OP 2: Greenhouse Gas Emissions

8 points available

Rationale

This credit recognizes institutions that have reduced their adjusted net Scope 1 and Scope 2 greenhouse gas (GHG) emissions.

Applicability

This credit applies to all institutions.

Criteria

Part 1. Reduction in GHG emissions per person

Institution has reduced its adjusted net *Scope 1 and Scope 2 GHG emissions* per *weighted campus user* compared to a baseline.

Part 2. GHG emissions per unit of floor area

Institution's annual adjusted net Scope 1 and Scope 2 GHG emissions are less than the *minimum performance threshold* of 0.215 metric tons of carbon dioxide equivalent (MTCO2e) per gross square metre (0.02 MTCO2e per gross square foot) of floor area.

Performance for Part 2 of this credit is assessed using *EUI-adjusted floor area*, a figure that accounts for significant differences in energy use intensity (EUI) between types of building space (see Standards and Terms).

Carbon sinks

For this credit, the following carbon sinks may be counted:

- *Third-party verified, purchased carbon offsets*
- *Institution-catalyzed carbon offsets* (popularly known as "local offsets")
- Carbon storage from on-site composting. The compost may be produced off-site, but must originate from on-site materials and be returned to the campus for use as a soil amendment.

Purchased carbon offsets that have not been third-party verified do not count. Consistent with the Sustainability Indicator Management & Analysis Platform (SIMAP) and relevant protocols from The Offset Network, non-additional sequestration does not count, but may be reported in the optional reporting field provided.

Scope 2 GHG emissions totals should include accounting for any contractual procurement and sales/transfer of renewable energy, e.g., Renewable Energy Certificates (RECs), Guarantees of Origin (GOs), and International RECs (I-RECs). Such products may not be counted as carbon offsets.

Scoring

Each part is scored independently. Points earned are calculated according to the formulas below. Please note that users do not have to calculate the number of points earned themselves; points will be calculated automatically when the data listed under Reporting Fields is entered in the online Reporting Tool.

Scoring for both parts of this credit are based on adjusted net Scope 1 and 2 GHG emissions, a measure of an institution's overall climate impact (gross emissions minus net carbon sinks). STARS calculates the figure according to the following formula:

$$\text{Adjusted net Scope 1 and 2 GHG emissions} = (A + B) – (C + D + E - F)$$

A = Gross Scope 1 GHG emissions (MTCO2e)
B = Gross Scope 2 GHG emissions (MTCO2e)
C = Institution-catalyzed carbon offsets generated (MTCO2e)
D = Carbon storage from on-site composting (MTCO2e)
E = Third-party verified carbon offsets purchased (MTCO2e)
F = Carbon sold or transferred (MTCO2e)

Part 1

Institutions earn the maximum of 4 points available for Part 1 of this credit by achieving zero adjusted net Scope 1 and 2 GHG emissions. Incremental points are awarded for reducing adjusted net Scope 1 and 2 GHG emissions per weighted campus user compared to a baseline. For example, an institution that reduced its adjusted net GHG emissions per weighted campus user by 50 percent would earn 2.25 points (half of the points available for Part 1).

STARS awards only positive points; points will not be deducted if adjusted net GHG emissions per weighted campus user increased rather than decreased during the time period. Points for Part 1 of this credit are earned according to the following formula:

$$\text{Points Earned} = 4 \times \{ [(A / B) - (C / D)] / (A / B) \}$$

A = Adjusted net Scope 1 and 2 GHG emissions, baseline year (MTCO2e)
B = Weighted campus users, baseline year
C = Adjusted net Scope 1 and 2 GHG emissions, performance year (MTCO2e)
D = Weighted campus users, performance year

Part 2

Institutions earn the maximum of 4 points available for Part 2 of this credit by achieving zero adjusted net Scope 1 and 2 GHG emissions. Incremental points are awarded based on an institution's performance between the minimum performance threshold of 0.215 MTCO2e per gross square metre (0.02 MTCO2e per gross square foot) of floor area and zero. For example, an institution with annual adjusted net Scope 1 and 2 GHG emissions of 0.01 MTCO2e per gross square foot of floor area would earn 2.25 points (half of the points available for Part 2).

