous oxide is released during the high temperature catalytic oxidation of ammonia (NH_3). In addition to nitrous oxide, this oxidation reaction can also generate smaller quantities of non-combustion oxides of nitrogen (NO_x). Nitrous oxide (N_2O) is the primary greenhouse gas emitted during the production of nitric acid and is pre-entered on Form EIA-1605.

Soda Ash Production and Use. There are four manufacturing processes employed to produce soda ash (Na_2CO_3): monohydrate carbonation, sesquicarbonate carbonation, direct carbonation, and the Solvay process. The first three of these processes, which account for about 25 percent of world soda ash production, generate carbon dioxide emissions during the chemical transformation of the naturally occurring ore, trona, into soda ash. The Solvay process, which synthesizes soda ash from a series of materials and reactions, generates no direct carbon dioxide emissions. Emissions from stationary combustion and the use of coke to facilitate these processes, however, should be estimated and should be accounted for separately. Carbon dioxide (CO_2) is the primary greenhouse gas emitted during the production and use of soda ash and is pre-entered on Form EIA-1605.

Energy

Coal Mines. The principal greenhouse gas associated with coal mining is methane. Carbon dioxide and nitrous oxide are also emitted but in relatively small amounts. Methane is created in the same geologic processes that produce coal, and therefore exists in varying degrees in all coal deposits. The methane is stored in the coal pores (open spaces) and in the cracks and fractures within the coal bed. Carbon dioxide is also emitted directly from the combustion of fossil fuels by mining equipment or indirectly from the consumption of electricity and should be estimated and reported according to the Technical Guidelines in Chapter 1, Parts C (Stationary Combustion). Methane (CH_4) is pre-entered on Form EIA-1605 as this section should focus exclusively on estimating methane emissions from coal mining.

Oil and Natural Gas Industries. Methane is the principal non-combustion greenhouse gas emitted by both the natural gas and oil industries. The majority of emissions from the both industries are fugitive methane emissions from production processes. Carbon dioxide emissions can be emitted in significant quantities from a limited number of processes, such as sour gas processing, or in instances where natural gas streams are particularly rich in carbon dioxide. Nitrous oxide is also emitted from a number of activities, but usually in relatively low concentrations. Methane (CH_4), carbon dioxide (CO_2) and nitrous oxide (N_2O) emissions are all associated with the oil and natural gas industries and are pre-entered on Form EIA-1605.

Waste Handling

Domestic and Industrial Wastewater Handling. The wastewater streams most likely to produce significant methane emissions are those that are rich in organic matter, including domestic wastewater as well as wastewater streams from the pulp and paper manufacturing industries, meat and poultry packing industries, and vegetable, fruit and juice processing industries. Wastewater can also be generated during the manufacture of textiles, petrochemical products, fertilizers, iron and steel, and organic chemicals. Domestic wastewater streams will also generate nitrous oxide emissions. Nitrous oxide is released as a byproduct of two processes: nitrification and

denitrification. Methane (CH₄) and nitrous oxide (N₂O) are the primary greenhouse gases emitted during the treatment of wastewater and have been pre-entered on Form EIA-1605.

Landfills. Methane is released from landfills through the anaerobic decomposition of organic wastes such as paper, food, and yard waste, and accounts for 30 to 60 percent of all gases emitted from landfills. The balance of gases includes primarily carbon dioxide and other minor constituents such as nitrogen, volatile organic compounds, and water vapor. The capture and combustion of landfill gas is a common practice used to mitigate methane and other air pollutants in the gas. Methane (CH₄) is pre-entered on Form EIA-1605, as this section should focus exclusively on estimating methane emissions from landfills.

High GWP Gases

Aluminum Production. Aluminum is produced through a complex set of processes, some of which generate emissions. A number of these processes can be completed using different technologies, each of which may feature more than one emission estimation method. Reporters should begin by familiarizing themselves with the types of facilities (and their accompanying processes) for which they will be estimating emissions. Greenhouse gases emitted from the various processes include carbon dioxide, perfluorocarbons (PFCs) and sulfur hexafluoride. Identify the specific PFCs that were emitted in Column 2 using the greenhouse gas codes from Appendix E.

HCFC-22 Production. Trifluoromethane (HFC-23) is a high GWP greenhouse gas that is generated as a byproduct during the manufacture of chlorodifluoromethane (HCFC-22). Unlike the majority of HFC emissions, most HFC-23 emissions are point-source emissions, emitted through the condenser vents of HCFC-22 manufacturing plants. Some HCFC-22 manufacturers may capture some of the HFC-23 byproduct and sell it for use in various applications from which it is eventually emitted. Captured HFC-23 should not be included in the inventory of the entity (though the entity should always report all process, fugitive and other emissions associated with its manufacture).

SF₆ Emissions From Electrical Equipment. Sulfur hexafluoride (SF₆) has various uses and emissions associated with electrical equipment. Include in the emissions inventory any SF₆ emissions associated with electrical equipment, generation, transmission and distribution.

Industrial Use and Production of HFCs, PFCs, and SF₆. HFCs, PFCs, and SF₆ are used as substitutes for ozone depleting substances and in a wide variety of industrial processes. Industrial uses of HFCs and PFCs include the manufacture and use of refrigeration and air-conditioning, fire suppression and explosion protection, aerosol manufacture and use, solvent cleaning, foam blowing, equipment sterilization, and the manufacture of coatings, adhesives and inks. SF₆ is commonly used to insulate switchgear and circuit breakers (for explosion protection) in semiconductor manufacture and aluminum and magnesium foundries. With the exception of PFC emissions from aluminum and HFC-23 emissions from HCFC-22 manufacture, emissions of HFCs, PFCs, and SF₆ are largely fugitive emissions associated with the prior purchase of manufactured chemicals by these industries.

Magnesium Production. Sulfur hexafluoride is used as a cover gas to prevent the oxidation of molten magnesium during smelting, casting, and other production processes. It is generally accepted that none of the sulfur hexafluoride is consumed in this process, and that it is all emitted directly into the atmosphere after use. The amount of sulfur hexafluoride emitted during

magnesium production is thus equal to the amount consumed. SF₆ has been pre-entered on Form EIA-1605.

Semiconductor Manufacture. The semiconductor manufacturing industry emits a variety of high global warming potential gases, including PFCs (CF₄, C₂F₆, C₃F₈, and c-C₄F₈), HFCs (CHF₃), and sulfur hexafluoride (SF₆). The relative quantity of each gas emitted (referred to collectively as fluorinated compounds, FCs) is site-specific, and depends on the processes employed, the machinery, and the specifications of the manufacturing process. In general, though, FCs are emitted from two distinct processes: plasma etching and chemical vapor deposition (CVD). Identify the specific FCs that were emitted using the greenhouse gas codes from Appendix E. Enter any other industrial processes occurring within your entity's boundary that produce emissions. Record the emissions of all greenhouse gases under the correct pre-entered greenhouse gas line item. Identify the specific PFCs and HFCs, if any, were emitted using the greenhouse gas codes from Appendix E.

Other Industrial Process Sources. Include any other emissions associated with industrial processes that are not included in the above categories. Report these emissions by gas in the lines provided.

Subtotal. Using the Global Warming Potential (GWP) values found in Appendix E, convert your Base Period emissions and Reporting Year emissions into units of carbon dioxide equivalent (CO₂e). Sum those CO₂e values for each column 4 through 9 and place the totals at the bottom of each column in the Subtotal row. It is not necessary to include an estimation method or rating in this row.

- d. Agricultural Sources.** Entities with agricultural operations should provide their emissions data in the table provided. The various sources listed are associated with keeping livestock, crop production, and soil management. Greenhouse gases emitted from these sources can be CO₂, CH₄, and N₂O. To report sources not included, use the "Other" row.

Follow the general instructions in Schedule I, Section 2, Part B for completing Columns 3 through 11 in the data table. Instructions pertaining to the specific sources are provided below.

Enteric Fermentation. CH₄ is produced as a byproduct of normal animal digestion through "enteric fermentation." Enteric fermentation results from the breakdown of food by microbes that release CH₄, which is then emitted from the animal to the atmosphere through exhaling or eructation. Ruminant livestock (including cattle, sheep, and goats) have greater rates of enteric fermentation than non-ruminant livestock (such as swine, horses, and mules).

Livestock Waste. CH₄ and N₂O emissions from waste are caused by the biological breakdown of organic matter in the waste. Livestock waste can be managed with storage and treatment systems, or spread daily on fields in lieu of long-term storage. In some cases, livestock waste is "unmanaged" and left on or in the pastures, ranges, or paddocks where the animals graze.

Residue Burning. Burning crop residues and native vegetation is not considered to be a significant source of carbon dioxide released in the United States. Carbon dioxide released during burning is generally taken up by vegetation the following growing season and is not considered a source of anthropogenic carbon dioxide emissions. However, field burning of crop residues emits nitrous oxide and methane that are considered anthropogenic emission sources and should be reported.

Rice Cultivation. Most rice grown in the United States is cultivated on shallow, continuously flooded fields, which results in emissions of CH₄. Anaerobic conditions in these waterlogged soils lead to the decomposition of organic matter by CH₄-emitting bacteria. This CH₄ reaches the atmosphere by bubbling up through the soil, diffusing through water to the surface, or diffusing through the vascular elements of plants. In some rice-growing states, the climate allows for two rice crops per season, the second of which is called a “ratoon crop.” Emissions from primary and ratoon crops should be estimated separately because emissions are higher from ratoon crops.

Agricultural Soils – Nitrogen Application. Amendments that add nitrogen to soils increase the production of N₂O (nitrous oxide) because they provide additional nitrogen to the natural cycle of nitrification and denitrification in soils. During nitrification and denitrification, soil microbes release N₂O, which eventually reaches the atmosphere. Commercial fertilizer, livestock manure, sewage sludge, incorporation of crop residues, and cultivation of nitrogen-fixing crops—all add nitrogen to soils, a portion of which is released to the atmosphere.

Agricultural Soils – Organic Soils. Cultivating highly organic soils also enhances mineralization of nitrogen-rich organic matter, making more nitrogen available for nitrification and denitrification, which, as described for the previous source, is converted by soil microbes to N₂O and released to the atmosphere.

Lime Application. Lime, in the form of limestone or dolomite, is often added to agricultural soils to reduce acidic conditions. Lime contains carbonate compounds that, when added to soils, release CO₂.

Cultivation of Organic Soils. Organic soils are soils that, when saturated with water, have 174 grams or more of organic carbon per kilogram of soil if the mineral fraction has 500 grams per kilogram or more of clay, or 116 grams per kilogram organic carbon if the mineral fraction has no clay, or has proportional intermediate contents. Agricultural practices—including clearing, drainage, tillage, planting, grazing, crop residue management, fertilization, and flooding—can alter organic matter inputs and decomposition. In general, more physically disruptive practices cause a loss of carbon from organic soils, and practices such no-till, conserve the carbon in organic soils.

Other Agricultural Sources. Enter emissions from any source not listed above. Identify the source in space provided in column 1 and specify the gas in column 2.

Subtotal. Using the Global Warming Potential (GWP) values found in Appendix E, convert your Base Period emissions and Reporting Year emissions into units of carbon dioxide equivalent (CO₂e). Sum those CO₂e values for each column 4 through 9 and place the totals at the bottom of each column in the Subtotal row. It is not necessary to include an estimation method or rating in this row.

- e. ***Fugitive Emissions Associated With Geologic Reservoirs.*** In Question 1e, enter the amount of carbon dioxide extracted from natural and man-made geologic reservoirs and fugitive emissions lost to the atmosphere during the extraction, processing, transport, and injection of carbon dioxide into geologic reservoirs. Include in your reported emissions any trace quantities of nitrous oxide and methane. To avoid double-counting, emissions reported in Questions 1a through 1d of Schedule I, Section 2, Part B, such as fugitive emissions during capture from an industrial or power plant, should be excluded from this section. In the case of enhanced resource recovery, particularly enhanced oil recovery (EOR), naturally occurring carbon dioxide is more commonly used, but a few projects to date use carbon dioxide captured from industrial processes and natural

gas processing. CO₂ recaptured and reinjected in enhanced oil recovery (EOR) and enhanced resource recovery (ERR) cannot be reported.

For more information on emissions and inventory methods associated with geologic sequestration, see Chapter 1, Part G of the Technical Guidelines.

Follow the General Instructions in Schedule I, Section 2, Part B of this document to fill out the information requested in each column for each of the following sources:

Fugitive Emissions From the Extraction of Naturally Occurring CO₂. Some CO₂ will be lost during the extraction from natural reservoirs. This should be reported as a fugitive emission. Reporters could use existing monitoring techniques, such as flow meters, to measure the amount of carbon dioxide lost from the natural geologic reservoirs, or calculate the fugitive emissions from the natural reservoir using a mass balance method.

Fugitive Emissions From the Extraction of CO₂ From Anthropogenic Sources. Include in this category any fugitive emissions that occur during the extraction of CO₂ from anthropogenic sources, provided these emissions have not already been reported in Schedule I, Section 2, Part B, Question 1c, Sector-Specific Industrial Process Emissions.

Fugitive Emissions During Transport and Processing. Include in this category any emissions resulting in the transportation and processing of carbon dioxide from the source to the injection site, provided these emissions have not already been reported elsewhere in Schedule I, Section 2, Part B, Question 1.

Fugitive Emissions During Injection and Extraction for Enhanced Resource Recovery. Many enhanced resource recovery operations recycle carbon dioxide used in the recovery process by re-injecting it into the same well or transferring the carbon dioxide to a new recovery site. Some carbon dioxide might be lost to the atmosphere during this process of recycling; it may be emitted when injected, and when extracted. Reporters should determine this volume of gas emitted using flow meters or a mass balance approach.

Post-Injection Seepage From a Permanent Geologic Storage Reservoir.

Evidence has shown that physical leakage rates of carbon dioxide are very small or nonexistent for carefully selected geologic formations. However, there remains the possibility of future seepage and entities are responsible for monitoring and reporting such seepage during the reporting year that the emissions occur. Methods to do so range from maintaining a detector log of the emissions via the well bore to detecting the amount of carbon dioxide in the formation by seismic, electromagnetic, gravitational, and geochemical methods.

- f. Captured CO₂ Emissions From Anthropogenic Sources.** Use question 1f to document the quantity of carbon dioxide emissions that have captured for subsequent storage in a geologic reservoir. These captured emissions must be reported as emissions at the point of generation in Questions 1a through 1d. The Gas (Column 2) and Unit of Measure (Column 3) have been completed as CO₂e and metric tons, respectively, in the printed version of Form EIA-1605. Enter the average annual quantity stored during the Base Period in onsite (Column 4) and offsite (Column 5) reservoirs with the total for the Base Period in Column 6. Likewise, enter the average annual quantity stored during the Reporting Year in onsite (Column 7) and offsite (Column 8) reservoirs with the total for the Reporting Year in Column 9. Sum the emissions of all sources for each column (Column 4-9) and enter the result in the Subtotals row.

- 2. Enter Indirect Emissions From Purchased Energy.** Enter information on energy purchased from other entities only.
- a. Physical Quantities of Energy Purchased.** Enter the units (e.g., MWh or MMBtu) used to measure fuel consumption in Column 2. If this is a Start Year Report, enter the physical quantities of each energy product purchased in the Base Period in Columns 3 through 6. Calculate the Base Period Average consumption for each energy product by summing the consumption for Base Period year 1 through year 4 and dividing by the number of years in the Base Period. Enter the result in Column 7. If this is a Reporting Year report, enter the physical quantity of each energy product consumed in the Reporting Year in Column 8. Enter Base Period data in Columns 3 through 6 only if you need to revise these data to correct errors or reflect changes to the entity, such as acquisitions and divestitures. Identify the System Type/Fuel Used for Generation for each purchased energy product in Column 9 using the codes in Appendix I.
 - b. Emissions From Purchased Energy for Emissions Inventory.** For each energy product purchased, calculate and enter the associated Base Period (Columns 4-8) or Reporting Year (Column 9) emissions of carbon dioxide, methane, and nitrous oxide in the data table provided. Use the appropriate regional electricity emission factors for emission inventories in Appendix F to estimate indirect emissions from purchases of electricity. Sum the emissions for all purchased energy sources for the Base Period (Columns 4-8) or Reporting Year (Column 9) and enter the result in the Totals row.
 - c. Emissions From Purchased Energy for Emission Reductions.** For the purposes of calculating emission reductions due to reductions for purchased energy, emissions for electricity must also be calculated using the appropriate regional electricity emission factors for emission reductions in Appendix F. Only complete this question if you are calculating reductions at the entity level using Addendum B1 or B2. In the first row of Question 2c, calculate emissions from purchased electricity in metric tons CO₂e for the Base Period (Columns 4-8) or Reporting Year (Column 9), based on the purchased electricity entered in Question 2a and the appropriate regional electricity emission factors for emission reductions in Appendix F. In the second row enter emissions from purchased steam, chilled water and hot water in metric tons CO₂e. Add these two rows together to derive values for the Totals (third) row. Note that these values will only be used for calculation of emission reductions in Addendum B1 or B2 and will not be included in the inventory emissions for your entity.
- 3. Enter Other Indirect Emissions.** Follow the general instructions for Schedule I, Section 2, Part B to complete Columns 3 through 9. (Leave Column 10 and 11 blank, since there are no rated methods for other indirect emissions sources.) Information on the specific sources covered under this category is provided below.

Entities may choose to report other forms of indirect emissions, such as emissions associated with employee commuting, manufacture and sale of energy efficient products, or consumption of energy-intensive products, although such other indirect emissions are not to be included in the entity's emission inventory and may not be the basis for registered emission reductions. All such reports of other forms of indirect emissions must be distinct from reports of indirect emissions associated with purchased energy and must be based on emission measurement or estimation methods identified in the Technical Guidelines or approved by DOE. Methods of estimating indirect emissions are covered in Part F of the Technical Guidelines.

4. Enter Terrestrial Carbon Fluxes and Stocks. Reporters engaged in forestry related activities, crop cultivation on mineral soils, and pasture/grazing should report the associated carbon sequestration and emissions here. Special categories of forestry related activities—harvested wood products, land restoration and forest preservation, natural disturbances, sustainably managed forests, and incidental lands—are each covered separately.

a. Forestry Activities

The following instructions apply to all the forestry categories under Schedule I, Section 2, Part B, Question 4a:

- **Units (Column 3).** Enter the unit of measure used to quantify the carbon stocks or fluxes (i.e., metric tons).
- **Base Period Average (Column 4).** Report the Base Period average of carbon stocks (for multiple year Base Periods) or the base year value (for single year Base Periods).
- **Estimated Carbon Stocks in Year Prior to Reporting Year (Column 5).** Report the estimated carbon stock of the year prior to the Reporting Year.
- **Reporting Year Carbon Stocks (Column 6).** Report the estimated carbon stock of the Reporting Year.
- **Reporting Year Stock Change or Carbon Flux (Column 7).** Subtract Column 5 from Column 6 and enter the value here. Reporters using flux-based measurement approaches can enter the resulting values directly here and leave Columns 5 and 6 blank. Enter the sum of all rows in the Total row.
- **Estimation Method (Column 8).** Follow the general instructions for Schedule I, Section 2, Part B, Column 10.
- **Rating (Column 9).** Follow the general instructions for Schedule I, Section 2, Part B, Column 11.

The following is a description of each source/sink:

Afforestation, Mine Land Reclamation, and Forest Restoration. Afforestation is a change in land use that may greatly alter the carbon storage on a site. Tree planting activities have the benefit of producing large gains in carbon storage (at least in the initial decades of tree growth) because they usually replace land uses that have a relatively constant stock of carbon from year to year.

Mine land reclamation is a special case of afforestation. Mine land soils are depleted of carbon, and therefore afforestation on these soils has a greater potential to sequester carbon than any other forestry activity.

Forest restoration can often be considered a special case of afforestation with regards to estimating net annual carbon flow. The goal of the restoration activity is to return the land to its original structure and species composition. If the land is in non-forest use prior to initiation of the restoration activity, the activity meets the definition of afforestation.

Agroforestry. Agroforestry combines agriculture and silviculture on the same tract of land. Because it emphasizes the use of woody and perennial crops and biological fertilizers, it may provide agricultural products with less intensive energy uses and sequester more carbon than traditional agriculture. Agroforestry activities are made up of a wide range of interdependent actions. In the face of the difficulties with estimating individual agroforestry activity effects, a

more credible report may result if the analysis is limited to the most certain of the effects, such as carbon capture and release by trees and soils.

Forest Management. It may be possible to modify the management regimes of existing forests to increase their rates of carbon capture. Activities may be applied either during the period of forest growth (intermediate forest treatments) or at the time of harvest and regeneration. These activities can be divided into intermediate treatments and site preparation techniques.

Intermediate treatments include, but are not limited to, the following:

- Species composition control;
- Precommercial thin;
- Commercial thin;
- Firewood harvests;
- Fertilization; and
- Prescribed fire.

Site preparation techniques include the following:

- Site preparation burning;
- Mechanical site preparation;
- Chemical site preparation.

Note that changes in carbon stocks or fluxes from the harvesting of timber itself are reported separately.

Short-Rotation Biomass Energy Plantations. With woody biomass crops, harvesting occurs approximately every 5 to 12 years, and regeneration is often accomplished by coppice methods that rely on regrowth of new stands from the root stock of the harvested stand. The principal effect of a biomass energy plantation is to displace fossil energy with biomass energy, thereby reducing fossil-fuel carbon emissions to the atmosphere.

Urban Forestry. Urban forestry activities can have two principal effects on greenhouse gas emissions and carbon capture. One is carbon capture through tree growth. As with all forestation activities, urban trees also capture and store carbon in above- and below-ground components, and may also contribute to carbon uptake in soils. Urban trees also help in energy conservation of buildings.

Timber Harvesting. Harvesting forests for timber involves a loss of carbon from the disturbance of the forest soil and the associated felling, and subsequent decay, of non-commercial trees and branches of trees. The cutting down of trees also ends their ability to sequester carbon in the future. The carbon sequestered in the harvested wood is released over time depending on how it is used and is reported separately under wood products.

Other. This category encompasses all other forestry activities landowners may practice with consequences on carbon storage not otherwise accounted for above.

- b. Wood Products.** Reporters are provided with two options for reporting on the carbon stock in harvested wood products.

- i. Method 1. Track and report on emissions from the gradual decomposition of the harvested wood products on a yearly basis. The following instructions apply to Method 1:
- **Units (Column 3).** Enter the unit of measure used to quantify the carbon stocks or fluxes (i.e., metric tons).
 - **Estimated Carbon Stocks in Harvested Wood Products in Year Prior to Reporting Year (Column 4).** Report the estimated carbon stock in harvested wood products in the year prior to the Reporting Year. For the first year of harvesting, this will be zero.
 - **Estimated Carbon Stocks in Harvested Wood Products in Reporting Year (Column 5).** Report the estimated carbon stock in harvested wood products in the Reporting Year.
 - **Reporting Year Stock Change (Column 6).** Subtract Column 4 from Column 5 and enter the value here.
 - **Estimation Method (Column 7).** Follow the general instructions for Schedule I, Section 2, Part B, Column 10.
 - **Rating (Column 8).** Follow the general instructions for Schedule I, Section 2, Part B, Column 11.
- ii. Method 2. Estimate the carbon remaining in the harvested wood products after 100 years, and report in the year of harvesting. The following instructions apply to Method 2:
- **Units (Column 3).** Enter the unit of measure used to quantify the carbon stocks or fluxes (i.e., metric tons).
 - **Stock of Carbon in Harvested Wood (Column 4).** Report the estimated carbon stock in the harvested wood in the year of harvest.
 - **100-Year Residual Carbon Stock (Column 5).** Report the estimated carbon stock remaining in the harvested wood one hundred years after the year of harvest.
 - **Estimation Method (Column 6).** Follow the general instructions for Schedule I, Section 2, Part B, Column 10.
 - **Rating (Column 7).** Follow the general instructions for Schedule I, Section 2, Part B, Column 11.
- c. **Land Restoration and Forest Preservation.** Entities may restore native habitat on land and place administrative restrictions to avoid future human-caused releases of carbon. Administrative restrictions can be permanent conservation easements registered with the County, State, or other Government entity, or deed restrictions. Check the box if you are certifying that your entity has placed administrative restrictions on the restored land. Use the instructions below to complete each row in the table:
- **Name/Description of Tract of Land (Column 1).** Enter the name or description of the tract of land.
 - **Type of Restriction (e.g., Easement, Deed Restrictions, etc.), (Column 2).** Enter the type of restriction on the tract of land.
 - **Year Protected (Column 3).** Enter the year in which the restriction was applied.
 - **Area (Column 4).** Enter the area of the tract of land in acres.
 - **Units (Column 5).** Enter the unit of measure used to quantify the carbon stocks or fluxes (i.e., metric tons).
 - **50% of Carbon Stock Accumulated in 50 Years From Inception of Preservation Activity (Column 6).** Enter 50 percent of the carbon stock increases that are expected over the 50

- years following the inception of the land restoration and forest preservation activity. Enter the sum of all rows in the Total row.
- **Estimation Method (Column 7).** Follow the general instructions for Schedule I, Section 2, Part B, Column 10.
 - **Rating (Column 8).** Follow the general instructions for Schedule I, Section 2, Part B, Column 11.
- d. Forest Land That Experiences Carbon Losses From Natural Disturbances.** Natural disturbances beyond the control of landowners can cause great fluxes of carbon, either as emissions following the disturbance, drastic decreases in carbon stocks, or great absorption of carbon (in some cases) with regrowth. In order to maintain the credibility of carbon reporting it is important that such natural disturbances are reported. Should forestland of an entity or subentity experience a natural disturbance such as a fire or windthrow, the carbon stocks in the disturbance year (the year in which the disturbance occurs) and for the preceding years should be entered. Also provide the acreage affected. Entities must track carbon stock changes on each tract of disturbed lands until carbon stocks reach pre-disturbance levels. Use the instructions below to complete each row in the table:
- **Name/Description of Tract of Land (Column 1).** Enter the name or description of the tract of land.
 - **Acres (Column 2).** Enter the area of the tract of land in acres.
 - **Type of Disturbance (Column 3).** Enter the type of disturbance the land experienced.
 - **Year (Column 4).** Enter the year in which the disturbance occurred.
 - **Units (Column 5).** Enter the unit of measure used to quantify the carbon stocks or fluxes (e.g., metric tons).
 - **Base Period Average (Column 6).** Report the Base Period average of carbon stocks (for multiple year Base Periods) or the base year value (for single year Base Periods).
 - **Carbon Stocks in Year Before Disturbance (Column 7).** Report the estimated carbon stock of the year prior to the disturbance. Enter the sum of all rows in the Total row.
 - **Reporting Year Carbon Stocks (Column 8).** Report the estimated carbon stock of the Reporting Year. Enter the sum of all rows in the Total row.
 - **Loss (Column 9).** Subtract Column 8 from Column 7 and enter the value here. Enter the sum of all rows in the Total row.
 - **Estimation Method (Column 10).** Follow the general instructions for Schedule I, Section 2, Part B, Column 10.
 - **Rating (Column 11).** Follow the general instructions for Schedule I, Section 2, Part B, Column 11.
- e. Sustainably Managed Forests.** Sustainably managed forests are forests managed to follow several specific criteria relating to replenishment of harvested trees, low impact logging, and other related activities. There are various entities that reporters may use to certify that their forests are sustainably managed. Entities or subentities that sustainably manage forests can report a zero flux, as it is assumed that the stock of carbon removed through timber harvesting is replaced by regrowth facilitated by sustainable management practices. There are various third-party certification systems (e.g., “Sustainable Forestry Initiative (SFI)” and the “Forest Stewardship Council (FSC)”). Those reporters that have obtained such certification should report it. Use the instructions below complete each row in the table:

- **Name/Description of Tract of Land (Column 1).** Enter the name or description of the tract of land.
- **Area (Column 2).** Enter the area of the tract of land in acres.
- **Has Sustainability Been Verified by Third Party Certifier (Y/N), (Column 3).** Answer yes or no.
- **Identify System Used to Determine Sustainability (Column 4).** Enter the name of the certification system used to determine sustainability.

f. Incidental Lands Excluded from Terrestrial Carbon Fluxes and Stocks in Question 4a.

Entity landholdings that are a minor component of an entity's operations and are not actively managed for production of goods and services are considered incidental lands. Reporters can either use methods specified in the Technical Guidelines to estimate changes in stocks, in which case this should be reported in Schedule I, Section 2, Part B, Question 4a, or report zero change in flux. If reporting zero change in flux, please provide information on the acreage and type of incidental land. If these lands are developed in the future for production of goods and services, the nature of the land-use change must be reported in the next inventory. Use the instructions below to complete each row in the table:

- **Name/Description of Tract of Land (Column 1).** Enter the name or description of the tract of land.
- **Type of Land (Column 2).** Enter a description of the type of land, such as "right-of-way" or "land around pipeline."
- **Area (Column 3).** Enter the area of the tract of land in acres. Enter the sum of all rows in the Total row.

g. Other Terrestrial Carbon Fluxes.

The following instructions apply to all other terrestrial carbon fluxes:

- **Units (Column 3).** Enter the unit of measure used to quantify the carbon stocks or fluxes (e.g., metric tons).
- **Base Period Average (Column 4).** Report the Base Period average of carbon stocks (for multiple year Base Periods) or the base year value (for single year Base Periods).
- **Estimated Carbon Stocks in Year Prior to Reporting Year (Column 5).** Report the estimated carbon stock of the year prior to the Reporting Year.
- **Estimated Carbon Stocks in Reporting Year (Column 6).** Report the estimated carbon stock of the Reporting Year.
- **Reporting Year Stock Change or Carbon Flux (Column 7).** Subtract Column 5 from Column 6 and enter the value here. Reporters using flux-based measurement approaches can enter the resulting values directly here and leave Columns 5 and 6 blank. Enter the sum of all rows in the Total row.
- **Estimation Method (Column 8).** Follow the general instructions for Schedule I, Section 2, Part B, Column 10.
- **Rating (Column 9).** Follow the general instructions for Schedule I, Section 2, Part B, Column 11.

The following is a description of each source/sink:

Crops on Mineral Soils. In contrast to organic soils, crop cultivation on mineral soils can actually lead to greater absorption of carbon. These soils increase their organic matter levels as a result of increasing crop productivity (providing more residues), less intensive tillage, and other changes in agricultural management practices. Changes in land-use or management practices that result in increased organic inputs or decreased oxidation of organic matter (e.g., improved crop rotations, cover crops, and application of manure) will result in a net accumulation of soil organic carbon until a new equilibrium is achieved.

Pasture/Grazing. The management of pastures and grazing lands can affect the net flows of carbon between the soil and the atmosphere. Generally speaking, these lands can be significant sinks for carbon as the soils remain relatively undisturbed. The degree of sequestration depends upon several factors such as the management regime, quality of pasture, grazing frequency and intensity.

Land-Use Change. Land-use change is defined for reporting purposes as a change in land classification between forest land and the following categories: cropland, grassland, and developed land (including urban land). Land-use change may affect all or part of the land area of an entity or activity. Since the estimation methods for land-use change may be different than the estimation methods for other land, determining the area of land-use change is important.

Other. This category encompasses all other forestry activities landowners may practice with consequences on carbon storage not otherwise accounted for above.

h. Terrestrial Carbon Flux Summary. Enter the requested data from the previous Schedule I, Section 2, Part B, Question 4a through 4g.

- **Units (Column 3).** Enter the unit of measure used to quantify the carbon stocks or fluxes (e.g., metric tons).
- **Reporting Year Stock Change or Carbon Flux (Column 4).**
 - Forestry Activities. Enter value from Total row of Column 7 of question 4a.
 - Wood Products Method 1. Enter value from Column 6 of question 4b.i.
 - Wood Products Method 2. Enter value from Column 5 of question 4b.ii.
 - Land Restoration and Forest Preservation. Enter value from Total row of Column 6 of question 4c.
 - Sustainably Managed Forests. Leave this row blank.
 - Incidental Lands. Leave this row blank.
 - Other Terrestrial Carbon Fluxes. Enter value from Total row of Column 7 of question 4g.
- **Rating (Column 5).** Follow the general instructions for Schedule I, Section 2, Part B, Column 11.

5. Identify and Estimate *De Minimis* Emissions Sources. List the *de minimis* sources that you intend to exclude from your entity-wide emissions inventory, providing the following information about each source:

- ***De Minimis* Emission Type (Column 1).** Enter the emission type (Direct, Indirect, or Carbon Flux) excluded.
- ***De Minimis* Emission Source (Column 2).** Enter the source of the emissions using the codes listed in Appendix J.
- **Gas (Column 3).** Enter the type of gas emitted by the source.
- **Unit of Measure (Column 4).** Enter the unit of measure used to quantify the source.

- **Base Period Average *De Minimis* Emissions (Column 5).** Enter the average annual quantity of the gas emitted during the Base Period.
- **Reporting Year *De Minimis* Emissions (Column 6).** Enter the quantity of the gas emitted during the Reporting Year if emissions from the source were re-estimated.
- **Year Last Estimated (Column 7).** Enter the year emissions from the source were last estimated. Enter the last year of your entity's Base Period if this is a Start Year report or if you have not re-estimated emissions since the Start Year. Emissions from *de minimis* sources must be re-estimated after any significant increase in such emissions, or every five years, whichever occurs sooner.

Part C. Inventory of Foreign Emissions and Carbon Flux

Complete and attach one copy of Addendum A, Inventory of Foreign or Subentity Emissions, if applicable. Part C is optional for independently verified reports.

Part D. Total Emissions and Carbon Flux

Use Part D to summarize the emissions and carbon flux included in your entity's emissions inventory.

- 1. Enter Total Domestic Emissions and Carbon Flux.** Enter all emissions and flux data in metric tons of carbon dioxide equivalents (mtCO₂e). If this is a Start Year report, enter total Base Period emissions for each emissions source in Column 3 through 7. If this is a Reporting Year report, enter total Reporting Year emissions for each emissions or carbon flux source in Column 8. If your entity has undergone boundary changes due to acquisitions or divestitures since the original Base Period, update the Base Period emissions data to reflect these changes.
 - a. Direct Emissions (Item A).** Calculate the total direct emissions by summing the total Base Period emissions (Columns 3-7) or Reporting Year emissions (Column 8) reported for stationary combustion, mobile sources, sector-specific industrial process emissions, agricultural sources, and fugitive emissions associated with geologic reservoirs from Part B, Questions 1a through 1e. Enter the result(s) under Item A in Part D. Biogenic carbon dioxide emissions should not be included in the total direct emissions.
 - b. Indirect Emissions From Purchased Energy for Emissions Inventory (Item B).** Enter the total indirect emissions from purchased energy for the emissions inventory for the Base Period (Columns 3-7) or Reporting Year (Column 8) from Part B, Question 2b. Be sure not to use indirect emissions from purchased energy for emission reductions (Question 2c), which is to be used for emission reduction calculations only.
 - c. Indirect Emissions From Purchased Energy for Calculation of Emission Reductions (Item C).** Enter the total indirect emissions from purchased energy for calculating emission reductions for the Base Period (Columns 3-7) or Reporting Year (Column 8) from Part B, Question 2c.
 - d. Total Emissions (Item D).** Sum the direct emissions (Item A) and indirect emissions from purchased energy for emissions inventories (Item B) for the Base Period (Columns 3-7) or Reporting Year (Column 8). Exclude indirect emissions from purchased energy for calculation of emission reductions (Item C) from this total. Enter the result(s) under Item D in Part D.

- e. **Carbon Flux (Item E).** Enter under Item E in Part D the carbon flux for the Reporting Year (Column 8) from Part B, Question 4h, Column 4.
 - f. **Captured CO₂ Sequestered in an Onsite Geologic Reservoir (Item F).** Enter under Item F in Part D the quantities of CO₂ sequestered in an onsite geologic reservoir for the Base Period average (Column 7) or Reporting Year (Column 8) as recorded in Part B, Question 1f, Columns 4 and 7, respectively.
 - g. **Total Inventory Emissions (Item G).** Calculate total inventory emissions for the Base Period (Columns 3-7) or the Reporting Year (Column 8) by subtracting carbon flux (Item E) and captured CO₂ sequestered in an onsite geologic reservoir (Item F) from total emissions (Item D). Enter the result(s) under Item G.
 - h. **Other Indirect Emissions (Item H).** Enter under Item H the total other indirect emissions for the Base Period (Columns 3-7) or Reporting Year (Column 8) from Part B, Question 3.
 - i. **Captured CO₂ Transferred to Another Entity for Sequestration in a Geologic Reservoir (Item I).** Enter under Item I in Part D the quantities of captured CO₂ transferred to another entity for sequestration in a geologic reservoir for the Base Period average (Columns 7) or Reporting Year (Column 8) as recorded in Part B, Question 1f, Columns 5 and 8, respectively.
2. **Enter Total Foreign Emissions and Carbon Flux.** Use the instructions for Question 1 above to enter total foreign emissions and carbon flux. You will need to pull data from the corresponding questions in Addendum A, Inventory of Foreign or Subentity Emissions, as attached to Part C.

