VERIFIED CARBON STANDARD
A Global Benchmark for Carbon

Approved VCS Methodology Module VMD0038

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Sectoral Scopes 1 and 3

Campus Clean Energy and Energy Efficiency:

Campus-Wide Module

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1 SOURCES

The module is based on approaches used in the following methodologies:

- VM0008 Weatherization of Single and Multifamily Homes (version 1.1)
- NM0302 Emission reductions in the cement production facilities of Holcim Ecuador S.A. (proposed CDM methodology)

The following have also informed the development of the module:

- The American College and University Presidents' Climate Commitment (ACUPCC) GHG inventory reports[1]
- Efficiency Valuation Organization's International Performance Measurement and Verification Protocol (IPMVP)[2] for guidance on methods determining energy savings. (EVO-1000-1, 2010)

2 SUMMARY DESCRIPTION OF THE MODULE

Additionality and Crediting Method	
Additionality	Performance Method
Crediting Baseline	Project Method

This module provides the procedures for quantifying reductions campus-wide in scope 1 stationary combustion emissions and scope 2 emissions from purchase of electricity in US college campuses.

The module is referenced by, and is part of VCS methodology *VM0025 Campus Clean Energy and Energy Efficiency*.

The module applies to projects targeting emission reductions on existing college campuses in the United States as segmented by ACUPCC Carnegie classification.[3] The campuses must meet the relevant additionality performance benchmarks set out in this module and must publicly report GHG emissions to ACUPCC, The Climate Registry, STARS or another third-party GHG reporting program for at least project year 1 and one of the baseline years. GHG emission reporting should be based on well-recognized tools and programs such as Clean Air Cool Planet's Campus GHG Calculator or The Climate Registry reporting system.

Under this module, the following two additionality tests must be met:

1) Campuses must achieve a net decrease in total energy-based emissions (ie, scope 1 stationary combustion emissions and scope 2 electricity emissions) calculated over the

[1] ACUPCC, 2013: http://rs.acupcc.org/
[2] EVO, 2010: http://www.evo-world.org/index.php?option=com_content&view=article&id=272&Itemid=379&lang=en
[3] Carnegie class is a US segmentation system by which US universities and colleges are categorized, roughly by size and scope of activities. ACUPCC uses a campus' Carnegie class to cluster campuses' GHG reporting results into aggregated sector performance averages.

additionality eligibility period (see Section 3 for definitions of scope 1 stationary combustion emissions and scope 2 electricity emissions).

2) Campuses must achieve an annual percent reduction in scope 1 stationary combustion emissions and/or scope 2 electricity emissions equal to or greater than the relevant additionality performance benchmark (PBS_c and PBE_c respectively).

The additionality benchmark metrics are provided as the campus' annual percent reduction in the relevant scope of emissions calculated over the additionality eligibility period. The levels of the respective additionality performance benchmarks are established based upon the average annual percent reduction achieved by campuses in the relevant ACUPCC Carnegie class that also achieved a net decrease in total energy-based emissions. The levels of the additionality performance benchmarks segmented by Carnegie class are provided in Table 2.

The campus must continue to achieve comparable performance in each future project year y in order for emission reductions in that year to be eligible for crediting.

For reductions in scope 1 stationary combustion emissions, the additionality benchmark is typically comparable to the 85th percentile level of performance for the corresponding Carnegie class (eg, for doctoral colleges). For reductions in scope 2 electricity emissions, the additionality benchmark is typically comparable to a similar percentile level of performance. The levels of the additionality benchmarks for scope 1 stationary combustion emissions and scope 2 electricity emissions are based upon five years of ACUPCC data.[4] Updates to the level of the additionality benchmarks must be made in accordance with VCS rules.

Determination of whether a project meets the additionality performance benchmark must account for variances in total campus square footage. Total campus square footage should not increase by more than 5 percent per year or decrease during the baseline period prior to project start date. If a project does not meet this condition, project proponents must adjust for these square foot/occupancy variances as specified in Section 7. Such square footage adjustments and square footage-adjusted parameters (as calculated in Section 7) must be applied in the determination of additionality, as specified in Section 7, and the quantification of baseline emissions and project emission adjustments, as specified in Section 8.

If square footage subsequently declines during the project crediting period, adjustments must be made to the quantification of net emission reduction as set out in Section 8. Where square footage similarly increases during the project crediting period by more than 5 percent per year, adjustments may be made under the new site area provisions as set out in Section 5.

Similarly, adjustments for weather-based variances must also be accounted for in additionality benchmark testing. Where the project's additionality eligibility period is a single year, weather-adjusted eligibility tests must be performed as set out in Section 7. Such weather adjustments

[4] Historical records from ACUPCC indicate that over 2007-2011 the top 32 percent of ACUPCC reporting doctoral colleges achieved and sustained an average of a 5 percent annual reduction in stationary combustion emissions while also achieving reductions in total GHG emissions. The additionality benchmark is set at the 85th performance level, to reasonably align with this average. Comparable performance benchmarks have also been developed for all other Carnegie classes.

and weather-adjusted parameters (as calculated in Section 7) must only be applied in the determination of additionality, as specified in Section 7.

The activities (ie, technologies and measures) delivering this performance level must be identified from the list of qualifying approaches set out in the applicability conditions (see Section 4). These technologies and measures must not have been adopted as a result of regulation.

Project proponents must have baseline data available that meets the following conditions:

- The baseline emissions must be estimated based on data from the baseline period. The baseline period must include project year 0 and three to five consecutive years prior to the project start date.
- For project year 1 and at least one of the baseline years, data must be publically-available through ACUPCC, STARS or another third-party GHG reporting program.

Emission reductions achieved outside the campus (eg, if campus on-site energy generation systems provide energy services to neighboring hospitals) must be excluded. Similarly, if RECs have been purchased by the campus, the RECs must be excluded (ie, project and baseline emissions cannot be reduced via such REC purchases). Additional guidance regarding right of use, ownership and double counting is specified in *VM0025 Campus Clean Energy and Energy Efficiency*.

3 DEFINITIONS

3.1 Defined Terms

Additionality Eligibility Period
The historical reference period over which the additionality benchmark tests are calculated, which must include project year 0 and one to five consecutive years prior to project year 1. The campus can establish different additionality eligibility periods for scope 1 stationary combustion and scope 2 electricity emissions[5]

Additionality Testing Year
The first year of the scope 1 stationary combustion additionality eligibility period (used in Test 3 and Test 4a-S/Test4b-S) or scope 2 electricity additionality eligibility period (used in Tests 3 and Test 4a-E/Test4b-E)

Adjustment Technology
A technology or measure which reduces emissions in scope 1 stationary combustion emissions but results in an increase in scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions, or that reduces scope 2 electricity emissions but results in an increase in scope 1 stationary combustion emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions

American College and University Presidents’ Climate Commitment (ACUPCC)

[5] The project’s additionality eligibility period may be different than the project’s baseline period.