Scoring for Part 2 of this credit is based on an EUI-adjusted floor area figure that accounts for significant differences in energy use intensity (EUI) between types of building space. The STARS Reporting Tool calculates EUI-adjusted floor area according to the following formula:

$$\text{EUI-adjusted floor area} = \{ A + [2 \times (B + C)] + D \}$$

A = Gross floor area of building space (square metres or feet)
B = Floor area of laboratory space (square metres or feet)
C = Floor area of healthcare space (square metres or feet)
D = Floor area of other energy intensive space (square metres or feet)

Points for Part 2 of this credit are earned according to the following formula:

$$\text{Points Earned} = 4 \times \{ [A - (B / C)] / A \}$$

A = Minimum performance threshold (MTCO2e per gross square metre or foot)
B = Adjusted net Scope 1 and 2 GHG emissions, performance year (MTCO2e)
C = EUI-adjusted floor area, performance year (square metres or feet)

Reporting Fields

Required

Performance year

- □ Gross Scope 1 and 2 GHG emissions, performance year (MTCO2e)
    - ○ Gross Scope 1 GHG emissions from stationary combustion, performance year
    - ○ Gross Scope 1 GHG emissions from other sources, performance year (i.e., mobile combustion, process emissions, fugitive emissions)
    - ○ Gross Scope 2 GHG emissions from imported electricity, performance year (calculated using a market-based method, see Measurement)
    - ○ Gross Scope 2 GHG emissions from imported thermal energy, performance year (i.e., steam, hot water, and/or chilled water)
- □ Figures needed to determine net carbon sinks, performance year:
    - ○ Third-party verified carbon offsets purchased, performance year (MTCO2e)
    - ○ Institution-catalyzed carbon offsets generated, performance year (MTCO2e)
    - ○ Carbon storage from on-site composting, performance year (MTCO2e)
    - ○ Carbon sold or transferred, performance year (e.g. in the form of verified emissions reductions) (MTCO2e) (Report '0' if sales/transfers are already accounted for in the figures reported above.)

  If total performance year carbon sinks are greater than zero, provide:
    - ○ A brief description of the carbon sinks, including vendor, project source, verification program and contract timeframes (as applicable)
- □ Start date, performance year or 3-year period
- □ End date, performance year or 3-year period
- □ *Gross floor area of building space*, performance year (square metres or feet)
- □ Floor area of *laboratory space*, performance year (square metres or feet)
- □ Floor area of *healthcare space*, performance year (square metres or feet)
- □ Floor area of other *energy intensive space*, performance year (square metres or feet)
- □ Figures needed to determine weighted campus users, performance year:
    - ○ Number of students resident on-site, performance year

- Number of employees resident on-site, performance year
- Number of other individuals resident on-site, performance year
- Total full-time equivalent student enrollment, performance year
- Full-time equivalent of employees, performance year
- Full-time equivalent of students enrolled exclusively in distance education, performance year

Baseline year

- □ Gross Scope 1 and 2 GHG emissions, baseline year (MTCO2e)
  - Gross Scope 1 GHG emissions from stationary combustion, baseline year
  - Gross Scope 1 GHG emissions from other sources, baseline year (i.e., mobile combustion, process emissions, fugitive emissions)
  - Gross Scope 2 GHG emissions from imported electricity, baseline year (calculated using a market-based method, see Measurement)
  - Gross Scope 2 GHG emissions from imported thermal energy, baseline year (i.e., steam, hot water, and/or chilled water)
- □ Figures needed to determine net carbon sinks, baseline year:
  - Third-party verified carbon offsets purchased, baseline year (MTCO2e)
  - Institution-catalyzed carbon offsets generated, baseline year (MTCO2e)
  - Carbon storage from on-site composting, baseline year (MTCO2e)
  - Carbon sold or transferred, baseline year (MTCO2e)
- □ Start date, baseline year or 3-year period
- □ End date, baseline year or 3-year period

  If end date of the baseline year/period is 2004 or earlier, provide:
    - A brief description of when and why the GHG emissions baseline was adopted (e.g. in sustainability plans and policies or in the context of other reporting obligations)
- □ Figures needed to determine “weighted campus users”, baseline year:
  - Number of students resident on-site, baseline year
  - Number of employees resident on-site, baseline year
  - Number of other individuals resident on-site, baseline year
  - Total full-time equivalent student enrollment, baseline year
  - Full-time equivalent of employees, baseline year
  - Full-time equivalent of students enrolled exclusively in distance education, baseline year

Optional

- □ Carbon storage from non-additional sequestration on institution-owned land, performance year (MTCO2e)
- □ Carbon storage from non-additional sequestration on institution-owned land, baseline year (MTCO2e)
- □ A brief description of the institution’s GHG emissions reduction initiatives (Include efforts made during the previous three years and clarification of any emissions outliers.)