Part E. Emissions Inventory Rating Summary

All entities that certify their use of only A or B estimation methods are not required to complete Part E. Large emitters intending to *register* reductions need to complete this section for the entire entity. (You need not calculate a separate rating for each subentity included in your report.) A weighted average rating of 3.0 or higher is required to *register* emission reductions. Small emitters intending to *register* reductions must complete this Part for those activities included in their inventory, unless they have used only A or B estimation methods.

For large or small emitters *reporting but not registering* reductions the submission of inventories is not required. However, should they submit an inventory, a rating needs to be calculated, although it need not achieve an average rating of 3.0 or higher. A large or small emitter *reporting but not registering* reductions that submits an inventory may also certify the use of only A and B estimation methods and skip Part E.

If this is a Start Year report, you should complete Question 1 only.

If this is a Reporting Year report, you should:

- complete Question 2; and
- complete Question 1 if you have submitted revised Base Period emissions data in Part B.

1. Enter Base Period Data.

Follow the steps below to calculate the weighted average emissions inventory rating for the Base Period in Part E, Question 1. Calculate and enter data for domestic and foreign emissions sources separately.

- For each rating category (A, B, C, and D), enter the total Base Period average domestic and foreign direct emissions calculated using methods with the corresponding rating in the appropriate row under the direct emissions column (Column 3). Likewise, enter total domestic and foreign indirect emissions from purchased energy (Column 4).
- For each rating category, sum the total of direct emissions (Column 3) and indirect emissions from purchased energy (Column 4), and enter in the total emissions column (Column 6). Sum the values for each rating category and enter the result in the Totals row for this column.
- For each rating category, multiply the total emissions (Column 6) by the weighting factor (Column 2) and enter the result in the weighted total emissions column (Column 7). Sum the values for each rating category and enter the result in the Totals row for this column.
- Calculate the weighted average emissions inventory rating by dividing the total in Column 7 by the total in Column 6. Enter this value under the weighted total emissions column (Column 7) in the Weighted Average Rating row.

2. Enter Reporting Year Data.

Follow the steps below to calculate the weighted average emissions inventory rating for the Reporting Year in Part D, Question 2. Calculate and enter data for domestic and foreign emissions sources separately.

- For each rating category (A, B, C, and D), enter the total Reporting Year domestic and foreign direct emissions calculated using methods with the corresponding rating in the appropriate row under the direct emissions column (Column 3). Likewise, enter total domestic and foreign emissions or flux by rating category in the respective columns for indirect emissions from purchased energy (Column 4) and carbon flux (Column 5). Enter carbon flux as a positive value, regardless of whether the flux was positive or negative.
- For each rating category, sum the total direct emissions (Column 3), indirect emissions from purchased energy (Column 4), and carbon flux (Column 5) and enter in the total emissions and carbon flux column (Column 6). Sum the values for each rating category and enter the result in the Totals row for this column.
- For each rating category, multiply the total emissions and carbon flux (Column 6) by the weighting factor (Column 2) and enter the result in the weighted total emissions and carbon flux column (Column 7). Sum the values for each rating category (A through D) and enter the result in the Totals row of Column 7.
- Calculate the weighted average emissions inventory rating by dividing the weighted total emissions (Column 7) in the Totals row by total emissions and carbon flux (Column 6) in the Totals row. Enter this value under the weighted total emissions and carbon flux column (Column 7) in the Weighted Average Rating row.

Section 3. Emissions Offsets

Indicate by checking the appropriate check boxes at the beginning of Section 3 whether you have obtained emission offsets from another reporting entity (or entities) or from entities that choose not to report under the 1605(b) program (non-reporter). *You must have an agreement with the other entity that permits you to report the offsets.*

Part A. Offsets Obtained by Agreement With Other Reporters

Complete Part A if you have obtained emissions offsets by agreement with other reporters to the Voluntary Reporting of Greenhouse Gases Program. By *registering* or *reporting but not registering* offsets in Part A, you are confirming the existence of an agreement between your entity and the entity providing the emissions offset to permit the inclusion of the emissions offset in your report.

For each offset obtained, enter the following information in the data table provided:

- **Name of Other Reporter (Column 1).** Enter the name of the other reporter in Column 1, using the name as it appears in the other entity's Form EIA-1605.
- **Name of Other Reporter's Subentity (Column 2).** If applicable, enter in Column 2 the name of the other reporter's subentity for which the offset was reported as it appears in the other entity's Form EIA-1605.
- **Domestic or Foreign (Column 3).** Indicate in Column 3 whether the offset was derived from a domestic or foreign emissions source.
- **Gas (Column 4).** Enter CO₂e unless the offset is for a CFC, in which case enter the code for the specific CFC from Appendix E.
- **Unit of Measure (Column 5).** Enter metric tons unless the offset is for a CFC, in which case you may report the quantity in kilograms.
- **Quantity (Column 6).** Enter the quantity of the offset obtained in metric tons CO₂e in Column 6, unless the gas is a CFC, in which case enter the quantity in kilograms or metric tons of the specific gas.
- **Registered by Other Reporter? (Column 7)** Indicate whether the offset was registered by the reporter from whom it was obtained by entering "Y" for yes or "N" for no in Column 7.

Part B. Offsets Obtained by Agreement With a Non-reporter

Complete Part B if you have obtained emission offsets from one or more non-reporters to the Voluntary Reporting of Greenhouse Gases Program. In addition to providing the information below, you must attach Schedules I, II (if applicable), and III completed by, or on behalf of, the non-reporter.

For each offset obtained, enter the following information in the data table provided:

- **Name of Non-reporter (Column 1).** Enter the name of the non-reporter in Column 1.
- **Name of Non-reporter's Subentity (Column 2).** If applicable, enter in Column 2 the name given to the non-reporter's subentity associated with the emission offset obtained.
- **Domestic or Foreign (Column 3).** Indicate in Column 3 whether the offset was derived from a domestic or foreign emissions source.
- **Gas (Column 4).** Enter CO₂e unless the offset is for a CFC, in which case enter the code for the specific CFC from Appendix E.

- **Unit of Measure (Column 5).** Enter metric tons unless the offset is for a CFC, in which case you may report the quantity in kilograms.
- **Quantity (Column 6).** Enter the quantity of the offset obtained in metric tons CO₂e in Column 6, unless the gas is a CFC, in which case enter to quantity in kilograms or metric tons of the specific gas.
- **Non-reporter Has Met Requirements for Registration? (Column 7)** Indicate whether the non-reporter has met the requirements for registering reductions in the attached report by entering “Y” for yes or “N” for no in Column 7.

Section 4. Entity-Level Emission Reductions

If this is a Reporting Year report and you are estimating emission reductions for the entire entity, complete and attach one copy of the appropriate addendum (Addendum B1-B16) for the method used to estimate the reductions. If you are estimating emission reductions for two or more subentities, proceed to Schedule II.

Instructions for Schedule II, Subentity Information

Section 1. Subentity Statement

Complete this schedule for each subentity included in your report.

- 1. Enter Subentity Identification:** List the subentity's name, its description, and relationship to the entity.
- 2. Enter Reason for Delineation of Subentity:** Check all applicable box(es) to explain the reason(s) for delineating the subentity.

Distinct estimation method: Check this box if you intend to use different methods to calculate reductions for your subentities. Indicate which estimation method you plan to use to calculate reductions for this specific subentity by checking the appropriate box.

Distinct output metric: Check this box if you intend to calculate separate emission reductions using the changes in emission intensity method for one or more other subentities because a different metric is required to accurately measure output.

Foreign country operations, specify country(ies): Check this box if the subentity includes operations in a foreign country. Identify the country or countries included in this specific subentity by entering the 3-digit country codes in the space provided. (See Appendix C for a list of country codes.)

Distinct Base Period from other subentities (for new or acquired operations): Check this box if the subentity has a distinct Base Period from other subentities.

Emission reduction calculation method changed: Check this box if the reduction calculation method has changed, resulting in a distinct subentity.

Small emitter registering emission reductions associated with more than one specific activity: Check this box if reductions are being estimated for more than one specific activity conducted by a small emitter that intends to register emission reductions. If the entity intends to register reductions for only one specific activity, the required inventory for this activity may be reported on Schedule I, Section 2.

Reporting but not registering emission reductions associated with more than one specific activity: Check this box if reductions are being estimated for more than one specific activity conducted by an entity that intends to *report but not register* emission reductions. If the entity intends to *register* reductions for only one specific activity, the required inventory for this activity may be reported on Schedule I, Section 2.

Not practicable to assess the changes in net emissions for the following reasons: Check this box if you cannot assess the change in net emissions. Please explain how it is not practicable to assess the change in the space provided.

- 3. Enter Significant Changes to Previous Subentity Statement:** Complete this question if this is a Reporting Year report and this subentity either has been added to your report or has undergone significant changes since the previous year's report. If the subentity is not new and has not undergone significant changes this question can be skipped. Check the appropriate boxes describing the changes your subentity has undergone and provide descriptive information where requested.

4. Describe the Subentity's Primary Economic Activities (NAICS Code): Enter the primary (and, if applicable, secondary) 3-digit NAICS code for the subentity. (For a list of NAICS codes, see Appendix A.)

5. Describe the Organizational Boundaries of Subentity: Please use the space provided to describe the organizational boundaries of this specific subentity.

6. Describe the Scope of the Emissions Inventory: If there are emissions associated with this subentity, check the applicable box for each of the emissions sources included in the emissions inventory for this specific subentity reported in Addendum A.

7. Describe the Geographic Scope of Activities: Please check the appropriate box to indicate whether this report covers U.S. activities or non-U.S. activities. If you checked "This report covers U.S. activities only," check the box indicating the scope of the subentity's activities in the U.S. using the following criteria:

Nationwide: Check the box for nationwide if your subentity has operations in at least one state in each of the 10 U.S. Census regions. The U.S. Census Regions are identified in Appendix B.

Multiple States: Check the box for multiple States if your subentity has operations in more than one State but does not meet the criteria for nationwide. List the States in which your subentity has operations using the two-letter abbreviations listed in Appendix B.

Single State: Check the box for single State if your subentity has operations in only one State. Identify the state in the space provided using two-letter abbreviations listed in Appendix B.

If you checked the box indicating that this subentity report covers non-U.S. activities, identify the foreign country or countries in which reported activities occurred using the 3-digit country codes found in Appendix C.

8. Indicate the Inclusion of Emission Reductions: Check "Yes" or "No" to indicate whether emission reductions are included in this year's report for this specific subentity. If "No," explain why.

9. Define the Subentity Base Period: Check the box indicating the number of years in the Base Period for the subentity, and enter the last (most recent) year of the Base Period.

10. Enter Any Supplementary Information for Subentity: Use this space to provide any supporting information about this subentity that you feel should be included in your report. Attach additional sheets if necessary.

Section 2. Subentity Emissions Inventory

For each subentity included in your report, complete and attach one copy of Addendum A, Inventory of Foreign or Subentity Emissions.

If you are a large emitter intending to *register* reductions, the subentities you establish for the purpose of calculating reductions must, when aggregated, include all the emission sources and carbon sinks in your entity. The sum of emissions and carbon flux reported for these subentities in Schedule II must equal the total entity-level emissions reported in Schedule I, Section 2, Part D.

If you are a small emitter or a large emitter intending to *report but not register* reductions, you may establish one or more subentities that include the emissions sources associated with the activity for which you are estimating reductions. The inventory prepared for each subentity must represent a complete assessment of the emissions and sequestration associated with the specific activity covered by the subentity.

Section 3. Summary of Subentity Emission Reductions

If this is a Reporting Year report, complete and attach one copy of the appropriate addendum (Addendum B1-B16) for the method used to estimate reductions for each subentity.

Instructions for Schedule III, Emission Reductions Summary

Section 1. Registered Emission Reductions

Use Schedule III, Section 1 to summarize the registered emission reductions entered in Schedule I or Schedule II and their associated emission reduction addenda. Enter domestic registered emission reductions in Part A and foreign registered emission reductions in Part B. Table 1 below indicates the source in Addendum B for each data value in the corresponding cells in the data tables for Parts A and B. Abbreviated references are used to conserve space, which are explained via example below:

- **B1, H2** refers to the value in Addendum B1, Item H, Column 2.
- **B1, Part C.1** refers to data in Addendum B1, Part C, Question 1.

If you are registering reductions for your entire entity, and you have not reported on subsidiaries, complete both Parts A and B using the same data from Addendum B and Schedule I referenced in Table 1.

If you are registering reduction based on subsidiaries, complete both parts A and B using the summation of all Addenda submitted to Schedule II referenced in Table 1 below.

Use the following instructions for completing the following Items in Parts A and B:

- **Column 2.** Enter total gross registered reductions by emission method/source (or Addendum type).
- **Column 3.** Enter any registered reductions distributed to others by emission method/source (or Addendum type).
- **Column 4.** Subtract Column 3 from Column 2 for all items.
- **Item P.** Sum the values in Columns 2 and 3 for Items A1 through O to get all reductions from Addendum B1-B15 and enter the result in the respective column under Item P.
- **Item R.** Sum the values in Column 2 and 3 for Items P through Q2 to get total reductions plus offsets and enter the result in the respective column under Item R.
- **Item S.** Enter reduction deficits carried over from last year's report in Column 4. For *domestic* reductions (Part A), enter value from Schedule III, Section 1, Part A, Item T in your previous year's report. For *foreign* reductions (Part B), enter value from Schedule III, Section 1, Part B, Item T in your previous year's report. For both domestic and foreign, if the value is negative, enter the value, and, if it is zero or positive, enter zero.
- **Item T.** In Column 4, add Item R and Item S and enter total net registered reductions.

Table 1. Net Entity-Level Registered Reductions and Carbon Storage (metric tons CO₂e)

| Item | Method/Source | 1 | 2 | 3 | 4 |
|------|--------------------------------|-----------------------------|--|---|---|
| | | Emission Reductions | | | |
| | | Gross Registered Reductions | Registered Reductions Distributed to Other Reporters | Net Registered Reductions (Subtract Column 3 from Column 2) | |
| A | Changes in Emissions Intensity | | | | |
| A1 | Direct | B1, I2 | B1, Part C.1 (Column 5) | | |
| A2 | Indirect From Purchased Energy | B1, I3 | B1, Part C.1 (Column 5) | | |

| Item | 1 Method/Source | 2 Emission Reductions | | |
|------|--|--|---|--|
| | | 3 Gross Registered Reductions | 4 Registered Reductions Distributed to Other Reporters | 5 Net Registered Reductions (Subtract Column 3 from Column 2) |
| B | Changes in Absolute Emissions | | | |
| B1 | Direct | B2, G2 | B2, Part C.1 (Column 5) | |
| B2 | Indirect From Purchased Energy | B2, G3 | B2, Part C.1 (Column 5) | |
| C | Changes in Carbon Storage | B3, H3 | B3, Part B.1 (Column 4 of Total row) | |
| D | Changes in Avoided Emissions | B4, H6 | B4, Part C.1 (Column 4 of Total row) | |
| E | Energy Generation and Distribution | B5, K6 | B5, Part C.1 (Column 4 of Total row) | |
| F | Coal Mine Methane Recovery | B6, CC5 | B6, Part D.1 (Column 4 of Total row) | |
| G | Landfill Methane Recovery | B7, DD6 | B7, Part D.1 (Column 4 of Total row) | |
| H | Geologic Sequestration | B8, I3 | B8, Part D.1 (Column 4 of Total row) | |
| I | Electricity Transmission and Distribution Improvements | B9, R3 | B9, Part D.1 (Column 4 of Total row) | |
| J | Capture of Methane From Anaerobic Digestion at Wastewater Treatment Facilities | B10, HH6 | B10, Part D.1 (Column 4 of Total row) | |
| K | Anaerobic Digestion of Animal Waste | B11, E3 | B11, Part D.1 (Column 4 of Total row) | |
| L | Recycling of Fly Ash | B12, J3 | B12, Part D.1 (Column 4 of Total row) | |
| M | Demand-Side Management or Other Emission Reduction Programs | B13, Part B.1, (Column 5 of Total row) | B13, Part C.1 (Column 4 of Total row) | |
| N | Combined Heat and Power | B14, OO3 | B14, Part C.1 (Column 4 of Total row) | |
| O | Other Action-Specific Methods | | | |
| O1 | Direct | B15, M3 | B15, Part C.1 (Column 5) | |
| O2 | Indirect From Purchased Energy | B15, M4 | B15, Part C.1 (Column 5) | |
| P | Subtotal (Sum rows A1 through O2) | | | |

| Item | 1 | 2 | 3 | 4 |
|------|---|--|--|---|
| | Method/Source | Emission Reductions | | |
| | | Gross Registered Reductions | Registered Reductions Distributed to Other Reporters | Net Registered Reductions (Subtract Column 3 from Column 2) |
| Q | Offsets | | | |
| Q1 | Offsets Obtained From Other Reporters | -Total from Schedule I, Section 3, Part A, Column 6* | | |
| Q2 | Offsets Obtained From Non-reporters | -Total from Schedule I, Section 3, Part B, Column 6* | | |
| R | Subtotal (Sum rows P through Q2) | | | |
| S | Reduction Deficits Carried Over From Last Year's Report | | | |
| T | TOTAL (Add row R to row S) | | | |

*Include total of registered domestic offsets in Part A and total of registered foreign offsets in Part B.

Section 2. Reported but Not Registered Emission Reductions

Use Schedule III, Section 2 to summarize the *reported but not registered* emission reductions entered in Schedule I or Schedule II and their associated emission reduction addenda. Enter domestic emission reductions in Part A and foreign emission reductions in Part B. Table 2 below indicates the sources in Addendum B for each data value in the corresponding cells in the tables for Parts A and B. Abbreviated references are used to conserve space, which are explained via example below:

- **B1, H2** refers to the value in Item H, Column 2 of Addendum B1.
- **B1, Part C.1** refers to data in Part C, Question 1 of Addendum B1.

Complete both Parts A and B using the same data from Addendum B and Schedule I referenced in Table 2 below.

Use the following instructions for completing the following items in Parts A and B:

- **Column 4.** Subtract Column 3 from Column 2 for all items.
- **Item P.** Sum the values in Columns 2 and 3 in Items A1 through O and enter the result in the respective column under Item P.
- **Item R.** Sum the values in Column 2 and 3 in Items P through Q2 and enter the result in the respective column under Item R.
- **Item S.** Enter reduction deficits carried over from your previous year's report in Column 4. For *domestic* reductions (Part A), enter value from Schedule III, Section 2, Part A, Item T in your previous year's report. For *foreign* reductions (Part B), enter value from Schedule III, Section 2, Part B, Item T in your previous year's report. For both domestic and foreign reductions, if the value is negative, enter value, and, if it is zero or positive, enter zero.
- **Item U.** If in Addendum B2 you have checked "Yes" to Part A, Question 4, enter any emissions reductions both *reported but not registered* on Addendum B2 and *registered* on Addendum B1 in Column 4 only.
- **Item W.** Enter the reduction deficit for the CFC carried over from last year's report in Column 4 only. For *Domestic*, enter value from Schedule III, Section 2, Part A, Item X in previous year's report. For *Foreign*, enter value from Schedule III, Section 2, Part B, Item X in previous year's report. For both Domestic and Foreign, if the value is negative, enter value, and, if it is zero or positive, enter zero.
- **Item X.** Enter the sum of rows V and W in Column 4 only.

Table 2. Net Entity-Level Reported but Not Registered Reductions and Carbon Storage

| Item | Method/Source | 1 | 2 | 3 | 4 |
|--|--------------------------------|---------------------------|--|---|---|
| | | Emission Reductions | | | |
| | | Gross Reported Reductions | Reported Reductions Distributed to Other Reporters | Net Reported Reductions (Subtract Column 3 from Column 2) | |
| Carbon Dioxide, Methane, Nitrous Oxide, Perfluorocarbons, Hydrofluorocarbons, and Sulfur Hexafluoride (metric tons CO₂e) | | | | | |
| A | Changes in Emissions Intensity | | | | |
| A1 | Direct | B1, I2 | B1, Part C.1 (Column 5) | | |
| A2 | Indirect From Purchased Energy | B1, I3 | B1, Part C.1 | | |

| Item | 1 Method/Source | 2 Gross Reported Reductions | 3 Emission Reductions | | 4 Net Reported Reductions (Subtract Column 3 from Column 2) |
|--|--|---|--|--|---|
| | | | Reported Reductions Distributed to Other Reporters | | |
| Carbon Dioxide, Methane, Nitrous Oxide, Perfluorocarbons, Hydrofluorocarbons, and Sulfur Hexafluoride (metric tons CO₂e) | | | | | |
| | | | (Column 5) | | |
| A3 | Other Indirect | B1, I4 | B1, Part C.1 (Column 5) | | |
| B | Changes in Absolute Emissions | | | | |
| B1 | Direct | B2, H2 | B2, Part C.1 (Column 5) | | |
| B2 | Indirect From Purchased Energy | B2, H3 | B2, Part C.1 (Column 5) | | |
| B3 | Other Indirect | B2, H4 | B2, Part C.1 (Column 5) | | |
| C | Changes in Carbon Storage | B3, H3 | B3, Part B.1 (Column 4 of Total row) | | |
| D | Changes in Avoided Emissions | B4, H6 | B4, Part C.1 (Column 4 of Total row) | | |
| E | Energy Generation and Distribution | B5, K6 | B5, Part C.1 (Column 4 of Total row) | | |
| F | Coal Mine Methane Recovery | B6, CC5 | B6, Part D.1 (Column 4 of Total row) | | |
| G | Landfill Methane Recovery | B7, DD5 | B7, Part D.1 (Column 4 of Total row) | | |
| H | Geologic Sequestration | B8, I3 | B8, Part D.1 (Column 4 of Total row) | | |
| I | Transmission and Distribution Improvements | B9, R3 | B9, Part D.1 (Column 4 of Total row) | | |
| J | Capture of Methane From Anaerobic Digestion at Wastewater Treatment Facilities | B10, HH6 | B10, Part D.1 (Column 4 of Total row) | | |
| K | Anaerobic Digestion of Animal Waste | B11, E3 | B11, Part D.1 (Column 4 of Total row) | | |
| L | Recycling of Fly Ash | B12, J3 | B12, Part D.1 (Column 4 of Total row) | | |
| M | Demand-Side Management or Other Emission Reduction Programs | B13, Part B.1, (Column 5 of Total row) | B13, Part C.1 (Column 4 of Total row) | | |
| N | Combined Heat and Power | B14, OO3 | B14, Part C.1 (Column 4 of Total row) | | |
| O | Other Action-Specific Methods | | | | |
| O1 | Direct | B15, N3 | B15, Part C.1 (Column 5) | | |

| Item | 1 Method/Source | 2 Gross Reported Reductions | 3 Emission Reductions | | 4 Net Reported Reductions (Subtract Column 3 from Column 2) |
|---|--|--|--|--|---|
| | | | Reported Reductions Distributed to Other Reporters | | |
| Carbon Dioxide, Methane, Nitrous Oxide, Perfluorocarbons, Hydrofluorocarbons, and Sulfur Hexafluoride (metric tons CO ₂ e) | | | | | |
| O2 | Indirect From Purchased Energy | B15, N4 | B15, Part C.1 (Column 5) | | |
| O3 | Other Indirect | B15, N5 | B15, Part C.1 (Column 5) | | |
| P | Subtotal (Sum rows A1 through O) | | | | |
| Q | Offsets | | | | |
| Q1 | Offsets Obtained From Other Reporters | -Total from Schedule I, Section 3, Part A, Column 6* | | | |
| Q2 | Offsets Obtained From Non-reporters | Total from Schedule I, Section 3, Part B, Column 6* | | | |
| R | Subtotal (Sum rows P through Q2) | | | | |
| S | Reduction Deficits Carried Over From Last Year's Report | | | | |
| T | TOTAL (Add row R to row S) | | | | |
| U | Emission Reductions Also Registered as Emission Intensity Reductions | | | | |
| Chlorofluorocarbons (CFCs) (Kilograms of native gas) <i>Attach additional copies of Part C if reporting but not registering reductions in domestic emissions of more than one CFC.</i> | | | | | |
| V | Destruction of CFCs. Specify CFC: _____ | B16, B.1 (Column 3 of each row) | B16, C.1 (Column 4 of each row) | | |
| W | Reduction Deficit for this CFC Carried Over From Last Year's Report | | | | |
| X | TOTAL (Add row V to row W) | | | | |

*Include total of reported domestic offsets in Part A and total of reported foreign offsets in Part B.

Instructions for Schedule IV, Verification and Certification

Section 1. Independent Verification

If your report has been independently verified, you must still provide the certification outlined in section 2, below.

If your report has been independently verified by a qualified verifier in accord with §300.11 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting, that verifier must complete Schedule IV, Section 1. Otherwise, skip to Section 2 of Schedule IV, Reporter Self Certification.

1. Enter the Name of Entity Report Independently Verified

Enter the name of the entity report for which you have provided independent verification. This name should be unique and match the name submitted on Schedule I, Section 1, Question 1.

2. Describe the Identity of Independent Verifier

Provide the legal name and complete address of the verifying company or individual. Provide the name and contact information of a person employed by the company that can answer questions about the verification of this Form EIA-1605 submission.

3. Define the Independent Verifier Qualifications

a. Corporate Accreditation(s)

Indicate accreditations held by your company by checking all boxes that apply. If the company is not accredited by any organization listed but is accredited by another nationally recognized certification program, check "Other," and describe the unlisted organization providing accreditation.

b. Independent Verifier Personnel Accreditation(s)

Provide the names of the lead verifier and other personnel on the verification team. For each of the personnel, provide their title, any relevant degrees, and any professional accreditations (e.g., professional engineer, certified public accountant) they may hold. Please also indicate whether each listed member of the verification team meets the requirements of §300.11(b) of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting. This section requires that all members of the verification team:

- 1) have education, training, and/or professional experience that matches the tasks they perform;
- 2) are familiar with the requirements of §300.11(b) of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting;
- 3) are familiar with the subject matter covered in the verification;
- 4) have knowledge of greenhouse gas emission and emission reduction quantification;
- 5) have knowledge of data and information auditing sampling methods; and
- 6) are familiar with risk assessment methodologies and materiality analysis procedures outlined by other domestic and international standards.

In addition to these qualifications, the lead verifier should also:

- 1) be accredited by one or more nationally recognized accreditation programs; and
- 2) have experience managing an auditing or verification process, including recruitment and allocation of a verification team.

c. Independent Verification Approach

Indicate the activities included in the independent verification of this report by checking all of the boxes that apply.

4. Include the Certification of Independent Verification

Indicate the name of the entity for which you have performed an independent verification and the data period that your verification covered. The form must then be signed and dated by the lead certifier of the verification team and a corporate officer of your company, if one exists, certifying that each of the listed eight conditions have been achieved.

Section 2. Reporter Self Certification

As noted in §300.10 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting, all reports submitted to EIA on Form EIA-1605 must be certified by the Chief Executive Officer, Agency Head, or an officer or employee of the entity who is responsible for reporting the entity's compliance with environmental regulations. If the report has been submitted on behalf of a household, any adult member of the household may certify the report.

1. Certification

Provide the name, title and contact information of the person certifying your report. If *reporting but not registering* reductions, this person must certify by signing and dating the form that, to the best of the person's knowledge and belief, the information submitted on the form meets the first three requirements listed in this section. If *registering* reductions, signing and dating the form indicates that the first three requirements have been met and the subsequently listed five requirements have also been met.

Instructions for Addendum A, Inventory of Foreign or Subentity Emissions

Part A. Aggregated Emissions by Gas (for Independently Verified Reports Only)

Use the instructions for Schedule I, Section 2, Part A to complete Addendum A, Part A. Note that you must complete only one summary table for aggregate emissions; enter either entity-wide foreign emissions or subentity emissions as appropriate. Only complete the “Weighted Rating” column if this copy of Addendum A is being completed for entity-wide foreign operations.

Part B. Inventory of Emissions and Carbon Flux

Use the instructions for Schedule I, Section 2, Part B to complete Addendum A, Part B. If you are using Addendum A to report for a subentity, ignore the instructions for providing rating information. Only complete the “Weighted Rating” column if this copy of Addendum A is being completed for entity-wide foreign operations.

Part C. Total Subentity Emissions and Carbon Flux

Use the instructions for Schedule I, Section 2, Part D to complete Addendum A, Part C.

Instructions for Addendum B, Emission Reduction Methods

B1. Changes in Emissions Intensity

Complete Addendum B1 if you intend to calculate reductions using the emissions intensity approach for your entity or subentity. If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Output

- 1. Enter the Physical, Economic, or Indexed Output Measure for the Base Period and Reporting Year.** Enter information for the specific output measure you have selected under the appropriate Item(s) for PHYSICAL (Item A), ECONOMIC (Item B and C), or INDEXED measure (Item D). Enter Base Period output data in Columns 4 through 8 and Reporting Year output in Column 9. Note that you are to enter data for only one output measure type (PHYSICAL, ECONOMIC, or INDEXED), completing either Item A, Items B and C, or Item D.
 - a. If a PHYSICAL measure is selected, enter a brief description under output measure (Item A, Column 1) and indicate the unit of measure in Item A, Column 2. For example, a cement manufacturer might enter “quantity of clinker” under output measure and “metric tons” under unit of measure.
 - b. If an ECONOMIC measure is selected, enter a brief description under output measure (Items B and C, Column 1). Provide the output measure in current dollar value(s) under Item B. Calculate the constant dollar value(s) (in \$2000) by multiplying the current value by the GDP price deflators found in Appendix K and enter under Item C.
 - c. If an INDEXED measure is selected, enter a brief description of the basis of the INDEXED measure under output measure (Item D, Column 1). For example, a steel manufacturer could enter tons of steel or dollar sales of steel. In Item D, Column 2, denote if the index is based on a physical or economic measure.
 - d. If reporting Base Period data, enter the value(s) for the PHYSICAL, ECONOMIC, or INDEXED measure under each of the years in the Base Period columns. If you have a single year in your Base Period, enter the output value for this year under Year 1 (Column 3). If you have multiple years in your Base Period, enter the output value for the first year under Year 1 (Column 3), the output value for the second year under Year 2 (Column 4), and so on. See Section 2.3.1 of the Technical Guidelines for a discussion of selecting the Base Period.
 - e. If submitting Base Period data, calculate a simple average for the Base Period by summing the output values reported under Year 1 through Year 4 (Columns 3-6) and dividing this total by the number of years in the Base Period. Enter the result under average (Column 7). Note that if using INDEXED output measures, the Base Period average (Item D, Column 7) index number should be set equal to 100.
 - f. If submitting Reporting Year data, enter the value for the PHYSICAL, ECONOMIC, or INDEXED measure under the Reporting Year column.
- 2. If Providing an Output Measure Not Described in the Technical Guidelines, Indicate Reason Why Alternative Measure Was Selected.** If the output measure you are using is not listed in Tables 2.1 and 2.2 of the Technical Guidelines (also see Appendix L of these instructions), check the box(es) to indicate why you selected an alternate measure.

- 3. Define and Describe the Output Measure Used and Provide a Rationale for Why the Measure Was Selected.** If your output measure is not included in Tables 2.1 and 2.2 of the Technical Guidelines (also see Appendix L of these instructions), explain briefly why the selected output measure is a good indicator of changes in emissions.

Part B. Emissions, Emissions Intensity, Emission Reductions

- 1. Enter Base Period and Reporting Year Emissions.** Enter Base Period emissions data under Item E and Reporting Year data under Item F in metric tons CO₂e as recorded in your entity or subentity emissions inventory (for an entity Schedule I, Section 2, Part D; for a subentity Addendum A, Part C as attached in Schedule II, Section 2). Enter the total quantity of direct emissions in Column 2 as entered in Part D, Item A of your entity emissions inventory or Part C, Item A of your subentity emissions inventory. Be sure direct emissions include any CO₂ captured and sequestered in geologic reservoirs (onsite and offsite). Enter indirect emissions from purchased energy in Column 3 as recorded in Part D, Item C (indirect emissions from purchased energy for calculation of emission reductions) of your entity emissions inventory or Part C, Item C of your subentity emissions inventory. Enter other indirect emissions in Column 4 as recorded in Part D, Item H of your entity emissions inventory or Part C, Item H of your subentity emissions inventory.
- 2. Calculate and Enter Base Period and Reporting Year Intensity.** Calculate Base Period emissions intensity for direct emissions, indirect emissions from purchased power, and other indirect emissions by dividing the appropriate emissions value (for Direct, Indirect Emissions from Purchased Power, and Other Indirect) under Item E (Part B, Question 1) by the corresponding PHYSICAL, ECONOMIC, or INDEXED Output Measure recorded under Items A, C, or D (Part A, Question 1). Enter the result under Item G in Column 2 for Direct Emissions, Column 3 for Indirect Emissions from Purchased Energy, and Column 4 for Other Indirect Emissions. Likewise, calculate and enter Reporting Year Emissions Intensity under Item H.
- 3. Calculate and Enter Emission Reductions.** Calculate emission reductions for direct emissions, indirect emissions from purchased energy, and other indirect emissions by subtracting the corresponding Reporting Year intensity (Item H) from the Base Period intensity (Item G) and multiplying the result by the Reporting Year Output Measure (Item A8, C8, or D8 in Part A, Question 1). Enter the results of these calculations under Item I in the appropriate column: Column 2 for direct emissions, Column 3 for indirect emissions from purchased energy, and Column 4 for other indirect emissions. Note that other indirect emission reductions cannot be included in your report as registered reductions.
- 4. Identify Types of Actions That Were the Likely Causes of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 5. Describe Actions That Were the Likely Cause of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 6. Identify the Cause(s) of the Emission Reduction(s).** Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check "Government requirement" and "Local requirement."

- 7. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part C. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part C if you have distributed the reductions reported by the entity or subentity in Part B, Question 3 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the Name of Recipient receiving the reduction in Column 1, enter the emission type distributed (direct, indirect from purchased energy, and other indirect) in Column 2, enter the units in which the reduction is denominated (metric tons) in Column 4, and enter the amount of the reduction in Column 5. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 3. Sum the total direct, indirect, or other indirect reductions and enter these amounts in the specified Total row.

B2. Changes in Absolute Emissions

Complete Addendum B2 if you intend to calculate reductions using the changes in absolute emissions approach for your entity or subentity. Note that to *register* reductions using this emission reduction method, your Reporting Year Output must be equal to or greater than your Base Period Average Output. If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Output

- 1. Enter the Physical, Economic, or Indexed Output Measure for Base Period and Reporting Year.** Enter information for the specific output measure you have selected under the appropriate Item(s) for PHYSICAL (Item A), ECONOMIC (Item B and C), or INDEXED measure (Item D). Enter Base Period output data in Columns 3-7 and Reporting Year output in Column 8. Note that you are to enter data for only one output measure type (PHYSICAL, ECONOMIC, or INDEXED), completing either Item A, Items B and C, or Item D.
 - a. If a PHYSICAL measure is selected, enter a brief description under output measure (Item A, Column 1) and indicate the unit of measure in Item A, Column 2. For example, a cement manufacturer would enter “quantity of cement” under output measure (Column 1) and “metric tons” under unit of measure (Column 2).
 - b. If an ECONOMIC measure is selected, enter a brief description under output measure (Items B and C, Column 1). Provide the output measure in current dollar value(s) under Item B. Calculate the constant dollar value(s) (in \$2000) by multiplying the current value by the GDP price deflators found in Appendix K and enter under Item C.
 - c. If an INDEXED measure is selected, enter a brief description of the basis of the INDEXED measure under output measure (Item D, Column 1). For example, a steel manufacturer could enter tons of steel or dollar sales of steel. In Item D, Column 2 denote if the index is based on a physical or economic measure.
 - d. If reporting Base Period data, enter the value(s) for the PHYSICAL, ECONOMIC, or INDEXED measure under each of the years in the Base Period columns. If you have a single year in your Base Period, enter the output value for this year under Year 1 (Column 3). If you have multiple years in your Base Period, enter the output value for the first year under Year 1 (Column 3), the output value for the second year under Year 2 (Column 4), and so on. See Section 2.3.1 of the Technical Guidelines for a discussion of selecting the Base Period.
 - e. If reporting Base Period data, calculate a simple average for the Base Period by summing the output values reported under Year 1 through Year 4 (Columns 3 through 6) and dividing this total by the number of years in the Base Period. Enter the result under average (Column 7). Note that if using INDEXED output measures, the Base Period average (Item D, Column 7) index number should be set equal to 100.
 - f. If reporting Reporting Year data, enter the value for the PHYSICAL, ECONOMIC, or INDEXED measure under the Reporting Year column.
- 2. Is the Reporting Year Output Equal To or Greater Than the Base Period Average Output?** Check “Yes” or “No.” If No, you may *report but not register* reductions on this addendum. Go to Question 4.
- 3. Do You Intend To Register Absolute Emission Reductions for the Entity or Subentity?** Check “Yes” or “No.” If Yes, go to Question 5. If No, go to Question 4.