The GHG emission reporting program used by colleges and universities to implement comprehensive plans in pursuit of climate neutrality and sustainability[6]

Baseline Period
The historical reference period over which the project's baseline emissions are calculated. which must include project year 0 and three to five consecutive years prior to the project start date

Campus
A college or university dedicated to higher education, as defined by American College and University Presidents' Climate Commitment by Carnegie classification (Carnegie class). Carnegie classes include four year (Doctoral, Masters, Baccalaureate), two year (Associate) and Special colleges and universities

Clean Air Cool Planet (CACP)
A non-profit organization which has developed a widely-used campus carbon calculator tool for developing campus-wide GHG inventories which is available on the organization's website

Cooling Degree Days (CDD)
A measure of the cumulative degree difference between the warmer outside temperature and the base temperature of the conditioned space on a daily basis during the cooling season[7]

eGRID
The US Environmental Protection Agency's Emissions and Generation Resource Integrated Database[8]

eGRID Combined Margin
The average of the eGRID build and operating margins

Heating Degree Days (HDD)
A measure of the cumulative degree difference between the colder outside temperature and the base temperature of the conditioned space on a daily basis during the heating season[9]

K-12 School (School)
A site where elementary, primary or secondary educational activities take place (ie, kindergarten to 12th grade) in the United States

New Site Area
An area that is added to campus between years y and y+1 where the campus' annual square footage growth during the project period exceed 5 percent per year between those two years

Performance Benchmark
See VCS document *Program Definitions*. Further, under this module, performance benchmarks are used to determine additionality for the project in each project year. Where the project meets

[6] ACUPCC is described at: http://rs.acupcc.org/
[7] Further specification is available at http://www.ncdc.noaa.gov/oa/documentlibrary/hcs/hcs.html
[8] The eGRID database is available at: http://cfpub.epa.gov/egridweb/ghg.cfm
[9] Further specification is available at http://www.ncdc.noaa.gov/oa/documentlibrary/hcs/hcs.html

the performance benchmark in a given project year emission reductions in that year are considered additional

Project Start Date
See VCS document *Program Definitions*. Further, under this module, since campuses will be implementing several measures, the project start date must reflect the fact that sufficient measures have been implemented that allow the project's performance to meet the additionality performance benchmarks. The project start date must be linked to the campus' typical calendar/fiscal year reporting to ACUPCC, STARS or another third-party GHG reporting program

Project Year 1, Project Year 0, Project Year y
Project Year 1 is the year following the project crediting period start date (ie, the first year of the project crediting period). Project year 1 is denoted as the year where p = 1
Project Year 0 is the year prior to project year 1 and is also known as the last baseline year. Project year 0 is denoted as the year where p = 0
Project Year y is any year included in the project crediting period. Project year y is denoted as the year where, which can vary across the 10 year project crediting period, is denoted by the variable y or p = y
Project years may be defined on calendar or fiscal or other periods (although consistency with relevant fiscal reporting to ACUPCC/STARS is strongly preferred)

Scope 1 Stationary Combustion Emissions (Stationary Combustion Emissions)
Scope 1 emissions include all direct energy-based GHG emissions, designated as scope 1 emissions under ACUPCC or another relevant third-party GHG reporting program. Scope 1 Stationary Combustion Emissions include only energy-based GHG emissions from on-site energy generation

Scope 2 Cooling Emissions
Scope 2 cooling emissions include all indirect energy-based GHG emissions resulting from purchased cooling generated off-site, designated as scope 2 emissions under the relevant third-party GHG reporting program

Scope 2 Electricity Emissions
Scope 2 electricity emissions include all indirect energy-based GHG emissions resulting from purchased electricity generated off-site (eg, by utilities), designated as scope 2 emissions under the relevant third-party GHG reporting program.[10]

Scope 2 Heating Emissions
Scope 2 heating emissions include all indirect energy-based GHG emissions resulting from purchased heating generated off-site, designated as scope 2 emissions under the relevant third-party GHG reporting program

[10] This scope is defined since, across this broader campus-wide boundary, they form the vast majority (97% on average) of all scope 2 energy consumption, per ACUPCC campuses' reported submissions. This definition must be consistent with those used by campuses when reporting to ACUPCC (or other third-party GHG reporting programs). See ACUPCC definitions at: http://rs.acupcc.org/instructions/ghg/

Scope 2 Steam Emissions

Scope 2 steam emissions include all indirect energy-based GHG emissions resulting from purchased steam generated off-site, designated as scope 2 emissions under the relevant third-party GHG reporting program

Third-Party GHG Reporting Program

A program such as ACUPCC, The Climate Registry or the Sustainability Tracking, Assessment & Rating System (STARS) that provides public, transparent and credible GHG reporting

Total Energy-Based Emissions

The sum of the campus' scope 1 stationary combustion emissions and scope 2 electricity emissions. Total energy-based emissions does not include scope 2 cooling, heating and steam emissions

3.2 Acronyms

AASHE	Association for the Advancement of Sustainability in Higher Education
ACUPCC	American College & University Presidents' Climate Commitment
CACP	Clean Air Cool Planet
CDD	Cooling Degree Day
CDM	Clean Development Mechanism
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse Gas
HDD	Heat Degree Day
IPMVP	International Performance Measurement & Verification Protocol
LEED	Leadership in Energy & Environmental Design
N_2O	Nitrous Oxide
NGO	Non-Governmental Organization
REC	Renewable Energy Certificate
STARS	Sustainability Tracking and Rating System
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
WRI	World Resources Institute

3.3 Suffix Notation

Throughout this module, suffixes are used to ensure that it is clear whether a term refers to a variable arising during a baseline year, b, or a project year, p. In many instances (eg, for additionality benchmark testing) a specific baseline or project year must be denoted. This is achieved by using a suffix notation which uses an "=" sign for terms such as $F_{b=x,i}$ and $E_{p=y}$ to indicate the relevant variable in the particular baseline years b = x and project years p = y. A suffix term $F_{b=1,i}$ indicates the term for the first baseline year of the relevant period (ie, b = 1). Similarly, a suffix term $E_{p=1}$ indicates the term for the project year 1 (ie, p = 1). A suffix term $F_{p=0}$ indicates the term for the project year 0 (ie, p = 0). This convention is used to avoid sub-sub-suffixes throughout this module.

4 APPLICABILITY CONDITIONS

This module applies to project activities that result in substantial improvement in a college or university's energy performance though activities that focus on reductions in scope 1 stationary combustion emissions and/or activities that focus on reductions in scope 2 electricity emissions.

This module is applicable under the following conditions:

- The project includes an existing campus in the United States.
- The campus must meet with one of the following ACUPCC Carnegie classifications: four year (Doctoral, Masters, Baccalaureate), two year (Associate) and Special colleges and universities.
- The campus reports (and has reported) GHG emissions through ACUPCC, STARS, The Climate Registry or another third-party GHG reporting program (see definition for third-party GHG reporting program) for at least project year 1 and one of the baseline years. Where GHG emissions have been reported through a third-party GHG reporting program besides ACUPCC, STARS or The Climate Registry, the project proponent must provide justification that such program meets with the definition for a third-party GHG reporting program in Section 3 (eg, with respect to providing public, transparent and credible GHG reporting).
- The project must demonstrate that it has achieved the required substantial reductions in GHG emissions by implementing at least two of the following activities:[11]
    - **Behavior change campaigns:** Activities include energy conservation measures and energy awareness campaigns and/or operational policies targeted at students and faculty staff who utilize campus facilities. The goal is to bring about behavioral change that increase energy efficiency and reduce GHG emissions.
    - **Cogeneration and fuel switch**: Activities include equipment upgrades to heating, cooling and water systems and/or shifting from heating with oil to cleaner natural gas. Activities also include systems that combine power generation and heat together to maximize energy efficiency. The goal is to upgrade systems in order to utilize cleaner fuels and/or increase energy efficiency of these systems.

[11] These activities represent the technologies and measures employed by ACUPCC campuses in their Climate Action Plans as of 2012 to reduce stationary combustion and scope 2 electricity emissions.