- □ Website URL where information about the institution's GHG emissions is available
- □ Additional documentation to support the submission (upload)
- □ Data source(s) and notes about the submission
- □ Contact information for a responsible party (an employee who can respond to questions regarding the data once it is submitted and available to the public)

Measurement

Timeframe

Performance Year

Report the most recent data available from the three years prior to the anticipated date of submission. Institutions may use the most recent single year for which data is available or an average from throughout the period. Institutions may choose the annual start and end dates that work best with the data they have (e.g., fiscal or calendar year), as long as data are reported from a consecutive 12-month (or 3-year) period.

Report building space and population figures from the same time period as that from which GHG emissions data are drawn (e.g., the consecutive 12-month or 3-year period that most closely overlaps with the emissions performance period). Institutions may report building space using an average from throughout the period or a snapshot at a single representative point during the period.

Baseline Year

Report data from the baseline year, which may be:

- Any year from 2005 to the present
- A baseline year, 1990 to 2004, that the institution has adopted as part of its sustainability plans or policies or in the context of other reporting obligations

Recommended best practices for defining a baseline include:

- Using the average of three consecutive years to reduce the impact of outliers.
- Using the same baseline year for multiple credits to reduce reporting requirements. For example, institutions using 2005 for all STARS credits that are baseline-based would only have to calculate baseline weighted campus user data once.
- Ensuring that baseline and performance year data are valid and reliable (e.g., that the data were gathered in the same manner).

Institutions without valid and reliable historical data should use performance year data for both the baseline and performance year. Following this approach, an institution would not be able to claim points for reductions during its first STARS submission, but would be able to use its newly established baseline for subsequent submissions. Institutions without valid and reliable historical data should use performance year data for both the baseline and performance year.

Institutions may choose the start and end dates that work best with the data they have (e.g., fiscal or calendar year), as long as data are reported from a consecutive 12-month (or 3-year) period.
Report building space and population figures from the same period as that from which GHG emissions data are drawn (e.g., the consecutive 12-month or 3-year period that most closely overlaps with the

emissions baseline period). Institutions may report building space using an average from throughout the period or a snapshot at a single representative point during the period.

Sampling and Data Standards

This credit is based on GHG emissions calculated using a market-based method that reflects emissions from electricity that the institution has purposefully chosen, including contractual instruments such as RECs, GOs, and I-RECs. For more information, see the Emissions Inventory and Disclosure credit.

Institution-catalyzed carbon offsets must be certified/third party verified or, at a minimum, quantified using a method that addresses all of the following accounting issues:

- Selection of a baseline scenario (i.e., what would have happened in the absence of the project?);
- Demonstration of additionality (i.e., the project has resulted in emission reductions or removals in addition to what would have happened in the absence of the project);
- Identification and quantification of relevant secondary effects (i.e., small, unintended GHG consequences of a project, include leakage and changes in GHG emissions up- and downstream of the project);
- Consideration of reversibility (i.e., assessing the risk of reversibility, together with any mitigation or compensation measures included in the project design);
- Avoidance of double-counting (i.e., the reductions giving rise to the offset must occur at sources or sinks not included in the target or cap for which the offset is used).

Examples include:

- GHG Protocol for Project Accounting_ (World Resources Institute)
- Land Use, Land Change and Forestry (IPCC)
- Forest Project Protocol (Climate Action Reserve)
- Framework for Forest Management Offset Protocols (Canadian Council of Forest Ministers)
- The Compliance Offset Protocols (COP) adopted by the California Air Resources Board (CARB)
- Protocols shared by members of The Offset Network

Institutions that have sold or transferred carbon , e.g., in the form of *verified emissions reductions* (VERs), must report those transactions in the appropriate reporting field. Net GHG emissions are automatically adjusted upward to reflect the sale or transfer of any institution-generated offsets that have been included as carbon offsets (see Scoring).