- 4. In Addition To Reporting but Not Registering Reductions on Addendum B2, Do You Also Intend To Register Reductions on Addendum B1 for this Entity or Subentity (Changes in Emissions Intensity)?** Check “Yes” or “No.”
- 5. If Providing an Output Measure Not Described in the Technical Guidelines, Indicate Reason Why Alternative Measure Was Selected.** If the output measure is not described in the Technical Guidelines (see Table 2.2 of the Technical Guidelines), use the check boxes to indicate the reason for selecting an alternate output measure.
- 6. Define and Describe the Output Measure Used and Provide a Rationale for Why This Measure Was Selected.** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part B. Emissions and Emission Reductions

- 1. Enter Emissions and Calculate Emission Reductions.** Enter Base Period emissions data under Item E and Reporting Year data under Item F in metric tons CO₂e as recorded in your entity or subentity emissions inventory (for an entity Schedule I, Section 2, Part D; for a subentity Addendum A, Part C as attached in Schedule II, Section 2). Enter the total quantity of direct emissions in Column 2 as entered in Part C, Item A of your entity or subentity emission inventory. Be sure the direct emissions include any CO₂ captured and sequestered in geologic reservoirs (onsite and offsite). Enter indirect emissions from purchased energy in Column 3 as recorded in Part D, Item C (Indirect Emissions from Purchased Energy for Calculation of Emission Reductions) of your entity emissions inventory or Part C, Item C of your subentity emissions inventory. Enter other indirect emissions in Column 4 as recorded in Part D, Item H of your entity emissions inventory or Part C, Item H of your subentity emissions inventory. Calculate direct, indirect from purchased energy and other indirect emission reductions by subtracting the Reporting Year emissions (as entered in Item F) from the Base Year emissions (as entered in Item E). Enter the result in either Item G if you intend to *register* the emission reductions or Item H if you intend to *report but not register* the emission reductions.
- 2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were a likely cause of the reductions in the boxes provided.
- 3. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 4. Identify the Cause(s) of the Emission Reduction(s).** Check the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement” and “Local requirement.”
- 5. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part C. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part C if you have distributed the reductions reported by the entity or subentity in Part B, Question 1 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the Name of Recipient receiving the reduction in Column 1, enter the Emission Type distributed (Direct, Indirect from Purchased Energy, and Other Indirect) in Column 2, enter the Units in which the reduction is denominated (metric tons) in Column 4, and enter the quantity of the reduction in Column 5. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed under Gas in Column 3. Sum the total direct, indirect, or other indirect reductions and enter these amounts in the specified Total rows.

B3. Changes in Carbon Storage

Complete Addendum B3 if you have changes in carbon storage from Schedule I, Section 2, Part B, Question 4 or from Addendum A, Part B, Question 4, as attached to Schedule II, Section 2. If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Terrestrial Carbon Flux

- 1. Enter Reporting Year Inventory of Terrestrial Carbon Flux.** If you are reporting for an entity, enter values for Reporting Year Carbon Stock Change or Carbon Flux from Schedule I, Section 2, Part B, Question 4h. If you are reporting for a subentity, enter values for Reporting Year Carbon Stock Change or Carbon Flux from Addendum A, Part B, Question 4h, as attached to Schedule II, Section 2.
- 2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 3. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 4. Identify the Cause(s) of the Emission Reduction(s).** Check the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State, and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check Government Requirement and Local Requirement.
- 5. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part B. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part B if you have distributed the reductions reported to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the entity receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and the amount of the reduction in Column 4.

B4. Changes in Avoided Emissions

Complete Addendum B4 if you intend to calculate reductions resulting from the sale of energy products using the changes in avoided emissions method for your entity or subentity. If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Generated Energy Source and Characteristics

- 1. Did the Entity or Subentity Emit Greenhouse Gases in the Base Period (including any capacity acquired since the Base Period)?** Check “Yes” if your entity or subentity emitted greenhouse gases in the Base Period. If you have checked “Yes,” you must estimate reductions using Addendum B5, Emission Reductions from Energy Generation and Distribution and readjust your Base Period to include any emission sources associated with energy generation capacity acquired since the Base Period. Check “No” if your entity or subentity emitted no emissions in the Base Period and proceed to Question 2.
- 2. Has the Entity or Subentity Acquired or Divested Generation Capacity Since the Base Period?** If your entity or subentity has acquired or divested energy generation capacity since the Base Period, check “Yes” and proceed to Question 3. Check “No” if energy generating capacity has not been acquired during the Base Period and proceed to Question 4.
- 3. Was the Acquired or Divested Capacity Operational During the Base Period for the Entity or Subentity?** Check “Yes” if the added energy generation capacity was operational during the Base Period. (You must adjust the Base Period Energy Sold to reflect this added capacity.) Check “No” if the added capacity was not operational during the Base Period.
- 4. Identify Energy Product Type Sold.** Identify the energy product sold by checking the appropriate box for “Electricity,” “Steam,” “Hot water,” or “Chilled water.”

Part B. Energy Generation, Emissions, and Emission Reductions

- 1. Enter Activity Data, Emission Coefficients, Conversion Factors, and Emission Reductions.** For each energy product sold (Columns 2-5), calculate and enter the following activity data, emission coefficients, conversion factors, and emission reductions in the data table provided:
 - Item A. Base Period Energy Sold.** Enter the quantities of electricity (Column 2), steam (Column 3), hot water (Column 4), and chilled water (Column 5) sold in the Base Period using the indicated units of measure.
 - Item B. Reporting Year Total Emissions.** In metric tons CO₂e, enter the quantity of total emissions associated with producing each energy product sold in the Reporting Year. Enter the total in Column 6.
 - Item C. Reporting Year Energy Generated.** Enter the quantities of electricity (Column 2), steam (Column 3), hot water (Column 4), and chilled water (Column 5) generated in the reporting year using the indicated units of measure.
 - Item D. Reporting Year Emissions Intensity.** Calculate the reporting year emissions intensity for each energy product by dividing Item B by Item C using the indicated units of measure.

- **Item E. Reporting Year Energy Sold.** Enter the quantities of electricity (Column 2), steam (Column 3), hot water (Column 4), and chilled water (Column 5) sold in the Reporting Year using the indicated units of measure.
 - **Item F. Reporting Year Incremental Energy Sold.** Calculate the incremental energy sold in the Reporting Year for each energy product by subtracting Item A from Item E.
 - **Item G. Avoided Emissions Intensity Benchmark.** Select the appropriate Avoided Emissions Benchmark for the energy product sold from Appendix F for electricity and Appendix N for steam and hot and chilled water. Enter the values for electricity (Column 2), steam (Column 3), hot water (Column 4), and chilled water (Column 5).
 - **Item H. Emission Reduction.** Calculate the emission reduction for each energy product by subtracting the Reporting Year emissions intensity (Item D) from the avoided emissions intensity benchmark (Item G) and multiply the result times the Reporting Year incremental energy sold (Item F). Calculate the total emission reduction by summing the emission reduction values in Columns 2 through 5 and enter the result in the total column (Column 6).
2. **Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reduction in the boxes provided.
 3. **Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
 4. **Identify the Cause(s) of the Emission Reduction(s).** Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement” and “Local requirement.”
 5. **Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part C. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part C if you have distributed the reductions reported by the entity or subentity in Part B, Question 1 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

1. **Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons or kilograms) in Column 3, and the quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B5. Energy Generation and Distribution

Complete Addendum B5 if you intend to calculate reductions resulting from the generation and sale of energy products by your entity or subentity. You must use this method to estimate reductions rather than the change in avoided emissions method if your entity or subentity emitted greenhouse gases in the Base Period.

If you are registering reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Energy Generation and Emissions

1. **Energy Product Type Exported.** Identify the energy product sold by your entity or subentity by checking the appropriate box for “Electricity,” “Steam,” “Hot water,” or “Chilled water.”
2. **Emissions, Energy Generation, and Emissions Intensity.** Calculate and enter the following emissions, energy generation, and emissions intensity data for each energy product sold in the table provided. Enter values for electricity in Column 2, steam in Column 3, hot water in Column 4, and chilled water in Column 5.
 - **Item A. Base Period Emissions.** In metric tons CO₂e, enter the quantity of emissions associated with producing each energy product sold in the Base Period. If you are using a multi-year Base Period, enter Base Period Average emissions.
 - **Item B. Base Period Exported Energy.** Enter the quantity of energy exported in the Base Period for each energy product sold (Columns 2-5) using the indicated units of measure. If you are using a multi-year Base Period, enter Base Period Average energy exported.
 - **Item C. Base Period Emissions Intensity.** Calculate the Base Period emissions intensity by dividing Item A by Item B.
 - **Item D. Reporting Year Emissions.** In metric tons CO₂e, enter the quantity of total emissions associated with producing each energy product sold in the Reporting Year.
 - **Item E. Reporting Year Exported Energy.** Enter the quantity of energy exported in the Reporting Year for each energy product sold (Columns 2-5) using the indicated units of measure.
 - **Item F. Reporting Year Emissions Intensity.** Calculate the Reporting Year emissions intensity by dividing Item D by Item E
 - **Item G. Reporting Year Incremental Exported Energy.** Calculate the incremental energy exported for each energy product by subtracting Item B from Item E using the indicated units of measure.
 - **Item H. Avoided Emissions Benchmark.** Select the appropriate Avoided Emissions Benchmark for the energy product sold from Appendix F for electricity and Appendix N for steam and hot and chilled water using the indicated units of measure.

Part B. Emission Reductions

- 1. Calculate and Enter Emission Reductions.** Calculate the following emission reductions and enter the results in metric tons CO₂e in the data table provided:
 - **Item I. Emission Reduction From Improvements in Historical Emissions Intensity.** Subtract Reporting Year emissions intensity (Item F) from Base Period emissions intensity (Item C) and multiply the result by the Base Period exported energy (Item B). Enter the result of this calculation for each energy product sold in Columns 2 through 5.
 - **Item J. Emission Reduction From Incremental Exported Energy.** Subtract Reporting Year emissions intensity (Item F) from the Avoided Emissions Benchmark (Item H) and multiply the result by the Reporting Year incremental exported energy (Item G). Enter the result of this calculation for each energy product sold in Columns 2 through 5.
 - **Item K. Total Emission Reductions From Energy Generation and Exports.** Sum the emission reduction from improvements in historical emissions intensity (Item I) and the emission reduction from incremental changes in generation (Item J) and enter the result for each energy product sold in Columns 2 through 5. Calculate the total emission reduction for all energy products by summing the values in Columns 2 through 5 and enter the total in Column 6.
- 2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reduction in the boxes provided.
- 3. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 4. Identify the Cause(s) of the Emission Reduction(s).** Check the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement” and “Local requirement.”
- 5. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part C. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part C if you have distributed the reductions reported by the entity or subentity in Part B, Question 1 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and enter the quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 3.

B6. Coal Mine Methane Recovery

Complete Addendum B6 if you are applying the action-specific method for calculating emission reductions from coal mine methane recovery as described in 2.4.5.6.1 of the Technical Guidelines pursuant to § 300.8(h)(5) of 10 CFR Part 300 Guidelines for Voluntary Greenhouse Gas Reporting.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Enter Location of Coal Mine(s).** Enter the name and location of each coal mine where methane is recovered.
- 2. Enter Date Methane Recovery Began.** Enter the month and year that methane recovery began. This is the earliest date when a mine listed in Part A, Question 1 began recovering methane.
- 3. Describe Action.** Describe the action taken in the space provided, explaining its basic nature and general characteristics, and the manner in which it reduced emissions. Include all information important to understanding the action and its effects on emissions, as well as any special conditions necessary to replicate its achievements.
- 4. Was the Action Reported Last Year.** Indicate “Yes” if you included this action (for any of the mines listed in Part A, Question 1) on last year’s Form EIA-1605 report. If you did not include the action(s) in last year’s report, or you did not file a Form EIA-1605 report last year, indicate “No.”

Part B. Action Quantification

- 1. Enter Action Characteristics.** For each coal mine reported in Part A, Question 1, enter the seam affected, and the month and year that seam was cut through. If multiple seams have been cut through at a single mine, complete one line of the table for each seam affected.
- 2. Enter Volume of Gas Captured by Source and Disposition.** There are three potential sources of methane from coal mines: 1) ventilation systems; 2) pre-mining degasification; and 3) other degasification methods. There are five potential methods for the disposition of gas captured from each of these sources, which are described below. For each source and disposition method, indicate the volume captured in each year of your Base Period (Columns 2-5) and the volume captured in the Reporting Year (Column 7), each expressed in thousand standard cubic feet (Mscf). Calculate and enter the average volume of gas captured from the affected mines over the Base Period (Column 6). In the bottom row, sum the total volume of gas captured in each year of your Base Period and the Reporting Year. Calculate and enter the average total volume of gas captured from the affected mines over the Base Period.

The methods for disposition of gas recovered from coal mines include:

Flared: Gas is combusted in a flare onsite for the purpose of disposal.

Electricity Generation Used Onsite: Gas is combusted onsite in an internal combustion engine, gas turbine, or other device to generate electricity and the electricity is used onsite.

Electricity Generation Sold to Grid: Gas is combusted onsite in an internal combustion engine, gas turbine, or other device to generate electricity and the electricity is sold offsite to an electric utility or end-use electricity consumer.

Injected Into Pipeline/Sale to Supply Network: Captured gas is injected into a pipeline for sale offsite to either an end-use consumer or a natural gas transmission and distribution company.

Direct Use Onsite: Captured gas is combusted onsite to meet onsite non-electric energy demand.

3. **Enter Average Heat Content of Gas Captured.** For each volume of gas entered in Part B, Question 2 for the Base Period and Reporting Year, enter the average heat content, expressed as British thermal units per standard cubic feet (Btu/scf) (Columns 2-5 and 7). Calculate and enter in units of Btu/scf the average heat content for gas captured over the Base Period for each source and disposition (Column 6).
4. **Enter Total Energy Content of Gas Captured and Combusted.** Multiply the volume of gas captured for each method of disposition (as reported in Part B, Question 2, above) by the average heat content of the gas captured (as reported in Part B, Question 3, above) by each method of disposition and then divide that figure by 1,000 to calculate the total Btu captured, expressed as million British thermal units (MMBtu), for each method of disposition. Enter the product of this calculation for each year of the Base Period (Columns 2-5) and for the Reporting Year (Column 7). Enter the average total Btu captured for the Base Period for each method of disposition (Column 6). In the bottom row, provide the sum of Btu captured for all methods of disposition for each year of the Base Period and for the Reporting Year. Calculate and enter the average total Btu captured for the Base Period.
5. **Enter Mass of Methane Captured.** Enter the total mass of methane captured, expressed in metric tons CO₂e for each year of your Base Period (Columns 2-5) and for the Reporting Year (Column 7). Enter the average mass of methane captured over the Base Period (Column 6). To calculate the mass of methane captured, use the following steps:
 - a. Divide the total energy content of gas captured (as reported in Part B, Question 4, above) by 1,005 Btu (the standard heat content of pure methane) and multiply this figure by 1,000,000. This will yield the volume of methane flared in standard cubic feet (scf).
 - b. Divide this figure by 1,000 to put it into Mscf (thousand standard cubic feet).
 - c. Multiply the volume of methane captured by the density of methane (42.28 pounds per Mscf). This will provide the total weight of methane captured expressed as pounds.
 - d. Divide total pounds methane by 2204.62 to derive metric tons methane.
 - e. Convert metric tons methane to metric tons CO₂e by multiplying by 23 (the global warming potential of methane).

Part C. Emission Reductions

1. Calculate Changes in Methane Capture.

- **Item A.** Enter the average total mass of methane captured in the Base Period in metric tons CO₂e from Part B, Question 5, Column 6, above.
- **Item B.** Enter the total mass of methane captured in the Reporting Year in metric tons CO₂e from Part B, Question 5, Column 7, above.

- **Item C.** Enter the difference yielded by subtracting the average mass of methane captured in the Base Period from the total mass of methane captured in the Reporting Year (B – A).
- 2. Calculate Changes in Disposition of Electricity Generation From Captured Methane.** Enter information on electricity use onsite and electricity sold offsite under Items D and E, respectively. For each potential disposition, enter in Columns 2 through 5 the amount of electricity generated, in units of megawatt-hours (MWh), for each year of your Base Period. In Column 7 enter the amount of electricity generated (MWh) in the Reporting Year. In Column 6, calculate and enter the average amount of electricity generated from the captured gas over the Base Period. Calculate and enter total generation under Item F. For Columns 2 through 5 and 7, sum the total electricity generated in each year of your Base Period and the Reporting Year, respectively. In Column 6, calculate and enter the average total generation from the captured gas over the Base Period.
- 3. Calculate Carbon Dioxide Displaced From Electricity Used Onsite (avoided emissions).**
- **Item G.** Enter the average MWh of electricity used onsite for your Base Period from Part C, Question 2, Item D, Column 6, above.
 - **Item H.** Enter the total MWh of electricity used onsite for your Reporting Year from Part C, Question 2, Item D, Column 7, above.
 - **Item I.** Calculate and enter the Reporting Year incremental electricity used onsite by subtracting the average MWh of electricity used onsite in your Base Period (Item G) from the total MWh used onsite in the Reporting Year (Item H). If the incremental amount is negative, no reductions were generated in your Reporting Year from electricity used onsite; therefore, you may skip to Part C, Question 4.
 - **Item J.** Enter the total emissions (metric tons CO₂e) from electricity used onsite during the Reporting Year.
 - **Item K.** Calculate and enter the emissions intensity of electricity used onsite during the Reporting Year by dividing Item J (metric tons CO₂e) by Item H (MWh).
 - **Item L.** Enter the applicable Avoided Emissions Benchmark for electricity, which must be less than or equal to 0.9 metric tons CO₂e/MWh as described in 2.4.4.2.1 of the Technical Guidelines.
 - **Item M.** Calculate your Emission Reductions (metric tons CO₂e) by subtracting Item K from Item L, and multiplying the result by Item I.
- 4. Calculate Carbon Dioxide Displaced From Electricity Sales (avoided emissions).**
- **Item N.** Enter the average electricity sales during your Base Period (MWh) from Part C, Question 2, Item E, Column 6.
 - **Item O.** Enter the electricity sales during your Reporting Year (MWh) from Part C, Question 2, Item E, Column 7.
 - **Item P.** Calculate and enter the incremental amount of electricity (MWh) sold in the Reporting Year by subtracting the average MWh of electricity sold in your Base Period (Item N) from the

total MWh sold in the Reporting Year (Item O). If the incremental amount is negative, and no reductions were generated in your Reporting Year from electricity sales, you may skip to Part C, Question 5.

- **Item Q.** Enter the total emissions (metric tons CO₂e) from electricity sold during the Reporting Year.
- **Item R.** Calculate and enter the emissions intensity of electricity sold during the Reporting Year by dividing Item Q (metric tons CO₂e) by Item O (MWh).
- **Item S.** Enter the applicable Avoided Emissions Benchmark for electricity, which must be less than or equal to 0.9 metric tons CO₂e/MWh as described in 2.4.4.2.1 of the Technical Guidelines.
- **Item T.** Calculate your emission reductions (metric tons CO₂e) by subtracting Item R from Item S, and multiplying the result by Item P.

5. Calculate Changes in Carbon Dioxide Emissions From Flaring.

- **Item U.** Enter Base Period average methane flared (MMBtu) from Part B, Question 4, Column 6.
- **Item V.** Enter Reporting Year quantity of methane flared (MMBtu) from Part B, Question 4, Column 7.
- **Item W.** Calculate and enter the change in methane flared (MMBtu) by subtracting Item U from Item V.
- **Item X.** Calculate the change in carbon dioxide emissions from flaring by converting methane to metric tons CO₂e using the following steps:
 - a. Divide the heat content (as reported in Item W, above) by 1,005 Btu (the standard heat content of pure methane) and multiply this figure by 1,000,000. This will yield the volume of methane flared in standard cubic feet.
 - b. Divide this figure by 1,000 to put it into Mscf (thousand standard cubic feet)
 - c. Multiply the volume of methane captured by the density of methane (42.28 pounds per Mscf). This will provide the total weight of methane captured expressed as pounds.
 - d. Divide total pounds methane by 2204.62 to derive metric tons methane.
 - e. Convert metric tons methane to metric tons carbon dioxide equivalent by multiplying by 23 (the global warming potential of methane).

6. Summarize Emission Reductions.

- **Item Y.** In the Direct and TOTAL Columns, enter the increase in methane captured value (metric tons CO₂e) from Item C.
- **Item Z.** In the Avoided and TOTAL Columns, enter the carbon dioxide displaced from electricity used onsite value (metric tons CO₂e) from Item M.
- **Item AA.** In the Avoided and TOTAL Columns, enter the carbon dioxide displaced from electricity sales value (metric tons CO₂e) from Item T.

- **Item BB.** In the Direct and TOTAL Columns, enter the change in carbon dioxide emissions from flaring (metric tons CO₂e) from Item X.
 - **Item CC.** Calculate and enter the net change in greenhouse gas emissions. In the Direct Column, subtract Item BB from Item Y. In the Avoided Column, add Item Z and Item AA. In the TOTAL Column, add Items Y, Z, and AA, and subtract Item BB from the sum. The resulting value in the TOTAL Column should equal the sum of the values in the Direct and Avoided Columns.
- 7. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 8. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 9. Identify Cause(s) of the Emission Reduction(s).** Check the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement” and “Local requirement.”
- 10. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part D. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part D if you have distributed the reductions reported by the entity or subentity in Part C, Question 6 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and the quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B7. Landfill Methane Recovery

Complete Addendum B7 if you are using the action-specific method for calculating emission reductions from landfill methane recovery as described in 2.4.5.6.2 of the Technical Guidelines pursuant to §300.8(h)(5) of 10 CFR Part 300 Guidelines for Voluntary Greenhouse Gas Reporting.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Enter Location of Landfill(s).** Enter the name and location of each landfill where methane recovery occurred.
- 2. Enter Date Methane Recovery Began.** Enter the month and year the methane recovery was initiated. This is the earliest date when a landfill listed in Part A, Question 1 began capturing methane.
- 3. Describe Action.** Describe the action taken in the space provided, explaining its basic nature, general characteristics, and the manner in which it reduced emissions. Include all information important to understanding the action and its effects on emissions, as well as any special conditions necessary to replicate its achievements.
- 4. Was the Action Reported Last Year.** Indicate “Yes” if you included this action (for any of the landfills listed in Part A, Question 1) on last year’s Form EIA-1605 report. If you did not include the action(s) in last year’s report, or you did not file a Form EIA-1605 report last year, indicate “No.”

Part B. Action Quantification

- 1. Enter Action Characteristics.** For each landfill reported in Part A, Question 1, enter the year the landfill opened and the year the landfill was closed, if it has closed. Also enter the year a gas recovery system was put into place and an estimate of waste in place in the landfill at the end of the Reporting Year in million metric tons of waste.
- 2. Enter Volume of Gas Captured and Disposition.** There are six potential methods for the disposition of captured gas, which are described below. For each method, indicate the volume captured in each year of your Base Period (Columns 2-5) and the volume captured in the Reporting Year (Column 7), each expressed in thousand standard cubic feet (Mscf). Calculate and enter the average volume of gas captured from the affected facilities over the Base Period (Column 6). In the bottom row, sum the total volume of gas captured in each year of your Base Period and the Reporting Year. Calculate and enter the average total volume of gas captured from the affected facilities over the Base Period.

The methods for disposition of gas from landfills include:

Flared: Gas is combusted in a flare onsite for the purpose of disposal.

Electricity Generation Used Onsite: Gas is combusted onsite in an internal combustion engine, gas turbine, or other device to generate electricity and the electricity is used onsite.

Electricity Generation Sold Offsite: Gas is combusted onsite in an internal combustion engine, gas turbine, or other device to generate electricity and the electricity is sold offsite to an electric utility or end-use electricity consumer.

Injected Into Pipeline/Sale to Supply Network: Captured gas is cleaned and upgraded to match pipeline gas specifications, and is injected into a pipeline for sale offsite to either an end-use consumer or a natural gas transmission and distribution company.

Direct Use Onsite: Captured gas is combusted onsite to meet onsite non-electric energy demand.

Direct Use Offsite: Captured gas is transported offsite and combusted as a medium-Btu fuel for meeting non-electric energy demand.

3. **Enter Average Heat Content of Gas Captured.** For each volume of gas entered in Part B, Question 2 for the Base Period and Reporting Year, enter the average heat content, expressed as British thermal units per standard cubic feet (Btu/scf) (Columns 2-5 and 7). Calculate and enter in units of Btu/scf the average heat content for gas captured over the Base Period for each source and disposition (Column 6).
4. **Enter Total Energy Content of Gas Captured and Combusted.** Multiply the volume of gas captured for each method of disposition (as reported in Part B, Question 2, above) by the average heat content of the gas captured (as reported in Part B, Question 3, above) by each method of disposition and then divide that figure by 1,000 to calculate the total Btu captured, expressed as million British Thermal Units (MMBtu), for each method of disposition. Enter the product of this calculation for each year of the Base Period (Columns 2-5) and for the Reporting Year (Column 7). Enter the average total Btu captured for the Base Period for each method of disposition (Column 6). In the bottom row, provide the sum of Btu captured for all methods of disposition for each year of the Base Period and for the Reporting Year. Calculate and enter the average total Btu captured for the Base Period.
5. **Enter Mass of Methane Captured.** Enter the total mass of methane captured, expressed in metric tons carbon dioxide equivalent (metric tons CO₂e) for each year of your Base Period (Columns 2-5) and for the Reporting Year (Column 7). Enter the average mass of methane captured over the Base Period (Column 6). To calculate the mass of methane captured, use the following steps:
 - a. Divide the energy content of gas captured (as reported in Part B, question 4, above) by 1,005 Btu (the standard heat content of pure methane) and multiply this number by 1,000,000. This will yield the volume of methane flared in standard cubic feet.
 - b. Divide this figure by 1,000 to put it in Mscf (thousand standard cubic feet).
 - c. Multiply the volume of methane captured by the density of methane (42.28 pounds per Mscf). This will provide the total weight of methane captured expressed as pounds.
 - d. Divide total pounds methane by 2204.62 to derive metric tons methane.
 - e. Convert metric tons methane to metric tons CO₂e by multiplying by 23 (the global warming potential of methane).

Part C. Emission Reductions

1. Calculate Changes in Methane Capture

- **Item A.** Enter the average total mass of methane captured in the Base Period in metric tons CO₂e from Part B, Question 5, Column 6, above.
- **Item B.** Enter the total mass of methane captured in the Reporting Year in metric tons CO₂e from Part B, Question 5, Column 7, above.
- **Item C.** Enter the difference yielded by subtracting the average mass of methane captured in the Base Period from the total mass of methane captured in the Reporting Year (B – A).

2. Calculate Changes in Disposition of Electricity Generation From Captured Methane. Enter information on electricity use onsite and electricity sold offsite under Items D and E, respectively. For each potential disposition, enter in Columns 2 through 5 the amount of electricity generated, in units of megawatt-hours (MWh), in each year of your Base Period. In Column 7, enter the amount of electricity generated (MWh) in the Reporting Year. In Column 6, calculate and enter the average amount of electricity generated from the captured gas over the Base Period. Calculate and enter total generation under Item F. For Columns 2 through 5 and 7, sum the total electricity generated in each year of your Base Period and the Reporting Year, respectively. In Column 6, calculate and enter the average total generation from the captured gas over the Base Period.

3. Calculate Carbon Dioxide Displaced From Electricity Used Onsite (avoided emissions).

- **Item G.** Enter the average MWh of electricity used onsite for your Base Period from Part C, Question 2, Item D, Column 6, above.
- **Item H.** Enter the total MWh of electricity used onsite for your Reporting Year from Part C, Question 2, Item D, Column 7, above.
- **Item I.** Calculate and enter the Reporting Year incremental electricity used onsite by subtracting the average MWh of electricity used onsite in your Base Period (Item G) from the total MWh used onsite in the Reporting Year (Item H). If the incremental amount is negative, no reductions were generated in the Reporting Year from electricity used onsite; therefore, you may skip to Part C, Question 4.
- **Item J.** Enter the total emissions (metric tons CO₂e) from electricity used onsite during the Reporting Year. *Note: Include emissions from supplemental fossil fuel use only. If there was no supplemental fossil fuel used, enter zero.*
- **Item K.** Calculate and enter the emissions intensity of electricity used onsite during the Reporting Year by dividing Item J (metric tons CO₂e) by Item H (MWh). If there was no supplemental fossil fuel used, enter zero.
- **Item L.** Enter the applicable Avoided Emissions Benchmark for electricity from Appendix F, which must be less than or equal to 0.9 metric tons CO₂e/MWh, as described in 2.4.4.2.1 of the Technical Guidelines.

- **Item M.** Calculate your emission reductions (metric tons CO₂e) by subtracting Item K from Item L, and multiplying the result by Item I.

4. Calculate Carbon Dioxide Displaced From Electricity Sales (avoided emissions).

- **Item N.** Enter the average electricity sales during your Base Period (MWh) from Part C, Question 2, Item E, Column 6.
- **Item O.** Enter the electricity sales during your Reporting Year (MWh) from Part C, Question 2, Item E, Column 7.
- **Item P.** Calculate and enter the incremental amount of electricity (MWh) sold in the Reporting Year by subtracting the average MWh of electricity sold in your Base Period (Item N) from the total MWh sold in the Reporting Year (Item O). If the incremental amount is negative, no reductions were generated in your Reporting Year from electricity sales, and you may skip to Part C, Question 5.
- **Item Q.** Enter the total emissions (metric tons CO₂e) from electricity sold during the Reporting Year. *Note: Include emissions from supplemental fossil fuel use only. If there was no supplemental fossil fuel used, enter zero.*
- **Item R.** Calculate and enter the emissions intensity of electricity sold during the Reporting Year by dividing Item Q (metric tons CO₂e) by Item O (MWh). If there was no supplemental fossil fuel used, enter zero.
- **Item S.** Enter the applicable Avoided Emissions Benchmark for electricity from Appendix F, which must be less than or equal to 0.9 metric tons CO₂e/MWh, as described in 2.4.4.2.1 of the Technical Guidelines.
- **Item T.** Calculate your Emissions Reductions (metric tons CO₂e) by subtracting Item R from Item S, and multiplying the result by Item P.

5. Calculate Carbon Dioxide Emission Displaced by Methane Supplied to a Natural Gas Distribution Network.

- **Item U.** Enter the average annual quantity of methane supplied to a natural gas distribution network in the Base Period in MMBtu.
- **Item V.** Enter the quantity of methane supplied to a natural gas distribution network in the Reporting Year in MMBtu.
- **Item W.** Calculate the incremental quantity of methane supplied to a natural gas distribution network by subtracting Item U from Item V. Enter the result in Item W, Column 3.
- **Item X.** Enter the emissions factor for natural gas from Appendix H.
- **Item Y.** Calculate the CO₂ emissions displaced by methane supplied to a natural gas distribution network by multiplying Item W by Item X. Enter the result under Item Y, Column 3.

6. Summarize Emission Reductions.

- **Item Z.** In the Direct and TOTAL Columns (Columns 3 and 6), enter the increase in methane captured value (metric tons CO₂e) from Item C.
 - **Item AA.** In the Avoided and TOTAL Columns (Columns 5 and 6), enter the carbon dioxide displaced from electricity used onsite value (metric tons CO₂e) from Item M.
 - **Item BB.** In the Avoided and TOTAL Columns (Columns 5 and 6), enter the carbon dioxide displaced from electricity sales value (metric tons CO₂e) from Item T.
 - **Item CC.** In the Indirect and TOTAL Columns (Columns 4 and 6), enter the carbon dioxide emissions displaced by methane supplied to a natural gas distribution network from Item Y.
 - **Item DD.** For each column (Direct, Indirect, Avoided), calculate and enter the net change in greenhouse gas emission reductions by totaling the reductions entered under Items Z, AA, and BB. Likewise, in the TOTAL Column, add the values entered under Items Z, AA, BB, and CC and enter the result in Item DD TOTAL Column. The resulting value in the TOTAL Column should equal the sum of the values in the Direct, Indirect, and Avoided Columns.
- 6. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 7. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 8. Identify the Cause(s) of the Emission Reduction(s).** Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement” and “Local requirement.”
- 9. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part D. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part D if you have distributed the reductions reported by the entity or subentity in Part C, Question 5 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and the enter quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B8. Geologic Sequestration

Complete Addendum B8 when using the action-specific method for calculating emission reductions from geologic sequestration of carbon dioxide as described in 2.4.5.6.5 of the Technical Guidelines pursuant to §300.8(h)(5) of 10 CFR Part 300 Guidelines for Voluntary Greenhouse Gas Reporting.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Enter the Name and Location of CO₂ Injection Project.** Enter the name and location of each facility where geologic sequestration occurred.
- 2. Enter the Date CO₂ Injection Began.** Enter the month and year the action was initiated. This is the earliest date when a facility listed in Part A, Question 1 began CO₂ injection for geologic sequestration.
- 3. Describe the Action.** Describe the action taken in the space provided, explaining its basic nature and general characteristics, and the manner in which it reduced emissions. Include all information important to understanding the action and its effects on emissions, as well as any special conditions necessary to replicate its achievements.
- 4. Was the Action Reported Last Year?** Indicate “Yes” if you included this action (for any of the injection projects listed in Part A, Question 1) on last year’s Form EIA-1605 report. If you did not include the action(s) in last year’s report, or you did not file a Form EIA-1605 report last year, indicate “No.”
- 5. Is the Reporting Entity Responsible for the Injection of CO₂ Into a Permanent Storage Reservoir?** Check “Yes” or “No” to indicate whether the entity is responsible.
- 6. If Answer to Question 5 is No, Does Reporter Have a Written Agreement With the Sequestering Party Allowing the Reporter to Claim the Reductions?** Check the appropriate box. If “Not-applicable,” enter an explanation in the space provided.

Part B. Action Quantification

- 1. Enter Source of Carbon Dioxide Sequestered in Current Reporting Year.** Complete a row for each different source of carbon dioxide captured or acquired in the current Reporting Year. Enter the name of each source in Column 1 and its location in Column 2. Enter the quantity of carbon dioxide captured from anthropogenic sources in Column 3 and the quantity of anthropogenic CO₂ acquired via transfer or purchase from another entity in Column 4. Enter the quantity acquired via transfer or purchase from another entity (for which the entity is deemed responsible through a written agreement). An entity should only claim reductions for CO₂ acquired and sequestered in accordance with a written agreement. Enter the total carbon dioxide obtained from each source in Column 5. Include in Column 6 the name of the ultimate storage site where each quantity of carbon dioxide was sequestered. In Item B, sum the quantities of carbon dioxide and indicate the unit of measure. Enter all carbon dioxide quantities in metric tons CO₂e.
- 2. Enter Amount Sequestered in Current Reporting Year.** For each storage site where carbon dioxide was sequestered in the current Reporting Year, complete a new row starting with Item C1 if

the carbon dioxide was sequestered by the entity, and starting with Item D1 if the carbon dioxide was sequestered by a third party. Indicate whether the carbon dioxide was injected for enhanced resource recovery, and enter the quantity injected, the quantity that leaked, the monitoring method used, and the total net carbon dioxide sequestered during the current Reporting Year. In Row E, sum the quantities of carbon dioxide. Enter all carbon dioxide quantities in metric tons CO₂e.

- 3. Enter Amount Sequestered in Base Year.** For each storage site where carbon dioxide was sequestered in the Base Year, complete a new row starting with Item F1 if the carbon dioxide was sequestered by the entity, and starting with Item G1 if the carbon dioxide was sequestered by a third party. Indicate whether the carbon dioxide was injected for enhanced resource recovery, and enter the quantity injected, the quantity that leaked, the monitoring method used, and the total net carbon dioxide sequestered during the Base Year. In Row H, sum the quantities of carbon dioxide. Enter all carbon dioxide quantities in metric tons CO₂e.

Part C. Emission Reductions

- 1. Calculate Emission Reductions.** For Item I, subtract the total carbon dioxide sequestered in the Base Year (Item H7) from the total carbon dioxide sequestered in the current Reporting Year (Item E7) to yield the total emission reductions expressed in metric tons CO₂e.
- 2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 3. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 4. Identify the Cause(s) of the Emission Reduction(s).** Check the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check "Government requirement" and "Local requirement."
- 5. Summarize Benefits and Costs of the Actions Taken to Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part D. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part D if you have distributed the reductions reported by the entity or subentity in Part C, Question 1, above to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and enter the quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B9. Electricity Transmission and Distribution Improvements

Complete Addendum B9 if you intend to calculate reductions resulting from improvements to your electricity transmission and distribution (T&D) system.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Date Action Was Initiated.** Enter the month and year when the earliest improvement to the T&D system was completed and operational in the space provided.
- 2. Did You Report Transmission and Distribution Improvements Last Year?** Indicate whether you have submitted information on T&D improvements affecting the T&D system included in your entity or subentity report in a previous Reporting Year by checking “Yes” or “No.”
- 3. Are You Reporting as a Control Area or as a Member of a Control Area?** Indicate whether you are reporting as a control area or as a member of a control area by checking “Yes” or “No.”

