

OP 19: Waste Minimization and Diversion

8 points available

A. Credit Rationale

This credit recognizes institutions that are minimizing their production of waste, diverting materials from landfills and incinerators, and conserving resources by recycling and composting.

B. Criteria

Part 1

Institution has implemented source reduction strategies to reduce the total amount of waste generated ([materials diverted](#) + [materials disposed](#)) per [weighted campus user](#) compared to a baseline.

Part 2

Institution's total annual waste generation (materials diverted and disposed) is less than the [minimum performance threshold](#) of 0.50 tons (0.45 tonnes) per weighted campus user.

Part 3

Institution diverts materials from the landfill or incinerator by recycling, composting, donating or re-selling.

For scoring purposes, up to 10 percent of total waste generated may also be disposed through post-recycling [residual conversion](#). To count, residual conversion must include an integrated materials recovery facility (MRF) or equivalent sorting system to recover recyclables and compostable material prior to conversion.

This credit includes on-campus dining services operated by the institution or the institution's primary on-site contractor.

[Waste](#) includes all materials that the institution discards, intends to discard or is required to discard (i.e., all materials that are recycled, composted, donated, re-sold, or disposed of as trash) except construction, demolition, electronic, hazardous, special (e.g., coal ash), universal and non-regulated chemical waste, which are covered in the *Construction and Demolition Waste Diversion* and *Hazardous Waste Management* credits.

Consistent with the U.S Environmental Protection Agency's Waste Reduction Model (WARM), the on-site reuse of materials is treated as a form of source reduction for scoring purposes. All materials that are reused on campus are automatically recognized in scoring for Part 1 and Part 2 of this credit. To avoid double counting, reuse therefore does not also contribute to scoring for Part 3 as waste diversion.

C. Applicability

This credit applies to all institutions.

D. 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 earned will be calculated automatically when the data listed under E. Reporting Fields is entered in the online Reporting Tool.

Part 1

Institutions earn maximum points of 2.5 points available for Part 1 by reducing their total waste generation by 50 percent or more compared to a baseline. Incremental points are awarded based on the percentage reduction achieved. For example, an institution that reduced the total amount of waste generated by 25 percent would earn 1.25 points (half of the points available for Part 1).

STARS only awards positive points; points will not be deducted if the total amount of waste generated increases rather than decreases during the time period.

$$\text{Points earned} = 5 \times \{ [(A/B) - (C/D)] / (A/B) \}$$

A = Total waste generated (diverted + disposed), baseline year (short tons/tonnes)

B = Weighted campus users, baseline year

C = Total waste generated (diverted + disposed), performance year (short tons/tonnes)

D = Weighted campus users, performance year

Part 2

An institution earns the maximum of 2.5 points available for Part 2 of this credit when its total annual waste generation per weighted campus user is 90 percent less than the minimum performance threshold of 0.50 short tons (0.46 tonnes). Incremental points are awarded based on the institution's performance between the threshold and the 90 percent target. For example, an institution that generates 0.275 tons of waste per weighted campus user (45 percent less than the threshold) would earn 1.25 points (half of the points available for Part 2).

$$\text{Points earned} = 2.78 \times \{ [C - (A/B)] / C \}$$

A = Total waste generated (diverted + disposed), performance year (short tons/tonnes)

B = Weighted campus users, performance year

C = Minimum performance threshold (0.50 short tons or 0.46 tonnes)

Part 3

Institutions earn the maximum of 3 points available for Part 3 of this credit by diverting 100 percent of waste from the landfill or incinerator through recycling, composting, donating or re-selling or by diverting at least 90 percent of waste from the landfill or incinerator and disposing of the remaining residual materials through post-recycling conversion. Incremental points are awarded based on the percentage of waste that is diverted and the percentage of waste that is disposed through post-recycling conversion, as follows:

$$\text{Points earned} = 3 \times \{ [(A + B + C) + (F \text{ if } D \geq F, \text{ else } D)] / (A + B + C + D + E) \}$$