Reductions should only be counted as offsets once, i.e., toward no more than one of the offset categories outlined in the credit criteria

Standards and Terms

Energy intensive space

Energy intensive space includes “laboratory space”, “healthcare space”, and “other energy intensive space”, which is reported separately and may include restaurants and food production facilities, convenience and grocery stores, and data centers.

Other facilities that the institution has determined to have an average energy use intensity (EUI) that is at least twice that of office/administrative space may also be counted as “other energy intensive space”, however classrooms, offices, residence halls, auditoriums, gymnasiums, arenas/stadiums, clinics, storage facilities, and convention centers would NOT typically qualify.

Energy use intensity is a unit of measurement that represents the energy consumed by a building relative to its size, e.g., 1,000 MMBtu per square metre. For more information, see ENERGY STAR Portfolio Manager Technical Reference: U.S. Energy Use Intensity by Property Type.

EUI-adjusted floor area
EUI-adjusted floor area is a figure that adjusts each institution's actual floor area to account for significant differences in energy use intensity (EUI) between types of building space. Energy use intensity is a unit of measurement that represents the energy consumed by a building relative to its size, for example 1,000 MMBtu per square metre.

STARS calculates the figure according to the following formula. Please note that users will not have to calculate this figure themselves; the result will be calculated automatically when data are entered into the online Reporting Tool.

$$\text{EUI-adjusted floor area} = \{ A + [2 \times (B + C)] + D \}$$

A = Gross floor area of building space (square metres or feet)
B = Floor area of laboratory space (square metres or feet)
C = Floor area of healthcare space (square metres or feet)
D = Floor area of other energy intensive space (square metres or feet)

Gross floor area of building space
Gross floor area of building space refers to the total amount of building space that is included within the institutional boundary. Any standard definition of building space may be used (e.g., ASHRAE, ANSI/BOMA, IECC) as long as it is used consistently. Parking structures are included. For guidance on calculating gross square footage of a building, you may also consult 3.2.1 Gross Area of the U.S. Department of Education's Postsecondary Education Facilities Inventory and Classification Manual.

Buildings within the overall STARS boundary that the institution leases entirely (i.e., the institution is the only tenant) should be included.

Buildings that are not owned by the institution and in which the institution is one of multiple tenants may be excluded. If the institution chooses to include such buildings, it must include all multi-tenant buildings that are included in the institution's overall STARS boundary and in which the institution is a tenant; institutions cannot choose to include some leased spaces and omit others. If an institution chooses to include leased spaces, the institution should count only the square footage of building space it occupies and not the entire building.

Guarantees of origin
A Guarantee of Origin (GO) is a certificate issued by European energy authorities to certify that electricity was produced from renewable energy sources.

Healthcare space
The total amount of building space within the institutional boundary that may be categorized as "Health Care Facilities" (e.g., codes in the 800 series under the Space Use Codes in the US Department of Education's Postsecondary Education Facilities Inventory and Classification Manual). To simplify reporting, institutions with hospitals may report all floor area within hospitals as healthcare space.

Imported electricity

Imported electricity includes all electricity purchased or otherwise obtained from off-campus sources.

Imported thermal energy
Imported thermal energy includes all steam, hot water, and chilled water purchased or otherwise obtained from off-campus sources.

Institution-catalyzed carbon offsets
Institution-catalyzed carbon offsets are generated by what are commonly referred to as “local offsets” programs. In such programs, institutions offset their greenhouse gas emissions by implementing projects that reduce or newly sequester greenhouse gas emissions on campus or in the broader community. For example, a local offsets program may engage students in weatherizing homes in the surrounding community. As part of the arrangement with the homeowner, the institution would “own” the emissions reductions that result from the program. Local projects that are to be used as offsets must be third party verified, peer verified (for example through the The Offset Network), or, at a minimum, quantified using a method that is consistent with the World Resources Institute GHG Protocol for Project Accounting (or equivalent). Non-additional sequestration does not count as an institution-catalyzed carbon offset.