Part B. Activity Data

- 1. Enter Activity Data.** Enter the following Base Period and Reporting Year activity data in the table provided. Enter the unit of measure used (kWh [kilowatthours] or kVAh [kilovolt-ampere hours]) in Column 2 for each item.

a. Enter Base Period Activity Data

- **Item A. Electricity Entering T&D System From Own Generation.** Enter the average annual quantity of electricity generated by your entity that entered the T&D system during the Base Period in Column 3.
- **Item B. Electricity Delivered Through T&D System to End Users.** Enter the average annual quantity of electricity delivered to end users through the T&D system during the Base Period in Column 3.
- **Item C. Electricity Imported Into T&D System.** Enter the average annual quantity of electricity generated by other entities and imported into your entity or subentity’s T&D system during the Base Period in Column 3.
- **Item D. Electricity Exported From T&D System.** Enter the average annual quantity of electricity exported to other entities from your entity or subentity’s T&D system during the Base Period in Column 3.
- **Item E. Net Imports of Electricity.** Calculate net imports of electricity in the Base Period by subtracting electricity exported from your T&D system (Item D) from the electricity imported into your T&D system (Item C). Enter the result in Column 3.
- **Item F. Actual Net Interchange (ANI) if Reporting on Control Area Basis.** If you are reporting as a control area or as a member of a control area, enter the annual average Actual Net Interchange (ANI) for the Base Period in Column 3.
- **Item G. Loss Ratio.** Calculate the Base Period Loss Ratio using the Equation 1 below (or Equation 2 below, if reporting as a control area or as a member of a control area). The letters in these equations refer to the item designations above (e.g., A = Electricity Entering T&D System from Own Generation). Enter the result in Item G, Column 3.

$$(A + E - B) / (A + E) \text{ (Equation 1)}$$

$$[A - (B + F)] / (A - F) \text{ (Equation 2)}$$

b. Enter Reporting Year Activity Data

- **Item H. Electricity Entering T&D System From Own Generation.** Enter quantity of electricity generated by your entity that entered the T&D system during the Reporting Year in Column 3.
- **Item I. Electricity Delivered Through T&D System to End Users.** Enter the quantity of electricity delivered to end users through the T&D system during the Reporting Year in Column 3.
- **Item J. Electricity Imported Into T&D System.** Enter the quantity of electricity generated by other entities and imported into your entity or subentity's T&D system during the Reporting Year in Column 3.
- **Item K. Electricity Exported From T&D System.** Enter the quantity of electricity exported to other entities from your entity or subentity's T&D system during the Reporting Year in Column 3.
- **Item L. Net Imports of Electricity.** Calculate net imports of electricity in the Reporting Year by subtracting electricity exported from your T&D system (Item K) from the electricity imported into your T&D system (Item J). Enter the result in Column 3.
- **Item M. Actual Net Interchange (ANI) if Reporting on Control Area Basis.** If you are reporting as a control area or as a member of a control area, enter the Actual Net Interchange (ANI) for the Reporting Year in Column 3.
- **Item N. Loss Ratio.** Calculate the Reporting Year loss ratio using the Equation 3 below (or Equation 4 below, if reporting as a control area or as a member of a control area). The letters in these equations refer to the item designations above (e.g., H = Average Annual Electricity Entering T&D System from Own Generation in Reporting Year). Enter the result in Column 3.

$$(H + L - I) / (H + L) \text{ (Equation 3)}$$

$$[H - (I + M)] / (H - M) \text{ (Equation 4)}$$

- **Item O. Change in Loss Intensity.** Calculate the change in loss intensity using Equation 5 below (or Equation 6 below, if reporting as a control area or as a member of a control area). The letters in these equations refer to the item designations above (e.g., H = Electricity Entering T&D System from Own Generation in Reporting Year). Enter the result in Column 3.

$$(G - N) * (H + L) \text{ (Equation 5)}$$

$$(G - N) * (H - M) \text{ (Equation 6)}$$

Part C. Emission Reductions

1. Calculate Emission Reductions.

- a. **Item P. Avoided Emissions Benchmark for Electricity.** Enter the appropriate Avoided Emissions Benchmark for electricity from Appendix F in Column 3.
- b. **Item Q. System Power Factor.** If you are calculating loss intensity in kVAh, enter the power factor for your T&D system, if known. If this power factor is greater than 0.95, enter 0.95. If you do not know the power factor for your T&D system, enter a default value of 0.90.
- c. **Item R. Total Emission Reductions.** Calculate total emission reductions using Equation 7 below (or Equation 8 below, if reporting as a control area or as a member of a control area). Enter the result in Column 3.

$$(O * P) / 1000 \text{ (Equation 7)}$$

$$[O * (P * Q)] / 1000 \text{ (Equation 8)}$$

- d. Item S. Direct Emission Reductions.** Calculate the quantity of total emission reductions attributable to direct emission sources using equation 9 below and enter the result in Column 3.

$$R * [I / (I + L)] \text{ (Equation 9)}$$

- e. Item T. Avoided Emissions.** Calculate the quantity of total emission reductions attributable to avoided electricity imports (avoided emissions) using equation 10 below. Enter the result in Column 3.

$$R + [L / (I + L)] \text{ Equation 10}$$

- 2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 3. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 4. Identify the Cause(s) of the Emission Reduction(s).** Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check "Government requirement" and "Local requirement."
- 5. Summarize Benefits and Costs of the Actions Taken to Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part D. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part D if you have distributed the reductions reported by the entity or subentity in Part C, Question 1 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the entity receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and enter the quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B10. Capture of Methane From Anaerobic Digestion at Wastewater Treatment Facilities

Complete Addendum B10 when using the action-specific method for calculating emission reductions from the capture of methane from anaerobic digestion at wastewater treatment facilities as described in 2.4.5.6.3 of the Technical Guidelines pursuant to §300.8(h)(5) of 10 CFR Part 300 Guidelines for Voluntary Greenhouse Gas Reporting.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Enter Locations of Wastewater Treatment Facilities.** Enter the name and location of each facility where methane capture occurred.
- 2. Enter Date Anaerobic Digester Use Began.** Enter the month and year the action was initiated. This is the earliest date when a facility listed in Part A, Question 1 began capturing methane.
- 3. Describe Action.** Describe the action taken in the space provided, explaining its basic nature and general characteristics, and the manner in which it reduced emissions. Include all information important to understanding the action and its effects on emissions, as well as any special conditions necessary to replicate its achievements.
- 4. Was the Action Reported Last Year?** Indicate “Yes” if you included this action (for any of the facilities listed in Part A, Question 1) on last year’s Form EIA-1605 report. If you did not include the action(s) in last year’s report, or you did not file a Form EIA-1605 report last year, indicate “No.”

Part B. Action Quantification

- 1. Enter Volume of Gas Captured and Disposition.** There are five potential methods for the disposition of captured gas, which are described below. For each method, indicate the volume captured (Mscf) in each year of your Base Period (Columns 2-5) and the volume (Mscf) captured in the Reporting Year (Column 7). Calculate and enter the average volume of gas captured from the affected facilities over the Base Period (Column 6). In the bottom row, sum the total volume of gas captured in each year of your Base Period and the Reporting Year. Calculate and enter the average total volume of gas captured from the affected facilities over the Base Period.

The methods for disposition of gas from anaerobic digestion of wastewater include:

Flared: Gas is combusted in a flare onsite for the purpose of disposal.

Electricity Generation: Gas is combusted onsite in an internal combustion engine, gas turbine, or other device to generate electricity and the electricity is used onsite or sold offsite to an electric utility or end-use electricity consumer.

Injected Into Pipeline/Sale to Supply Network: Captured gas is cleaned and upgraded to match pipeline gas specifications, and is injected into a pipeline for sale offsite to either an end-use consumer or a natural gas transmission and distribution company.

Direct Use Onsite: Captured gas is combusted onsite to meet onsite non-electric energy demand.

Direct Use Offsite: Captured gas is transported offsite and combusted as a medium-Btu fuel for meeting non-electric energy demand.

- 2. Enter Average Heat Content of Gas Captured and Utilized.** For each volume of gas entered in Part B, Question 1, above for the Base Period and Reporting Year, enter the average heat content, expressed as British thermal units per standard cubic feet (Btu/scf) (Columns 2-5 and 7). Calculate and enter in units of Btu/scf the average heat content for gas captured over the Base Period for each source and disposition (Column 6).
- 3. Enter Total Energy Content of Gas Captured and Utilized.** Multiply the volume of gas captured for each method of disposition (as reported in Part B, Question 1, above) by the average heat content of the gas captured (as reported in Part B, Question 2, above) and divide this figure by 1,000 to calculate the total Btu captured, expressed as million British thermal units (MMBtu), for each method of disposition. Enter the product of the multiplication for each year of the Base Period (Columns 2-5) and for the Reporting Year (Column 7). Enter the average total Btu captured for the Base Period for each method of disposition (Column 6). In the bottom row, provide the sum of Btu captured for all methods of disposition for each year of the Base Period and for the Reporting Year. Calculate and enter the average total Btu captured for the Base Period.
- 4. Enter Mass of Methane Captured and Utilized.** Enter the total mass of methane captured, expressed in metric tons CO₂e for each year of your Base Period and for the Reporting Year. Enter the average mass of methane captured over the Base Period. To calculate the mass of methane captured, use the following steps:
 - a. Divide the energy content of gas captured (as reported in Question 3, above) by 1,005 Btu (the standard heat content of pure methane) and multiply by 1,000,000. This will yield the volume of methane flared in standard cubic feet.
 - b. Divide this figure by 1,000 to put it in Mscf (thousands of standard cubic feet).
 - c. Multiply the volume of methane captured by the density of methane (42.28 pounds per Mscf). This will provide the total weight of methane captured expressed as pounds.
 - d. Divide total pounds methane by 2204.62 to derive metric tons methane.
 - e. Convert metric tons methane to metric tons CO₂e by multiplying by 23 (the global warming potential of methane).
- 5. Enter Nitrous Oxide Emissions From Aerobic Conditions During Base Period and Reporting Year.** For domestic wastewater treatment facilities, calculate nitrous oxide emissions from domestic wastewater effluent during the Base Period and Reporting Year, as described in 1.E.4.3.2 of the Technical Guidelines.

Part C. Emission Reductions

1. Calculate Changes in Methane Captured and Utilized

- **Item A.** Enter the average total mass of methane captured in the Base Period in metric tons CO₂e from Part B, Question 4, Column 6, above.
- **Item B.** Enter the total mass of methane captured in the Reporting Year in metric tons CO₂e from Part B, Question 4, Column 7, above.

- **Item C.** Enter the difference yielded by subtracting the average mass of methane captured in the Base Period from the total mass of methane captured in the Reporting Year (B – A).
- 2. Calculate Changes in Disposition of Electricity Generation From Captured Methane.** Enter information on electricity use onsite and electricity sold offsite under Items D and E, respectively. For each potential disposition, enter in Columns 2 through 5 the amount of electricity generated, in units of megawatt-hours (MWh), in each year of your Base Period. In Column 7 enter the amount of electricity generated (MWh) in the Reporting Year. In Column 6, calculate and enter the average amount of electricity generated from the captured gas over the Base Period. Calculate and enter total generation under Item F. For Columns 2 through 5 and 7, sum the total electricity generated in each year of your Base Period and the Reporting Year, respectively. In Column 6, calculate and enter the average total generation from the captured gas over the Base Period.
- 3. Calculate Carbon Dioxide Displaced From Electricity Used Onsite (avoided emissions).**
- **Item G.** Enter the average MWh of electricity used onsite for your Base Period from Part C, Question 2, Item D, Column 6, above.
 - **Item H.** Enter the total MWh of electricity used onsite for your Reporting Year from Part C, Question 2, Item D, Column 7, above.
 - **Item I.** Calculate and enter the Reporting Year incremental electricity used onsite by subtracting the average MWh of electricity used onsite in your Base Period (Item G) from the total MWh used onsite in the Reporting Year (Item H). If the incremental amount is negative, no reductions were generated in your Reporting Year from electricity used onsite, and you may skip to Part C, Question 4.
 - **Item J.** Enter the total emissions (metric tons CO₂e) from electricity used onsite during the Reporting Year. *Note: Include emissions from supplemental fossil fuel use only. If there was no supplemental fossil fuel used, enter zero.*
 - **Item K.** Calculate and enter the emissions intensity of electricity used onsite during the Reporting Year by dividing Item J (metric tons CO₂e) by Item H (MWh). If there was no supplemental fossil fuel used, enter zero.
 - **Item L.** Enter the applicable Avoided Emissions Benchmark for electricity from Appendix F, which must be less than or equal to 0.9 metric tons CO₂e/MWh as described in 2.4.4.2.1 of the Technical Guidelines.
 - **Item M.** Calculate your emissions reductions (metric tons CO₂e) by subtracting Item K from Item L, and multiplying the result by Item I.
- 4. Calculate Carbon Dioxide Displaced From Electricity Sales (avoided emissions).**
- **Item N.** Enter the average electricity sales during your Base Period (MWh) from Part C, Question 2, Item E, Column 6.
 - **Item O.** Enter the electricity sales during your Reporting Year (MWh) from Part C, Question 2, Item E, Column 7.

- **Item P.** Calculate and enter the incremental amount of electricity (MWh) sold in the Reporting Year by subtracting the average MWh of electricity sold in your Base Period (Item N) from the total MWh sold in the Reporting Year (Item O). If the incremental amount is negative, no reductions were generated in your Reporting Year from electricity sales; therefore, you may skip to Part C, Question 5.
- **Item Q.** Enter the total emissions (metric tons CO₂e) from electricity sold during the Reporting Year. *Note: Include emissions from supplemental fossil fuel use only. If there was no supplemental fossil fuel used, enter zero.*
- **Item R.** Calculate and enter the emissions intensity of electricity sold during the Reporting Year by dividing Item Q (metric tons CO₂e) by Item O (MWh). If there was no supplemental fossil fuel used, enter zero.
- **Item S.** Enter the applicable Avoided Emissions Benchmark for electricity from Appendix F, which must be less than or equal to 0.9 metric tons CO₂e/MWh as described in 2.4.4.2.1 of the Technical Guidelines.
- **Item T.** Calculate your Emissions Reductions (metric tons CO₂e) by subtracting Item R from Item S, and multiplying the result by Item P.

5. Calculate Carbon Dioxide Displaced by Methane Supplied to a Natural Gas Distribution Network.

- **Item U.** Enter the average annual quantity of methane supplied to a natural gas distribution network in the Base Period in MMBtu.
- **Item V.** Enter the quantity of methane supplied to a natural gas distribution network in the Reporting Year in MMBtu.
- **Item W.** Calculate the incremental quantity of methane supplied to a natural gas distribution network by subtracting Item U from Item V. Enter the result in Item W, Column 3.
- **Item X.** Enter the emissions factor for natural gas from Appendix H.
- **Item Y.** Calculate the CO₂ emissions displaced by methane supplied to a natural gas distribution network by multiplying Item W by Item X. Enter the result under Item Y, Column 3.

6. Calculate Changes in Nitrous Oxide Emissions From Use of Anaerobic Digester.

- **Item Z.** Enter Base Period average annual nitrous oxide emissions value (metric tons CO₂e) from Part B, Question 5, Column 6.
- **Item AA.** Enter Reporting Year quantity of nitrous oxide emissions value (metric tons CO₂e) from Part B, Question 5, Column 7.
- **Item BB.** Calculate and enter the change in nitrous oxide emissions (metric tons CO₂e) by subtracting Item Z from Item AA.

7. Summarize Emissions Reductions.

- **Item CC.** In the Direct and TOTAL columns (Columns 3 and 6), enter the increase in the methane captured value (metric tons CO₂e) from Item C.
- **Item DD.** In the Avoided and TOTAL columns (Columns 5 and 6), enter the carbon dioxide displaced from electricity used onsite (metric tons CO₂e) from Item M.
- **Item EE.** In the Avoided and TOTAL columns (Columns 5 and 6), enter the carbon dioxide displaced from electricity sales (metric tons CO₂e) from Item T.
- **Item FF.** In the Indirect and TOTAL Columns (Columns 4 and 6), enter the carbon dioxide emissions displaced by methane supplied to a natural gas distribution network from Item Y.
- **Item GG.** In the Direct and TOTAL columns (Columns 3 and 6), enter the change in nitrous oxide emissions value (metric tons CO₂e) from Item BB.
- **Item HH.** Calculate and enter the net change in emissions. In the Column 3 (direct), subtract Item GG from Item CC. In the Column 4 (indirect), enter the value in Item FF. In the Column 5 (avoided), add Item DD and Item EE. In the Column 6 (total), add Items CC, DD, EE, and FF, and subtract Item GG from the sum. The resulting value in the TOTAL column should equal the sum of the values in the Direct, Indirect, and Avoided columns.

8. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved. Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.

9. Describe Actions That Were the Likely Causes of the Reductions Achieved. Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.

10. Identify the Cause(s) of the Emission Reduction(s). Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement” and “Local requirement.”

11. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional). Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part D. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part D if you have distributed the reductions reported by the entity or subentity in Part C, Question 7, above to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and enter the quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B11. Anaerobic Digestion of Animal Waste

Complete Addendum B11 when using the action-specific method for calculating emission reductions from the capture of methane from anaerobic digestion of animal waste as described in 2.4.5.6.4 of the Technical Guidelines pursuant to §300.8(h)(5) of 10 CFR Part 300 Guidelines for Voluntary Greenhouse Gas Reporting.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Enter Location of Livestock Management Facilities.** Enter the name and location of each facility where methane capture occurred.
- 2. Date Anaerobic Digester Use Began.** Enter the month and year the action was initiated. This is the earliest date when a facility listed in Part A, Question 1 began capturing methane.
- 3. Describe Action.** Describe the action taken in the space provided, explaining its basic nature and general characteristics, and the manner in which it reduced emissions. Include all information important to understanding the action and its effects on emissions, as well as any special conditions necessary to replicate its achievements.
- 4. Was the Action Reported Last Year?** Indicate “Yes” if you included this action (for any of the facilities listed in Part A, Question 1) on last year’s Form EIA-1605 report. If you did not include the action(s) in last year’s report, or you did not file a Form EIA-1605 report last year, indicate “No.”

Part B. Action Quantification

- 1. Enter Action Characteristics.** For each livestock management facility reported in Part A, Question 1, enter each species of animal producing waste handled by the facility that captured methane, and the corresponding number of animals per species. If one facility includes more than one animal species, report separate species in separate rows, repeating the name of the facility.

Part C. Emission Reductions

- 1. Calculate Carbon Dioxide Displaced by Methane Supplied to a Natural Gas Distribution Network.**
 - Item A.** Enter the average amount methane supplied annually to a natural gas distribution network in the Base Period in MMBtu.
 - Item B.** Enter the average amount of methane supplied to a natural gas distribution network in the Reporting Year in MMBtu.
 - Item C.** Calculate and enter the incremental amount of methane supplied to a natural gas distribution network in the Reporting Year in MMBtu (B – A).
 - Item D.** Enter the emissions factor for natural gas from Appendix H.

- **Item E.** Calculate and enter the change in carbon dioxide emissions displaced by methane supplied to a natural gas distribution network.
- 2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
 - 3. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
 - 4. Identify the Cause(s) of the Emission Reduction(s).** Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement” and “Local requirement.”
 - 5. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part D. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part D if you have distributed the reductions reported by the entity or subentity in Part C, Question 1 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and enter the amount of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B12. Recycling of Fly Ash

Complete Addendum B12 when using the action-specific method for calculating emission reductions associated with recycling of fly ash as described in 2.4.5.6.7 of the Technical Guidelines pursuant to Section 300.8(h)(5) of the General Guidelines.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Enter Name and Location of Concrete Manufacturing Facilities Where Fly Ash Was Recycled.**
Enter the name and location of each facility where action occurred.
- 2. Enter Date Fly Ash Recycling Began.** Enter the month and year the action was initiated. This is the earliest date when a facility listed in Part A, Question 1 began recycling fly ash.
- 3. Describe Action.** Describe the action taken in the space provided, explaining its basic nature and general characteristics, and the manner in which it reduced emissions. Include all information important to understanding the action and its effects on emissions, as well as any special conditions necessary to replicate its achievements.
- 4. Was the Action Reported Last Year?** Indicate “Yes” if you included this action (for any of the facilities listed in Part A, Question 1) on last year’s Form EIA-1605 report. If you did not include the action in last year’s report, or you did not file a Form EIA-1605 report last year, indicate “No.”

Part B. Action Quantification

- 1. Enter Total Quantity of Fly Ash Used and Portland Cement Displaced for Base Period and Reporting Year.**
 - **Item A.** Enter the total quantity of fly ash used in place of Portland cement in each year of your Base Period (A3-A6) and the total quantity used in the Reporting Year (A8), expressed in short tons or metric tons. Calculate and enter the average quantity of fly ash used per year over the Base Period and enter the result in Item A7.
 - **Item B.** Enter the total quantity of Portland cement displaced by fly ash in each year of your Base Period in Items B3-B6 and the total quantity displaced in the Reporting Year in Item B8. Calculate the average quantity of Portland cement displaced per year in the Base Period and enter the result in Item B7.
- 2. Calculate Substitution Ratio of Fly Ash for Portland Cement for Base Period and Reporting Year.**
 - **Item C.** Calculate and enter the Base Period substitution ratio by dividing Item B7 by Item A7.
 - **Item D.** Calculate and enter the Reporting Year substitution ratio by dividing Item B8 by Item A8.

Part C. Emission Reductions

1. Calculate Reduction in Indirect Emissions

- **Item E.** Enter the net emissions factor for virgin cement (0.2396 metric tons carbon equivalent).
- **Item F.** Enter the net emissions factor for fly ash (0.0021 metric tons carbon equivalent).
- **Item G.** Enter the conversion factor for carbon equivalent to CO₂e (3.667).
- **Item H.** Calculate emissions displaced in the Base Period using the following equation:
Item A7 * [(Item E / Item C) - Item F] * Item G.
- **Item I.** Calculate emissions displaced in the Reporting Year using the following equation: Item A8 * [(Item E / Item D) - Item F] * Item G.
- **Item J.** Calculate and enter the indirect reductions from recycling fly ash by subtracting Item H from Item I.

2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved. Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.

3. Describe Actions That Were the Likely Causes of the Reductions Achieved. Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.

4. Identify the Cause(s) of the Emission Reduction(s). Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check "Government requirement" and "Local requirement."

5. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emission (Optional). Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part D. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part D if you have distributed the reductions reported by the entity or subentity in Part C, Question 1 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters. For each emission reduction distributed, enter the Name of the Recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and enter the amount of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B13. Demand-Side Management and Other Emission Reduction Programs

Complete Addendum B13 when using the action-specific method for calculating emission reductions associated with demand-side management or other emission reduction programs as described in 2.4.5.6.9 of the Technical Guidelines pursuant to Section 300.8(h)(5) of the General Guidelines.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

If you are reporting more than one program, copy Part A and complete for each program.

- 1. Enter Name of Program.** Enter the name of the demand-side management program.
- 2. Enter Location of Program.** Enter the city and state (if a domestic subentity) or the city and country (if a foreign subentity) where the program occurred. If multiple states, list all that apply.
- 3. Enter Date Program Began.** Enter the month and year the program was initiated.
- 4. Provide Summary Description of Program.** Describe the action taken in the space provided, explaining its basic nature and general characteristics, and the manner in which it reduced emissions. Include all information important to understanding the action and its effects on emissions, as well as any special conditions necessary to replicate its achievements.
- 5. Check the Applicable Box(es) To Indicate What the Program Provides to Very Small Emitters.** Check all that apply.
- 6. Identify Sector(s) of Very Small Emitters Targeted.** Check all that apply.
- 7. Describe Program Evaluation Method.** Method must be capable of reliably distinguishing between program effects and non-program-related effects, and capable of estimating how program-related effects are likely to diminish over time, and may include statistically valid surveys or energy use metering.
- 8. Enter Name and Describe Qualifications of 3rd Party Verifier.** To be qualified, the third-party must have experience in conducting or assessing statistically valid program impact evaluations recognized by government agencies.
- 9. Enter Annual Energy Usage Reductions in Reporting Year.** If emission reductions were not related to energy usage, skip to Part A, Question 10. Otherwise enter the unit used to measure energy consumption (e.g., KWh, MMBtu) and the quantity of the energy use reduction.
- 10. Enter Greenhouse Gas Emission Reductions in Reporting Year.** Enter Reporting Year emission reduction for the program.
- 11. Do the Reductions Qualify for Registration?** Check the box for “Yes” if the reductions achieved by the program meet all of the criteria listed for registration. If not, check “No.”

Part B. Emissions Reductions

- 1. Summarize Energy Savings and Greenhouse Gas Emissions Reductions by Program.** For each program enter the program name as reported in Part A, Question 1, and enter the energy unit in Column 2 (e.g., kWh of electricity, thousand cubic feet of natural gas), the total quantity of energy savings in Column 3, the emissions unit in Column 4 (e.g., metric tons), and the total quantity of emission reductions in Column 5. In Column 4 of the bottom row, enter the unit of emission reductions. In Column 5 of the bottom row, sum the total emission reductions from all programs.
- 2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 3. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 4. Identify the Cause(s) of the Emission Reduction(s).** Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check "Government requirement" and "Local requirement."
- 5. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part C. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part C if you have distributed the reductions reported by the entity or subentity in Part B, Question 1 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the recipient receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and enter the quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B14. Combined Heat and Power Generators

Complete Addendum B14 when using the action-specific method for calculating emission reductions from combined heat and power (CHP) generators as described in 2.4.6.3 of the Technical Guidelines pursuant to §300.8(h)(5) of the General Guidelines.

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Quantification

1. Enter Plant Emissions Data.

- **Item A.** Calculate total CHP plant fuel use by summing the quantities for each year in the Base Period and dividing by the number of years in the Base Period. Enter the result in Column 3.
- **Item B.** Calculate and sum emissions resulting from plant fuel use in each year of the Base Period using the methods in Chapter 1, Part C of the Technical Guidelines. Divide total Base Period emissions by the number of years in the Base Period and enter the result in Column 3.
- **Item C.** Calculate total CHP plant fuel use in the Reporting Year and enter the result in Column 3.
- **Item D.** Calculate the emissions resulting from plant fuel use in the Reporting Year using the methods in Chapter 1, Part C of the Technical Guidelines and enter the result in Column 3.

2. Enter Activity Data. For Items E through J, enter the specified quantity for the Base Period average. To calculate the Base Period average, sum the quantities for each year in the Base Period and divide by the number of years in the Base Period.

- **Item E.** Enter the Base Period average total thermal generation for the CHP plant in MMBtu.
- **Item F.** Enter the Base Period average total electrical generation for the CHP plant in MWh.
- **Item G.** Enter the Base Period average amount of thermal energy exported for use by other entities in MMBtu.
- **Item H.** Enter the Base Period average amount of electricity exported for use by other entities in MWh.
- **Item I.** Enter the Base Period average thermal generating efficiency for the CHP plant. If this efficiency is not known, use a default value of 80 percent.
- **Item J.** Enter the Base Period average electrical generating efficiency for the CHP plant. If this efficiency is not known, use a default value of 35 percent.
- **Item K.** Enter the total thermal generation for the CHP plant in the Reporting Year in MMBtu.
- **Item L.** Enter the total electrical generation for the CHP plant in the Reporting Year in MWh.
- **Item M.** Enter the amount of thermal energy exported for use by other entities in the Reporting Year in MMBtu.
- **Item N.** Enter the amount of electricity exported for use by other entities in the Reporting Year in MWh.
- **Item O.** Enter the thermal generating efficiency for the CHP plant in the Reporting Year. If this efficiency is not known, use a default value of 80 percent.
- **Item P.** Enter the electrical generating efficiency for the CHP plant in the Reporting Year. If this efficiency is not known, use a default value of 35 percent.
- **Item Q.** Enter the applicable thermal Avoided Emissions Benchmark, which may be found in Appendix N.

- **Item R.** Enter the applicable Avoided Emissions Benchmark for electricity from Appendix F, which must be less than or equal to 0.9 metric tons CO₂e/MWh as described in Section 2.4.4.2.1 of the Technical Guidelines.
- 3. Calculate Emissions for Each Generating Stream.** Calculate and enter emissions for each generating stream expressed in metric tons CO₂e as follows:
- **Item S.** Calculate and total thermal generation emissions for the Base Period using the following equation:
$$\text{Item B} * \{(\text{Item E} / \text{Item I}) / [(\text{Item E} / \text{Item I}) + (\text{Item F} / \text{Item J})]\}.$$
 - **Item T.** Calculate total electricity generation emissions for the Base Period by subtracting Item S from Item B.
 - **Item U.** Calculate and total thermal generation emissions for the Reporting Year using the following equation:
$$\text{Item D} * \{(\text{Item K} / \text{Item O}) / [(\text{Item K} / \text{Item O}) + (\text{Item L} / \text{Item P})]\}.$$
 - **Item V.** Calculate total electricity generation emissions for the Reporting Year by subtracting Item U from Item D.
- 4. Calculate Emissions Associated With Thermal and Electrical Energy Exported and Used Onsite.**
- **Item W.** Calculate and enter the exported thermal generation emissions for the Base Period (metric tons CO₂e) by dividing the thermal exports Base Period average (as entered in Item G) by the total thermal generation Base Period average (as entered in item E), and multiplying the result by the total thermal generation emissions for the Base Period (as entered in Item S).
 - **Item X.** Calculate and enter the exported electrical generation emissions for the Base Period (metric tons CO₂e) by dividing the electricity exports Base Period average (as entered in Item H) by the total electrical generation Base Period average (as entered in Item F), and multiplying the result by the total electricity generation emissions for the Base Period (as entered in item T).
 - **Item Y.** Calculate and enter the onsite thermal generation emissions for the Base Period (metric tons CO₂e) by subtracting the value entered for Item W, above, from the total thermal generation emissions for the Base Period (as entered in Item S).
 - **Item Z.** Calculate and enter the onsite electrical generation emissions for the Base Period (metric tons CO₂e) by subtracting the value entered for Item X, above, from the total electricity generation emissions for the Base Period (as entered in Item T).
 - **Item AA.** Calculate and enter the exported thermal generation emissions for the Reporting Year by dividing the thermal exports for the Reporting Year (as entered in Item M) by the total thermal generation for the Reporting Year (as entered in Item K), and multiplying the result by the total thermal generation emissions for the Reporting Year (as entered in Item U).
 - **Item BB.** Calculate and enter the exported electrical generation emissions for the Reporting Year by dividing the electricity exports for the Reporting Year (as entered in Item N) by the total

electrical generation for the Reporting Year (as entered in Item L), and multiplying the result by the total electricity generation emissions for the Reporting Year (as entered in Item V).

- **Item CC.** Calculate and enter the onsite thermal generation emissions for the Reporting Year (metric tons CO₂e) by subtracting the value entered for Item AA, above, from the total thermal generation emissions for the Reporting Year (as entered in Item U).
- **Item DD.** Calculate and enter the onsite electrical generation emissions for the Reporting Year (metric tons CO₂e) by subtracting the value entered for Item BB, above, from the total electricity generation emissions for the Reporting Year (as entered in Item V).

Part B. Emission Reductions

1. Calculate Direct Emission Reductions From Onsite Energy Use. Use the method in Question 1a, below, if you are using the emissions intensity method to calculate onsite emission reductions. If using absolute emissions reduction method to calculate onsite emission reductions, use the method in Question 1b, below.

a. Calculate Changes in Emissions Intensity From Energy Used Onsite. (Use this method if you are using emissions intensity method to calculate onsite emission reductions).

- **Item EE.** Calculate and enter the direct emission reductions from thermal generation used onsite (metric tons CO₂e) by calculating the difference between Item S divided by Item E and Item U divided by Item K, and multiplying the result by the difference between Item K and Item M.
- **Item FF.** Calculate and enter the direct emission reductions from electrical generation used onsite (metric tons CO₂e) by calculating the difference between Item T divided by Item F and Item V divided by Item L, and multiplying the result by the difference between Item L and Item N.

b. Calculate Absolute Changes in Emissions From Energy Used Onsite. (Use this method if you are using absolute emissions method to calculate onsite emission reductions).

- **Item GG.** Calculate and enter the emission reductions from thermal generation used onsite (metric tons CO₂e) by subtracting the onsite thermal generation emissions for the Reporting Year (as entered for Item CC above) from the onsite thermal generation emissions for the Base Year (as entered for Item Y above).
- **Item HH.** Calculate and enter the emission reductions from electrical generation used onsite (metric tons CO₂e) by subtracting the onsite electrical generation emissions for the Reporting Year (as entered for Item DD above) from the onsite electrical generation emissions for the Base Year (as entered for Item Z above).

2. Calculate Emission Reductions Associated With Energy Exports

a. Calculate the Thermal Energy Emission Reductions Due to Improvements in Historical Emissions Intensity. To calculate Item II expressed in metric tons CO₂e, subtract the result of Item U divided by Item K from the result of Item S divided by Item E, and multiply the result by Item G.

- b. Calculate Thermal Energy Emission Reductions Due to Incremental Changes in Thermal Exports.** To calculate Item JJ expressed in metric tons CO₂e, subtract the result of Item U divided by Item K from Item Q, and multiply the result by the result of Item M minus Item G.
- c. Calculate Electricity Emission Reductions Due to Improvements in Historical Emissions Intensity.** To calculate Item KK expressed in metric tons CO₂e, subtract the result of Item V divided by Item L from the result of Item T divided by Item F, and multiply the result by Item H.
- d. Calculate and Enter the Electricity Emission Reductions Due to Incremental Changes in Electricity Exports.** To calculate Item LL expressed in metric tons CO₂e, subtract the result of Item V divided by Item L from Item R, and then multiply by the result of Item N minus Item H.

3. Summarize Emission Reductions

- **Item MM.** Calculate and enter the reductions associated with onsite energy use, expressed in metric tons CO₂e, which is the sum of Item EE and Item FF, if using the Changes in Emissions Intensity method, or the sum of Item GG and HH, if using the Changes in Absolute Emissions method.
- **Item NN.** Calculate and enter the total emission reductions from energy generation and exports, expressed in metric tons CO₂e, by summing Items II, JJ, KK, and LL.
- **Item OO.** Sum and enter the total emission reductions, expressed in metric tons CO₂e, by adding the reductions associated with onsite energy use (as calculated in MM) and the total emission reductions from energy generation and exports (as calculated in NN).

- 4. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 5. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 6. Identify the Cause(s) of the Emission Reduction(s).** Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check "Government requirement and "Local requirement."
- 7. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part C. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part C if you have distributed the reductions reported by the entity or subentity in Part B, Question 3 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the entity receiving the reduction in Column 1, enter the units in which the reduction is denominated (metric tons) in Column 3, and enter the quantity of the reduction in Column 4. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO₂e has been printed in Column 2.

B15. Other Action-Specific Methods

Complete Addendum B15 if you intend to calculate emission reductions using the generic, other action-specific method. *Note that this method can only be used if it is not possible to use any of the other emission reduction methods contained in Addendum B (B1 – B14).*

If you are reporting reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Explain Why It Is Not Possible To Use Any of the Methods in Addendum B1-B14.** Provide an explanation in the space provided of why none of the other emission reduction methods (embodied in Addenda B1 through B14) could be used to estimate reductions for your entity or subentity.
- 2. Enter Date Action Was Initiated.** Enter the month and year when the action was initiated.
- 3. Was the Action Reported Last Year?** Indicate whether you have submitted information on this action in a previous Reporting Year by checking the “Yes” or “No” checkbox.
- 4. Identify Activities Affected by the Action.** Identify the activities that were affected by the action and provide specific information on the technology, process, or output involved.
- 5. Identify Equipment Affected by the Action.** Identify and quantify any equipment that was affected by the action. For example, the reporter should provide the number of vehicles, transformers, or lights affected by the action.
- 6. Identify the Emission Sources Affected by the Action.** Identify the emission sources that were affected by the action.