- **Lighting retrofits**: Activities include replacing older energy-intensive lighting systems with newer high-efficiency alternatives. Examples include shifting from florescent to LED lighting systems or replacing standard lighting ballasts with smart/active ones to reduce electricity load.
- **On-site renewables:** Activities include generation of renewable energy on campus. Common examples include solar PV systems located on campus buildings or parking areas.
- **Boiler retrofits, central heating and cooling upgrades:** Activities include equipment upgrades to improve efficiency in key systems such as central heating and cooling plants. An example includes replacing out-of-date steam boilers with radiant hot water systems.
- **Building system retro-commissioning and upgrades, including automation:** Activities include an in-depth building review that seeks to improve how current equipment and systems function together in an existing facility and can often resolve problems that occurred during design or construction, or address problems that have developed throughout the building's life. Retro-commissioning often leads to improvements to a building's operations and maintenance procedures to enhance overall building performance.
- **Weatherization improvements:** Activities include sealing building heating/cooling leaks in bypasses, lighting fixtures, air ducts, protecting/insulating plumbing and duct systems, replacing drafty/low-efficiency doors and windows, and improving roofing/siding/flashing.
- **LEED certification/green building:** Activities include implementing energy efficiency building improvements that achieve LEED certification, developed by the US Green Building Council.
- **Other innovative strategies:** Strategies for reduction of GHG emissions that include activities/technologies outside of common approaches. Examples include geothermal heating/cooling systems, improved space occupancy management/utilization, improved passive lighting/heating/cooling strategies, development and use of biofuels, peak/off-peak energy management, and enhanced energy monitoring including use of tools such as energy dashboards.

- This module is not applicable to K-12 schools.

5 PROJECT BOUNDARY

The spatial extent of the project boundary encompasses the campus' scope 1 stationary combustion emissions, scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and scope 2 steam emissions, as reported on a campus-wide basis to ACUPCC, STARs, The Climate Registry or other third-party GHG reporting program.

The greenhouse gases included in or excluded from the project boundary are shown in Table 1 below.

Table 1: GHG Sources Included In or Excluded from the Project Boundary

Emissions (Baseline and Project)	Source	Gas	Included / Excluded	Justification
Scope 1	Stationary Combustion	CO_2	Included	This is the only scope 1 source of emissions relating to renewable energy and energy efficiency targeted by this module. CO_2 emissions constitute the most significant source of emissions. CH_4 and N2O are included in ACUPCC reporting but differentials are small. Where included, they must be included in both baseline and project case.
		CH_4	Optional	
		N_2O	Optional	
	Mobile Combustion	CO_2	Excluded	Transportation fleet improvements are not eligible project activities.
		CH_4		
		N_2O		
	Fugitive	CO_2	Excluded	Not relevant to energy-based GHG emissions
		CH_4		
		N_2O		
	Process	CO_2	Excluded	Not relevant to energy-based GHG emissions
		CH_4		
		N_2O		
Scope 2	Purchased Electricity	CO_2	Included	93 to 97 percent of campus scope 2 emissions are from purchased electricity based on GHG emissions data reported to ACUPCC.[12] CO_2 emissions constitute the most significant source of emissions. CH_4 and N2O are included in ACUPCC reporting but differentials are small. Where included, they must be included in both baseline and project case.
		CH_4	Optional	
		N_2O	Optional	
	Purchased Heat	CO_2	Conditional	This source has a relatively small contribution to a campus' energy performance. This source is conservatively excluded from the quantification of baseline and project emissions except where adjustment technologies may impact this source of emission as described in the project emissions adjustment section.
		CH_4		
		N_2O		
	Purchased Cooling	CO_2	Conditional	This source has a relatively small contribution to a campus' energy performance. This source is
		CH_4		

[12] ACUPCC, 2013: http://rs.acupcc.org/stats/ghg-source-stats/

		N_2O		conservatively excluded from the quantification of baseline and project emissions except where adjustment technologies may impact this source of emission as described in the project emissions adjustment section.
	Purchased Steam	CO_2	Conditional	This source has a relatively small contribution to a campus' energy performance. This source is conservatively excluded from the quantification of baseline and project emissions except where adjustment technologies may impact this source of emission as described in the project emissions adjustment section.
		CH_4		
		N_2O		

The spatial extent of the project boundary must be consistent with the boundary used to report to the relevant third-party GHG reporting program (eg, ACUPCC, STARS). The boundary can be comprise of either the entire campus (all college facilities) or a campus which represents a standalone entity within the university system, provided that this is consistent with the campus's reporting for the relevant third-party GHG reporting program. For example, a large, state-wide doctoral college which reports its GHG inventories to ACUPCC separating out the campus' reporting for each of the major cities in which different campuses are located across the state could have a separate the project boundary for each city campus location. However, a city-based college, which might have several sites from which services are provided, but which nonetheless reports its GHG inventory to ACUPCC as one single entity, must define the project boundary as one single, integrated entity.

The project boundary includes both stationary combustion emissions and scope 2 electricity emissions, and project proponents may seek emission reductions under either, or both, of these scopes. Where reductions under both scopes are sought, the project must determine the net emission reductions under each scope, which are then added together to determine the total reductions in stationary combustion emissions and the scope 2 electricity emissions. Where emission reductions are sought under only one scope, adjustments to the project emissions are made as described in Section 8.2.1 and 8.2.2.

GHG emission reductions which arise from on-site energy generation systems that provide services beyond the University's own needs (eg, to nearby hospitals) must be excluded from the project boundary. Note that the consumption of energy services provided by off-site suppliers (eg, local industry) must be excluded from the stationary combustion emissions and included in scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions. If RECs have been generated from off-site renewable installations and purchased by the campus, the RECs cannot be used to decrease project emissions or the respective grid emission factors associated with the RECs in the quantification of emission reductions. Additional guidance regarding RECs is provided in *VM0025 Campus Clean Energy and Energy Efficiency*.

Changes in the campus area must be accounted for within the project boundary as follows:

1) Where the campus area increased by more than five percent per year or decreased during the baseline period, adjusted additionality benchmark tests and quantification procedures must be applied as described in Section 7.

2) Where the campus area decreases during the project crediting period, square footage adjustments are required as described in Section 8.

3) Where the campus area increases by more than five percent per year during the project crediting period, such new site areas may be excluded from the project boundary. To exclude new site areas, project proponents must demonstrate that there is no transfer of activities from the existing campus area to the new site areas (whether based on people, function or energy systems). If a new site area arising between project years y and y+1 is excluded for PE_{y+1} then the new site area should be excluded from the project boundary for all subsequent project years going forward.

The creation of a new site area does not automatically include all new campus areas that might be subsequently added to campuses in later years. By default, subsequent additions to campus areas are not to be included in the new site area and must be included in the project boundary. Further new site areas can be defined in subsequent years only if the relevant area itself experienced an annual growth rate exceeding five percent per year for those later years. For example, if a campus defined a new site area between project years y and y+1, any new campus areas added between project year y+1 and y+2 would only be excluded if the campus square foot growth rate exceeded five percent between project years y+1 and y+2 since these areas would comprise a separate new site area. If the annual growth rate between years y+1 and y+2 was less than five percent, such areas would not be considered a new site area and must be included in the project boundary. In all cases the exclusion of new site areas must be justified based on verifiable information.

GHG emissions in this methodology are referenced as CO_2e. Where a campus is reporting GHG emissions from CO_2, then the references to CO_2e should not include methane and N_2O.

6 BASELINE SCENARIO

The baseline scenario comprises the historical campus-wide scope 1 stationary combustion emissions prior to the project start date for reductions in stationary combustion emissions, and the historical campus-wide scope 2 electricity emissions prior to the project start date for reductions in scope 2 electricity emissions.

Regarding the project start date, since the campus will be implementing several technologies and measures (see Section 4), the campus' project start date must be set at the beginning of the reporting year where a substantial performance improvement that meets the relevant additionality tests has occurred (ie, the beginning of project year 1 where the additionality performance benchmarks is met). The project start date must be linked to the campus' typical calendar/fiscal year reporting to ACUPCC or another third-party GHG reporting program. The beginning of project year 1 will thus be considered the project start date.