A = Materials recycled, performance year (short tons/tonnes)

B = Materials composted, performance year (short tons/tonnes)
 C = Materials donated or re-sold, performance year (short tons/tonnes)
 D = Materials disposed through post-recycling residual conversion, performance year (short tons/tonnes)
 E = Materials disposed in a solid waste landfill or incinerator, performance year (short tons/tonnes)
 F = Maximum allowable residual conversion $[0.1 \times (A + B + C + D + E)]$

For example, an institution that diverts 40 percent of its waste through recycling, composting, donating or re-selling and disposes of the remaining 60 percent through post-recycling conversion would earn 1.5 points (half of the points available for Part 3 of this credit).

E. Reporting Fields

Required

- Figures needed to determine total waste generated and diverted during the performance year:
 - Materials recycled, performance year (short tons/tonnes)
 - Materials composted, performance year (short tons/tonnes)
 - Materials donated or re-sold, performance year (short tons/tonnes)
 - Materials disposed through post-recycling residual conversion, performance year (short tons/tonnes)
 - Materials disposed in a solid waste landfill or incinerator, performance year (short tons/tonnes)
- Figures needed to determine total waste generated and diverted during the baseline year:
 - Materials recycled, baseline year (short tons/tonnes)
 - Materials composted, baseline year (short tons/tonnes)
 - Materials donated or re-sold, baseline year (short tons/tonnes)
 - Materials disposed through post-recycling residual conversion, baseline year (short tons/tonnes)
 - Materials disposed in a solid waste landfill or incinerator, baseline year (short tons/tonnes)
- If reporting post-recycling residual conversion, provide:*
 - A brief description of the residual conversion facility, including affirmation that materials are sorted prior to conversion to recover recyclables and compostable materials
- Start date, performance year or 3-year period
- End date, performance year or 3-year period
- 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 waste generation 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” during the 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 and/or staffed hospital beds (if applicable), performance year
- Total full-time equivalent student enrollment, performance year
- Full-time equivalent of employees (staff + faculty), performance year
- Full-time equivalent of students enrolled exclusively in distance education, performance year
- Figures needed to determine “weighted campus users” during the 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 and/or staffed beds (if applicable), baseline year
 - Total full-time equivalent student enrollment, baseline year
 - Full-time equivalent of employees (staff + faculty), baseline year
 - Full-time equivalent of students enrolled exclusively in distance education, baseline year
- In the waste figures reported above, has the institution recycled, composted, donated and/or re-sold the following materials?
 - Paper, plastics, glass, metals, and other recyclable containers
 - Food
 - Cooking oil
 - Plant materials
 - Animal bedding
 - White goods (i.e., appliances)
 - Laboratory equipment
 - Furniture
 - Residence hall move-in/move-out waste
 - Scrap metal
 - Pallets
 - Tires
 - Other (please specify)

Optional

- Materials intended for disposal but subsequently recovered and reused on campus, performance year (e.g., materials that are actively diverted from the landfill or incinerator and refurbished/repurposed) (short tons/tonnes)
- Which of the following methods does the institution use to collect standard recyclables (i.e. paper, plastic, glass, metals) in common areas? (select all that apply)
 - Single stream (a single container for commingled recyclables)
 - Dual stream (two separate containers for recyclables, e.g. one for paper and another for plastic, glass, and metals)
 - Multi-stream (multiple containers that further separate different types of materials)
- Average contamination rate for the institution’s recycling program