Part B. Emission Reduction Computation

- 1. Enter Activity Data, Emission Coefficients, and Conversion Factors.** Enter any activity data, emission coefficients, and conversion factors that you used to estimate the emission reduction for your action. For example, an entity conducting an motor efficiency effort would report the following information:
 - **Item A.** Base Period average annual electricity consumption by motors in kWh.
 - **Item B.** Reporting Year electricity consumption by motors in kWh.
 - **Item C.** Applicable regional electricity end-use emission coefficient in metric tons CO₂ per MWh.
- 2. Enter Equation(s) Used To Calculate Base Period and Reporting Year Emissions in Question 3.** Using the item designations for the information entered in Question 1, enter the equations used to calculate the reduction. For the above example, the equation would be written as follows:
Base Period Emissions = A * (1 MWh / 1000 kWh) * C
Reporting Year Emissions = B * (1 MWh / 1000 kWh) * C

- 3. Calculate Emission Reductions.** Calculate and enter emissions and emission reductions for the following sources of emissions affected by the action: direct (Column 3), indirect from purchased energy (Column 4), and other indirect (Column 5). Calculate and enter the following:
 - **Item K. Base Period Emissions.** Calculate and enter the average annual emissions associated with the action during the Base Period.
 - **Item L. Reporting Year Emissions.** Calculate and enter the emissions associated with the action during the Reporting Year.
 - **Item M. Registered Emission Reductions.** If you intend to register emission reductions, calculate and enter the reductions of direct emissions (Column 3) and indirect emissions from purchased energy (Column 4) by subtracting Reporting Year emissions (Item L) from Base Period emissions (Item K). (Note that reductions of other indirect emissions may not be registered and must be entered under Item N.)
 - **Item N. Reported Emission Reductions** If you intend to report emission reductions, calculate and enter the reductions of direct emissions (Column 3), indirect emissions from purchased energy (Column 4), and other indirect emissions (Column 5) by subtracting Reporting Year emissions (Item L) from the corresponding Base Period emissions value (Item K).
- 4. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 5. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 6. Identify the Cause(s) of the Emission Reduction(s).** Check the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are reporting for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement” and “Local requirement.”
- 7. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part C. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part C if you have distributed the reductions reported by the entity or subentity in Part B, Question 3 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the entity receiving the reduction in Column 1, enter the emission reduction type (Direct, Indirect, or Other Indirect) in Column 2, enter the units in which the reduction is denominated (metric tons) in Column 4, and enter the quantity of the reduction in Column 5. The reduction distributed must be recorded in carbon dioxide equivalent; therefore, CO_{2e} has been printed in Column 3. Sum the total direct, indirect, or other indirect reductions and enter these amounts in the specified “Total” rows.

B16. Destruction of Chlorofluorocarbons

Complete Addendum B16 when using the action-specific method for calculating emission reductions associated with destruction of chlorofluorocarbons (CFCs) as described in 2.4.5.6.8 of the Technical Guidelines pursuant to Section 300.8(h)(5) of the General Guidelines. Reporters may report but not register reductions associated with the destruction of CFCs.

If you are *reporting but not registering* reductions for a subentity, enter the name of the subentity in the space provided.

Part A. Action Identification

- 1. Enter Name and Location of Facility Where CFCs Were Destroyed.** Enter the name and location of each facility where action occurred.
- 2. Enter Date CFC Destruction Began.** Enter the month and year the action was initiated. This is the earliest date when a facility listed in Part A, Question 1 began destroying CFCs.
- 3. Describe Action.** Describe the action taken in the space provided, explaining its basic nature, general characteristics, and the manner in which it reduced emissions. Include all information important to understanding the action and its effects on emissions, as well as any special conditions necessary to replicate its achievements.
- 4. Was the Action Reported Last Year?** Indicate “Yes” if you included this action (for any of the facilities listed in Part A, Question 1) on last year’s Form EIA-1605 report. If you did not include the action in last year’s report, or you did not file a Form EIA-1605 report last year, indicate “No.”

Part B. Emission Reductions

- 1. Enter Type and Quantity of CFCs Destroyed.** In Column 1, indicate the type of CFC destroyed. In Column 2, report the unit of measure expressed as kilograms or metric tons. In column 3, enter the quantity of each type of CFC destroyed. In Column 4, indicate whether the reduction was transferred to another reporting entity. If “Yes,” complete Part C.
- 2. Identify Types of Actions That Were the Likely Cause of the Reductions Achieved.** Using the action type codes in Appendix M, enter the codes for all applicable activity types that were the likely cause of the reductions in the boxes provided.
- 3. Describe Actions That Were the Likely Causes of the Reductions Achieved.** Use the space provided to provide a brief summary of the actions that contributed to the emission reductions achieved in the Reporting Year.
- 4. Identify the Cause(s) of the Emission Reduction(s).** Select the applicable check boxes corresponding to the causes of the emission reductions achieved by your entity or subentity. If the reduction is the result of a government requirement, check the applicable requirement types (Federal, State and/or Local). If you are *reporting but not registering* for a foreign subentity and the reductions were caused by a requirement of a foreign government, check “Government requirement and “Local requirement.”

- 5. Summarize Benefits and Costs of the Actions Taken To Reduce Greenhouse Gas Emissions (Optional).** Reporters may use the space provided to record information on the benefits and costs of the actions taken to reduce emissions, such as the expected rates of return, life cycle costs, or benefit to cost ratios, using appropriate discount rates.

Part C. Distribution of Emission Reductions to Other 1605(b) Reporters

Complete Part C if you have distributed the reductions reported by the entity or subentity in Part B, Question 1 to another reporter to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program.

- 1. Where Applicable, Enter Emission Reductions Distributed to Other 1605(b) Reporters.** For each emission reduction distributed, enter the name of the entity receiving the reduction in Column 1, enter the native gas in Column 2, enter the units in which the reduction is denominated (metric tons or kilograms) in Column 3, and enter the quantity of the reduction in Column 4.

Instructions for Addendum C, Country-Specific Factors Used To Estimate Emissions From Foreign Sources

Complete Addendum C if you are reporting emissions for a foreign subentity.

1. Enter Information on Emission Factors Used To Estimate Emissions for Foreign Subentities.

Enter the following information for each emission factor used in estimating emissions for a foreign subentity:

- a. **Emissions Type (Column 1).** Enter the emission type (e.g., Direct, Indirect from Purchased Energy, Other Indirect, Terrestrial Carbon Flux and Stocks).
- b. **Emission Source (Column 2).** Enter the emission source for which the factor was used using the codes listed in Appendix J.
- c. **Gas (Column 3).** Identify the gas for which the factor is applicable.
- d. **Unit of Measure (Column 4).** Enter the unit of measure for the factor (e.g., metric tons of gas per MMBtu).
- e. **Factor Value (Column 5).** Enter the quantitative value of the factor.
- f. **Countries/Regions (Column 6).** List the countries or regions for which you have used the emission factor. For countries, use the country codes in Appendix C.
- g. **Factor Source (Column 7).** Use the Item letter in the left hand column of the table in Question 2 to identify the source of the emission factor (e.g., publication, Web site) listed. If there is no publically available documentation for the emission factor, enter "T" and describe how this factor was developed in Question 3.

2. Identify the Publications and Other Sources for Factors Used To Estimate Foreign Emissions.

List the publications and other reference that were the sources for the emission factors used in preparing the emissions inventory for any foreign subentity included in your report.

3. Document Reporter-Defined Emission Factors.

For emission factors that do not have publicly available documentation exists or to which you have made adjustments, describe how these factors were developed or adjusted in the space provided below.

Appendix A. North American Industrial Classification System (NAICS) Codes

Agriculture, Forestry, Fishing and Hunting

| | |
|-----|---|
| 111 | Crop Production |
| 112 | Animal Production |
| 113 | Forestry and Logging |
| 114 | Fishing, Hunting and Trapping |
| 115 | Support Activities for Agriculture and Forestry |

Mining

| | |
|-----|-------------------------------|
| 211 | Oil and Gas Extraction |
| 212 | Mining (except Oil and Gas) |
| 213 | Support Activities for Mining |

Utilities

| | |
|-----|-----------|
| 221 | Utilities |
|-----|-----------|

Construction

| | |
|-----|--|
| 236 | Construction of Buildings |
| 237 | Heavy and Civil Engineering Construction |
| 238 | Specialty Trade Contractors |

Manufacturing

| | |
|-----|--|
| 311 | Food Manufacturing |
| 312 | Beverage and Tobacco Product Manufacturing |
| 313 | Textile Mills |
| 314 | Textile Product Mills |
| 315 | Apparel Manufacturing |
| 316 | Leather and Allied Product Manufacturing |
| 321 | Wood Product Manufacturing |
| 322 | Paper Manufacturing |
| 323 | Printing and Related Support Activities |
| 324 | Petroleum and Coal Products Manufacturing |
| 325 | Chemical Manufacturing |
| 326 | Plastics and Rubber Products Manufacturing |
| 327 | Nonmetallic Mineral Product Manufacturing |
| 331 | Primary Metal Manufacturing |
| 332 | Fabricated Metal Product Manufacturing |
| 333 | Machinery Manufacturing |
| 334 | Computer and Electronic Product Manufacturing |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing |
| 336 | Transportation Equipment Manufacturing |
| 337 | Furniture and Related Product Manufacturing |
| 339 | Miscellaneous Manufacturing |

Wholesale Trade

| | |
|-----|---|
| 423 | Merchant Wholesalers, Durable Goods |
| 424 | Merchant Wholesalers, Nondurable Goods |
| 425 | Wholesale Electronic Markets and Agents and Brokers |

Retail Trade

| | |
|-----|---|
| 441 | Motor Vehicle and Parts Dealers |
| 442 | Furniture and Home Furnishings Stores |
| 443 | Electronics and Appliance Stores |
| 444 | Building Material and Garden Equipment and Supplies Dealers |
| 445 | Food and Beverage Stores |
| 446 | Health and Personal Care Stores |
| 447 | Gasoline Stations |
| 448 | Clothing and Clothing Accessories Stores |
| 451 | Sporting Goods, Hobby, Book, and Music Stores |
| 452 | General Merchandise Stores |
| 453 | Miscellaneous Store Retailers |
| 454 | Nonstore Retailers |

Transportation and Warehousing

| | |
|-----|---|
| 481 | Air Transportation |
| 482 | Rail Transportation |
| 483 | Water Transportation |
| 484 | Truck Transportation |
| 485 | Transit and Ground Passenger Transportation |
| 486 | Pipeline Transportation |
| 487 | Scenic and Sightseeing Transportation |
| 488 | Support Activities for Transportation |
| 491 | Postal Service |
| 492 | Couriers and Messengers |
| 493 | Warehousing and Storage |

Information

| | |
|-----|--|
| 511 | Publishing Industries (except Internet) |
| 512 | Motion Picture and Sound Recording Industries |
| 515 | Broadcasting (except Internet) |
| 516 | Internet Publishing and Broadcasting |
| 517 | Telecommunications |
| 518 | Internet Service Providers, Web Search Portals, and Data Processing Services |
| 519 | Other Information Services |

Finance and Insurance

521 Monetary Authorities - Central Bank
522 Credit Intermediation and Related Activities
523 Securities, Commodity Contracts, and Other
Financial Investments and Related Activities
524 Insurance Carriers and Related Activities
525 Funds, Trusts, and Other Financial Vehicles

Real Estate and Rental and Leasing

531 Real Estate
532 Rental and Leasing Services
533 Lessors of Nonfinancial Intangible Assets
(except Copyrighted Works)

Professional, Scientific, and Technical Services

541 Professional, Scientific, and Technical
Services

Management of Companies and Enterprises

551 Management of Companies and Enterprises

**Administrative and Support and Waste Management
and Remediation Services**

561 Administrative and Support Services
562 Waste Management and Remediation Services

Educational Services

611 Educational Services

Health Care and Social Assistance

621 Ambulatory Health Care Services
622 Hospitals
623 Nursing and Residential Care Facilities
624 Social Assistance

Arts, Entertainment, and Recreation

711 Performing Arts, Spectator Sports, and Related
Industries
712 Museums, Historical Sites, and Similar
Institutions
713 Amusement, Gambling, and Recreation
Industries

Accommodation and Food Services

721 Accommodation
722 Food Services and Drinking Places

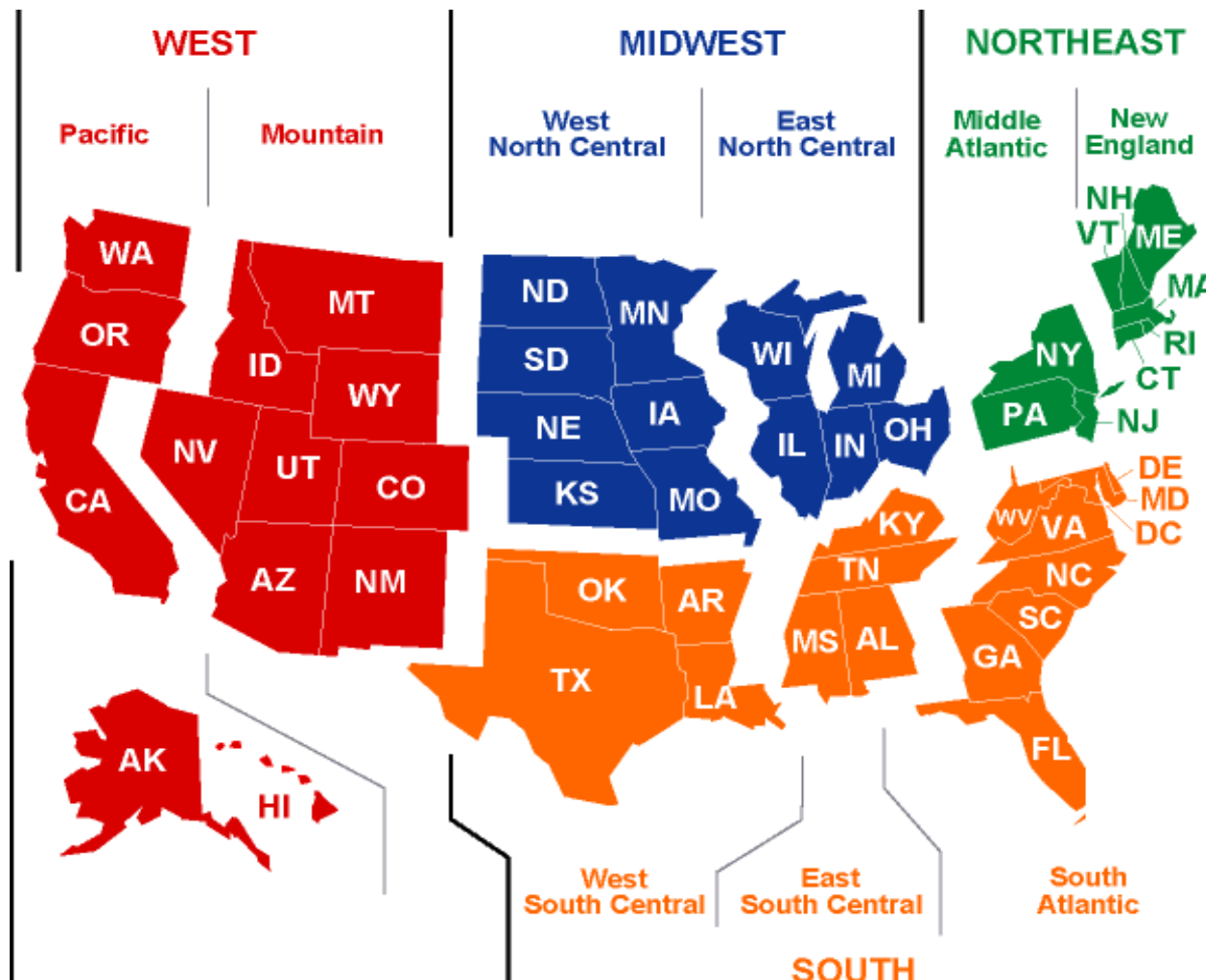
Other Services (Except Public Administration)

811 Repair and Maintenance
812 Personal and Laundry Services
813 Religious, Grantmaking, Civic, Professional,
and Similar Organizations
814 Private Households

Public Administration

921 Executive, Legislative, and Other General
Government Support
922 Justice, Public Order, and Safety Activities
923 Administration of Human Resource Programs
924 Administration of Environmental Quality
Programs
925 Administration of Housing Programs, Urban
Planning, and Community Development
926 Administration of Economic Programs
927 Space Research and Technology
928 National Security and International Affairs

Appendix B. U.S. Census Regions and Abbreviations for States and U.S. Territories



Source: http://www.eia.doe.gov/emeu/reps/maps/us_census.html.

Census Bureau Regions and Divisions With State Abbreviations

REGION 1: NORTHEAST

Division 1: New England

| | |
|---------------|----|
| Connecticut | CT |
| Maine | ME |
| Massachusetts | MA |
| New Hampshire | NH |
| Rhode Island | RI |
| Vermont | VT |

Division 2: Middle Atlantic

| | |
|--------------|----|
| New Jersey | NJ |
| New York | NY |
| Pennsylvania | PA |

REGION 2: MIDWEST*

Division 3: East North Central

| | |
|-----------|----|
| Illinois | IL |
| Indiana | IN |
| Michigan | MI |
| Ohio | OH |
| Wisconsin | WI |

Division 4: West North Central

| | |
|-----------|----|
| Iowa | IA |
| Kansas | KS |
| Minnesota | MN |
| Missouri | MO |

Nebraska NE
 North Dakota ND
 South Dakota SD

REGION 3: SOUTH

Division 5: South Atlantic

Delaware DE
 District of Columbia DC
 Florida FL
 Georgia GA
 Maryland MD
 North Carolina NC
 South Carolina SC
 Virginia VA
 West Virginia WV

Division 6: East South Central

Alabama AL
 Kentucky KY
 Mississippi MS
 Tennessee TN

Division 7: West South Central

Arkansas AR
 Louisiana LA
 Oklahoma OK
 Texas TX

REGION 4: WEST

Division 8: Mountain

Arizona AZ
 Colorado CO
 Idaho ID
 Montana MT
 Nevada NV
 New Mexico NM
 Utah UT
 Wyoming WY

Division 9: Pacific

Alaska AK
 California CA
 Hawaii HI
 Oregon OR
 Washington WA

*Prior to June 1984, the Midwest Region was designated as the North Central Region.

Source: http://www.census.gov/geo/www/reg_div.txt.

Abbreviations for U.S. Territories

American Samoa AQ
 Guam GQ
 Midway Islands MQ
 Northern Mariana Islands CQ
 Puerto Rico PR
 U.S. Virgin Islands VQ

Appendix C. Country Codes

| Code | Country | Code | Country |
|------|--------------------------------|------|-----------------------------------|
| AF | Afghanistan | BU | Bulgaria |
| AL | Albania | UV | Burkina Faso |
| AG | Algeria | BM | Burma |
| AN | Andorra | BY | Burundi |
| AO | Angola | CB | Cambodia |
| AV | Anguilla | CM | Cameroon |
| AY | Antarctica | CA | Canada |
| AC | Antigua and Barbuda | CV | Cape Verde |
| AR | Argentina | CJ | Cayman Islands |
| AM | Armenia | CT | Central African Republic |
| AA | Aruba | CD | Chad |
| AT | Ashmore and Cartier Islands | CI | Chile |
| AS | Australia | CH | China |
| AU | Austria | KT | Christmas Island |
| AJ | Azerbaijan | IP | Clipperton Island |
| BF | Bahamas, The | CK | Cocos (Keeling) Islands |
| BA | Bahrain | CO | Colombia |
| FQ | Baker Island | CN | Comoros |
| BG | Bangladesh | CF | Congo |
| BB | Barbados | CG | Congo, Democratic Republic of the |
| BS | Bassas Da India | CW | Cook Islands |
| BO | Belarus | CR | Coral Sea Islands |
| BE | Belgium | CS | Costa Rica |
| BH | Belize | IV | Cote D'ivoire |
| BN | Benin | HR | Croatia |
| BD | Bermuda | CU | Cuba |
| BT | Bhutan | CY | Cyprus |
| BL | Bolivia | EZ | Czech Republic |
| BK | Bosnia and Herzegovina | DA | Denmark |
| BC | Botswana | DJ | Djibouti |
| BV | Bouvet Island | DO | Dominica |
| BR | Brazil | DR | Dominican Republic |
| IO | British Indian Ocean Territory | TT | East Timor |
| VI | British Virgin Islands | EC | Ecuador |
| BX | Brunei | EG | Egypt |

| Code | Country | Code | Country |
|-------------|-------------------------------------|-------------|--|
| ES | El Salvador | HK | Hong Kong |
| EK | Equatorial Guinea | HQ | Howland Island |
| ER | Eritrea | HU | Hungary |
| EN | Estonia | IC | Iceland |
| ET | Ethiopia | IN | India |
| EU | Europa Island | ID | Indonesia |
| FK | Falkland Islands (Islas Malvinas) | IR | Iran |
| FO | Faroe Islands | IZ | Iraq |
| FM | Federated States of Micronesia | IE | Ireland |
| FJ | Fiji | IS | Israel |
| FI | Finland | IT | Italy |
| FR | France | JM | Jamaica |
| FG | French Guiana | JN | Jan Mayen |
| FP | French Polynesia | JA | Japan |
| FS | French Southern and Antarctic Lands | DQ | Jarvis Island |
| GB | Gabon | JE | Jersey |
| GA | Gambia, The | JQ | Johnston Atoll |
| GZ | Gaza Strip | JO | Jordan |
| GG | Georgia | JU | Juan De Nova Island |
| GM | Germany | KZ | Kazakhstan |
| GH | Ghana | KE | Kenya |
| GI | Gibraltar | KQ | Kingman Reef |
| GO | Glorioso Islands | KR | Kiribati |
| GR | Greece | KN | Korea, Democratic People's Republic of |
| GL | Greenland | KS | Korea, Republic of |
| GJ | Grenada | KU | Kuwait |
| GP | Guadeloupe | KG | Kyrgyzstan |
| GT | Guatemala | LA | Laos |
| GK | Guernsey | LG | Latvia |
| GV | Guinea | LE | Lebanon |
| PU | Guinea-Bissau | LT | Lesotho |
| GY | Guyana | LI | Liberia |
| HA | Haiti | LY | Libya |
| HM | Heard Island and McDonald Islands | LS | Liechtenstein |
| HO | Honduras | LH | Lithuania |

| Code | Country | Code | Country |
|-------------|----------------------|-------------|--------------------------------|
| LU | Luxembourg | NF | Norfolk Island |
| MC | Macau | NO | Norway |
| MK | Macedonia | MU | Oman |
| MA | Madagascar | PK | Pakistan |
| MI | Malawi | PS | Palau |
| MY | Malaysia | LQ | Palmyra Atoll |
| MV | Maldives | PM | Panama |
| ML | Mali | PP | Papua New Guinea |
| MT | Malta | PF | Paracel Islands |
| IM | Man, Isle of | PA | Paraguay |
| RM | Marshall Islands | PE | Peru |
| MB | Martinique | RP | Philippines |
| MR | Mauritania | PC | Pitcairn Islands |
| MP | Mauritius | PL | Poland |
| MF | Mayotte | PO | Portugal |
| MX | Mexico | QA | Qatar |
| MD | Moldova | RE | Reunion |
| MN | Monaco | RO | Romania |
| MG | Mongolia | RS | Russia |
| MJ | Montenegro | RW | Rwanda |
| MH | Montserrat | SC | St. Kitts and Nevis |
| MO | Morocco | SH | St. Helena |
| MZ | Mozambique | ST | St. Lucia |
| WA | Namibia | SB | St. Pierre and Miquelon |
| NR | Nauru | VC | St. Vincent and The Grenadines |
| BQ | Navassa Island | WS | Samoa |
| NP | Nepal | SM | San Marino |
| NL | Netherlands | TP | Sao Tome and Principe |
| NT | Netherlands Antilles | SA | Saudi Arabia |
| NC | New Caledonia | SG | Senegal |
| NZ | New Zealand | RB | Serbia |
| NU | Nicaragua | SE | Seychelles |
| NG | Niger | SL | Sierra Leone |
| NI | Nigeria | SN | Singapore |
| NE | Niue | LO | Slovakia |

| Code | Country | Code | Country |
|-------------|--|-------------|--------------------------|
| SI | Slovenia | TE | Tromelin Island |
| BP | Solomon Islands | TS | Tunisia |
| SO | Somalia | TU | Turkey |
| SF | South Africa | TX | Turkmenistan |
| SX | South Georgia and the South Sandwich Islands | TK | Turks and Caicos Islands |
| SP | Spain | TV | Tuvalu |
| PG | Spratly Islands | UG | Uganda |
| CE | Sri Lanka | UP | Ukraine |
| SU | Sudan | AE | United Arab Emirates |
| NS | Suriname | UK | United Kingdom |
| SV | Svalbard | UY | Uruguay |
| WZ | Swaziland | UZ | Uzbekistan |
| SW | Sweden | NH | Vanuatu |
| SZ | Switzerland | VT | Vatican City |
| SY | Syria | VE | Venezuela |
| TI | Tajikistan | VM | Vietnam |
| TZ | Tanzania | WQ | Wake Island |
| TH | Thailand | WF | Wallis and Futuna |
| TW | Taiwan | WE | West Bank |
| TO | Togo | WI | Western Sahara |
| TL | Tokelau | YM | Yemen |
| TN | Tonga | ZA | Zambia |
| TD | Trinidad And Tobago | ZI | Zimbabwe |

Sources: (1) National Institute of Standards and Technology, Information Technology Laboratory, Federal Information Processing Standards Publication 10-4, Specifications for Countries, Dependencies, Areas of Special Sovereignty, and Their Principal Administrative Divisions, 1995 April, <http://www.itl.nist.gov/fipspubs/fip10-4.htm>.
 (2) National Geospatial Intelligence Agency, FIPS 10-4 Change Notices, http://earth-info.nga.mil/gns/html/fips_files.html.

Appendix D. Greenhouse Gas Reduction Initiatives

Domestic Voluntary Initiatives

| Code | Program |
|-------|--|
| AGS | AgSTAR |
| CCP | Cool Communities Program |
| CCTY | Clean Cities Program |
| CLL | Climate Leaders |
| CLV | Climate VISION |
| CMOP | Coalbed Methane Outreach Program |
| ESB | Energy Star Buildings and Green Lights Partnership |
| ESC | Energy Star Computers Program |
| ESSB | Energy Star Small Business Program |
| EST | Energy Star Transformers |
| ESP | Other Energy Star Programs |
| FSP | Forest Stewardship Program |
| LMOP | Landfill Methane Outreach Program |
| NGS | Natural Gas STAR |
| OTH | Other Federal, state and local programs |
| RBA | Rebuild America |
| RGGI | Regional Greenhouse Gas Initiative |
| RLMP | Ruminant Livestock Methane Program |
| SFERP | Sulfur Hexafluoride (SF6) Emissions Reduction Partnership for Electric Power Systems |
| VAIP | Voluntary Aluminum Industrial Partnership |
| WWP | Waste Wise Program |

Domestic Registries and Exchanges

| Code | Program |
|-------|---|
| CCAR | California Climate Action Registry |
| CCX | Chicago Climate Exchange |
| WVERR | Wisconsin Voluntary Emission Reduction Registry |
| ERT | ERT GHG Registry Program |
| ECR | Eastern Climate Registry |
| NHGGR | New Hampshire GHG Registry |

International Registries and Exchanges

| Code | Program |
|-------|--|
| EUETS | European Union Greenhouse Gas Emission Trading Scheme (EU ETS) |
| WBCF | World Bank Carbon Fund |
| IETS | International Emissions Trading System |
| WEC | World Energy Council GHG Emissions Reduction Programme |
| GEIM | La Programa GEI Mexico |
| CGGCR | Canadian GHG Challenge Registry |

Appendix E. Greenhouse Gases and Global Warming Potentials (GWP)

| GREENHOUSE GAS NAME | GREENHOUSE GAS CODE | FORMULA | GWP | |
|--|---------------------|--|------------------|------------------|
| | | | TAR ¹ | FAR ² |
| (1) Carbon Dioxide | CO2 | CO ₂ | 1 | 1 |
| (2) Methane | CH4 | CH ₄ | 23 | 25 |
| (3) Nitrous Oxide | N2O | N ₂ O | 296 | 298 |
| (4) Hydrofluorocarbons | | | | |
| HFC-23 (trifluoromethane) | 15 | CHF ₃ | 12000 | 14800 |
| HFC-32 (difluoromethane) | 16 | CH ₂ F ₂ | 550 | 675 |
| HFC-41 (monofluoromethane) | 43 | CH ₃ F | 97 | - ³ |
| HFC-125 (pentafluoroethane) | 17 | CHF ₂ CF ₃ | 3400 | 3500 |
| HFC-134 (1,1,2,2-tetrafluoroethane) | 44 | CHF ₂ CHF ₂ | 1100 | - ³ |
| HFC-134a (1,1,1,2-tetrafluoroethane) | 18 | CH ₂ FCF ₃ | 1300 | 1430 |
| HFC-143 (1,1,2-trifluoroethane) | 45 | CHF ₂ CH ₂ F | 330 | - ³ |
| HFC-143a (1,1,1-trifluoroethane) | 46 | CF ₃ CH ₃ | 4300 | 4470 |
| HFC-152 (1,2-difluoroethane) | 47 | CH ₂ FCH ₂ F | 43 | - ³ |
| HFC-152a (1,1-difluoroethane) | 19 | CH ₃ CHF ₂ | 120 | 124 |
| HFC-161 (ethyl fluoride) | 48 | CH ₃ CH ₂ F | 12 | - ³ |
| HFC-227ea (heptafluoropropane) | 20 | CF ₃ CHF ₂ CF ₃ | 3500 | 3220 |
| HFC-236cb (1,1,1,2,2,3-hexafluoropropane) | 49 | CH ₂ FCF ₂ CF ₃ | 1300 | - ³ |
| HFC-236ea (1,1,1,2,3,3-hexafluoropropane) | 50 | CHF ₂ CHF ₂ CF ₃ | 1200 | - ³ |
| HFC-236fa (1,1,1,3,3,3-hexafluoropropane) | 41 | CF ₃ CH ₂ CF ₃ | 9400 | 9810 |
| HFC-245ca (1,1,2,2,3-pentafluoropropane) | 21 | CH ₂ FCF ₂ CHF ₂ | 640 | - ³ |
| HFC-245fa (1,1,1,3,3-pentafluoropropane) | 51 | CHF ₂ CH ₂ CF ₃ | 950 | 1030 |
| HFC-365mfc (pentafluorobutane) | 52 | CF ₃ CH ₂ CF ₂ CH ₃ | 890 | 794 |
| HFC-43-10mee (decafluoropentane) | 53 | CF ₃ CHFCH ₂ CF ₂ CF ₃ | 1500 | 1640 |
| (5) Perfluorocarbons | | | | |
| Perfluoromethane | 22 | CF ₄ | 5700 | 7390 |
| Perfluoroethane | 23 | C ₂ F ₆ | 11900 | 12200 |
| Perfluoropropane | 42 | C ₃ F ₈ | 8600 | 8830 |
| FC 3-1-10 (perfluorobutane) | 30 | C ₄ F ₁₀ | 8600 | 8860 |
| Perfluorocyclobutane | 54 | c-C ₄ F ₈ | 10000 | 10300 |
| Perfluoropentane | 51 | C ₅ F ₁₂ | 8900 | 9160 |
| FC 5-1-14 (perfluorohexane) | 31 | C ₆ F ₁₄ | 9000 | 9300 |
| (6) Sulfur Hexafluoride | SF6 | SF ₆ | 22200 | 22800 |
| (7) Chlorofluorocarbons⁴ | | | | |
| CFC-11 (trichlorofluoromethane) | 01 | CCl ₃ F | - | - |
| CFC-12 (dichlorodifluoromethane) | 02 | CCl ₂ F ₂ | - | - |
| CFC-13 (monochlorotrifluoromethane) | 56 | CClF ₃ | - | - |
| CFC-113 (Freon 113) | 03 | CCl ₂ FCClF ₂ | - | - |
| CFC-114 (dichlorotetrafluoroethane) | 04 | CClF ₂ CClF ₂ | - | - |
| CFC-115 (monochloropentafluoroethane) | 05 | CF ₃ CClF ₂ | - | - |

¹ Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis* (Cambridge, UK: Cambridge University Press, 2001). This document was part of the Intergovernmental Panel on Climate Change's (IPCC's) Third Assessment Report (TAR).

² The IPCC has developed revised GWPs for selected gases for the Fourth Assessment Report (FAR). These revised GWPs were published in *Climate Change 2007: The Physical Science Basis*, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp. EIA will adopt these revised GWPs for the Voluntary Reporting of Greenhouse Gases once the full report for *Climate Change 2007: The Physical Science Basis* has been formally approved by the IPCC, which is expected to occur in November 2007.

³ In cases where the FAR does not have a revised GWP for a gas, EIA will continue to use the appropriate GWP from the TAR.

⁴ The reporting of CFC emissions on Form EIA-1605 is optional. CFC emissions cannot be included in total inventory emissions since reliable net global warming potentials are not available for these gases. Reductions in CFC emissions may be *reported but not registered*.

Appendix F. Electricity Emission Factors

F.1 Domestic Electricity Emission Factors, 1999-2002

| Region | Emission Inventory ^a | | | Emission Reductions | |
|--|---|----------------------|----------------------------|--|---|
| | Carbon Dioxide (Metric tons/ MWh) | Methane (kg/ MWh) | Nitrous Oxide (kg/ MWh) | Avoided Emissions ^b (Metric tons CO ₂ e/MWh) | Indirect Emissions ^c (Metric tons CO ₂ e/MWh) |
| (1) New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire and Maine | 0.466 | 0.02647 | 0.00616 | 0.744 | 0.793 |
| (2) New Jersey, Delaware, Pennsylvania, Maryland, West Virginia, Ohio, Indiana and Michigan | 0.782 | 0.01404 | 0.01281 | 0.900 | 1.002 |
| (3) Illinois and Wisconsin | 0.638 | 0.01231 | 0.01048 | 0.900 | 1.151 |
| (4) Missouri, Kentucky, Virginia, Arkansas, Tennessee, North Carolina, South Carolina, Louisiana, Mississippi, Alabama and Georgia | 0.690 | 0.02556 | 0.01283 | 0.900 | 1.005 |
| (5) Florida | 0.678 | 0.02437 | 0.00856 | 0.788 | 0.840 |
| (6) Texas | 0.730 | 0.01351 | 0.00774 | 0.782 | 0.833 |
| (7) Oklahoma and Kansas | 0.867 | 0.01315 | 0.01236 | 0.900 | 0.990 |
| (8) North Dakota, South Dakota, Nebraska, Minnesota and Iowa | 0.875 | 0.01392 | 0.01414 | 0.900 | 1.160 |
| (9) Colorado, Utah, Nevada, Wyoming and Montana | 0.909 | 0.01158 | 0.01377 | 0.900 | 1.009 |
| (10) New Mexico and Arizona | 0.658 | 0.00762 | 0.00941 | 0.900 | 0.970 |
| (11) Oregon, Washington and Idaho | 0.147 | 0.01345 | 0.00337 | 0.781 | 0.833 |
| (12) California | 0.350 | 0.01831 | 0.00299 | 0.618 | 0.659 |
| (13) Hawaii | 0.858 | 0.03443 | 0.00777 | 0.849 | 0.905 |
| (14) Alaska | 0.749 | 0.01163 | 0.00461 | 0.859 | 0.916 |
| (15) U.S. Territories | 0.858 | 0.03443 | 0.00777 | 0.849 | 0.905 |
| U.S. Average | 0.676 | 0.01815 | 0.01053 | 0.900 | 0.959 |

^a Emission inventory electricity emission factors are based on average emissions intensity of total electric sector generation for specified state-based regions and include transmission and distribution (T&D) losses incurred in delivering electricity to the point of use.

^b Avoided emissions benchmark emission factors are based on average emissions intensity of fossil-fired generation for specified state-based regions, but do not exceed 0.9 metric tons CO₂e per MWh. Note that the Avoided emissions benchmarks do not include (T&D) losses.

^c Indirect emission reductions emission factors for reduced purchases of electricity are based on average emissions intensity of fossil-fired generation for specified state-based regions and include transmission and distribution (T&D) losses incurred in delivering electricity to point of use.

Source: U.S. Energy Information Administration, October, 2007.

F.2 Domestic Electricity Emission Factors, 1991-1994

| Region | Emission Inventory ^a | | | Emission Reductions | |
|--|---|----------------------|----------------------------|--|---|
| | Carbon Dioxide (Metric tons/ MWh) | Methane (kg/ MWh) | Nitrous Oxide (kg/ MWh) | Avoided Emissions ^b (Metric tons CO ₂ e/MWh) | Indirect Emissions ^c (Metric tons CO ₂ e/MWh) |
| (1) New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire and Maine | 0.500 | 0.03281 | 0.00816 | 0.817 | 0.877 |
| (2) New Jersey, Delaware, Pennsylvania, Maryland, West Virginia, Ohio, Indiana and Michigan | 0.799 | 0.01442 | 0.01320 | 0.900 | 1.012 |
| (3) Illinois and Wisconsin | 0.636 | 0.01312 | 0.01083 | 0.900 | 1.162 |
| (4) Missouri, Kentucky, Virginia, Arkansas, Tennessee, North Carolina, South Carolina, Louisiana, Mississippi, Alabama and Georgia | 0.681 | 0.02892 | 0.01351 | 0.900 | 1.025 |
| (5) Florida | 0.718 | 0.03551 | 0.01187 | 0.838 | 0.899 |
| (6) Texas | 0.786 | 0.01536 | 0.00891 | 0.813 | 0.872 |
| (7) Oklahoma and Kansas | 0.857 | 0.01379 | 0.01222 | 0.900 | 0.988 |
| (8) North Dakota, South Dakota, Nebraska, Minnesota and Iowa | 0.892 | 0.01498 | 0.01461 | 0.900 | 1.191 |
| (9) Colorado, Utah, Nevada, Wyoming and Montana | 0.945 | 0.01147 | 0.01497 | 0.900 | 1.061 |
| (10) New Mexico and Arizona | 0.690 | 0.00832 | 0.01064 | 0.900 | 1.024 |
| (11) Oregon, Washington and Idaho | 0.124 | 0.01490 | 0.00374 | 0.900 | 1.057 |
| (12) California | 0.345 | 0.01950 | 0.00338 | 0.621 | 0.666 |
| (13) Hawaii | 0.861 | 0.06238 | 0.01186 | 0.856 | 0.918 |
| (14) Alaska | 0.797 | 0.01440 | 0.00647 | 0.900 | 1.007 |
| (15) U.S. Territories | 0.861 | 0.06238 | 0.01186 | 0.856 | 0.918 |
| U.S. Average | 0.687 | 0.02051 | 0.01136 | 0.900 | 0.987 |

^a Emission inventory electricity emission factors are based on average emissions intensity of total electric sector generation for specified state-based regions and include transmission and distribution (T&D) losses incurred in delivering electricity to the point of use.