Baseline emissions must be determined over a three- to five-year period using data that meets the following conditions:

- Data must be from a baseline period which includes project year 0 and three to five consecutive years prior to project start date (see definitions for definitions of project years). The baseline period must be justified relative to the data that most accurately reflects historical emissions that are comparable to the campus conditions during project crediting period (eg, similar square footage and enrollment).
- Where reductions are sought for both stationary combustion emissions and scope 2 electricity emissions, the same baseline period does not have to be used for both.
- Data for project year 1 and at least one of the years in the baseline period must have been reported through ACUPCC, STARS or another third-party GHG reporting program. This may require new ACUPCC campus signatories to report on additional years beyond what is required by ACUPCC's two year reporting window.
- Where GHG inventory data have not been reported publicly in a given baseline year and are used for the determination of baseline emissions, the same reporting framework as used for publicly reported data must be consistently applied (ie, the reporting framework used by ACUPCC, STARS or other third-party GHG reporting programs must be applied).
- The choice of annual reporting periods (eg, calendar, fiscal, other) must be consistent through the project crediting period and the baseline period. The reporting period should be consistent with that selected for public reporting to the relevant third-party GHG program.
- Where the project requires adjustments for square footage, as determined in Test 2 of Section 7.1, the square footage-adjusted baseline emissions, as determined in Section 7.3.2, must be applied for both the additionality tests in Section 7 and quantification of baseline emissions in Section 8.[13]

7 ADDITIONALITY

7.1 Additionality Tests

This module uses a performance method for the demonstration of additionality. Appendix 1 provides a full discussion of performance benchmark approach.

The complete set of steps in this section must be followed at project validation, using data from project year 1 and the relevant additionality eligibility period. An additionality eligibility period is a historical reference period which includes project year 0 and one to five consecutive years prior to project year 1. For all subsequent project years (ie, after project year 1), only step 4 needs to be completed, to determine whether the GHG emission reductions for the given project year y qualify as additional.

[13] Note that any weather-based adjustments applied for additionality benchmark testing are not applied to thequantification of baseline emissions in Section 8.

Step 1: Regulatory Surplus (Test 1)

Project proponents must demonstrate regulatory surplus in accordance with the rules and requirements regarding regulatory surplus set out in the latest version of the *VCS Standard*.

Step 2: Square Foot Variance (Test 2)

The campus' emissions during the additionality eligibility period and baseline period must be adjusted for variances in square footage as specified in the sub-steps below.

Sub-step 2a: Square Foot Variance Test (Test 2a)

It must be determined whether the campus' total square footage has increased by more than five percent per year on average or declined over the additionality eligibility period or baseline period, as relevant to the determination of additionality or calculation of baseline emissions respectively. The procedures for conducting the Square Foot Variance Test are provided in Section 7.3.1 below.

Outcome of Step 2a: Identify whether the campus requires adjustments for square footage. Where campus passes the square foot variance test proceed to Step 3. Where the campus area increases by more than five percent annually during the baseline period, proceed to Sub-step 2b. Where the campus area decreases during the baseline period, proceed to Sub-step 2c.

Sub-step 2b: Adjustments for Campuses with More than a Five Percent Annual Increase in Campus Area during the Baseline Period (Square Footage Adjustments)

Where the campus area increases on average by more than five percent annually during the additionality eligibility period or baseline period, the baseline emissions in each baseline year x must be adjusted to reflect the larger square footage. Such square footage adjustments must be made using square footage-adjusted baseline parameters provided in Section 7.3.2 below.

Outcome of Step 2b: Determine the square footage-adjusted baseline emissions and proceed to Step 3 applying such adjustments. All subsequent calculations must be performed by substituting $F_{b=x,i}$ adj_{sf} for $F_{b=x,i}$ and $E_{b=x}$ adj_{sf} for $E_{b=}x$. The square footage-adjusted baseline emissions must be substituted for baseline emissions in all equations for additionality benchmark testing in Section 7 and quantification of baseline emissions and project emission adjustments in Section 8.

Sub-step 2c: Adjustments for Campuses with a Decrease in Campus Area during the Baseline Period (Square Footage Adjustments)

Where the campus area decreases during the additionality eligibility period or baseline period (ie, experiences a net decrease over the relevant period), project proponents must first evaluate whether the following conditions apply:

1) Total student numbers are steady or increasing; and

2) The GHG emissions per student are declining, determined as follows:

   a) For Test 3; Total energy-based emissions per student are declining.

   b) For Test 4a-S and Test 4b-S; Stationary combustion emissions per student are declining

   c) For Test 4a-E and Test 4b-E; Scope 2 electricity emissions per student are declining.

These conditions (ie, 1 and 2 above) must be evaluated over the same period that the square footage is declining (ie, the additionality eligibility period or baseline period), comparing the first baseline year or additionality testing year, as relevant, to project year 1. Where both of these conditions apply, the module must be applied without square footage adjustments.[14]

Where either of these conditions are not met, the baseline emissions in each baseline year x must be adjusted to reflect the smaller square footage. Such square footage adjustments must be made using square footage-adjusted baseline parameters provided in Section 7.3.2 below.

Outcome of Step 2c: Identify whether the campus requires adjustments for square footage declines. Where conditions 1 and 2 above are met, proceed to Step 3 without adjusting for square footage. Where either condition 1 or 2 is not met, determine the square footage-adjusted baseline emissions and proceed to Step 3 applying such adjustments. All subsequent calculations must be performed substituting $F_{b=x,i}$ adj_{sf} for $F_{b=x,i}$ and $E_{b=x}$ adj_{sf} for $E_{b=}x$, The square footage-adjusted baseline emissions must be substituted for baseline emissions in all equations for additionality benchmark testing in Section 7 and quantification of baseline emissions and project emission adjustments in Section 8.

Step 3: Net Decrease in Total Energy-Based Emissions (Test 3)

The campus must experience a net decrease in total energy-based emissions over one of the eligible additionality eligibility periods (see definition of total energy-based emissions). An additionality eligibility period is a historical reference period which includes project year 0 and one to five consecutive years prior to project year 1.

Sub-step 3a: Net Decrease in Total Energy-Based Emissions Test (Test 3a)

The campus' total energy-based emissions must decrease over the additionality eligibility period relative to project year 1. For Test 3a, the additionality eligibility period must begin two to five years prior to the project start date and must include project year 0. The calculations for Test 3a are provided in Section 7.3.3 below.

Outcome of Sub-step 3a: Identify over which additionality eligibility periods, if any, the campus experiences a net decrease in total energy-based emissions. Where the campus passes Test 3a for at least one additionality eligibility period, proceed to Step 4, applying only

[14] In such instances, the GHG emission reductions have been delivered as a result of more efficient service delivery per capita and thus reductions due to square foot declines reflect these service efficiency gains and thus credible GHG reductions.

these additionality eligibility periods which passed Sub-step 3a. Where the campus does not pass Test 3a for any eligible additionality eligibility periods, proceed to Sub-step 3b.

Sub-step 3b: Weather-Adjusted Net Decrease in Total Energy-Based Emissions Test (Test 3b)

The campus' weather-adjusted total energy-based emissions must decrease between project year 0 and project year 1. The calculations for Test 3b are provided in Section 7.3.4 below.

Outcome of Sub-step 3b: Identify whether the campus experiences a net decrease in weather-adjusted total energy-based emissions over a one year additionality eligibility period. Where the campus passes Test 3b, proceed to Sub-step 4b, applying a one year additionality eligibility period. Where the campus does not meet Test 3b, emission reductions being considered under this test are not deemed additional.

Step 4: Additionality Benchmarks (Test 4)

The relevant additionality benchmark must be met for emission reductions in project year 1 for the campus to be deemed additional and in subsequent project years y for emission reductions in that project year to be deemed additional. Only emission reductions that are deemed additional can be included in the quantification of net GHG emission reductions in Section 8.