- A brief description of any recycling quality control mechanisms employed, e.g. efforts to minimize contamination and/or monitor the discard rates of the materials recovery facilities and mills to which materials are diverted
- A brief description of any of the following waste minimization strategies employed by the institution:
 - Behavior change, e.g. initiatives to shift individual attitudes and practices such as signage and competitions
 - Waste audits and other initiatives to assess its materials management efforts and identify areas for improvement
 - Institutional procurement policies designed to prevent waste (e.g., by minimizing packaging and purchasing in bulk)
 - A surplus department or formal office supplies exchange program that facilitates reuse of materials
 - Platforms to encourage peer-to-peer exchange and reuse (e.g., of electronics, furnishings, books and other goods)
 - Limits on paper and ink consumption (e.g., restricting free printing and/or mandating doubled-sided printing in libraries and computer labs)
 - Making materials (e.g., course catalogs, course schedules, and directories) available online by default rather than printing them
 - Program to reduce residence hall move-in/move-out waste
 - Programs or initiatives to recover and reuse other materials intended for disposal
- The website URL where information about the programs or initiatives is available
- Additional documentation to support the submission (upload)
- Data source(s) and notes about the submission
- Contact information for a responsible party (a staff member, faculty member, or administrator who can respond to questions regarding the data once it is submitted and available to the public)

F. Measurement

Timeframe

Performance Year

Report the most recent data available from within 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 population figures from the same time period as that from which waste generation data are drawn (e.g., the consecutive 12-month or 3-year period that most closely overlaps with the waste generation performance 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 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 population figures from the same period as that from which waste generation data are drawn (e.g. the consecutive 12-month or 3-year period that most closely overlaps with the waste generation baseline period).

Sampling and Data Standards

Waste figures measured in volume may be converted to weight using the conversion factors provided by the [U.S. Environmental Protection Agency](#) and the College and University Recycling Council (used for the U.S. [RecycleMania competition](#)) or the conversion factors provided by the [United Nations Environment Programme](#) (UNEP).

To the extent possible, include all waste (diverted + disposed) that was generated by the institution and the institution's primary on-site dining services contractor (if applicable) when reporting for this credit. Construction, demolition, electronic, hazardous, special (e.g., coal ash), universal and non-regulated chemical waste, which are covered in the *Construction and Demolition Waste Diversion* and *Hazardous Waste Management* credits, are excluded. Agricultural waste may be excluded, provided it is excluded from both the volume of materials diverted and the volume of materials disposed.

If data for the entire campus and/or entire year are not available, institutions may use a representative sample. When taking a sample, strive for consistency between the baseline and performance year.

G. Standards and Terms

Materials disposed

Materials disposed include any solid waste that was sent for disposal in a municipal waste landfill or incinerator.

Materials diverted

Materials diverted include any solid waste that was destined for disposal in a municipal waste landfill or incinerator but was diverted by recycling, composting, donating, or re-selling.

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.

Residual conversion

Consistent with CalRecycle and the [Southern California Conversion Technology Project](#), residual conversion includes:

...thermal, chemical, mechanical, and/or biological processes capable of converting post-recycled residual solid waste into useful products and chemicals, green fuels like ethanol and biodiesel, and clean, renewable energy.

Examples include the transformation of post-recycled residual materials into usable heat or electricity through gasification, pyrolysis, distillation, or biological conversion other than composting. To count as residual conversion, the process must include an integrated materials recovery facility (MRF) or equivalent sorting system to recover recyclables and compostable material prior to conversion.

Materials that are otherwise landfilled or incinerated, including biomass conversion operations that exclusively incinerate organic materials, landfill-gas-to-energy (LFGTE) facilities, and other facilities that do not employ integrated materials recovery or equivalent sorting and recovery systems may not be considered to be converted residual waste.

Waste

Waste is defined as any substance or object which the institution discards, intends to discard, or is required to discard. This includes materials that are recycled, composted, donated, re-sold, or disposed of as trash.