^b Avoided emissions benchmark emission factors are based on average emissions intensity of fossil-fired generation for specified state-based regions, but do not exceed 0.9 metric tons CO₂e per MWh. Note that the Avoided emissions benchmarks do not include (T&D) losses.

^c Indirect emission reductions emission factors for reduced purchases of electricity are based on average emissions intensity of fossil-fired generation for specified state-based regions and include transmission and distribution (T&D) losses incurred in delivering electricity to point of use.

Source: U.S. Energy Information Administration, October, 2007

F.3 Foreign Electricity Emission Factors, 1999-2002

| Region/Country | Emission Inventory ^a | | | Emission Reductions | |
|------------------------------------|---|----------------------|----------------------------|--|---|
| | Carbon Dioxide (Metric tons/ MWh) | Methane (kg/ MWh) | Nitrous Oxide (kg/ MWh) | Avoided Emissions ^b (Metric tons CO ₂ e/MWh) | Indirect Emissions ^c (Metric tons CO ₂ e/MWh) |
| OECD North America | | | | | |
| Canada | 0.223 | 0.00390 | 0.00351 | 0.802 | 0.876 |
| Mexico | 0.593 | 0.01676 | 0.00230 | 0.763 | 0.899 |
| OECD Europe^d | 0.387 | 0.00694 | 0.00505 | 0.694 | 0.749 |
| Austria | 0.197 | 0.00377 | 0.00207 | 0.558 | 0.594 |
| Belgium | 0.289 | 0.00420 | 0.00275 | 0.682 | 0.716 |
| Czech Republic | 0.604 | 0.00783 | 0.01074 | 0.782 | 0.854 |
| Denmark | 0.358 | 0.01181 | 0.00831 | 0.475 | 0.506 |
| Finland | 0.239 | 0.00395 | 0.00348 | 0.451 | 0.468 |
| France | 0.083 | 0.00136 | 0.00093 | 0.849 | 0.912 |
| Germany | 0.539 | 0.00637 | 0.00779 | 0.829 | 0.869 |
| Greece | 0.887 | 0.01453 | 0.01141 | 0.900 | 1.044 |
| Hungary | 0.437 | 0.01009 | 0.00540 | 0.673 | 0.773 |
| Iceland | 0.001 | 0.00003 | 0.00001 | 0.315 | 0.331 |
| Ireland | 0.699 | 0.01623 | 0.00765 | 0.738 | 0.807 |
| Italy | 0.525 | 0.01773 | 0.00482 | 0.649 | 0.693 |
| Luxembourg ^e | 0.387 | 0.00694 | 0.00505 | 0.694 | 0.749 |
| Netherlands | 0.479 | 0.00998 | 0.00492 | 0.545 | 0.568 |
| Norway | 0.005 | 0.00003 | 0.00001 | 0.410 | 0.442 |
| Poland | 0.730 | 0.01084 | 0.01528 | 0.749 | 0.848 |
| Portugal | 0.511 | 0.01459 | 0.00711 | 0.690 | 0.755 |
| Slovak Republic | 0.297 | 0.00357 | 0.00324 | 0.706 | 0.750 |
| Spain | 0.443 | 0.00923 | 0.00631 | 0.790 | 0.865 |
| Sweden | 0.048 | 0.00092 | 0.00046 | 0.495 | 0.537 |
| Switzerland | 0.022 | 0.00030 | 0.00005 | 0.379 | 0.408 |
| Turkey | 0.584 | 0.01135 | 0.00628 | 0.786 | 0.973 |
| United Kingdom | 0.475 | 0.00793 | 0.00549 | 0.643 | 0.701 |
| OECD Asia | 0.511 | 0.00787 | 0.00679 | 0.808 | 0.963 |
| Australia | 0.924 | 0.01008 | 0.01290 | 0.900 | 1.096 |
| Japan | 0.417 | 0.00839 | 0.00465 | 0.696 | 0.730 |
| Korea | 0.493 | 0.00758 | 0.00672 | 0.842 | 0.892 |
| New Zealand | 0.159 | 0.00307 | 0.00084 | 0.526 | 0.595 |
| Non-OECD Europe and Eurasia | 0.513 | 0.01300 | 0.01309 | 0.900 | 1.077 |
| Albania | 0.051 | 0.00251 | 0.00050 | 0.685 | 1.025 |
| Armenia | 0.230 | 0.00950 | 0.00095 | 0.490 | 0.693 |
| Azerbaijan | 0.613 | 0.03937 | 0.00710 | 0.664 | 0.790 |
| Belarus | 0.326 | 0.02441 | 0.00335 | 0.328 | 0.369 |
| Bosnia-Herzegovina | 0.770 | 0.01074 | 0.01544 | 0.900 | 2.145 |
| Bulgaria | 0.492 | 0.01087 | 0.01351 | 0.900 | 1.124 |
| Croatia ^e | 0.513 | 0.01300 | 0.01309 | 0.900 | 1.077 |
| Estonia | 0.774 | 0.02085 | 0.02810 | 0.900 | 1.300 |
| FYR of Macedonia | 0.773 | 0.01810 | 0.02453 | 0.900 | 1.255 |
| Georgia | 0.137 | 0.00392 | 0.00052 | 0.853 | 1.007 |
| Gibraltar | 0.870 | 0.05168 | 0.01034 | 0.874 | 0.874 |
| Kazakhstan | 1.293 | 0.01888 | 0.02150 | 0.900 | 1.814 |
| Kyrgyzstan | 0.102 | 0.00209 | 0.00168 | 0.407 | 0.605 |
| Latvia ^e | 0.513 | 0.01300 | 0.01309 | 0.900 | 1.077 |
| Lithuania | 0.165 | 0.00629 | 0.00103 | 0.343 | 0.407 |
| Malta | 0.904 | 0.05977 | 0.01195 | 0.900 | 1.051 |
| Republic of Moldova ^e | 0.513 | 0.01300 | 0.01309 | 0.900 | 1.077 |
| Romania | 0.426 | 0.01443 | 0.01135 | 0.676 | 0.785 |
| Russia | 0.351 | 0.01379 | 0.00668 | 0.403 | 0.463 |
| Serbia and Montenegro | 0.786 | 0.01291 | 0.01828 | 0.900 | 1.595 |
| Slovenia | 0.369 | 0.00674 | 0.00915 | 0.861 | 0.918 |
| Tajikistan | 0.038 | 0.00044 | 0.00004 | 0.475 | 0.554 |

| Region/Country | Emission Inventory ^a | | | Emission Reductions | |
|---------------------------------|---|----------------------|----------------------------|--|---|
| | Carbon Dioxide (Metric tons/ MWh) | Methane (kg/ MWh) | Nitrous Oxide (kg/ MWh) | Avoided Emissions ^b (Metric tons CO ₂ e/MWh) | Indirect Emissions ^c (Metric tons CO ₂ e/MWh) |
| Turkmenistan | 0.858 | 0.01951 | 0.00195 | 0.859 | 1.034 |
| Ukraine | 0.345 | 0.01035 | 0.00999 | 0.796 | 1.003 |
| Uzbekistan | 0.497 | 0.01976 | 0.00366 | 0.543 | 0.599 |
| Non-OECD Asia | 0.809 | 0.01607 | 0.01447 | 0.900 | 1.136 |
| Bangladesh | 0.625 | 0.02353 | 0.00274 | 0.664 | 0.783 |
| Brunei Darussalam | 0.830 | 0.02089 | 0.00213 | 0.831 | 0.893 |
| China (including Hong Kong) | 0.839 | 0.01458 | 0.01841 | 0.900 | 1.081 |
| Chinese Taipei | 0.631 | 0.01375 | 0.00882 | 0.845 | 0.887 |
| Dem. People's Republic of Korea | 0.630 | 0.00732 | 0.00747 | 0.900 | 1.645 |
| India | 0.999 | 0.01664 | 0.01959 | 0.900 | 1.702 |
| Indonesia | 0.722 | 0.02041 | 0.00855 | 0.865 | 1.001 |
| Malaysia | 0.528 | 0.01984 | 0.00365 | 0.585 | 0.623 |
| Myanmar | 0.456 | 0.02336 | 0.00318 | 0.696 | 1.023 |
| Nepal | 0.013 | 0.00093 | 0.00019 | 0.823 | 1.047 |
| Pakistan | 0.482 | 0.03146 | 0.00549 | 0.690 | 0.945 |
| Philippines | 0.526 | 0.01554 | 0.00777 | 0.879 | 1.021 |
| Singapore | 0.731 | 0.03997 | 0.00743 | 0.734 | 0.774 |
| Sri Lanka | 0.384 | 0.02717 | 0.00543 | 0.777 | 0.941 |
| Thailand | 0.583 | 0.01967 | 0.00489 | 0.631 | 0.688 |
| Vietnam | 0.417 | 0.01297 | 0.00389 | 0.900 | 1.101 |
| Other Asia ^f | 0.469 | 0.02202 | 0.00656 | 0.512 | 0.609 |
| Middle East^g | 0.743 | 0.01917 | 0.00507 | 0.760 | 0.857 |
| Bahrain | 0.876 | 0.01163 | 0.00116 | 0.877 | 0.954 |
| Cyprus | 0.851 | 0.03817 | 0.00763 | 0.854 | 0.909 |
| Iraq | 0.744 | 0.03809 | 0.00762 | 0.760 | 0.822 |
| Islamic Republic of Iran | 0.598 | 0.01874 | 0.00279 | 0.626 | 0.754 |
| Israel | 0.839 | 0.01769 | 0.01318 | 0.844 | 0.875 |
| Jordan | 0.775 | 0.03787 | 0.00746 | 0.782 | 0.890 |
| Kuwait | 0.790 | 0.03331 | 0.00633 | 0.792 | 0.907 |
| Lebanon | 0.754 | 0.04011 | 0.00802 | 0.799 | 0.943 |
| Oman | 0.856 | 0.01821 | 0.00258 | 0.857 | 1.035 |
| Qatar | 0.862 | 0.01156 | 0.00116 | 0.863 | 0.934 |
| Saudi Arabia | 0.816 | 0.02678 | 0.00487 | 0.818 | 0.873 |
| Syria | 0.655 | 0.03129 | 0.00564 | 0.751 | 1.099 |
| United Arab Emirates | 0.760 | 0.01205 | 0.00132 | 0.761 | 0.801 |
| Yemen | 1.029 | 0.05155 | 0.01031 | 0.900 | 1.482 |
| Africa | 0.683 | 0.00977 | 0.00955 | 0.860 | 0.985 |
| Algeria | 0.752 | 0.01506 | 0.00161 | 0.756 | 0.925 |
| Angola | 0.386 | 0.01341 | 0.00268 | 0.900 | 1.275 |
| Benin ^e | 0.683 | 0.00977 | 0.00955 | 0.860 | 0.985 |
| Botswana ^e | 0.683 | 0.00977 | 0.00955 | 0.860 | 0.985 |
| Cameroon | 0.016 | 0.00079 | 0.00016 | 0.830 | 1.076 |
| Congo ^e | 0.683 | 0.00977 | 0.00955 | 0.860 | 0.985 |
| Côte d'Ivoire | 0.408 | 0.00980 | 0.00103 | 0.635 | 0.788 |
| Democratic Republic of Congo | 0.004 | 0.00011 | 0.00002 | 0.900 | 1.188 |
| Egypt | 0.436 | 0.01365 | 0.00177 | 0.531 | 0.606 |
| Eritrea | 0.736 | 0.03845 | 0.00769 | 0.742 | 0.905 |
| Ethiopia | 0.011 | 0.00040 | 0.00008 | 0.900 | 1.060 |
| Gabon | 0.311 | 0.01011 | 0.00177 | 0.846 | 1.040 |
| Ghana | 0.150 | 0.00693 | 0.00139 | 0.875 | 1.112 |
| Kenya | 0.393 | 0.01342 | 0.00268 | 0.900 | 1.447 |
| Libya | 1.146 | 0.03699 | 0.00705 | 0.900 | 1.555 |
| Morocco | 0.809 | 0.01874 | 0.01467 | 0.868 | 1.030 |
| Mozambique ^e | 0.683 | 0.00977 | 0.00955 | 0.860 | 0.985 |
| Namibia ^e | 0.683 | 0.00977 | 0.00955 | 0.860 | 0.985 |
| Nigeria | 0.372 | 0.01444 | 0.00189 | 0.621 | 1.019 |

| Region/Country | Emission Inventory ^a | | | Emission Reductions | |
|----------------------------------|---|----------------------|----------------------------|--|---|
| | Carbon Dioxide (Metric tons/ MWh) | Methane (kg/ MWh) | Nitrous Oxide (kg/ MWh) | Avoided Emissions ^b (Metric tons CO ₂ e/MWh) | Indirect Emissions ^c (Metric tons CO ₂ e/MWh) |
| Senegal | 0.892 | 0.03793 | 0.00758 | 0.900 | 1.545 |
| South Africa | 0.911 | 0.01085 | 0.01627 | 0.900 | 1.069 |
| Sudan | 0.540 | 0.01962 | 0.00392 | 0.900 | 1.221 |
| Togo ^e | 0.683 | 0.00977 | 0.00955 | 0.860 | 0.985 |
| Tunisia | 0.608 | 0.01566 | 0.00196 | 0.614 | 0.692 |
| United Republic of Tanzania | 0.108 | 0.00249 | 0.00105 | 0.900 | 1.767 |
| Zambia | 0.007 | 0.00017 | 0.00006 | 0.900 | 1.145 |
| Zimbabwe ^e | 0.683 | 0.00977 | 0.00955 | 0.860 | 0.985 |
| Other Africa ^h | 0.431 | 0.01631 | 0.00435 | 0.794 | 0.826 |
| Central and South America | 0.204 | 0.00520 | 0.00170 | 0.780 | 0.940 |
| Argentina | 0.317 | 0.00570 | 0.00101 | 0.569 | 0.671 |
| Bolivia | 0.401 | 0.00730 | 0.00115 | 0.850 | 0.968 |
| Brazil | 0.093 | 0.00251 | 0.00106 | 0.900 | 1.140 |
| Chile | 0.333 | 0.00586 | 0.00417 | 0.693 | 0.742 |
| Colombia | 0.157 | 0.00280 | 0.00185 | 0.647 | 0.823 |
| Costa Rica | 0.015 | 0.00057 | 0.00011 | 0.900 | 1.073 |
| Cuba | 1.104 | 0.03956 | 0.00791 | 0.900 | 1.412 |
| Dominican Republic | 0.771 | 0.04458 | 0.01017 | 0.850 | 1.247 |
| Ecuador | 0.256 | 0.01523 | 0.00304 | 0.779 | 1.055 |
| El Salvador | 0.302 | 0.01764 | 0.00353 | 0.680 | 0.774 |
| Guatemala | 0.418 | 0.02068 | 0.00593 | 0.822 | 1.074 |
| Haiti | 0.347 | 0.03417 | 0.00683 | 0.720 | 1.461 |
| Honduras | 0.290 | 0.01656 | 0.00331 | 0.765 | 0.957 |
| Jamaica | 0.819 | 0.03716 | 0.00743 | 0.847 | 0.932 |
| Netherlands Antilles | 0.793 | 0.04090 | 0.00818 | 0.796 | 0.936 |
| Nicaragua | 0.650 | 0.04223 | 0.00845 | 0.804 | 1.202 |
| Panama | 0.286 | 0.01651 | 0.00330 | 0.777 | 0.998 |
| Paraguay | 0.000 | 0.00000 | 0.00000 | 0.900 | 1.970 |
| Peru | 0.148 | 0.00534 | 0.00135 | 0.826 | 0.931 |
| Trinidad and Tobago | 0.751 | 0.00796 | 0.00080 | 0.755 | 0.821 |
| Uruguay | 0.055 | 0.00281 | 0.00056 | 0.848 | 1.043 |
| Venezuela | 0.251 | 0.00628 | 0.00106 | 0.854 | 1.134 |
| Other Latin America ⁱ | 0.584 | 0.03073 | 0.00614 | 0.705 | 0.750 |

^a Emission inventory electricity emission factors are based on average emissions intensity of total electric sector generation for specified countries or country-based regions and include transmission and distribution (T&D) losses incurred in delivering electricity to the point of use.

^b Avoided emissions benchmark emission factors are based on average emissions intensity of fossil-fired generation for specified countries or country-based regions, but do not exceed 0.9 metric tons CO₂e per MWh. Note that the Avoided emissions benchmarks do not include (T&D) losses.

^c Indirect emission reductions emission factors for reduced purchases of electricity are based on average emissions intensity of fossil-fired generation for specified countries or country-based regions and include transmission and distribution (T&D) losses incurred in delivering electricity to point of use.

^d Use the factors for OECD Europe for western European countries not listed (e.g., Andorra, Monaco, Liechtenstein, San Marino, Vatican City).

^e The weighted average emission factors for the region are provided for countries that import more than 25 percent of electricity consumed in either or both time periods (1991-1994 or 1999-2002).

^f Use the factors for Other Asia for non-OECD Asian countries not listed.

^g Use the weighted average Middle East factors for the West Bank and Gaza Strip.

^h Use the factors for Other Africa for African countries not listed.

ⁱ Use the factors for Other Latin America for Central and South American countries not listed.

Source: U.S. Energy Information Administration, based on data from the following sources: International Energy Agency (IEA), *Electricity Information Database 2007* and *CO₂ Emissions from Fuel Combustion Database 2006*, <http://www.iea.org>, October 2007.

F.4 Foreign Electricity Emission Factors, 1991-1994

| Region/Country | Emission Inventory ^a | | | Emission Reductions | |
|--|---|----------------------|----------------------------|--|---|
| | Carbon Dioxide (Metric tons/ MWh) | Methane (kg/ MWh) | Nitrous Oxide (kg/ MWh) | Avoided Emissions ^b (Metric tons CO ₂ e/MWh) | Indirect Emissions ^c (Metric tons CO ₂ e/MWh) |
| OECD North America | | | | | |
| Canada | 0.188 | 0.00357 | 0.00317 | 0.882 | 0.954 |
| Mexico | 0.558 | 0.02090 | 0.00490 | 0.740 | 0.859 |
| OECD Europe^d | 0.432 | 0.00750 | 0.00597 | 0.769 | 0.829 |
| Austria | 0.223 | 0.00434 | 0.00203 | 0.599 | 0.639 |
| Belgium | 0.366 | 0.00451 | 0.00423 | 0.882 | 0.930 |
| Czech Republic | 0.628 | 0.00800 | 0.01146 | 0.786 | 0.855 |
| Denmark | 0.506 | 0.01102 | 0.01309 | 0.606 | 0.650 |
| Finland | 0.249 | 0.00444 | 0.00423 | 0.458 | 0.479 |
| France | 0.094 | 0.00156 | 0.00122 | 0.900 | 1.006 |
| Germany | 0.602 | 0.00708 | 0.00858 | 0.872 | 0.902 |
| Greece | 1.020 | 0.01634 | 0.01267 | 0.900 | 1.196 |
| Hungary | 0.501 | 0.01046 | 0.00574 | 0.778 | 0.879 |
| Iceland | 0.001 | 0.00005 | 0.00001 | 0.429 | 0.463 |
| Ireland | 0.788 | 0.01481 | 0.00985 | 0.834 | 0.923 |
| Italy | 0.560 | 0.02370 | 0.00604 | 0.710 | 0.764 |
| Luxembourg ^e | 0.432 | 0.00750 | 0.00597 | 0.769 | 0.829 |
| Netherlands | 0.588 | 0.01018 | 0.00568 | 0.627 | 0.652 |
| Norway | 0.004 | 0.00001 | 0.00001 | 0.654 | 0.703 |
| Poland | 0.713 | 0.01104 | 0.01587 | 0.739 | 0.855 |
| Portugal | 0.569 | 0.01873 | 0.00861 | 0.814 | 0.920 |
| Slovak Republic | 0.432 | 0.00618 | 0.00470 | 0.791 | 0.857 |
| Spain | 0.456 | 0.00728 | 0.00682 | 0.900 | 1.050 |
| Sweden | 0.056 | 0.00108 | 0.00047 | 0.390 | 0.419 |
| Switzerland | 0.023 | 0.00040 | 0.00007 | 0.541 | 0.583 |
| Turkey | 0.605 | 0.00878 | 0.00656 | 0.900 | 1.204 |
| United Kingdom | 0.644 | 0.00969 | 0.00942 | 0.887 | 0.966 |
| OECD Asia | 0.494 | 0.01046 | 0.00521 | 0.777 | 0.821 |
| Australia | 0.855 | 0.00992 | 0.01284 | 0.900 | 1.030 |
| Japan | 0.430 | 0.01091 | 0.00410 | 0.696 | 0.733 |
| Korea | 0.582 | 0.01005 | 0.00461 | 0.900 | 1.106 |
| New Zealand | 0.122 | 0.00226 | 0.00049 | 0.550 | 0.619 |
| Non-OECD Europe and Eurasia^f | 0.521 | 0.01573 | 0.01345 | 0.858 | 0.995 |
| Albania ^f | 0.074 | 0.00416 | 0.00083 | 0.512 | 1.025 |
| Armenia ^f | 0.122 | 0.01512 | 0.00236 | 0.295 | 0.453 |
| Azerbaijan ^g | 0.723 | 0.05159 | 0.01014 | 0.851 | 1.024 |
| Belarus ^f | 0.364 | 0.02941 | 0.00456 | 0.356 | 0.396 |
| Bosnia-Herzegovina ^f | 0.831 | 0.00703 | 0.01032 | 0.900 | 3.334 |
| Bulgaria ^f | 0.534 | 0.01351 | 0.01486 | 0.895 | 1.087 |
| Croatia ^e | 0.521 | 0.01573 | 0.01345 | 0.858 | 0.995 |
| Estonia ^f | 0.717 | 0.02234 | 0.02870 | 0.823 | 1.030 |
| FYR of Macedonia ^f | 0.873 | 0.01640 | 0.02379 | 0.900 | 1.296 |
| Georgia ^f | 0.333 | 0.00979 | 0.00130 | 0.452 | 0.544 |
| Gibraltar ^f | 0.922 | 0.05229 | 0.01046 | 0.900 | 0.938 |
| Kazakhstan ^f | 1.355 | 0.01979 | 0.02090 | 0.900 | 1.705 |
| Kyrgyzstan ^f | 0.114 | 0.00325 | 0.00225 | 0.395 | 0.469 |
| Latvia ^e | 0.521 | 0.01573 | 0.01345 | 0.858 | 0.995 |
| Lithuania ^f | 0.218 | 0.00778 | 0.00147 | 0.386 | 0.480 |
| Malta ^f | 1.312 | 0.04383 | 0.01666 | 0.900 | 1.451 |
| Republic of Moldova ^e | 0.521 | 0.01573 | 0.01345 | 0.858 | 0.995 |
| Romania ^f | 0.468 | 0.01782 | 0.01126 | 0.667 | 0.745 |
| Russia ^f | 0.321 | 0.01612 | 0.00630 | 0.355 | 0.394 |
| Serbia and Montenegro ^f | 0.792 | 0.01346 | 0.01895 | 0.900 | 1.453 |
| Slovenia ^f | 0.363 | 0.00761 | 0.00972 | 0.774 | 0.828 |
| Tajikistan ^f | 0.064 | 0.00064 | 0.00006 | 0.517 | 0.581 |

| Region/Country | Emission Inventory ^a | | | Emission Reductions | |
|--|---|----------------------|----------------------------|--|---|
| | Carbon Dioxide (Metric tons/ MWh) | Methane (kg/ MWh) | Nitrous Oxide (kg/ MWh) | Avoided Emissions ^b (Metric tons CO ₂ e/MWh) | Indirect Emissions ^c (Metric tons CO ₂ e/MWh) |
| Turkmenistan ^h | 0.521 | 0.01573 | 0.01140 | 0.858 | 0.995 |
| Ukraine ^f | 0.387 | 0.01450 | 0.01196 | 0.863 | 0.965 |
| Uzbekistan ^f | 0.558 | 0.01730 | 0.00365 | 0.679 | 0.752 |
| Non-OECD Asia^f | 0.778 | 0.01670 | 0.01391 | 0.900 | 1.113 |
| Bangladesh ^f | 0.613 | 0.02479 | 0.00283 | 0.668 | 0.863 |
| Brunei Darussalam ^f | 1.034 | 0.02037 | 0.00208 | 0.900 | 1.087 |
| China (including Hong Kong) ^f | 0.839 | 0.01458 | 0.01841 | 0.900 | 1.081 |
| Chinese Taipei ^f | 0.521 | 0.01476 | 0.00776 | 0.828 | 0.878 |
| Dem. People's Republic of Korea ^f | 0.563 | 0.00450 | 0.00658 | 0.900 | 1.613 |
| India ^f | 0.963 | 0.01357 | 0.01672 | 0.900 | 1.552 |
| Indonesia ^f | 0.709 | 0.02590 | 0.00832 | 0.898 | 1.022 |
| Malaysia ^f | 0.596 | 0.02517 | 0.00532 | 0.706 | 0.778 |
| Myanmar ^f | 0.477 | 0.01881 | 0.00245 | 0.900 | 1.479 |
| Nepal ^f | 0.065 | 0.00387 | 0.00077 | 0.900 | 1.242 |
| Pakistan ^f | 0.403 | 0.02399 | 0.00408 | 0.702 | 0.916 |
| Philippines ^f | 0.516 | 0.02985 | 0.00687 | 0.856 | 1.019 |
| Singapore ^f | 0.997 | 0.03971 | 0.00739 | 0.900 | 1.043 |
| Sri Lanka ^f | 0.106 | 0.00516 | 0.00103 | 0.900 | 1.366 |
| Thailand ^f | 0.658 | 0.02559 | 0.00714 | 0.707 | 0.782 |
| Vietnam ^f | 0.290 | 0.01131 | 0.00350 | 0.900 | 1.531 |
| Other Asia ^{f,i} | 0.500 | 0.02652 | 0.00700 | 0.550 | 0.575 |
| Middle East^{f,j} | 0.756 | 0.02439 | 0.00512 | 0.792 | 0.876 |
| Bahrain ^f | 0.998 | 0.01121 | 0.00112 | 0.900 | 1.048 |
| Cyprus ^f | 0.878 | 0.03805 | 0.00761 | 0.881 | 0.934 |
| Iraq ^f | 0.648 | 0.03665 | 0.00733 | 0.667 | 0.697 |
| Islamic Republic of Iran ^f | 0.607 | 0.01938 | 0.00316 | 0.690 | 0.790 |
| Israel ^f | 0.872 | 0.02120 | 0.01233 | 0.877 | 0.918 |
| Jordan ^f | 0.916 | 0.03601 | 0.00706 | 0.900 | 1.018 |
| Kuwait ^f | 0.753 | 0.02551 | 0.00453 | 0.755 | 0.818 |
| Lebanon ^f | 0.676 | 0.03437 | 0.00687 | 0.814 | 0.936 |
| Oman ^f | 0.899 | 0.01779 | 0.00256 | 0.900 | 1.036 |
| Qatar ^f | 1.046 | 0.01134 | 0.00113 | 0.900 | 1.111 |
| Saudi Arabia ^f | 0.848 | 0.02770 | 0.00507 | 0.850 | 0.916 |
| Syria ^f | 0.589 | 0.03017 | 0.00558 | 0.732 | 1.034 |
| United Arab Emirates ^f | 0.799 | 0.01286 | 0.00143 | 0.800 | 0.886 |
| Yemen ^f | 0.973 | 0.04627 | 0.00925 | 0.900 | 1.258 |
| Africa^{f,k} | 0.724 | 0.01304 | 0.01040 | 0.900 | 1.020 |
| Algeria ^f | 0.711 | 0.01491 | 0.00163 | 0.720 | 0.865 |
| Angola ^f | 0.171 | 0.00359 | 0.00072 | 0.900 | 3.068 |
| Benin ^e | 0.724 | 0.01304 | 0.01040 | 0.900 | 1.020 |
| Botswana ^e | 0.724 | 0.01304 | 0.01040 | 0.900 | 1.020 |
| Cameroon ^f | 0.010 | 0.00044 | 0.00009 | 0.887 | 1.046 |
| Congo ^e | 0.724 | 0.01304 | 0.01040 | 0.900 | 1.020 |
| Côte d'Ivoire ^f | 0.303 | 0.01830 | 0.00366 | 0.632 | 0.759 |
| Democratic Republic of Congo ^f | 0.003 | 0.00011 | 0.00002 | 0.900 | 1.138 |
| Egypt ^f | 0.519 | 0.01702 | 0.00277 | 0.665 | 0.744 |
| Eritrea ^f | 1.495 | 0.03707 | 0.00741 | 0.900 | 1.754 |
| Ethiopia ^f | 0.062 | 0.00269 | 0.00054 | 0.823 | 0.928 |
| Gabon ^f | 0.269 | 0.00614 | 0.00096 | 0.900 | 1.127 |
| Ghana ^f | 0.002 | 0.00009 | 0.00002 | 0.835 | 0.906 |
| Kenya ^f | 0.075 | 0.00175 | 0.00035 | 0.900 | 1.870 |
| Libya ^f | 0.882 | 0.04359 | 0.00872 | 0.885 | 1.219 |
| Morocco ^f | 0.908 | 0.02611 | 0.00860 | 0.900 | 1.043 |
| Mozambique ^e | 0.724 | 0.01304 | 0.01040 | 0.900 | 1.020 |
| Namibia ^e | 0.724 | 0.01304 | 0.01040 | 0.900 | 1.020 |
| Nigeria ^f | 0.366 | 0.01505 | 0.00213 | 0.595 | 0.912 |

| Region/Country | Emission Inventory ^a | | | Emission Reductions | |
|--|---|----------------------|----------------------------|--|---|
| | Carbon Dioxide (Metric tons/ MWh) | Methane (kg/ MWh) | Nitrous Oxide (kg/ MWh) | Avoided Emissions ^b (Metric tons CO ₂ e/MWh) | Indirect Emissions ^c (Metric tons CO ₂ e/MWh) |
| Senegal ^f | 0.935 | 0.03362 | 0.00668 | 0.900 | 1.170 |
| South Africa ^f | 0.931 | 0.01102 | 0.01650 | 0.900 | 1.077 |
| Sudan ^f | 0.394 | 0.01526 | 0.00305 | 0.900 | 1.449 |
| Togo ^e | 0.724 | 0.01304 | 0.01040 | 0.900 | 1.020 |
| Tunisia ^f | 0.701 | 0.02176 | 0.00356 | 0.709 | 0.791 |
| United Republic of Tanzania ^f | 0.172 | 0.00435 | 0.00118 | 0.900 | 1.830 |
| Zambia ^f | 0.011 | 0.00015 | 0.00009 | 0.900 | 1.581 |
| Zimbabwe ^e | 0.724 | 0.01304 | 0.01040 | 0.900 | 1.020 |
| Other Africa ^f | 0.442 | 0.01644 | 0.00389 | 0.847 | 0.887 |
| Central and South America^{f,i} | 0.189 | 0.00517 | 0.00145 | 0.900 | 1.080 |
| Argentina ^f | 0.358 | 0.00816 | 0.00178 | 0.753 | 0.939 |
| Bolivia ^f | 0.398 | 0.00567 | 0.00082 | 0.900 | 1.062 |
| Brazil ^f | 0.057 | 0.00136 | 0.00065 | 0.900 | 1.408 |
| Chile ^f | 0.212 | 0.00357 | 0.00305 | 0.900 | 1.295 |
| Colombia ^f | 0.228 | 0.00368 | 0.00291 | 0.866 | 1.102 |
| Costa Rica ^f | 0.138 | 0.00538 | 0.00108 | 0.900 | 1.052 |
| Cuba ^f | 1.097 | 0.03931 | 0.00786 | 0.900 | 1.465 |
| Dominican Republic ^f | 0.808 | 0.03977 | 0.00963 | 0.900 | 1.324 |
| Ecuador ^f | 0.216 | 0.01083 | 0.00217 | 0.900 | 1.198 |
| El Salvador ^f | 0.322 | 0.01369 | 0.00274 | 0.900 | 1.157 |
| Guatemala ^f | 0.291 | 0.01379 | 0.00276 | 0.845 | 0.968 |
| Haiti ^f | 0.233 | 0.01332 | 0.00266 | 0.900 | 1.775 |
| Honduras ^f | 0.081 | 0.00657 | 0.00131 | 0.604 | 0.848 |
| Jamaica ^f | 0.978 | 0.03587 | 0.00717 | 0.900 | 1.114 |
| Netherlands Antilles ^f | 0.791 | 0.04030 | 0.00806 | 0.794 | 0.920 |
| Nicaragua ^f | 0.450 | 0.02419 | 0.00484 | 0.891 | 1.222 |
| Panama ^f | 0.325 | 0.01293 | 0.00259 | 0.900 | 1.450 |
| Paraguay ^f | 0.000 | 0.00001 | 0.00000 | 0.900 | 1.397 |
| Peru ^f | 0.184 | 0.00871 | 0.00173 | 0.881 | 1.091 |
| Trinidad and Tobago ^f | 0.770 | 0.00817 | 0.00082 | 0.776 | 0.871 |
| Uruguay ^f | 0.058 | 0.00293 | 0.00059 | 0.876 | 1.103 |
| Venezuela ^f | 0.234 | 0.00455 | 0.00069 | 0.786 | 0.970 |
| Other Latin America ^f | 0.686 | 0.02953 | 0.00590 | 0.855 | 0.904 |

^a Emission inventory electricity emission factors are based on average emissions intensity of total electric sector generation for specified countries or country-based regions and include transmission and distribution (T&D) losses incurred in delivering electricity to the point of use.

^b Avoided emissions benchmark emission factors are based on average emissions intensity of fossil-fired generation for specified countries or country-based regions, but do not exceed 0.9 metric tons CO₂e per MWh. Note that the Avoided emissions benchmarks do not include (T&D) losses.

^c Indirect emission reductions emission factors for reduced purchases of electricity are based on average emissions intensity of fossil-fired generation for specified countries or country-based regions and include transmission and distribution (T&D) losses incurred in delivering electricity to point of use.

^d Use the factors for OECD Europe for western European countries not listed (e.g., Andorra, Monaco, Liechtenstein, San Marino, Vatican City).

^e The weighted average emission factors for the region are provided for countries that import more than 25 percent of electricity consumed in either or both time periods (1991-1994 or 1999-2002).

^f The weighted average emission factors for 1992-1994 are provided because data for 1991 were unavailable.

^g The weighted average emission factors for 1993-1994 are provided because 1991 and 1992 data were unavailable for Azerbaijan.

^h The weighted average emission factors for the region are provided since 1991-1994 data were not available for Turkmenistan.

ⁱ Use the factors for Other Asia for non-OECD Asian countries not listed.

^j Use the weighted average Middle East factors for the West Bank and Gaza Strip.

^k Use the factors for Other Africa for African countries not listed.

^l Use the factors for Other Latin America for Central and South American countries not listed.

Source: U.S. Energy Information Administration, based on data from the following sources: International Energy Agency (IEA), *Electricity Information Database 2007* and *CO₂ Emissions from Fuel Combustion Database 2006*, <http://www.iea.org>, October 2007.