The relevant Sub-steps 4a or 4b must be applied as specified in the outcomes of Sub-steps 3a and 3b.

Sub-step 4a: Additionality Benchmark Tests (Test 4a)

Where project activities that reduce scope 1 stationary combustion emissions are implemented, follow Option I (Test 4a-S) to determine whether the campus meets the relevant benchmark. Where project activities that reduce scope 2 electricity emissions are implemented, follow Option II (Test 4a-E) to determine whether the campus meets the relevant benchmark. Where project activities that reduce both stationary combustion emissions and scope 2 electricity emissions are implemented, follow both Options I and II to determine whether the campus meets the relevant benchmarks.

Tests 4a-S and 4a-E must only be applied using the additionality testing years from the two to five year additionality eligibility periods that passed Test 3a (ie, the additionality testing years from the additionality eligibility periods where the campus experiences a net decrease in total energy-based emissions without weather adjustments).

Option I. Stationary Combustion Additionality Benchmark Test (Test 4a-S):

The campus' annual percent reduction in stationary combustion emissions calculated over the additionality eligibility period relative to project year 1 must be equal to or greater than the relevant stationary combustion additionality performance benchmark, PBS_c. For each subsequent year y, the campus must achieve the requisite level of performance. Such additionality benchmark tests must be conducted using the equations for Test 4a-S provided in Section 7.3.5.

Option II. Scope 2 Electricity Additionality Benchmark Test (Test 4a-E)

The campus' annual percent reduction in scope 2 electricity emissions calculated over the additionality eligibility period relative to project year 1 must be equal to or greater than the relevant scope 2 electricity additionality performance benchmark, PBE_c. For each subsequent year y, the campus must achieve the requisite level of performance. Such additionality benchmark tests must be conducted using the equations for Test 4a-E provided in Section 7.3.7.

<u>Outcome of Sub-step 4a</u>: Identify whether the campus meets the stationary combustion and/or scope 2 electricity additionality benchmarks in project year 1 and subsequent project years y. Where the campus passes Test 4a-S, the campus' stationary combustion emission reductions in year y are deemed additional. Where campus passes Test 4a-E, the campus' scope 2 electricity emission reductions in year y are deemed additional. Where the campus does not meet Test 4a-S and/or Test 4a-E, go to Sub-step 3b for weather-based additionality testing (for the set of emission reductions that did not pass Test 4a).

Sub-step 4b: Weather-Adjusted Additionality Benchmark Tests (Test 4b)

Where project activities that reduce stationary combustion emissions are implemented, follow Option I (Test 4b-S) to determine whether the project meets the relevant benchmark. Where project activities that reduce scope 2 electricity emissions are implemented, follow Option II (Test 4b-E) to determine whether the project meets the relevant additionality benchmark. Where project activities that reduce both stationary combustion emissions and scope 2 electricity emissions are implemented, follow Options I and II to determine whether the project meets the relevant benchmarks.

Tests 4b-S and 4b-E must only be applied using weather-adjusted parameters and a one year additionality eligibility period, provided that the campus experiences a net decrease in total energy-based emissions over such additionality eligibility period (ie, the campus passed Test 3b).

Option I. Weather-Adjusted Stationary Combustion Additionality Benchmark Test (Test 4b-S)

The campus' weather-adjusted percent reduction in stationary combustion emissions between project year 0 and project year 1 must be equal to or greater than the relevant stationary combustion additionality performance benchmark, PBS_c. For each subsequent year y, the campus must achieve the requisite level of performance. Such additionality benchmark tests must be conducted using the equations for Test 4b-S provide in Section 7.3.6.

Option II. Weather-Adjusted Scope 2 Electricity Additionality Benchmark Test (Test 4b-E)

The campus' weather-adjusted percent reduction in scope 2 electricity emissions between project year 0 and project year 1 must be equal to or greater than the relevant scope 2 electricity additionality performance benchmark, PBE_c. For each subsequent year y, the campus must achieve the requisite level of performance. Such additionality benchmark tests must be conducted using the equations for Test 4b-E provide in Section **Error! Bookmark not defined.**7.3.8.

Outcome of Sub-step 4b: Identify whether the campus meets the stationary combustion and/or scope 2 electricity additionality benchmarks in project year 1 and subsequent project years y. Where campus passes Test 4b-S, the campus' stationary combustion emission reductions in year y are deemed additional. Where campus passes Test 4b-E, the campus' scope 2 electricity emission reductions in year y are deemed additional. Where the campus does not meet Test 4b-S and/or Test 4b-E, the respective emission reductions are not deemed additional.

7.2 Level of the Additionality Benchmarks

The levels of the additionality benchmarks are set at the average annual percent reduction in the respective emissions (ie, stationary combustion emissions or scope 2 electricity emissions) achieved by campuses experiencing a net decrease in total energy-based emissions according to their ACUPCC Carnegie class.

The analysis to determine the performance benchmarks only included campuses which achieve a net decrease in total energy-based emissions. The analysis also excluded outlier data. The data are drawn from public ACUPCC college statistics for years 2007 to 2011, and incorporate all reporting campuses with at least two years of data. Appendix 1 contains additional background and explanation regarding the development of the additionality benchmarks.

All of the annual percent reductions (ie, decreases in GHG emissions) are denoted as positive percentages. The levels of the stationary combustion additionality performance benchmark (PBS_c) and scope 2 electricity additionality performance benchmark (PBE_c) are specified by ACUPCC Carnegie class (c) in Table 2 below.

Table 2: Additionality Performance Benchmarks by ACUPCC Carnegie Class

Carnegie Class	PBS_c	PBE_c
Doctoral	5.68%	6.85%
Masters	6.05%	6.78%
Baccalaureate	5.88%	6.60%
Associate	7.66%	6.74%
Specials	4.69%	3.98%

7.3 Calculations for Additionality Tests

In order to determine additionality a number of additionality tests must be applied, as set out in Section 7.1. This section provides the equations for these tests.

7.3.1 Test 2a: Square Foot Variance Test

It must be determined whether the campus' total square footage has increased by more than five percent annually or declined over the baseline period.

The square foot variance test is satisfied if both equations 1 and 2 are met:

$$SF_{p=1} - SF_{b=1} \geq 0 \qquad (1)$$

Where:

$SF_{b=1}$ = Total campus-wide square footage in the first year of the baseline period (ft^2)

$SF_{p=1}$ = Total campus-wide square footage in project year 1 (ft^2)

and

$$\frac{SF_{p=1} - SF_{b=1}}{SF_{p=1} * B} \leq 5\% \qquad (2)$$

Where:

$SF_{b=1}$ = Total campus-wide square footage in the first year of the baseline period (ft^2)

$SF_{p=1}$ = Total campus-wide square footage in project year 1 (ft^2)

B = Baseline period (years)

The square footage used in $SF_{p=1}$ and $SF_{b=1}$ must be consistent with the values reported to ACUPCC or the relevant third-party GHG reporting program for these same years.