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 and/or staffed hospital beds

D = Total full-time equivalent student enrollment

E = Full-time equivalent of employees (staff + faculty)

F = Full-time equivalent of students enrolled exclusively in distance education

Scoring Example: Waste Minimization and Diversion

The following data describe Example University:

A. Waste generation, baseline year:

- Tons of materials recycled = 1,000
- Tons of materials composted = 350
- Tons of materials donated or re-sold = 0
- Tons of materials disposed through post-recycling residual conversion = 0
- Tons of materials disposed in a solid waste landfill or incinerator = 650

Total waste generation = $1,000 + 350 + 650 = 2,000$ tons

B. Weighted campus users, baseline year:

- A. Number of students resident on-site = 2,000
- B. Number of employees resident on-site = 0
- C. Number of other individuals resident on-site and/or staffed hospital beds = 0
- D. Total full-time equivalent student enrollment = 2,500
- E. Full-time equivalent of employees = 750
- F. Full-time equivalent of students enrolled exclusively in distance education = 0

Baseline year weighted campus users = $(A + B + C) + 0.75 [(D - A) + (E - B) - F]$
 $= (2,000 + 0 + 0) + 0.75 [(2,500 - 2,000) + (750 - 0) - (0)]$
 $= 2,000 + 0.75 (500 + 750 - 0)$
 $= 2,000 + 0.75 (1,250)$
 $= 2,937.5$

C. Waste generation, performance year:

- Tons of materials recycled = 790
- Tons of materials composted = 350
- Tons of materials donated or re-sold = 10
- Tons of materials disposed through post-recycling residual conversion = 0
- Tons of materials disposed in a solid waste landfill or incinerator = 400

Total waste generation = $790 + 350 + 10 + 400 = 1,550$ tons

D. Weighted campus users, performance year:

- A. Number of students resident on-site = 2,500
- B. Number of employees resident on-site = 50
- C. Number of other individuals resident on-site and/or in-patient hospital beds = 0
- D. Total full-time equivalent student enrollment = 3,000
- E. Full-time equivalent of employees = 800
- F. Full-time equivalent of students enrolled exclusively in distance education = 0

$$\begin{aligned}
\text{Performance year weighted campus users} &= (A + B + C) + 0.75 [(D - A) + (E - B) - F] \\
&= (2,500 + 50 + 0) + 0.75 [(3,000 - 2,500) + (800 - 50) - (0)] \\
&= 2,550 + 0.75 (500 + 750 - 0) \\
&= 2,550 + 0.75 (1,250) \\
&= 3,487.5
\end{aligned}$$

Part 1

$$\begin{aligned}
\text{Points earned} &= 5 \times \{ [(A/B) - (C/D)] / (A/B) \} \\
&= 5 \times \{ [(2,000/2,937.5) - (1,550/3,487.5)] / (2,000/2,937.5) \} \\
&= 5 \times \{ [0.681 - 0.444] / 0.681 \} \\
&= 5 \times \{ 0.2366 / 0.6809 \} \\
&= 5 \times 0.347 \\
&= 1.74 \text{ points}
\end{aligned}$$

Part 2

$$\begin{aligned}
\text{Points earned} &= 2.78 \times \{ [0.50 - (C/D)] / 0.50 \} \\
&= 2.78 \times \{ [0.50 - (1,550/3,487.5)] / 0.50 \} \\
&= 2.78 \times \{ [0.50 - 0.4444] / 0.50 \} \\
&= 2.78 \times \{ 0.0556 / 0.50 \} \\
&= 2.78 \times 0.1112 \\
&= 0.31 \text{ points}
\end{aligned}$$

Part 3

Waste generation, performance year:

A = Tons of materials recycled, performance year = 790

B = Tons of materials composted, performance year = 350

C = Tons of materials donated or re-sold, performance year = 10

D = Tons of materials disposed through post-recycling residual conversion, performance year = 0

E = Tons of materials disposed in a solid waste landfill or incinerator, performance year = 400

F = Maximum allowable residual conversion $[0.1 \times (A + B + C + D + E)]$

$$\begin{aligned}
\text{Points earned} &= 3 \times \{ [(A + B + C) + (F \text{ if } D \geq F, \text{ else } D)] / (A + B + C + D + E) \} \\
&= 3 \times \{ [(1,150) + (0)] / (1,550) \} \\
&= 3 \times 0.742 \\
&= 2.226 \text{ points}
\end{aligned}$$