Appendix G. Estimation Methods and Ratings

| Source | Method | Rating | Code |
|---------------------------------|---|--------|-------|
| Stationary Combustion | | | |
| Carbon Dioxide From Coal | CEM or mass balance supervised by a government regulatory agency | A | C01A1 |
| | Mass balance, measured consumption, emission factor derived from plant-specific periodic analysis | A | C01A2 |
| | Mass balance, measured consumption, emission factor derived from plant-specific single analysis | B | C01B1 |
| | Mass balance, estimated consumption based on purchases or deliveries, emission factor derived from plant-specific periodic analysis | B | C01B2 |
| | Mass balance, measured consumption, emission factor is default based on coal rank | C | C01C1 |
| | Mass balance, estimated consumption based on purchases or deliveries, emission factor derived from plant-specific single analysis | C | C01C2 |
| | Mass balance, estimated consumption based on purchases or deliveries, emission factor is default based on coal rank | D | C01D1 |
| Carbon Dioxide From Natural Gas | Continuous emissions monitoring or mass balance supervised by a Government regulatory agency | A | C02A1 |
| | Mass balance where heating value is known and falls between 975 and 1100 btu per standard cubic foot. | A | C02A2 |
| | Mass balance, where heating value and gas composition are known and used to calculate a situation-specific emission factor (even if outside 975-1100 btu/scf range) | A | C02A3 |
| | Mass balance based on purchases where only volume is known (no heating value); | B | C02B1 |
| | Mass balance of "rich" flare gas, or low btu gas where composition is not known | C | C02C1 |
| Carbon Dioxide From Fuel Oil | Continuous emissions monitoring or mass balance supervised by a government regulatory agency | A | C03A1 |
| | Mass balance Based on actual fuel consumption and specific information about fuel quality (e.g., heating value, density, or actual carbon content) | A | C03A2 |
| | Mass balance based on actual fuel consumption (or purchases if stock changes are not material), but default emission factors | B | C03B1 |
| | Mass balance based on purchases and default emissions factors | B | C03B2 |

| Source | Method | Rating | Code |
|---|---|--------|-------|
| Liquid Petroleum Gas | CEM or mass balance using actual quantities consumed (volume, weight or heating value) | A | C04A1 |
| | Mass balance using actual quantities consumed (volume weight, or heating value) so long as the actual product is known to be propane or butane. | A | C04A2 |
| | Mass balance using fuel purchase data (with no correction for stock change, if material) | B | C04B1 |
| | Mass balance using "LPG" without identification of a particular compound | C | C04C1 |
| Methane & Nitrous Oxide Emissions From Stationary Source Combustion | Continuous Emission Monitor supervised by a regulatory agency | A | C05A1 |
| | Unsupervised CEM, unit-specific emission factors base on actual measurements | B | C05B1 |
| | Default emission factors based on published sources. | C | C05C1 |
| Carbon Dioxide Emissions From Refinery Fuel Gas | Continuous emission monitoring (or mass balance), supervised by a government regulatory agency | A | C06A1 |
| | Mass balance, based on volume, density and composition from multiple gas samples | A | C06A2 |
| | Mass balance, based on volume plus density or heating value, and composition from a single gas sample | B | C06B1 |
| | Mass balance, based on actual heating value, using default emissions factor | C | C06C1 |
| | Mass balance, based on volume, using assumed heating value and default emissions factor | D | C06D1 |
| Carbon Dioxide Emissions From Petroleum Coke | Continuous emission monitoring (or mass balance supervised by a regulatory agency | A | C07A1 |
| | Mass balance based on measured consumption or complete estimate of usage (including catalyst coke and non-fuel use, if applicable), actual carbon content composition of coke based on periodic samples | A | C07A2 |
| | Mass balance based on measured consumption or complete estimate of usage (including catalyst coke and non-fuel use, if applicable), emissions factor based on one-time sample | B | C07B1 |
| | Mass balance based on measured consumption or complete estimate of usage, plus default emissions factor | C | C07C1 |
| | Mass balance based on marketable coke only (if catalyst coke is being combusted) and default emissions factor | D | C07D1 |

| Source | Method | Rating | Code |
|--|--|--------|-------|
| Carbon Dioxide From Venting and Flaring of Natural Gas | Measured venting or flaring; actual composition data from periodic samples | A | C08A1 |
| | Estimated venting or flaring; actual composition data from single sample | B | C08B1 |
| | Estimated venting or flaring; assumed composition using default emission factor | C | C08C1 |
| Carbon Dioxide From Combustion of Crude Oil | Continuous emission monitoring or mass balance supervised by a regulatory agency | A | C09A1 |
| | Measured fuel use; emissions factor based on actual composition data | A | C09A2 |
| | Measured fuel use; assumed composition using default emission factor | B | C09B1 |
| Carbon Dioxide Emissions From Waste Fuels | Continuous emission monitoring or mass balance supervised by a regulatory agency. Pro-rated by measured waste composition. | A | C10A1 |
| | Continuous emission monitoring or mass balance supervised by a regulatory agency, with emissions pro-rated by default waste composition. | B | C10B1 |
| | Default emissions factor multiplied by quantity of waste combusted | C | C10C1 |
| Carbon Dioxide From Non-Fuel Use of Fossil Fuel | Facility-level mass balance computation with known product composition | A | C11A1 |
| | Facility-level mass balance computation with default emissions factor for product | B | C11B1 |
| | Product consumption multiplied by default emissions factor multiplied by a default fraction combustion for asphalt, lubricants, and solvents | B | C11B2 |
| | Product consumption multiplied by default emissions factor multiplied by default fraction sequestered (petrochemical feedstocks). | C | C11C1 |
| Mobile Sources | | | |
| Carbon Dioxide Emissions From Highway Vehicles | Mass balance based on fuel volume burned, or bulk purchase data adjusted for stock change | A | D01A1 |
| | Mass balance based on bulk fuel purchase not accounting for stock change | B | D01B1 |
| | Mass balance based on distance traveled and fuel economy data, or hours, horsepower-hours, or ton-distance shipped and fuel consumption per unit activity data | C | D01C1 |
| | Mass balance based on fuel price or expenditure data | D | D01D1 |

| Source | Method | Rating | Code |
|--|--|--------|-------|
| Carbon Dioxide Emissions From Off –Road Vehicles, Including Diesel Locomotives | Mass balance based on actual fuel consumed or via bulk purchase data that accounts for stock change | A | D02A1 |
| | Mass balance using fuel consumption based on bulk purchase not accounting for stock change | B | D02B1 |
| | Mass balance based on distance traveled and fuel economy for each engine, or hours, horsepower hours of operation, or ton-distance shipped and fuel consumed per unit activity data | C | D02C1 |
| | Mass balance based on fuel price data only or default factors for fuel consumption per unit activity data | D | D02D1 |
| Carbon Dioxide Emissions From Water Borne Vessels | Mass balance based on actual fuel quantities consumed or bulk purchase records accounting for stock change | A | D03A1 |
| | Mass balance based on bulk fuel purchase data not adjusted for stock change | B | D03B1 |
| | Mass balance based on distance traveled data and fuel economy for each engine, or hours, horsepower hours of operation, or ton-distance shipped and specific information on fuel consumed per unit activity data | C | D03C1 |
| | Mass balance based on fuel price data only or default factors for fuel consumption per unit of activity data | D | D03D1 |
| Carbon Dioxide Emissions From Aircraft | Mass balance based on measured quantities loaded into vehicle or bulk purchase records accounting for stock change | A | D04A1 |
| | Mass balance fuel consumption volume from bulk purchase data not adjusted for stock change | B | D04B1 |
| | Mass balance based on distance traveled and fuel economy for each engine or hours, horsepower hours, or ton-distance shipped and specific information on fuel consumed per unit activity data | C | D04C1 |
| | Mass balance based on fuel price data only or default factors for fuel consumption per unit of activity data | D | D04D1 |

| Source | Method | Rating | Code |
|---|--|--------|-------|
| Methane and Nitrous Oxide From Highway Vehicles | Inference based on vehicle distance traveled (or fuel consumption) and an emission factor for specific vehicle types, provided combustion and emission control technology are known for each vehicle | A | D04A1 |
| | Inference based on total vehicle distance traveled (for an uncharacterized vehicle mix) and weight average emission factor | B | D04B1 |
| Methane and Nitrous Oxide From Off-Road and Marine Vessels | Inference based on fuel or energy consumption data and specific factors | A | D05A1 |
| | Inference based other activity data (e.g., distance traveled) to calculate fuel consumption, if fuel economy factors are specific | B | D05B1 |
| | Inference based on default/generic fuel economy values and available activity data | C | D05C1 |
| Methane and Nitrous Oxide From Aircraft | Inference based on individual jet engine aircraft LTO and cruise data and IPCC default emission factors | A | D06A1 |
| | Known fuel/energy consumption and either LTO approach or emissions per kilogram fuel | B | D06B1 |
| | Inference based on other activity data (e.g., distance traveled) use to calculate fuel consumption to use with IPCC factors, provided fuel economy data are specific | C | D06C1 |
| | Inference using other activity data (e.g., hours) and default/generic fuel economy values | D | D06D1 |
| Hydrofluorocarbons From Mobile Refrigeration and Air-Conditioning | Mass balance, provided specific features and data availability | A | D07A1 |
| | Mass balance based on emission factors (percent) for initial charge, annual leakage, capacity remaining at disposal, and recovery | C | D07C1 |
| Industrial Processes | | | |
| Nitrous Oxide Emissions From Adipic Acid Production | Direct measurement, including continuous emissions monitoring and periodic direct measurements | A | E01A1 |
| | Default emission factors using known destruction and utilization factors for an abatement technology | B | E01B1 |
| | Default emission factors, using utilization factors, and reflecting an uncontrolled stream or default factor for an abatement technology | C | E01C1 |

| Source | Method | Rating | Code |
|--|---|--------|-------|
| Carbon Dioxide, PFCs, and Sulfur Hexafluoride Emissions From Aluminum Production | Mass balance based on quantity and composition of reducing agents consumed | A | E02A1 |
| | Mass balance based on default anode composition values and data on quantity of reducing agent consumed | B | E02B1 |
| | Default emission factors | B | E02B2 |
| PFCs From Aluminum Production | Smelter-specific slope factors based on representative field measurements | A | E03A1 |
| | Technology-specific slope factors (or overvoltage coefficients), anode effect frequency and duration (or anode effect overvoltage), and production data | B | E03B1 |
| | Inference method based on most recent IPCC default emission factors | C | E03C1 |
| Sulfur Hexafluoride From Aluminum Production | Inference method using purchase data | A | E04A1 |
| Carbon Dioxide From Ammonia Production | Direct measurement, including continuous emission monitoring | A | E05A1 |
| | Mass balance when carbon content of feedstock fuel is known | B | E05B1 |
| | Mass balance using default carbon content value | B | E05B2 |
| | Default emission factor of 1.26 tons carbon dioxide per ton ammonia produced | C | E05C1 |
| Carbon Dioxide From Cement Production – Clinker Production | Mass balance, clinker method, based on measured calcium oxide content of clinker | A | E06A1 |
| | Clinker method based on measured magnesium oxide content of clinker | A | E06A2 |
| | Default emission factor (includes emissions from CaO and MgO) | B | E06B1 |
| | Mass balance, cement method, based on plant-specific raw material data and clinker content of cement | A | E06A3 |
| | Default clinker and additive fraction values for appropriate cement production mix | B | E06B2 |
| | Default emission factor of 0.499 tons carbon dioxide per ton cement produced | C | E06C2 |
| Carbon Dioxide From Cement Production – Discarded Bypass/Cement Kiln Dust | Direct measurement | A | E07A1 |
| | Plant-specific clinker emission factors and data on portion of CKD that is calcined | B | E07B1 |
| | Inference based on discarded CKD value, assumed equal to two percent of CO ₂ from clinker production | C | E07C1 |
| Carbon Dioxide From Hydrogen Production | Direct measurement | A | E08A1 |
| | Mass balance based on feedstock use of fossil fuels | A | E08A2 |
| Carbon Dioxide Emissions From Iron and Steel Production – Reducing Agent | Plant-specific data on reducing agent consumption and its carbon content | A | E09A1 |
| | Default reducing agent emission factors | B | E09B1 |

| Source | Method | Rating | Code |
|---|---|--------|-------|
| Carbon Dioxide Emissions From Iron and Steel Production – Furnace Additives | Mass balance using default furnace-additive emission factor | A | E10A1 |
| Carbon Dioxide Emissions From Iron and Steel Production – Conversion of Iron to Steel | Mass balance based on plant-specific carbon content of pig iron minus plant-specific carbon content of steel | A | E11A2 |
| | Mass balance based on default carbon content values | B | E11B1 |
| Carbon Dioxide Emissions From Iron and Steel Production – Graphite Electrodes in EAF Furnaces | Mass Balance using plant-specific graphite electrode emission factors | A | E12A1 |
| | Mass Balance using default emission factor | B | E13A2 |
| Carbon Dioxide Emissions From Iron and Steel Production – All Processes | Production times default emission factor of 1.75 tons carbon per ton of steel | C | E14C1 |
| Carbon Dioxide Emissions From Lime Production | Mass balance using limestone production emission factor based on measured lime purity value | A | E15A1 |
| | Mass balance using IPCC default emission factor | B | E15B1 |
| Carbon Dioxide From Limestone and Dolomite Use | Mass balance using plant-specific emission factor based on limestone and dolomite content of the raw material consumed | A | E16A1 |
| | Mass balance using IPCC default emission factor | B | E16B1 |
| Carbon Dioxide From Methanol Production | Direct measurement | A | E17A1 |
| | Mass balance accounting for carbon content of feedstock fuel minus carbon content of methanol | B | E17B1 |
| Methane From Methanol Production | Direct measurement | A | E18A1 |
| | Use of IPCC provided default factors | B | E18B1 |
| Methane From Petrochemical Production | Continuous emissions monitoring or other direct measurement | A | E19A1 |
| | Use of IPCC provided default factors | B | E19B1 |
| Nitrous Oxide From Nitric Acid Production | Continuous emissions monitoring | A | E20A1 |
| | Emission factors based on direct, periodic measurement of plant emissions | A | E20A2 |
| | Default emission factors for uncontrolled and non-selective catalytic reduction control technologies from consensus-based published sources | B | E20B1 |
| | Default emission factors for uncontrolled and non-selective catalytic reduction control technologies | C | E20C1 |
| Carbon Dioxide From Soda Ash Production | Emission factor based on production of soda ash from trona | A | E21A1 |
| Carbon Dioxide From Soda Ash Use | Emission factor based on molecular weight ratio of carbon dioxide to soda ash | A | E22A1 |

| Source | Method | Rating | Code |
|--|--|--------|-------|
| Methane From Coal Mining (all sources) | Direct measurement | A | E23A1 |
| | Direct measurement augmented by indirect estimates based on default emission factors | B | E23B1 |
| | Indirect estimates based on default emission factors | C | E23C1 |
| Carbon Dioxide and Methane From Oil and Natural Gas Industries | Direct, site-specific measurements | A | E24A1 |
| | Mass-balance approach, including documentation on all data, factors, and methods | B | E24B1 |
| | Default emission factors based on general activity data | C | E24C1 |
| Methane From Wastewater and Sludge Handling | Emission factors derived from measured wastewater stream composition data | A | E25A1 |
| | Default emission factors based on general activity data | B | E25B1 |
| Nitrous Oxide From Disposed Wastewater Treatment Effluent | Direct measurement | A | E26A1 |
| | IPCC method using measured, site-specific effluent data | B | E26B1 |
| | IPCC method using default values | C | E26C1 |
| Methane From Landfilling | IPCC First-order decay model using site-specific waste and landfill parameters | A | E27A1 |
| | Publicly available models that rely on user-defined data elements | A | E27A2 |
| | Publicly-available models that rely on default parameters | B | E27B1 |
| | Mass balance using single year, site-specific DOC data | C | E27C1 |
| | Mass balance using single year, default DOC values | D | E27D1 |
| HFCs From HCFC-22 Production | Continuous emissions monitoring | A | E28A1 |
| | Emission estimates based on representative direct measurement | B | E28B1 |
| | Default, uncontrolled emission factors with abatement/capture technology reduction value if applicable | C | E28C1 |
| Sulfur Hexafluoride From Electrical Equipment | Mass balance by Life Cycle Stage of Equipment (IPCC Tier 3a) | A | E29A1 |
| | Mass Balance at the Manufacturer and Facility Level (IPCC Tier 3b) | A | E29A2 |
| | Life Cycle Stage using Emission Factors (IPCC Tier 2a) | B | E29B1 |
| | Inference Method using IPCC Default Emission Factors (IPCC Tier 2b) | C | E29C1 |
| | Potential Emissions Method (IPCC Tier 1) | D | E29D1 |

| Source | Method | Rating | Code |
|---|--|-------------------------------------|-------|
| HFCs From Use of Air-Conditioning and Refrigeration Equipment | EPA Climate Leaders Material Balance Method | A | E30A1 |
| | EPA Climate Leaders Simplified Material Balance Method | A | E30A2 |
| | IPCC Good Practice Guidance Mass Balance, or Top-Down Approach that does not rely on emission factors | A | E30A3 |
| | IPCC Revised 1996 Guidelines Tier 2-Actual Emissions, using facility-specific emission factors that have been demonstrated to be highly representative | A | E30A4 |
| | IPCC Revised 1996 Guidelines Tier 2-Actual Emissions, using reasonably representative facility-specific emission factors | B | E30B1 |
| | IPCC Revised 1996 Guidelines Tier 2-Actual Emissions, using country-specific emission factors | C | E30C1 |
| | IPCC Revised 1996 Guidelines Tier 1-Potential Emissions | D | E30D1 |
| | California Climate Change Action Registry General Reporting Protocol Mass Balance Method | A | E30A5 |
| | SF ₆ Emissions From Magnesium Production | Mass balance using consumption data | A |
| Default emission factors based on general activity data | | B | E31B1 |
| Methods for High GWP Gases From Semiconductor Manufacturing | Mass Balance at the specific process or tool level (IPCC Tier 2a) | A | E32A1 |
| | Mass Balance at the process or tool type level (IPCC Tier 2b) | B | E32B1 |
| | Mass Balance using WRI spreadsheets with plant specific data | B | E32B2 |
| | Mass Balance using site specific purchase and abatement data (IPCC Tier 2c) | C | E32C1 |
| | Mass Balance using WRI spreadsheets with default factors | C | E32C2 |
| Indirect Emissions | | | |
| Carbon Dioxide, Methane, and Nitrous Oxide From Electricity Imports | Measured electricity consumption in conjunction with source-specific, generator-type or default regional or default national emission rates and system-specific or default transmission loss factor | A | F01A1 |
| | “Area” method estimate of electricity consumption in conjunction with source-specific, generator-type or default regional or default national emission rates and system-specific or default transmission loss factor | B | F01B1 |

| Source | Method | Rating | Code |
|--|---|--|-------|
| Carbon Dioxide, Methane, and Nitrous Oxide From Steam or Hot Water Imports | Measured heat consumption in conjunction with source-specific emission factor and source-specific or default transmission loss factor | A | F02A1 |
| | Measured heat consumption in conjunction with default emission factor and source-specific or default transmission loss factor | B | F02B1 |
| | "Area" method estimate of heat consumption in conjunction with source-specific emission factor and source-specific or default transmission loss factor | C | F02C1 |
| | "Area" method estimate of heat consumption in conjunction with default emission factor and source-specific or default transmission loss factor | D | F02D1 |
| Carbon Dioxide, Methane, and Nitrous Oxide From Chilled Water Purchases | Measured chilled water consumption data used in conjunction with source-specific COP and a source-specific or default transmission loss factor | Same rating as given to the method used to calculate emissions (see Step 4) | F02X1 |
| | Measured chilled water consumption data used in conjunction with default COP and source-specific or default transmission loss factor | One value rating lower than the rating given to the method used to calculate emissions (see Step 4) | F02X2 |
| | "Area" method estimates of chilled water consumption used in conjunction with source-specific COP and source-specific or default transmission loss factor | Two value ratings lower than the rating given to the method used to calculate emissions (see Step 4) | F02X3 |
| | "Area" method estimates of chilled water consumption in conjunction with default COP and source-specific or default transmission loss factor | D | F02D1 |

| Source | Method | Rating | Code |
|--|---|--|-------|
| Carbon Dioxide, Methane, and Nitrous Oxide From Electricity and Heat Purchases From Offsite CHP Plants | Measured steam/electricity consumption data used in conjunction with source-specific emission rates and a source-specific or default transmission loss factor | Same rating as given to the method used to calculate emissions (see Step 4) | F03X1 |
| | Measured steam/electricity consumption data used in conjunction with the method provided for allocating fuel use to thermal and electrical generation, and a specific or default transmission loss factor | One value rating lower than the rating given to the method used to calculate emissions (see Step 4) | F03X2 |
| | "Area" method estimate of steam/electricity consumption used in conjunction with source-specific emission rates and a source-specific or default transmission loss factor | Two value ratings lower than the rating given to the method used to calculate emissions (see Step 4) | F03X3 |
| | "Area" method estimate of steam/electricity consumption used in conjunction with the method provided for allocating fuel use to thermal and electrical generation, and a specific or default transmission loss factor | D | F03D1 |
| Geologic Sequestration of Carbon Dioxide | | | |
| Fugitive Emissions From the extraction of Naturally Occurring CO ₂ | Direct measurement and at least annual content analysis of gas | A | G01A1 |
| | Mass balance based on before-and-after measurements, minus amount extracted (<i>Equation 1</i>) | B | G01B1 |
| Fugitive Emissions During Extraction From Anthropogenic Source | Difference between upstream and downstream measurements based on CEM or flow meter data (<i>Equation 2</i>) | A | G02A1 |
| | Difference between upstream and downstream measurements based on annual emissions data (<i>Equation 2</i>) | B | G02B1 |
| | Manufacturer's specifications for capture technology employed (<i>Equation 3</i>) | C | G02C1 |
| Fugitive Emissions During Transport and Processing | Direct actual measurements at pipeline beginning and endpoint (<i>Equation 4</i>) | A | G03A1 |
| | Direct actual measurements at tank fill and delivery (<i>Equation 5</i>) | A | G03A2 |
| | Annual measurements at pipeline beginning and endpoint (<i>Equation 4</i>) | B | G03B1 |
| | Estimating without direct measurement (<i>Equation 6</i>) | C | G03C1 |
| | Use of EPA VOC emissions factors (<i>Equation 7</i>) | D | G03D1 |

| Source | Method | Rating | Code |
|---|---|--------|-------|
| Fugitive Emissions From Enhanced Oil Recovery | Monitoring system for direct CO ₂ loss measurement | A | G04A1 |
| | Difference in CO ₂ needed and CO ₂ stored (<i>Equation 8</i>) | D | G04D1 |
| Post-Injection Seepage to Atmosphere | Monitoring plan using 4D seismic, reservoir pressure monitoring, formation fluid monitoring, shallow water sampling (if present) and soil gas surveys | A | G05A1 |
| | Monitoring plan using one or more measurement techniques in both categories | B | G05B1 |
| | Monitoring plan using measurement techniques in only one category | C | G05C1 |
| Agricultural Emissions and Sequestration | | | |
| Methane and Nitrous Oxide From Enteric Fermentation | Inference using improved emission factors | A | F01A1 |
| | Inference using default emission factors | B | F01B1 |
| Methane and Nitrous Oxide From Livestock Waste | Inference Using Emission Factors Specific to Livestock Category and Waste Management System | B | F02B1 |
| Methane and Nitrous Oxide From Crop Residue Burning | Inference Using Default Emission Factors | B | F03B1 |
| Methane From Rice Cultivation | Inference Using Default Emission Factors | B | F04B1 |
| Nitrous Oxide From Agricultural Soils | Inference Using Specific Activity Data and Default N ₂ O Emission Factor | B | F05B1 |
| Carbon Dioxide From Lime Applications to Agricultural Soils | Inference Using Default Emission Factors | B | F06B1 |
| Carbon Dioxide Fluxes on Mineral Soils | Model-based Estimates of CO ₂ Flux on Mineral Soils with uncertainty estimates less than or equal to 15 percent | A | F07A1 |
| | Model-based Estimates of CO ₂ Flux on Mineral Soils with uncertainty estimates greater than 15 percent | B | F07B1 |
| | Direct Measurement of Mineral Soil Carbon Stocks | A or B | F07X1 |
| | Inference Using Default Emission and Sequestration Factors | C | F07C1 |
| Carbon Dioxide Emissions on Cultivated Organic Soils | Direct measurement of Organic Soil Carbon Stock Change with associated uncertainty levels of 15 percent or less | A | F08A1 |
| | Direct measurement of Organic Soil Carbon Stock Change with associated uncertainty levels of more than 15 percent | B | F08B1 |
| | Inference Using Default Emission Factors | B | F08B2 |

| Source | Method | Rating | Code |
|--|--|--------|-------|
| Forest Ecosystem Carbon Stocks | Estimates from look-up tables that match specific site conditions and management practices, as documented using independent data or information. | A | F09A1 |
| | Use of the US Forest Service COLE model or an approved model, validated with data specific to the site conditions and management practices. | A | F09A2 |
| Forest Ecosystem Carbon Stocks (continued) | Sampling with quantified accuracy | A | F10A1 |
| | Estimates in look-up tables adapted to specific site conditions and management practices. | B | F10B1 |
| | Use of an approved model that is parameterized specifically for site conditions and management practices. | B | F10B2 |
| | Use of the U.S. Forest Service COLE Model | B | F10B3 |
| | Typical application of regional look-up tables that generally match the site conditions and management practices | C | F10C1 |
| | Use of an approved model that generally matches site conditions and management practices. | C | F10C2 |
| | Use of look-up tables for site conditions and management practices that are not represented accurately by the tables. | D | F10D1 |
| Harvest Wood Products Carbon Stocks | Use of an approved model validated with data specific to the product mix of the entity | A | F11A1 |
| | Use of specific data on harvest and product mix and default decay factors provided in section 4 or the Appendix | B | F11B1 |
| | Use of aggregate data on harvest and default decay factors provided in section 4 of the appendix | C | F11C1 |

Appendix H. Fuel Emission Factors

Carbon Dioxide Emission Factors for Stationary Combustion

| Fuel | Emission Factor | Units |
|--|-----------------|--------------------------------|
| Coal¹ | | |
| Anthracite | 102.58 | kg CO ₂ / MMBtu |
| Bituminous | 92.53 | kg CO ₂ / MMBtu |
| Sub-bituminous | 96.12 | kg CO ₂ / MMBtu |
| Lignite | 95.47 | kg CO ₂ / MMBtu |
| Electric Power Sector | 94.31 | kg CO ₂ / MMBtu |
| Residential/Commercial | 94.53 | kg CO ₂ / MMBtu |
| Industrial Coking | 93.04 | kg CO ₂ / MMBtu |
| Other Industrial | 93.44 | kg CO ₂ / MMBtu |
| Natural Gas¹ | | |
| HHV of 975 - 1000 Btu/scf | 53.74 | kg CO ₂ / MMBtu |
| HHV of 1000 - 1025 Btu/scf | 52.65 | kg CO ₂ / MMBtu |
| HHV of 1025 - 1050 Btu/scf | 52.79 | kg CO ₂ / MMBtu |
| HHV of 1050 - 1075 Btu/scf | 52.93 | kg CO ₂ / MMBtu |
| HHV of 1075 - 1100 Btu/scf | 53.18 | kg CO ₂ / MMBtu |
| Petroleum Fuels¹ | | |
| Middle Distillate Fuels (No. 1, No. 2, No. 4 fuel oil, diesel, home heating oil) | 72.32 | kg CO ₂ / MMBtu |
| Jet Fuel (JetA, JP-8) | 70.87 | kg CO ₂ / MMBtu |
| Kerosene | 71.23 | kg CO ₂ / MMBtu |
| Heavy Fuel Oil (No. 5, 6 fuel oil), bunker fuel | 78.80 | kg CO ₂ / MMBtu |
| Ethane | 58.98 | kg CO ₂ / MMBtu |
| Propane | 62.44 | kg CO ₂ / MMBtu |
| Isobutene | 64.43 | kg CO ₂ / MMBtu |
| N-butane | 64.32 | kg CO ₂ / MMBtu |
| Unspecified LPG | 62.47 | kg CO ₂ / MMBtu |
| Refinery Gas | 63.87 | kg CO ₂ / MMBtu |
| Crude Oil | 73.69 | kg CO ₂ / MMBtu |
| Other Fuels | | |
| Tires/Tire Derived Fuel ² | 85.97 | kg CO ₂ / MMBtu |
| Waste Oil ³ | 9.98 | kg CO ₂ / gallon |
| Plastics Portion of MSW ¹ | 2617.70 | kg CO ₂ / short ton |
| MSW ¹ | 417.00 | kg CO ₂ / short ton |
| MSW ¹ | 41.70 | kg CO ₂ / MMBtu |

¹ U.S. Department of Energy, Technical Guidelines Voluntary Reporting of Greenhouse Gases (1605(b)) Program, Chapter 1, Part C, Stationary Source Combustion, January 2007.

² Energy Information Administration, Instructions for Form EIA-1605 (for Data Through 2005), Voluntary Reporting of Greenhouse Gases Program, March 2006, Appendix B.

³ U.S. EPA, AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, <http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s11.pdf>

Carbon Dioxide Emission Factors for Transportation Fuels¹

| Transportation Fuel | Emission Factors | |
|---|---|---|
| | Pounds CO ₂ Per Unit of Volume | Kilograms CO ₂ Per Million Btu |
| Aviation Gasoline | 18.15 per gallon | 68.50 |
| Biodiesel | | |
| -B100 | 0 per gallon | 0.00 |
| -B20 | 17.71 per gallon | 59.17 |
| -B10 | 19.93 per gallon | 65.86 |
| -B5 | 21.04 per gallon | 69.16 |
| -B2 | 21.70 per gallon | 71.12 |
| Diesel Fuel (No. 1 and No. 2) | 22.15 per gallon | 72.43 |
| Ethanol/Ethanol Blends | | |
| -E100 | 0 per gallon | 0.00 |
| -E85 | 2.9 per gallon | 14.59 |
| -E10 (Gasohol) | 17.41 per gallon | 65.29 |
| Motor Gasoline | 19.36 per gallon | 70.21 |
| Jet Fuel, Kerosene | 20.88 per gallon | 70.17 |
| Natural Gas | 119.90 per 1000 cubic feet | 52.80 |
| Propane | 12.60 per gallon | 62.76 |
| Residual Fuel (No. 5 and No. 6 Fuel Oil) | 25.75 per gallon | 78.02 |

¹ U.S. Department of Energy, Technical Guidelines Voluntary Reporting of Greenhouse Gases (1605(b)) Program, Chapter 1, Part D, Mobile Source Combustion, January 2007.

Appendix I. System and Fuel Codes for Purchased Steam and Chilled/Hot Water

System Codes

| Code | System Type |
|------|---------------------------------|
| | Steam/Hot Water Systems |
| WB | Water-tube Boiler |
| FB | Fire-tube Boiler |
| | Chilled Water Systems |
| AC | Absorption Chiller |
| CC | Engine-Driven Chiller |
| EC | Electric-Driven Chiller |
| | Other or Unknown Systems |
| OT | Other |
| UK | Unknown |

Fuel Codes

| Code | Fuel Type |
|------|--|
| | Petroleum Products |
| DF | Distillate Fuel (Nos. 1, 2, and 4 Fuel Oil and Diesel) |
| KS | Kerosene |
| LG | Liquified Petroleum Gases |
| MG | Motor Gasoline |
| PC | Petroleum Coke |
| RF | Residual Fuel (Nos. 5 and 6 Fuel Oil) |
| WO | Waste Oil |
| | Natural Gas and Other Gaseous Fuels |
| ME | Methane |
| LF | Landfill Gas |
| FG | Flare Gas |
| NG | Natural Gas (Pipeline) |
| PR | Propane |
| | Coal |
| AC | Anthracite |
| BC | Bituminous |
| SB | Subbituminous |
| LC | Lignite |
| | Renewable Fuels |
| BM | Biomass |
| GE | Geothermal |
| SL | Solar |
| TF | Tires/Tire-Derived Fuel |
| WW | Wood and Wood Waste |
| MS | Municipal Solid Waste |
| BD | Biodiesel |
| | Electricity |
| EL | Electricity |
| | Other or Unknown Fuels |
| OT | Other |
| UK | Unknown |

Appendix J. Emission Source Codes

| Emission Source Category | Code | Emission Source |
|---|------|---|
| DIRECT EMISSIONS | | |
| Stationary Combustion | SC01 | Fossil fuel combustion |
| | SC02 | Non-standard fuel combustion |
| | SC03 | Waste fuels combustion |
| | SC04 | Biomass combustion |
| | SC05 | Nonfuel use of fossil fuels |
| Mobile Sources | MS01 | Highway vehicles |
| | MS02 | Off-road vehicles |
| | MS03 | Marine vessels |
| | MS04 | Aircraft |
| | MS05 | Mobile refrigeration and air-conditioning |
| Sector-Specific Industrial Processes: General | IP01 | Adipic acid production |
| | IP02 | Aluminum production |
| | IP03 | Ammonia production |
| | IP04 | Cement production |
| | IP05 | Hydrogen production |
| | IP06 | Iron and steel production |
| | IP07 | Lime production |
| | IP08 | Limestone and dolomite use |
| | IP09 | Methanol production |
| | IP10 | Nitric acid production |
| | IP11 | Soda ash production and use |
| Sector-Specific Industrial Processes: Energy | EI01 | Coal mines |
| | EI02 | Oil and natural gas industries |
| Sector-Specific Industrial Processes: Waste Handling | WI01 | Domestic and industrial wastewater handling |
| | WI02 | Landfills |
| Sector-Specific Industrial Processes: High GWP Gases | GI01 | Aluminum production |
| | GI02 | HCFC-22 production |
| | GI03 | Industrial production and use of high GWP gases |
| | GI04 | Magnesium production |
| | GI05 | Semiconductor manufacture |
| Other Industrial Process Sources | IP99 | Other industrial processes |
| Agricultural Sources | AS01 | Enteric fermentation |
| | AS02 | Livestock waste |
| | AS03 | Residue burning |
| | AS04 | Rice cultivation – 1 st harvest |
| | AS05 | Rice cultivation – 2 nd (“ratoon”) harvest |
| | AS06 | Agricultural soils – nitrogen application |
| | AS07 | Agricultural soils – organic soils |
| | AS08 | Lime application |
| | AS09 | Cultivation of organic soils |
| | AS10 | Other |

| Emission Source Category | Code | Emission Source |
|---|-------------|--|
| Fugitive Emissions Associated With Geologic Reservoirs | GR01 | CO ₂ extracted from natural geologic reservoir |
| | GR02 | CO ₂ extracted from man-made geologic reservoir |
| | GR03 | Fugitive emissions from the extraction of naturally occurring CO ₂ |
| | GR04 | Fugitive emissions from the extraction of CO ₂ from anthropogenic sources |
| | GR05 | Fugitive emissions during transport and processing |
| | GR06 | Fugitive emissions during injection and extraction for enhanced resource recovery |
| | GR07 | Post-injection seepage from permanent geologic storage reservoir |
| INDIRECT EMISSIONS | | |
| Indirect Emissions From Purchased Energy | PE01 | Electricity |
| | PE02 | Steam |
| | PE03 | Hot water |
| | PE04 | Chilled water |
| Other Indirect Emissions | OI01 | Employee commuting |
| | OI02 | Manufacture and sale of energy efficient products |
| | OI03 | Consumption of energy-intensive products |
| | OI04 | Other |

Appendix K. GDP Price Deflators

Chained Weighted Price Deflator for GDP[2000=100]

| Year | Value |
|------|---------|
| 1987 | 73.196 |
| 1988 | 75.694 |
| 1989 | 78.556 |
| 1990 | 81.590 |
| 1991 | 84.444 |
| 1992 | 86.385 |
| 1993 | 88.381 |
| 1994 | 90.259 |
| 1995 | 92.106 |
| 1996 | 93.852 |
| 1997 | 95.414 |
| 1998 | 96.472 |
| 1999 | 97.868 |
| 2000 | 100.000 |
| 2001 | 102.399 |
| 2002 | 104.187 |
| 2003 | 106.404 |
| 2004 | 109.462 |
| 2005 | 113.000 |
| 2006 | 116.567 |

Source: Bureau of Economic Analysis, Table 1.1.9. Implicit Price Deflators for Gross Domestic Product.