7.3.2 Square Footage Adjustments

Where adjustments for square footage are required, as determine in Section 7.1, the square footage-adjusted baseline emissions (for stationary combustion emissions and scope 2 electricity emissions) must be determined by applying the ratio between the campus-wide square footage in project year 1 ($SF_{p=1}$) and the campus-wide square footage for each year included in the baseline period ($SF_{b=x}$). The ratio to be applied to each baseline year may vary since the square footage can vary across each baseline year. The square footage used in $SF_{p=1}$ and $SF_{b=x}$ must be consistent with the values reported to ACUPCC or the relevant third-party GHG reporting program for these same years. Separate square footage adjustment must be applied to each baseline year x as calculated in equations 3 and 4.

$$F_{b=x,i} adj_{sf} = F_{b=x,i} * \frac{SF_{p=1}}{SF_{b=x}} \qquad (3)$$

Where,

$F_{b=x,i}\ adj_{sf}$ = Square footage-adjusted stationary combustion emissions in year x of the baseline period from fuel type i (tCO_2e)

$F_{b=x,i}$ = Stationary combustion emissions in year x of the baseline period from fuel type I (tCO_2e)

$SF_{p=1}$ = Total campus-wide square footage in project year 1 (ft^2)

$SF_{b=x}$ = Total campus-wide square footage in years x of the baseline period (ft^2)

and

$$E_{b=x}adj_{sf} = E_{b=x} * \frac{SF_{p=1}}{SF_{b=x}} \quad (4)$$

Where,

$E_{b=x}adj_{sf}$ = Square footage-adjusted scope 2 electricity emissions in year x of the baseline period (tCO_2e)

$E_{b=x}$ = Scope 2 electricity emissions in year x of the baseline period (tCO_2e)

$SF_{p=1}$ = Total campus-wide square footage in project year 1 (ft^2)

$SF_{b=x}$ = Total campus-wide square footage in years x of the baseline period (ft^2)

The campus' square footage-adjusted baseline emissions must be applied in all equations for additionality benchmark testing in section 7 and quantification of baseline emissions and project emission adjustments in section 8 by substituting $F_{b=x,i}$ adj_{sf} for $F_{b=x,i}$ and $E_{b=x}$ adj_{sf} for $E_{b=x}$.

7.3.3 Test 3a: Net Decrease in Total Energy-Based Emissions

Test 3a must be conducted to determine which additionality eligibility periods, if any, the campus experiences a net decrease in total energy-based emissions. Where Test 3a is passed for additionality eligibility periods of two to five years, no weather adjustments are applied.

$$\sum_i (F_{p=1,i} - F_{b=1,i}) + (E_{p=1} - E_{b=1}) \leq 0 \quad (5)$$

Where:

$F_{b=1,i}$ =Stationary combustion emissions in the additionality testing year from fuel type i (tCO_2e)

$F_{p=1,i}$ =Stationary combustion emissions in project year 1 from fuel type i (tCO_2e)

$E_{b=1}$ =Scope 2 electricity emissions in the additionality testing year (tCO_2e)

$E_{p=1}$ =Scope 2 electricity emissions in project year 1 (tCO_2e)

The additionality testing year is the first year of each potential additionality eligibility period.

7.3.4 Test 3b: Weather-Adjusted Net Decrease in Total Energy-Based Emissions

Where the additionality eligibility period is one year, weather adjustments must be made in accordance with Test 3b. The weather-adjusted parameters must be calculated by applying either simplified weather adjustments or regression-based weather adjustments. The same type of weather adjustments (ie, simplified or regression-based) must be applied for the calculations of Test 3b as the relevant Test 4b (ie, Test 4b-S or Test 4b-E).

Where the campus must apply square footage variance adjustments and weather adjustment both sets of adjustments must be applied in the additionality benchmark testing in Section 7.[15]

[15] Note that any weather-based adjustments applied for additionality benchmark testing are not applied to the quantification of baseline emissions in Section 8.

Weather-adjusted parameters must be determined as described below:

Simplified Weather Adjustments

The simplified weather adjustments provide a first order set of adjustment to emissions figures which can be used to adjust for weather variances between project year 1 and 0. The simplified weather adjustments must be applied by substituting weather-adjusted parameters, $F_{b=1,i}adj_w$ and $E_{b=1}adj_w$, for $F_{b=1,i}$ and $E_{b=1}$ respectively in equation 5 to determine whether the campus experiences a net decrease in total energy-based emissions over a one year additionality eligibility period.

The HDD and CDD factors used to calculate such adjustments must be consistent with campuses' public reporting of such factors (eg, to ACUPCC).[16] The simplified weather-adjusted parameters ($F_{b=1,i}adj_w$ and $E_{b=1}adj_w$) must be calculated using the equations below:

$$F_{b=1,i}adj_w = F_{p=0,i} * \frac{HDD_{p=1}}{HDD_{p=0}} \tag{6}$$

Where:

$F_{b=1,i}adj_w$	= Weather-adjusted stationary combustion emissions in the additionality testing year from fuel type i (tCO_2e)
$F_{p=0,i}$	= Stationary combustion emissions in project year 0 from fuel type i (tCO_2e)
$HDD_{p=1}$	= Heating degree days in project year 1 (days)
$HDD_{p=0}$	= Heating degree days in project year 0 (days)

and

$$E_{b=1}adj_w = E_{p=0} * \frac{CDD_{p=1}}{CDD_{p=0}} \tag{7}$$

Where:

$E_{b=1,i}adj_w$	= Weather-adjusted scope 2 electricity emissions in the additionality testing year (tCO_2e)
$E_{p=0}$	= Scope 2 electricity emissions in project year 0 (tCO_2e)
$CDD_{p=1}$	= Cooling degree days in project year 1 (days)
$CDD_{p=0}$	= Cooling degree days in project year 0 (days)

Regression-Based Weather Adjustments

Where the campus does not pass Tests 3b using the simplified weather adjustments, regression-based weather adjustments may be applied. The regression-based weather-adjusted parameters ($F_{b=1,i}adj_w$, and $E_{b=1}adj_w$) must be determined as follows:

[16] For reference, US state-based HDD/CDD data are found at: http://www.ncdc.noaa.gov/oa/documentlibrary/hcs/hcs.html

- The regression must be calculated using data from a period of five consecutive years prior to the project start date provided that the period includes project year 0 (regardless of whether the project's baseline period includes five years).
- Baseline emissions data used to develop the regression must be consistent with the data used to quantify baseline emissions and with ACUPCC or other third-party GHG reporting.
- Direct regressions between GHG emissions and HDD, and GHG emissions and CDD, must be determined (not double regressions).
- The regressions must be developed for only the relevant scope of GHG emissions. For Test 3b, the GHG emission data must include total energy-based emissions.
- The monitoring and measurement of GHG emissions data used to develop the regression for weather adjustments must be consistent with the requirements in Section 9.

The GHG/HDD or GHG/CDD regressions must be used to establish the weather-adjusted parameters ($F_{b=1,i}adj_w$ and $E_{b=1}adj_w$). The regression-based weather adjustments must be applied by substituting weather-adjusted parameters, $F_{b=1,i}adj_w$ and $E_{b=1}adj_w$, for $F_{b,i=1,}$ and $E_{b=1}$ respectively, in equation 5 to determine whether the campus experiences a net decrease in total energy-based emissions over a one year additionality eligibility period.

7.3.5 Test 4a-S: Stationary Combustion Additionality Benchmark Test

Where the additionality eligibility period is two to five years, Test 4a-S must be conducted (without making any weather-based adjustments) to determine whether the campus meets the relevant stationary combustion additionality benchmark in year y. Test 4a-S must only be performed over additionality eligibility periods that meet Test 3a. For Test 4a-S, baseline emissions and project emissions only include stationary combustion emissions as calculated in equations 8 and 9.