International RECs
An International REC (I-REC) is a type of energy attribute certificate intended for regions without an existing or reliable energy attribute tracking framework.

Laboratory space
The total amount of building space within the institutional boundary that may be categorized as "research laboratories" (e.g., code 250 under the Space Use Codes in the US Department of Education's Postsecondary Education Facilities Inventory and Classification Manual). To simplify reporting, institutions may report all floor area within buildings that contain research laboratories as laboratory space.

Minimum performance threshold
Minimum performance thresholds are benchmarks against which campus performance may be assessed for scoring purposes. The thresholds used in this version of STARS were calculated at the first decile for institutions reporting under STARS 2.0 as of July 31, 2015 and rounded to the nearest hundredth. In other words, 90 percent of institutions rated under STARS 2.0 before July 31, 2015 performed better than the minimum threshold. Extreme outliers were excluded from the calculations.

Renewable energy certificates
The Center for Resource Solutions (CRS) provides the following definition of Renewable Energy Certificates (RECs), also known as green tags, renewable energy credits, renewable electricity certificates, and tradable renewable certificates):

> When a renewable energy facility operates, it creates electricity that is delivered into a vast network of transmission wires, often referred to as “the grid.” The grid is segmented into regional power networks called pools. To help facilitate the sale of renewable electricity nationally, a system was established that separates renewable electricity generation into two parts: the electricity or electrical energy produced by a renewable generator and the renewable “attributes” of that generation. (These attributes include the tons of greenhouse gas that were avoided by generating electricity from renewable resources instead of conventional fuels, such as coal, nuclear, oil, or gas.) These renewable (“green”) attributes are sold separately as renewable energy certificates (RECs). One REC is issued for each megawatt-hour (MWh) unit of renewable

electricity produced. The electricity that was split from the REC is no longer considered "renewable" and cannot be counted as renewable or zero-emissions by whoever buys it.

RECs contain specific information about the renewable energy generated, including where, when, at what facility, and with what type of generation. Purchasers of RECs are buying the renewable attributes of those specific units of renewable energy, which helps offset conventional electricity generation in the region where the renewable generator is located.

Scope 1 and Scope 2 GHG Emissions

Scope 1 GHG emissions are direct GHG emissions occurring from sources that are owned or controlled by the institution. Scope 1 emission sources include:

- Combustion of fuels to produce electricity, steam, heat, or power using equipment in a fixed location such as boilers, burners, heaters, furnaces, incinerators
- Combustion fuels by institution-owned cars, tractors, buses, and other transportation devices

Scope 2 GHG emissions are indirect GHG emissions that are a consequence of activities that take place within the organizational boundaries of the institution, but that occur at sources owned or controlled by another entity. Scope 2 emission sources include purchased electricity, purchased heating, purchased cooling, and purchased steam.

Third-party verified, purchased carbon offsets

Third-party verified carbon offsets are purchased from outside vendors. The Verified Carbon Standard and the Gold Standard are two organizations that provide project-level third-party certification for carbon offsets. These standards provide assurance that offsets are real, measured, permanent, verified, and beyond business-as-usual GHG emission reductions. Green-e Climate is a retail standard and certification for carbon offsets that requires use of high-quality offset project standards like VCS and Gold Standard and also provides assurances related to the accurate and exclusive sale and delivery of carbon offsets in the retail market.

Verified emission reduction

Verified emission reductions (VERs) are carbon offsets created by projects which have been verified outside of the Kyoto Protocol and exchanged in the voluntary market for carbon credits.

Weighted campus user

Weighted campus user is a measurement of an institution's population that is adjusted to accommodate how intensively certain community members use the campus. This figure is used to normalize resource consumption and environmental impact figures in order to accommodate the varied impacts of different population groups. For example, an institution where a high percentage of students live on campus would witness higher greenhouse gas emissions, waste generation, and water consumption figures than otherwise comparable non-residential institution since students' residential impacts and consumption would be included in the institution's totals.