Appendix L. Possible Output Measures

| NAICS Code | NAICS Description With Possible Output Metrics |
|------------|---|
| 51 | Information number of employees square feet of building space |
| 62 | Health Care and Social Assistance number of beds square feet of building space |
| 111 | Crop Production metric tons of product/raw material |
| 113 | Forestry and Logging Acres |
| 212 | Mining (except Oil and Gas) metric tons of product/raw material |
| 221 | Utilities kilowatt-hours revenue (U.S. \$) |
| 311 | Food Manufacturing short tons of product/raw material metric tons of product/raw material lbs of product/raw material kg of product/raw material sacks (flour) bushels (wheat) kilolitres of product/raw material |
| 313 | Textile Mills 1000 lbs of product/raw material million hours (spindle) bales (cotton) lbs (tie cord) square yards (fabrics) |
| 314 | Textile Product Mills dozens square yards of product/raw material |
| 321 | Wood Product Manufacturing billion board feet cubic meters of product/raw material |
| 322 | Paper Manufacturing short tons of product/raw material metric tons of product/raw material |
| 323 | Printing and Related Support Activities square meter |
| 324 | Petroleum and Coal Products Manufacturing million barrels per day (crude throughput) |

| NAICS Code | NAICS Description With Possible Output Metrics |
|-------------------|--|
| 325 | Chemical Manufacturing short tons of product/raw material metric tons of product/raw material gallons of product/raw material cubic ft. of product/raw material |
| 326 | Plastics and Rubber Products Manufacturing metric tons of product/raw material |
| 327 | Nonmetallic Mineral Product Manufacturing billion square feet of product/raw material short tons of product/raw material metric tons of product/raw material metric tons (clinker) kilograms of product/raw material million dozen tumblers million dozen cookware million dozen stemware million pieces tableware 1000 bricks square meters (wall tile) |
| 331 | Primary Metal Manufacturing million tons by metal smelted 1000 short tons steel in process 1000 short tons of finished steel 1000 metric tons of product by grade-carbon & furnace type 1000 metric tons of product by grade-alloy & furnace type 1000 metric tons of product by grade-stainless & furnace type |
| 332 | Fabricated Metal Product Manufacturing million tons by metal 1000 units by type |
| 333 | Machinery Manufacturing units by type units by fuel-gas units by fuel-diesel units by fuel-Natural Gas units by fuel-LPG |
| 334 | Computer and Electronic Product Manufacturing units by type square meters of silicon |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing units by type 1000 lbs gross (by type of material) 1000 units (if product type does not change substantially over time) |
| 336 | Transportation Equipment Manufacturing units by type-cars units by type-trucks number of vehicles |

| NAICS Code | NAICS Description With Possible Output Metrics |
|-------------------|---|
| 337 | Furniture and Related Product Manufacturing units by type |
| 339 | Miscellaneous Manufacturing units by type |
| 442 | Furniture and Home Furnishings Stores units by type |
| 486 | Pipeline Transportation barrels of throughput |
| 523 | Securities, Commodity Contracts, and Other Financial Investments and Related Activities square feet of building space |
| 531 | Real Estate square feet of building space by category of commercial building number of apartments number of residential units |
| 541 | Professional, Scientific, and Technical Services square feet of building space number of employees |
| 562 | Waste Management and Remediation Services tons of waste processed |
| 611 | Educational Services number of students number of faculty |
| 812 | Personal and Laundry Services lbs laundry cleaned number of employees |
| 813 | Religious, Civic, Professional, and Similar Organizations by category of commercial building square feet of building space |
| 814 | Private Households Household number of inhabitants |
| 921 | Executive, Legislative, and Other General Government Support number of employees square feet of building space by category of commercial building |
| 928 | National Security and International Affairs square feet of building space number of employees |

Appendix M. Action Type Codes

| Action Category | Code | Action Type |
|---|------|--|
| 1. Electricity Generation, Transmission, and Distribution | A01 | General Generation, transmission & distribution projects |
| | A02 | General generator improvements |
| | A03 | Heat rate or other efficiency improvement |
| | A04 | Availability improvement |
| | A05 | Fuel Switching |
| | A06 | Increase in low-emitting capacity |
| | A07 | Decrease in high-emitting capacity |
| | A08 | Dispatching changes only |
| | A09 | Zero/low emitting power purchases |
| | A10 | General transmission and distribution |
| | A11 | High-efficiency transformers |
| | A12 | Reconductoring |
| | A13 | Distribution voltage upgrade |
| | A14 | Other transmission & distribution improvements |
| | A15 | Other electricity generation, transmission, and distribution projects/activities |
| 2. Cogeneration and Waste Heat Recovery | B01 | Cogeneration and waste heat recovery |
| 3. Energy End Use | C01 | General energy use |
| | C02 | Equipment and appliances improvement or replacement |
| | C03 | Lighting and lighting control |
| | C04 | Load control |
| | C05 | Heating, ventilation, and air-conditioning |
| | C06 | Building shell improvement |
| | C07 | Motor and motor drive |
| | C08 | Fuel switching |
| | C09 | Industrial power systems |
| | C10 | Urban forestry (energy effects only) |
| | C11 | Other energy end-use projects/activities |
| 4. Transportation and Off-Road Vehicles | D01 | General transportation |
| | D02 | Marketing/manufacturing of more efficient vehicles |
| | D03 | Marketing/manufacturing of more efficient vehicle components |
| | D04 | Marketing/manufacturing of alternative fuel vehicles |
| | D05 | Operation of more efficient vehicles |
| | D06 | Use of more efficient vehicle components |
| | D07 | Operation of alternative fuel vehicles |
| | D08 | General trip reduction (demand modification) |
| | D09 | Demand Modification: Carpooling/Vanpooling |
| | D10 | Demand Modification: Mass transit |
| | D11 | Demand Modification: Employee parking buyout |
| | D12 | Demand Modification: Telecommuting |
| | D13 | Demand Modification: Other |
| | D14 | Service efficiency improvements |
| | D15 | Driver/operator training |
| | D16 | Infrastructure improvement |
| | D17 | Accelerated scrappage |
| | D18 | Other transportation and off-road vehicle projects/activities |

| Action Category | Code | Action Type |
|--|------|--|
| 5. Waste Treatment and Disposal —Methane | E01 | General Waste Treatment and Disposal: Methane emissions avoidance or recovery |
| | E02 | Landfills: General methane emissions avoidance or recovery |
| | E03 | Landfills: Landfill gas recovery for energy use |
| | E04 | Landfills: Flaring landfill gas |
| | E05 | Landfills: Modification of waste stream (e.g., yard waste bans) |
| | E06 | Landfills: Other |
| | E07 | Wastewater Treatment: General methane emissions avoidance or recovery |
| | E08 | Wastewater Treatment: Biogas recovery for energy use |
| | E09 | Wastewater Treatment: Flaring biogas |
| | E10 | Wastewater Treatment: Modification of waste stream (e.g. elimination of pulp and paper wastes) |
| | E11 | Wastewater Treatment: Altered waste treatment (may be mechanical or chemical) |
| | E12 | Wastewater Treatment: Other |
| | E13 | Other waste treatment and disposal activities reducing emissions of methane |
| 6. Agriculture —Methane and Nitrous Oxide | F01 | General Agriculture: Methane and nitrous oxide emissions avoidance or recovery |
| | F02 | General Livestock: General methane emissions avoidance or recovery |
| | F03 | Livestock: Reduced livestock production |
| | F04 | Livestock: Improved livestock productivity |
| | F05 | Livestock: Recovery of biogas from manure for energy use |
| | F06 | Livestock: Recovery and flaring of biogas from manure |
| | F07 | Cropland: Rice field drainage |
| | F08 | Cropland: Improved nutrients management |
| | F09 | Other agricultural projects reducing emissions of methane or nitrous oxide |
| 7. Oil and Natural Gas Systems and Coal Mining — Methane | G01 | General oil and natural gas systems and coal mining |
| | G02 | Oil and Natural Gas Systems: General methane emissions avoidance or recovery |
| | G03 | Oil and Natural Gas Systems: Reduction in gas vented due to increased flaring |
| | G04 | Oil and Natural Gas Systems: Reduction in gas vented due to recovery for energy |
| | G05 | Oil and Natural Gas Systems: Changes in operation and maintenance practices |
| | G06 | Oil and Natural Gas Systems: Equipment replacement and upgrade |
| | G07 | Oil and Natural Gas Systems: Natural gas reinjection |
| | G08 | Oil and Natural Gas Systems: Reduced production |
| | G09 | Oil and Natural Gas Systems: Recovery of glycol dehydrator emissions |
| | G10 | Oil and Natural Gas Systems: Other methane emissions avoidance or recovery |
| | G11 | Coal Mining: General methane emissions avoidance or recovery |
| | G12 | Coal Mining: Decreased production |
| | G13 | Coal Mining: Change in operation and maintenance procedures |

| Action Category | Code | Action Type |
|--|------|--|
| 7. Oil and Natural Gas Systems and Coal Mining — Methane (continued) | G14 | Coal Mining: Equipment replacement and upgrade |
| | G15 | Coal Mining: Pre-mining degasification |
| | G16 | Coal Mining: Gas recovery using in-mine horizontal boreholes |
| | G17 | Coal Mining: Gas recovery using gob wells |
| | G18 | Coal Mining: Recovery of mine ventilation air |
| | G19 | Coal Mining: Gas recovery from inactive mines |
| | G20 | Coal Mining: Other methane emissions avoidance or recovery |
| | G21 | Other projects reducing methane emissions from oil and natural gas systems and coal mining |
| 8. Carbon Sequestration | H01 | General carbon sequestration |
| | H02 | General tree planting |
| | H03 | Afforestation |
| | H04 | Reforestation |
| | H05 | Urban Forestry (sequestration effects only) |
| | H06 | Forest preservation |
| | H07 | Modified forest management |
| | H08 | Woody biomass production and other agroforestry |
| | H09 | Wood products |
| | H10 | Conservation tillage |
| | H11 | Other carbon sequestration projects/activities |
| 9. Halogenated Substances | I01 | General halogenated substances |
| | I02 | Reclamation: Recycling |
| | I03 | Reclamation: Destruction |
| | I04 | Substitution |
| | I05 | Emission avoidance |
| | I06 | Use of improved appliances |
| | I07 | Other halogenated substances projects/activities |
| 10. Other Emission Reduction Projects | J01 | General projects |
| | J02 | Other materials recycling/reuse |
| | J03 | Waste/source reduction |
| | J04 | Coal ash reuse |
| | J05 | Underground injection of carbon dioxide |
| | J06 | Reduction of process emissions |
| | J07 | Research and development programs |
| | J08 | Education and training programs |
| | J09 | All other projects not included in the above categories |

Appendix N. Emission Benchmarks for Purchased Steam and Chilled/Hot Water

Use these emission factors to calculate the following:

- Indirect emissions from the consumption of purchased steam and hot/chilled water for emissions inventories.
- Reductions in indirect emissions resulting from the consumption of purchased steam and hot/chilled water.
- Avoided emissions resulting from the sale of steam and hot/chilled water to another entity.

Emission Factors for Steam and Chilled/Hot Water

| Energy Product | Emission Inventory | Emission Reductions | |
|---|---------------------|------------------------------|---------------------|
| | | Avoided Emissions | Indirect Emissions |
| Steam or Hot Water (kg CO ₂ e/MMBtu) | 86.845 ^a | 78.95 ^b | 86.845 ^a |
| Chilled Water (kg CO ₂ e/Ton-hours Cooling) | | | |
| Absorption Chiller Using Natural Gas ^c | 0.871 | | 0.871 |
| Engine-Driven Chiller Using Natural Gas ^c | 0.581 | | 0.581 |
| Electric-Driven Chiller ^c | see notes below | see notes below ^d | see notes below |

^a Weighted average based on Energy Information Administration's (EIA) 1998 Manufacturers Energy Consumption Survey data on the quantities of natural gas, coal, and residual and distillate fuel oils consumed as boiler fuel, carbon coefficients provided in EIA's Assumptions to the Annual Energy Outlook 2003, and EIA/OIAF efficiency assumptions of 80, 81, and 82 percent for natural gas, coal and petroleum boilers, respectively. Value also includes 10 percent loss during transmission.

^b Same methodology as emission inventory and indirect emission reductions factors but does not include transmission losses.

^c Chilled water efficiencies based on California Climate Action Registry, *General Reporting Protocol* (October 2002).

^d All avoided emission reductions are assumed to displace chilled water from electric driven chillers.

Source: U.S. Department of Energy, Office of Policy and International Affairs, *Technical Guidelines to the Voluntary Reporting of Greenhouse Gases (1605(b)) Program* (March 2006) p. 154-156.

Notes – Electric Driven Chiller Calculations:

The quantity of emissions associated with a unit of electricity varies on a regional basis according to the mix of electric power generators in a given region. When calculating indirect and avoided emissions associated with chilled water obtained from electric driven chillers, reporters should use regional electricity emission factors in Appendix F – Electricity Emission Factors that reflect their appropriate regional electricity emission rate. Reporters should use the formulas provided below to calculate appropriate emission factors (kg CO₂e/ton-hour Cooling) for electric-driven chilled water.

Chilled Water Emission Factor for Use in Calculating Indirect Emissions for Emission Inventories

Reporters should use this formula for determining an appropriate emissions factor for use in indirect emissions inventory calculations. It includes a 10 percent thermal loss factor in transmission, and makes use of the regional electricity emissions factors for emission inventories found in Appendix F:

$$EF_{\text{Chilled Water}} = 0.921 * EF_{\text{Electric/Inventory}}$$

Where:

$EF_{\text{Chilled Water}}$ = Emissions Factor, expressed in kg CO₂e/ton hour of cooling purchased

$EF_{\text{Electric/Inventory}}$ = Appropriate Regional Electricity Emissions Factor for Emission Inventory, expressed in MT CO₂e/MWh.

Chilled Water Emission Factor for Use in Calculating Reductions in Indirect Emission Reductions

Reporters should use this formula for determining an appropriate emissions factor for use in indirect emission reductions calculations. It includes a 10 percent thermal loss factor in transmission, and makes use of the regional electricity emissions factors for indirect emission reductions found in Appendix F:

$$EF_{\text{Chilled Water}} = 0.921 * EF_{\text{Electric/Indirect}}$$

Where:

$EF_{\text{Chilled Water}}$ = Emissions Factor, expressed in kg CO₂e/ton hour of cooling purchased
 $EF_{\text{Electric/Indirect}}$ = Appropriate Regional Electricity Emissions Factor for Indirect Emission Reductions, expressed in MT CO₂e/MWh.

Chilled Water Emission Factor for Use in Calculating Avoided Emissions

Reporters should use this formula for determining an appropriate emissions factor for use in avoided emissions calculations. It does not include a thermal loss factor in transmission, and makes use of the regional electricity emission factors for indirect emission reductions found in Appendix F:

$$EF_{\text{Chilled Water}} = 0.837 * EF_{\text{Electric/Indirect}}$$

Where:

$EF_{\text{Chilled Water}}$ = Emissions Factor, expressed in kg CO₂e/ton hour of cooling purchased
 $EF_{\text{Electric/Indirect}}$ = Appropriate Regional Emission Electricity Emissions Factor for Indirect Emission Reductions from Appendix F, expressed in MT CO₂e/MWh.

Glossary of Selected Terms

Activity of a small emitter: With respect to a small emitter, any single category of anthropogenic production, consumption or other action that releases emissions or results in sequestration, the annual changes of which can be assessed generally by using a single calculation method.

Afforestation: The establishment of forest or forest stands on lands that have not been recently forested.

Aggregator: An entity that reports to the 1605(b) program on behalf of non-reporting entities. An aggregator may be a large or small emitter, such as a trade association, non-profit organization or public agency.

Agroforestry: A land-use system that involves deliberate retention, introduction, or mixture of trees or other woody perennials in crop and animal production systems to take advantage of economic and/or ecological interactions among the components.

Anaerobic lagoon: A liquid-based organic waste management installation characterized by waste residing in water at a depth of at least 6 feet for periods of 30 to 200 days.

Anaerobic decomposition: Decomposition in the absence of oxygen, as in an anaerobic lagoon or digester, which produces CO₂ and CH₄.

Anthropogenic: Greenhouse gas emissions and removals that are a direct result of human activities or are the result of natural processes that have been affected by human activities.

Avoided emissions: The greenhouse gas emission reductions that occur outside the organizational boundary of the entity as a direct consequence of changes in the entity's activity, including but not necessarily limited to the emission reductions associated with increases in the generation and sale of electricity, steam, hot water or chilled water produced from energy sources that emit fewer greenhouse gases per unit than other competing sources of these forms of distributed energy.

Base period: A period of 1-4 years used to derive the average annual base emissions, emissions intensity or other values from which emission reductions are calculated.

Base value: The value from which emission reductions are calculated for an entity or subentity. The value may be annual emissions, emissions intensity, kilowatt-hours generated, or other value specified in the 1605(b) guidelines. It is usually derived from actual emissions and/or activity data derived from the base period.

Biofuels: Liquid fuels and blending components produced from biomass (plant) feedstocks, used primarily for transportation.

Biogenic emissions: Emissions that are naturally occurring and are not significantly affected by human actions or activity.

Biomass: Non-fossilized organic matter available on a renewable basis, including organic material (both living and dead) from above and below ground, e.g., trees, crops, grasses, tree litter, roots, animals, and animal waste. Biomass includes forest and mill residues, agricultural crops and residues, wood and wood

residues, animal wastes, livestock operation residues, aquatic plants, fast-growing trees and plants, and the organic portion of municipal and relevant industrial wastes.

Boundary: The actual or virtual line that encompasses all the emissions and carbon stocks that are to be quantified and reported in an entity's greenhouse gas inventory, including *de minimis* emissions. Entities may use financial control or another classification method based on ownership or control as the means of determining which sources or carbon stocks fall within this organizational boundary.

Calcining: The process of thermally decomposing carbonate into quicklime, as in cement manufacturing.

Carbon cycle: The flow of carbon through the atmosphere, ocean, terrestrial biosphere, and lithosphere. Carbon exchange between carbon pools is driven by chemical, physical, geological, and biological processes. Also see **Carbon pool** below.

Carbon dioxide equivalent (CO₂e): The amount of carbon dioxide by weight emitted into the atmosphere that would produce the same estimated radiative forcing as a given weight of another radiatively active gas. Carbon dioxide equivalents are computed by multiplying the weight of the gas being measured (for example, methane) by its estimated global warming potential. The global warming potential (GWP) is the standard unit used for aggregating different greenhouse gases with dissimilar radiative forcing properties into a common unit. Also see Global warming potential below

Carbon flow/carbon flux: The movement of carbon from one carbon pool to another, expressed as a quantum transfer (flow), or as a rate per unit time (flux).

Carbon pool: Any reservoir of carbon. The four pools are atmosphere, biosphere, oceans and sediments.

Carbon stocks: The quantity of carbon stored in biological and physical systems including: trees, products of harvested trees, agricultural crops, plants, wood and paper products and other terrestrial biosphere sinks, soils, oceans, and sedimentary and geological sinks.

Chlorofluorocarbon (CFC): Any of the various compounds of carbon, hydrogen, chlorine, and fluorine, typically used as refrigerants and for other purposes.

Climate Leaders: The EPA sponsored industry-government partnership that works with individual companies to develop long-term comprehensive climate change strategies. Certain Climate Leaders Partners have, working with EPA, set a corporate-wide greenhouse gas reduction goal and have inventoried their emissions to measure progress towards their goal.

Climate VISION: The public-private partnership initiated pursuant to a Presidential directive issued in 2002 that aims to contribute to the President's goal of reducing greenhouse gas intensity through voluntary frameworks with industry. Climate VISION partners have signed an agreement with DOE to implement various climate-related actions to reduce greenhouse gas emissions.

Cogeneration facility: A facility producing electricity and another form of useful energy (such as heat or steam) through sequential use of energy.

Coke: The solid black hydrocarbon left as a residual after the volatile hydrocarbons have been removed from bitumen by distillation. It is a fuel product often used in metal processing as a fuel and a reduction agent for oxide compounds, the use of which results in carbon dioxide emissions.

Conversion factor: A coefficient that converts units of one measurement system into corresponding units in another measurement system.

Cropland: A land cover/use category that includes areas used for the production of crops for harvest.

De minimis emissions: Emissions from one or more sources and of one or more greenhouse gases that, in aggregate, are less than or equal to 3 percent of the total annual carbon dioxide (CO₂) equivalent emissions of an entity.

DOE: The U. S. Department of Energy.

Direct emissions: Emissions from sources within the organizational boundaries of an entity.

Direct measurement: Quantification of the greenhouse gas components of an exhaust stream by continuous emissions monitoring (CEM) or sufficient periodic sampling to closely approximate continuous monitoring.

Direct monitoring: See **Direct measurement**

Distributed energy: Electrical or thermal energy generated by an entity that is sold or otherwise exported outside of the entity's boundaries for use by another entity.

Double reporting: When one entity submits emission or reduction data more than once or when two or more entities report the same emission or reduction.

Ecosystem carbon components:

Live tree – A living woody perennial plant (capable of reaching at least 15 feet in height) with a diameter at breast height greater than 2.5 cm (1 inch), including the carbon mass in roots with diameters greater than 0.2 to 0.5 cm (note the specific diameter threshold will depend on sampling/estimation methods), stems, branches, and foliage.

Tree seedling – A trees less than 2.5 cm (1 inch) diameter at breast height.

Standing dead tree – A dead tree of at least 2.5 cm diameter at breast height that has not yet fallen, including the carbon mass of coarse roots, stems, and branches.

Understory vegetation – Roots, stems, branches, and foliage of tree seedlings, shrubs, herbs, forbs, and grasses.

Forest floor – Fine woody debris (smaller than 7.5 cm), tree litter, humus, and fine roots in the organic forest floor layer above mineral soil.

Down dead wood – Logging residue and other coarse dead wood on the ground (greater than 7.5 cm diameter), as well as stumps and the coarse roots of stumps.

Soil – Includes fine roots and all other organic carbon not included in the above pools, to a depth of one (1) meter.

Harvested wood – Wood removed from the forest ecosystem for the processing of various products. Logging debris (slash) left in the forest after harvesting is not included.

EIA: The Energy Information Administration within the U.S. Department of Energy.

Emissions: The direct release of greenhouse gases to the atmosphere from any anthropogenic (human induced) source and certain indirect emissions (releases) specified in this part.

Emissions coefficient: A unique value for scaling emissions to activity data in terms of a standard rate of emissions per unit of activity (e.g., pounds of carbon dioxide emitted per Btu of fossil fuel consumed).

Emissions factor: see Emissions coefficient

Emissions, fugitive: Any unintentional release of greenhouse gases to the atmosphere, including methane from the processing, transmission, and/or transportation of fossil fuels, HFCs from stationary and mobile air-conditioning and refrigeration equipment, SF₆ from electric power distribution, and methane from solid waste landfills.

Emissions intensity: Emissions per unit of output, where output is defined as the quantity of physical output, or a non-physical indicator of an entity's or subentity's productive activity.

Emissions, process: Emissions inherent in a productive process, as in cement or ammonia manufacture, as distinguished from those resulting from fuel combustion.

Emissions source: A discrete process, occurring at a particular location, which emits one or more Greenhouse Gases.

Engineered sequestration: An engineered process whereby carbon dioxide is captured from the point of emission and then stored in underground reservoirs (geologic sequestration), dissolved in deep oceans, or converted to rock-like solid materials.

Enteric fermentation: Animal digestion aided by methane-generating microbes in the animal rumen and intestine that produces greenhouse gas emissions, primarily methane.

Entity: The whole or part of any business, institution, organization, government agency or corporation, or household that:

- Is recognized under any U.S. Federal, State or local law that applies to it;
- Is located and operates, at least in part, in the United States; and
- The emissions of such operations are released, at least in part, in the United States.

A reporting entity is an entity that has submitted a report under the 1605(b) program that has been accepted by the Energy Information Administration.

Entity boundary: The limit in the scope of coverage for an entity's emission inventory and emission reduction report.

Entity statement: The 1605(b) participant's description of entity name, primary activities, covered sites and activities, emissions measurement method(s) and the applicability of each method to separate operations. In the case of entities seeking to register emission reductions, the entity statement also provides information on the methods used to define the operational boundaries of the entity and the resulting entity boundaries, shared ownership arrangements, designation of a start year, description of baseline methods, and identification of sub-entities to which different measurement methods may apply. For more specific requirements of entity statements, see § 300.5 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting.

Equity share: The percentage interest in ownership, benefits, or control that may govern entitlements to emission reductions by participants in collective undertakings.

Estimation method: The technique, including key assumptions and data sources, used by a 1605(b) participant to derive reported emissions, emission reductions, and/or sequestration where actual measurement is not possible or practical.

Financial control: The ability to direct the financial and operating policies of all elements of the entity with a view to gaining economic or other benefits from its activities over a period of many years.

First reduction year: The first year for which an entity intends to register emission reductions; it is the year that immediately follows the start year.

Flaring: The combustion of non-utilized gases prior to release into the atmosphere. See also **Venting**.

Forest land: Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for non-forest uses. The minimum area considered for classification is one (1) acre.

Forest management: The practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, tending, protection, harvest, access, utilization, and conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest.

Fugitive emissions: Uncontrolled releases to the atmosphere of greenhouse gases from the processing, transmission, and/or transportation of fossil fuels or other materials, such as HFC leaks from refrigeration, SF₆ from electrical power distributors, and methane from solid waste landfills, among others, that are not emitted via an exhaust pipe(s) or stack(s).

General Guidelines: The emission and emission reduction Guidelines that appear in Part 300 of the U.S. Code of Federal Regulations.

Geologic sequestration: A type of engineered sequestration, where captured carbon dioxide is injected for permanent storage into underground geologic reservoirs, such as oil and natural gas fields, saline aquifers, or abandoned coal mines.

Global warming potential (GWP): An index used to compare the relative radiative forcing of different gases without directly calculating the changes in atmospheric concentrations. GWPs are calculated as the ratio of the radiative forcing that would result from the emission of one kilogram of a greenhouse gas to that from the emission of one kilogram of carbon dioxide over a fixed period of time, such as 100 years.

Grassland: Rangelands and pasturelands that are not considered cropland and would not become forestland without human intervention.

Greenhouse gases (GHGs): The gases that may be reported to the Department of Energy under this program. They are:

- (1) Carbon dioxide (CO₂)
- (2) Methane (CH₄)
- (3) Nitrous oxide (N₂O)
- (4) Hydrofluorocarbons HFC-23 [trifluoromethane- (CHF₃)] HFC-32 [trifluoromethane-CH₂F₂], CH₂CF₃, CH₃F, CHF₂CF₃, CH₂FCF₃, CH₃FCF₃, CHF₂CH₂F, CF₃CH₃, CH₂FCH₂F, CH₃CHF₂, CH₃CH₂F, CF₃CHF₂CF₃, CH₂FCF₂CF₃, CHF₂CHF₂CF₃, CF₃CH₂CF₃, CH₂FCF₂CHF₂, CHF₂CH₂CF₃, CF₃CH₂CF₂CH₃, CH₃CHF₂CHF₂

- (5) Perfluorocarbons (perfluoromethane-CF₄, perfluoroethane-C₂F₆, C₃F₈, C₄F₁₀, c-C₄F₈, C₅F₁₂, C₆F₁₄)
- (6) Sulfur hexafluoride (SF₆)
- (7) Chlorofluorocarbons (CFC-11 [trichlorofluoromethane-CCl₃F], CCl₂F₂, CClF₃, CCl₂FCClF₂, CClF₂CClF₂, ClF₃CClF₂,)
- (8) Other gases or particles that have been demonstrated to have significant, quantifiable climate forcing effects when released to the atmosphere in significant quantities and for which DOE has established or approved methods for estimating emissions and reductions. (Note: As provided in § 300.6(i) of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting, chlorofluorocarbons and other gases with quantifiable climate forcing effects may be reported to the 1605(b) program if DOE has established an appropriate emission inventory or emission reduction calculation method, but reductions of these gases may not be registered.)

Heating value: The amount of thermal energy released per unit of a fuel that is burned completely.

Hydrofluorocarbons (HFCs): A class of anthropogenically created chemical compounds composed of one or more carbon atoms and varying numbers of hydrogen and fluorine atoms. Most HFCs have potent radiative forcing effects, with 100-year GWPs generally between 1,300 and 12,000 times that of CO₂.

Incidental lands: Entity landholdings that are a minor component of an entity's operations and are not actively managed for production of goods and services, including:

- (1) Transmission, pipeline, or transportation right of ways that are not managed for timber production;
- (2) Land surrounding commercial enterprises or facilities; and
- (3) Land where carbon stock changes are determined by natural factors.

Independent verifier: One who is qualified to attest to the accuracy and completeness of emissions reports and who is capable of independent assessment by virtue of having no ties to the emitter that might create a conflict of interest. For detailed qualifications of independent verifiers, see § 300.11 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting.

Independent verification: A process by which an organizationally independent source assess the accuracy, completeness and conformity with DOE Guidelines of proffered entity reports of emissions and emission reductions, in accord with 1605(b) Guidelines. For detailed qualifications of independent verification, see § 300.11 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting.

Indexed measure: An output measure, either physical or economic, that is defined relative to an index year's physical quantity or dollar value.

Indirect emissions: Greenhouse gas emissions from stationary or mobile sources outside the organizational boundary that occur as a direct consequence of an entity's activity, including but not necessarily limited to the emissions associated with the generation of electricity, steam and hot/chilled water used by the entity.

Intergovernmental Panel on Climate Change (IPCC): A panel established jointly by the World Meteorological Organization and the United Nations Environmental Program in 1988 to assess scientific, technical and socio-economic information relevant to climate change, its potential impacts, and options for adaptation and mitigation.

Inventory: A quantified account of an entity's total Greenhouse Gas emissions.

Joint venture: A legal organization that takes the form of a partnership in which the persons jointly undertake a transaction for mutual profit. Generally each person contributes assets and share risks. Like a partnership, joint ventures can involve any type of business transaction and the “persons” involved can be individuals, groups of individuals, companies, or corporations. (Source: http://www.law.cornell.edu/wex/index.php/Joint_venture.)

Landfill gas: Gas that is generated by the decomposition of organic material at landfill disposal sites. The average composition of landfill gas is approximately 50 percent methane and 50 percent carbon dioxide and water vapor by volume. The methane percentage, however, can vary from 40 to 60 percent, depending on several factors including waste composition (e.g. carbohydrate and cellulose content). The methane in landfill gas may be vented, flared, combusted to generate electricity or useful thermal energy on-site, or injected into a pipeline for combustion off-site.

Large emitter: an entity whose annual emissions are more than 10,000 metric tons of CO₂ equivalent, as determined in accordance with § 300.5(c) of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting.

Life cycle: The progression of a product or facility through its service life.

Look-up tables: Reference tables, typically provided to relate values of an observable parameter to corresponding values of less easily observed variables.

Managed carbon stocks: Stocks that are affected by human decision or action. Examples include managed forest, engineered carbon sinks, or certain agricultural practices.

Mass balance: A method for calculating emissions based on the mass and composition of fuel inputs, appropriate emissions factors, and combustion performance.

Materials balance calculation: A computation of carbon flow through an industrial process.

Mineral soils: A soil consisting predominantly of, and having its properties determined predominantly by, mineral matter. Usually contains less than 200 g / kg organic carbon (less than 120-180 g / kg if saturated with water), but may contain an organic surface layer up to 30 cm thick.

Mobile source emissions: Transportation emissions, plus emissions from small engines such as lawnmowers and equipment used at commercial and industrial sites, non-road equipment used in farming and forestry, at airports, and at railroad and marine terminals.

Municipal solid waste: Residential solid waste and some non-hazardous commercial, institutional, and industrial wastes.

Natural disturbances: Processes or events such as insect outbreaks, fire, disease, flooding, windstorms and avalanches that cause ecosystem change.

Net carbon flow: The sum of all transfers of carbon between the land and the atmosphere over a specified period. See also **Carbon flow/carbon flux**.

Net emission reductions or net entity-wide emission reductions: The sum of all annual changes in emissions, eligible avoided emissions and sequestration of the greenhouse gases specifically identified in

§ 300.6(i), and determined to be in conformance with §§ 300.7 and 300.8 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting.

Offset: An emission reduction that is included in a 1605(b) report and meets the requirements of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting, but is achieved by an entity other than the reporting entity. Offset reductions must not be reported or registered by any other entity and must appear as a separate and distinct component of an entity's report. Offsets are not integrated into the reporting entity's emissions or net emission reductions.

Operational control: The authority to introduce and implement operating policies in an organization.

Operations data system: A data collection system that reports the physical quantities of inputs utilized and products manufactured. These data are typically produced for management and regulatory compliance needs and are usually held at the facility level in the organization.

Organic growth/decline: Increases/decreases in greenhouse gas emissions as a result of changes in production levels, net investment in new capacity, and changes in product mix, as distinguished from acquisitions and divestitures.

Organic soils: Soil materials that are saturated with water and have 174 g / kg or more organic carbon if the mineral fraction has 500 g / kg or more clay, or 116 g / kg organic carbon if the mineral fraction has no clay, or has proportional intermediate contents. If these materials were never saturated with water they would have 203 g / kg or more organic carbon.

Organizational boundary: The scope of the entity covered by 1605(b) reporting, as defined in the entity statement. Generally, the organizational boundary of an entity encompasses all facilities and operations that are under the management control of the entity, which usually includes all land, facilities and vehicles that are wholly or majority owned or under long-term lease by the entity, as well as certain other facilities, vehicles or land that are under the management control of the entity. See also **Entity Boundary**.

Output: Output is a physical or economic measure used in determining an entity's or subentity's emissions intensity that is a reliable indicator of the level of activity of the entity or subentity and is related to the emissions levels of the entity or subentity.

Outsourcing: Contracting out activities by an entity to other businesses, where the output of the outsourced activity is later re-integrated into the entity's products or is otherwise integral to the entity's operations.

Permanence: The longevity of carbon in a carbon sink (such as forest land).

Perfluorocarbons (PFCs): A group of man-made chemicals composed of one or six carbon atoms and four to fourteen fluorine atoms, containing no chlorine. PFCs are compounds derived from hydrocarbons by replacement of hydrogen atoms by fluorine atoms. PFCs have several commercial uses and are emitted as a byproduct of aluminum smelting and semiconductor manufacturing. PFCs have very high 100-year Global Warming Potentials and are very long-lived in the atmosphere.

Prescribed fire: Intentionally set and managed forest burns, which further specific resource management objectives.

Process emissions: See **Emissions, process**.

Process models: Mathematical representations of ecosystem processes, such as nitrogen and carbon cycles.

Reforestation: The re-establishment of forest cover, naturally or artificially, on lands that have recently been harvested or otherwise cleared of trees.

Regeneration: The natural (by natural seeding, coppice, or root suckers) or artificial (by direct seeding or planting) process of re-establishing tree cover on forestland.

Registration: The reporting of emission reductions that the EIA has determined meet the qualifications for registered emission reductions set forth in the guidelines.

Reporting but not registering: If an entity does not choose to report emissions in a manner that conforms to the registration requirements, including those set forth in §§ 300.6 and 300.7 of 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting, then the entity may choose to report on any emissions or any emission reductions by complying with the other requirements of 10 CFR Part 300.

Reporting Year: The year that is the subject of a report to EIA.

Sequestration: The process by which CO₂ is removed from the atmosphere, either through biologic processes or physical processes.

Simplified Emission Inventory Tool (SEIT): A computer-based method, to be developed and made readily accessible by EIA, for translating common physical indicators into an estimate of greenhouse gas emissions.

Silviculture: The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands.

Sink: An identifiable discrete location, set of locations, or area in which CO₂ or some other greenhouse gas is sequestered.

Small emitter: An entity whose annual emissions are less than or equal to 10,000 metric tons of CO₂ equivalent, as determined in accordance with § 300.5(c), and that chooses to be treated as a small emitter under the guidelines.

Source: Any land, facility, process, vehicle or activity that releases a greenhouse gas.

Start year: The year upon which the initial entity statement is based and the last year of the initial base period(s).

Stationary sources: Emission sources at fixed locations, such as power plants, factories, refineries, mines, heating plants or waste conversion facilities.

Subentity: A component of any entity, such as a discrete business line, facility, plant, vehicle fleet, or energy using system, which has associated with it emissions of greenhouse gases that can be distinguished from the emissions of all other components of the same entity and, when summed with the emissions of all other subentities, equal the entity's total emissions.

Sustainable Forest Management: The practice of managing forests to provide ecological, economic, social and cultural benefits for present and future generations. For the purposes of 1605(b) reporting, a determination of sustainably managed forests must be certified consistent with provisions of the Technical Guidelines, Chapter 1.I.3.5.

Technical Guidelines: Detailed explanatory supplements to the 1605(b) General Guidelines.

Terrestrial sequestration: Biotic sequestration of carbon in above- and below-ground biomass and soils.

Total emissions: The total annual contribution of the greenhouse gases (as defined in 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting) to the atmosphere by an entity, including both direct and indirect entity-wide emissions.

Total entity-wide emission reductions: The sum of all annual changes in emissions, carbon stocks and avoided emissions of the greenhouse gases specifically identified in §300.6(f) 10 CFR Part 300, Guidelines for Voluntary Greenhouse Gas Reporting, determined in conformance with §300.7 and 300.8 of those guidelines. In calculating this total, decreases in emissions and increases in carbon stocks and avoided emissions are expressed as positive values.

Transportation sources: In the context of emissions, transportation sources include vehicles that operate on roads and highways, as well as non-road vehicles, engines, and equipment, but exclude farm equipment associated with particular farm premises. Examples of transportation sources include cars, trucks, buses, earth-moving equipment, lawn and garden power tools, ships, railroad locomotives, and airplanes.

United States or U.S.: The 50 States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, and any other territory of the United States.

Venting: Release of gases into the atmosphere without combustion. See also **Flaring**.

Verification: See **Independent verification**.

Wood products: Products derived from the harvested wood from a forest, including fuel-wood and logs and the products derived from them such as cut timber, plywood, wood pulp, paper, etc. Includes both products in use and in disposal systems such as landfills (but which have not yet decayed, releasing carbon to the atmosphere as carbon dioxide and/or methane).