To ensure the campus meets the stationary combustion additionality benchmark in project year 1, campuses must meet with equation 8 below. Equation 8 must only be performed over additionality eligibility periods that pass Test 3a, as determined in equation 5 (or a one year additionality eligibility period that passes Test 3b, where equation 8 is applied under Test 4b-S).

$$\sum_i \frac{F_{b=1,i} - F_{p=1,i}}{F_{p=1,i}} \geq PBS_c * SCAP \qquad (8)$$

Where:

$F_{b=1,i}$	= Stationary combustion emissions in the additionality testing year from fuel type i (tCO_2e)
$F_{p=1,i}$	= Stationary combustion emissions in project year 1 from fuel type i (tCO_2e)
PBS_c	= Stationary combustion additionality performance benchmark for Carnegie class c (percent)
SCAP	= Stationary combustion additionality eligibility period (years)

To ensure that the campus meets the stationary combustion additionality benchmark, after adjusting for any eligible change in campus size, in each project year y, campuses must meet with equation 9 below. Equation 9 must only be performed over additionality eligibility periods that pass Test 3a and Test 4a-S in project year 1, as determined in equation 8 (or a one year additionality eligibility period that passes Test 3b and Test 4b-S in project year 1, where equation 9 is applied under Test 4b-S).

$$\sum_i \frac{F_{b=1,i}}{F_{p=y,i}} \geq (PBS_c * SCAP + 1) * \frac{SF_{p=1}}{SF_{p=y}} \tag{9}$$

Where:

$F_{b=1,i}$	= Stationary combustion emissions in the additionality testing year from fuel type i (tCO_2e)
$F_{p=y,i}$	= Stationary combustion emissions in project year y from fuel type i (tCO_2e)
PBS_c	= Stationary combustion additionality performance benchmark for Carnegie class c (percent)
SCAP	= Stationary combustion additionality eligibility period (years)
$SF_{p=1}$	= Total campus-wide square footage in project year 1 (ft^2)
$SF_{p=y}$	= Total campus-wide square footage in project year y (ft^2)

7.3.6 Test 4b-S: Weather-Adjusted Stationary Combustion Additionality Benchmark Test

Where the additionality eligibility period is one year, weather adjustments must be made in accordance with Test 4b-S. The weather-adjusted parameters must be calculated by applying either simplified weather adjustments or regression-based weather adjustments. The same type of weather adjustments (ie, simplified or regression-based) must be applied for the calculations of Test 4b-S as Test 3b, except that the regressions must be made based upon the stationary combustion emissions not the total energy-based emissions.

Where the campus must apply square footage variance adjustments and weather adjustment both sets of adjustments must be applied.

Weather-adjusted parameters must be determined as described below:

Simplified Weather Adjustments

The simplified weather adjustments provide a first order set of adjustment to emissions figures which can be used to adjust for weather variances between project year 1 and 0. The simplified weather-adjusted stationary combustion emissions in the additionality testing year from fuel type i ($F_{b=1,i}adj_w$) calculated in equation 6 must be used in equation 8 or 9 to determine if the campus meets the relevant stationary combustion additionality benchmark in year y.

Regression-Based Weather Adjustments

Where the campus does not pass Tests 4b-S using the simplified weather adjustments, regression-based weather adjustments may be applied. The regression-based weather-adjusted parameter ($F_{b=1,i}adj_w$) must be determined as follows:

- The regression must be calculated using data from a period of five consecutive years prior to the project start date provided that the period includes project year 0 (regardless of whether the project's baseline period includes five years).
- Baseline emissions data used to develop the regression must be consistent with the data used to quantify baseline emissions and with ACUPCC or other third-party GHG reporting.
- Direct regressions between GHG emissions and HDD must be determined (not double regressions).
- The regressions must be developed for only the relevant scope of GHG emissions. For Test 4b-S the GHG emissions data must only include stationary combustion emissions.
- The monitoring and measurement of GHG emissions data used to develop the regression for weather adjustments must be consistent with the requirements in Section 9.

The GHG/HDD regressions must be used to establish the weather-adjusted parameter ($F_{b=1,i}adj_w$). The regression-based weather adjustments must be applied by substituting weather-adjusted parameter, $F_{b=1,i}adj_w$, for $F_{b=1,i}$, in the relevant equation 8 or 9 to determine if the campus meets the relevant stationary combustion additionality benchmark in year y.

7.3.7 Test 4a-E: Scope 2 Electricity Additionality Benchmark Test

Where the additionality eligibility period is two to five years, Test 4a-E must be conducted (without making any weather-based adjustments) to determine whether the campus meets the relevant scope 2 electricity additionality benchmark in year y. Test 4a-E must only be performed over additionality eligibility periods that meet Test 3a. For Test 4a-E, baseline emissions and project emissions only include scope 2 electricity emissions as calculated in equations 10 and 11.

To ensure the campus meets the scope 2 electricity additionality benchmark in project year 1, campuses must meet with equation 10 below. Equation 10 must only be performed over additionality eligibility periods that pass Test 3a, as determined in equation 5 (or a one year additionality eligibility period that passes Test 3b, where equation 10 is applied under Test 4b-E).:

$$\frac{E_{b=1} - E_{p=1}}{E_{p=1}} \geq PBE_c * E2AP \qquad (10)$$

Where:

$E_{b=1}$ = Scope 2 electricity emissions in the additionality testing year (tCO_2e)
$E_{p=1}$ = Scope 2 electricity emissions in project year 1 (tCO_2e)
PBE_c = Scope 2 electricity additionality performance benchmark for Carnegie class c (percent)
E2AP = Scope 2 electricity additionality eligibility period (years)

To ensure that the campus meets the scope 2 electricity additionality benchmark, after adjusting for any eligible change in campus size, in each project year y, campuses must meet with equation 11 below. Equation 11 must only be performed over additionality eligibility periods that pass Test 3a and Test 4a-E in project year 1, as determined in equation 10 (or a one year additionality eligibility period that passes Test 3b and Test 4b-E in project year 1, where equation 11 is applied under Test 4b-E).

$$\frac{E_{b=1}}{E_{p=y}} \geq (PBE_c * E2AP + 1) * \frac{SF_{p=1}}{SF_{p=y}} \qquad (11)$$

Where:

$E_{b=1}$	= Scope 2 electricity emissions in the additionality testing year (tCO_2e)
$E_{p=y}$	= Scope 2 electricity emissions in project year y (tCO_2e)
PBE_c	= Scope 2 electricity additionality performance benchmark for Carnegie class c (percent)
E2AP	= Scope 2 electricity additionality eligibility period (years)
B	= Baseline period (years)
$SF_{p=1}$	= Total campus-wide square footage in project year 1 (ft^2)
$SF_{p=y}$	= Total campus-wide square footage in project year y (ft^2)

7.3.8 Test 4b-E: Weather-Adjusted Scope 2 Electricity Additionality Benchmark Test

Where the additionality eligibility period is one year, weather adjustments must be made in accordance with Test 4b-E. The weather-adjusted parameters must be calculated by applying either simplified weather adjustments or regression-based weather adjustments. The same type of weather adjustments (ie, simplified or regression-based) must be applied for the calculations of Test 4b-E as Test 3b, except that the regressions must be made based upon the scope 2 electricity emissions not the total energy-based emissions.

Where the campus must apply square footage variance adjustments and weather adjustment both sets of adjustments must be applied.

Weather-adjusted parameters must be determined as described below:

<u>Simplified Weather Adjustments</u>

The simplified weather adjustments provide a first order set of adjustment to emissions figures which can be used to adjust for weather variances between project year 1 and 0. The simplified weather-adjusted scope 2 electricity emissions in the additionality testing year ($E_{b=1}adj_w$) calculated in equation 7 must be used in equation 10 or 11 to determine if the campus meets the relevant scope 2 electricity additionality benchmark in year y.

<u>Regression-Based Weather Adjustments</u>

Where the campus does not pass Tests 4b-E using the simplified weather adjustments, regression-based weather adjustments may be applied. The regression-based weather-adjusted parameter ($E_{b=1}adj_w$) must be determined as follows:

- The regression must be calculated using data from a period of five consecutive years prior to the project start date provided that the period includes project year 0 (regardless of whether the project's baseline period includes five years).

- Baseline emissions data used to develop the regression must be consistent with the data used to quantify baseline emissions and with ACUPCC or other third-party GHG reporting.
- Direct regressions between GHG emissions and CDD must be determined (not double regressions).
- The regressions must be developed for only the relevant scope of GHG emissions. For Test 4b-E the GHG emissions data must only include scope 2 electricity emissions.
- The monitoring and measurement of GHG emissions data used to develop the regression for weather adjustments must be consistent with the requirements in Section 9.