STARS calculates the figure according to the following formula. Please note that users will not have to calculate this figure themselves; the result will be calculated automatically when the data are entered into the online Reporting Tool.

$$\text{Weighted campus users} = (A + B + C) + 0.75 [(D - A) + (E - B) – F]$$

A = Number of students resident on-site

B = Number of employees resident on-site
C = Number of other individuals resident on-site
D = Total full-time equivalent student enrollment
E = Full-time equivalent of employees
F = Full-time equivalent of students enrolled exclusively in distance education

Scoring Example: Greenhouse Gas Emissions

Part 1

A. Adjusted net Scope 1 and 2 GHG emissions, baseline year (MTCO2e):

- Gross Scope 1 GHG emissions = 48,195
- Gross Scope 2 GHG emissions = 11,475
- Institution-catalyzed carbon offsets generated = 650

Baseline adjusted net Scope 1 and 2 GHG emissions
= (48,195 + 11,475) - (650)
= 59,670 - 650
= 59,020 MTCO2e

B. Weighted campus users, baseline year:

a. Number of students resident on-site = 5,800
b. Number of employees resident on-site= 200
c. Number of other individuals resident on-site and/or staffed hospital beds = 0
d. Total full-time equivalent student enrollment = 6,750
e. Full-time equivalent of employees = 1,200
f. Full-time equivalent of students enrolled in exclusively in distance education = 250

Baseline weighted campus users = (Ba + Bb + Bc) + 0.75 [(Bd - Ba) + (Be - Bb) - Bf]
= (5,800 + 200 + 0) + 0.75 [(6,750 - 5,800) + (1,200 - 200) - (250)]
= 6,000 + 0.75 (950 + 1,000 – 250)
= 6,000 + 0.75 (1,700)
= 7,275

C. Adjusted net Scope 1 and 2 GHG emissions, performance year (MTCO2e):

- Gross scope 1 GHG emissions = 42,133
- Gross scope 2 GHG emissions = 11,599
- Institution-catalyzed carbon offsets generated = 4,400

Performance year adjusted net Scope 1 and 2 GHG emissions
= (42,133 + 11,599) - 4,400
= 53,732 – 4,400
= 49,332 MTCO2e

D. Weighted campus users, performance year:

a. Number of students resident on-site = 6,000
b. Number of employees resident on-site= 180
c. Number of other individuals resident on-site and/or staffed hospital beds = 0
d. Total full-time equivalent student enrollment = 7,000
e. Full-time equivalent of employees = 1,200
f. Full-time equivalent of students enrolled exclusively in distance education = 350

Performance year weighted campus users = (Da + Db + Dc) + 0.75 [(Dd - Da) + (De - Db) - Df]
= (6,000 + 180 + 0) + 0.75 [(7,000 - 6,000) + (1,200 - 180) - (350)]
= 6,180 + 0.75 (1,000 + 1,020 - 350)
= 6,180 + 0.75 (1,670)
= 7,432.5

Calculating points earned for Part 1

Points earned = 4 × { [(A / B) - (C / D)] / (A / B) }
= 4 × { [(59,020 / 7,275) – (49,332 / 7,432.5)] / (59,020 / 7,275) }
= 4 × { [8.11 - 6.64] / 8.11 }
= 4 × { 1.47 / 8.11 }
= 4 × 0.182
= 0.73 points

Part 2

EUI-adjusted floor area (square feet)

A. Gross floor area of building space = 4,000,000
B. Floor area of laboratory space = 80,000
C. Floor area of healthcare space = 0
D. Floor area of other energy intensive space = 24,000

EUI-adjusted floor area = { A + [2 × (B + C)] + D }
= { 4,000,000 + [2 × (80,000 + 0)] + 24,000 }
= 4,000,000 + [2 × 80,000) + 24,000
= 4,000,000 + 184,000
= 4,184,000 square feet

Calculating points earned for Part 2

A. Minimum performance threshold = 0.02 MTCO2e per square foot
B. Adjusted net Scope 1 and 2 GHG emissions, performance year = 49,332 MTCO2e
C. EUI-adjusted floor area, performance year = 4,184,000 square feet

Points earned = 4 × { [A - (B / C)] / A}
= 4 × { [0.02 - (49,332 / 4,184,000)] / 0.02}
= 4 × { [0.02 - (.0118)] / 0.02}
= 4 × { 0.0082 / 0.02}

= 4 × 0.41
= 1.64 points