The GHG/CDD regressions must be used to establish the weather-adjusted parameter ($E_{b=1}adj_{w}$). The regression-based weather-adjusted parameters must then be applied by substituting weather-adjusted parameter, $E_{b=1}adj_{w}$, for $E_{b=1}$, in the relevant equation 10 or 11 to determine if the campus meets the relevant scope 2 electricity additionality benchmark in year y.

8 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

Project proponents must follow the procedures in this section to determine campus-wide GHG emission reductions for year y (ER_{y}).

Where the campus must apply square footage-adjusted parameters, as determined in the Square Footage Adjustment Test in Step 2 of Section 7.1, such adjustments calculated in Section 7.3.2 must also be applied in the quantification of emissions reductions (ie, $F_{b=x,i}\ adj_{sf}$ must be substituted for $F_{b=x,i}$ and $E_{b=x}adj_{sf}$ must be substituted for $E_{b=x}$ for each baseline year x in the calculation of both baseline emissions and project emission adjustments). Note that weather-based adjustments must not be applied in the quantification of emission reductions.[17]

For each project year y, where campus-wide square footage decreases during the project crediting period, campuses must apply a square footage adjustment factor, $PSF_{\Delta y}$, as described in Section 8.3.

Calculations for scope 1 stationary combustion emissions and scope 2 electricity emissions are set out in Section 8.1 and 8.2 respectively. The project's net GHG emission reductions are the sum of reductions in stationary combustion emissions and scope 2 electricity emissions, and the calculation of net GHG emissions reductions are set out in Section 8.3.

[17] Variances in weather over the baseline period are accounted for by averaging baseline emissions over a three to five year baseline period

8.1 Stationary Combustion Emissions

8.1.1 Baseline Emissions

Baseline emissions must be calculated over all baseline years included in the baseline period as follows:

$$BE = \frac{\sum_{x}\sum_{i} F_{b=x,i}}{B} \quad (12)$$

Where:

BE = Baseline emissions (tCO2e)
$F_{b=x,i}$ = Stationary combustion emissions in year x of the baseline period from fuel type i (tCO_2e)
B = Baseline period (years)

Where the campus requires adjustments for square footage, as determined in Test 2 of Section 7.1, then square footage-adjusted baseline emissions, as determined in Section 7.3.2, must be applied for equation 12 (ie, $F_{b=x,i}$ adj_{sf} must be substituted for $F_{b=x,i}$ for each baseline year x). Note that weather-based adjustments must not be applied in the quantification of baseline emissions.[18]

To adjust for business as usual energy efficiency gains, BE must be adjusted each project year y to take account of an assumed US average 1.3 percent efficiency improvement factor, using the following equation:

$$BE_y = BE * (1 - 0.013)\text{^}(y - 1) \quad (13)$$

Where:

BE_y = Baseline emissions for year y (tCO_2e)
y = Project year (number)
BE = Baseline emissions (tCO_2e)

8.1.2 Project Emissions

Project emissions must be calculated as follows:

$$PE_y = \sum_{i} F_{p=y,i} \quad (14)$$

Where:

PE_y = Project emissions for year y (tCO_2e)
$F_{p=y,i}$ = Stationary combustion emissions in project year y from fuel type i (tCO_2e)

[18] Variances in weather over the baseline period are accounted for by averaging baseline emissions over a three to five year baseline period

8.1.3 Project Emission Adjustments

Where the project only qualifies for GHG emission reductions for stationary combustion emissions, the quantification of reductions must be adjusted when technologies or measures implemented to reduce stationary combustion emissions result in increases in scope 2 electricity, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions. Such technologies or measures are referred to as adjustment technologies, and the procedure below must be followed to determine project emission adjustments ($PE\Delta_y$).

For projects reducing stationary combustion emissions, $PE\Delta_y$ is defined as the increase in scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions due to the implementation of stationary combustion technologies or measures.

It must be assessed whether any of the activities undertaken to reduce stationary combustion emissions lead to a net increase in scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions (eg, the net difference in electricity needed to run a new geothermal system compared to the electricity needed to run both the older boilers and electric-powered chilled water systems if these are both displaced by new geothermal installations). Generally, such stationary combustion adjustment technologies represent substantial changes to campus energy generation systems and the estimates can be reasonably made for incremental scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions (ie, sub-metering is not required).

Any increase in scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions must be estimated on a net basis in comparison to the electricity required to power the stationary combustion/ancillary systems that are replaced. Therefore the electricity consumption of old displaced systems must be subtracted from the electricity needed to power the new stationary combustion systems to generate the net electricity consumption. For the displaced systems, the electricity consumption must be averaged over the project baseline period, for any energy system which is taken substantially offline as a result of the new stationary combustion system installations/upgrades and whose functionality is now serviced by these same stationary combustion system installations. For example, for a geothermal system which not only delivers heat (displacing boilers) but also displaces electricity-powered chilled water cooling systems, the electricity needed to run both the old boilers and the chillers would be subtracted from the electricity needed to run the geothermal systems.

$PE\Delta_y$ is set at zero where the conditions in Adjustment Tests A, B or C (see below) are met. These tests are presented in order of increasing data requirements with the latter test requiring more detailed data. Note that de minimis is given as the situation where emissions would form less than five percent of the total emissions reductions.

Where the conditions of these three tests are not met, $PE\Delta_y$ must be calculated using the appropriate test among Adjustment Tests D, E or F (see below). Project proponents may estimate the project emissions adjustments using any of the Adjustment Tests, except projects involving CHP or geothermal technologies which can only apply tests A, B, C or F. These tests are presented in order of increasing data requirements with the latter tests requiring more detailed data. More detailed data and information is required for these tests, and although sub-metering is not required, credible estimates must be provided.

Project Emission Adjustment Calculations

This section provides the tests and calculation for project emission adjustments.

Adjustment Test A*:*

$PE\Delta_y$ is deemed to be zero if the increases in scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions due to the adjustment technologies in project year y is considered de minimis (ie, less than five percent) relative to the size of the stationary combustion emissions in project year y, and the project passes the (scope 2 electricity emissions) additionality benchmark tests Test 4a-E or Test 4b-E

Adjustment Test B

$PE\Delta_y$ is deemed to be zero if the increases in the total scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and scope 2 steam emissions due to the adjustment technologies, in project year y is considered de minimis (ie, less than five percent) relative to the size of the stationary combustion emission reductions in project year y, as calculated using equation 15.

$$\Delta E_y \leq 0.05 * (BE_y - PE_y) \qquad (15)$$

Where:

ΔE_y = Incremental scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions in project year y due to adjustment technologies (tCO_2e)

BE_y = Baseline stationary combustion emissions, calculated in equation 13 (tCO_2e)

PE_y = Project stationary combustion emissions, calculated in equation 14 (tCO_2e)

Adjustment Test C:

$PE\Delta_y$ is deemed to be zero if the following test is passed:

$$\sum_{p=1}^{y} \Delta E_y \leq E_{b=1} - E_{p=1} + PSH_{b=1} - PSH_{p=1} + PC_{b=1} - PC_{p=1} \qquad (16)$$

Where:

ΔE_y = Incremental scope 2 electricity, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions in project year y due to adjustment technologies (tCO_2e)

$E_{p=1}$ = Scope 2 electricity emissions in project year 1 (tCO_2e)

$E_{b=1}$ = Scope 2 electricity emissions in the first year of the baseline period (tCO_2e)

$PSH_{p=1}$ = Scope 2 steam emission and/or scope 2 heat emissions in project year 1 (tCO_2e)

$PSH_{b=1}$ = Scope 2 steam emission and/or scope 2 heat emissions in the first year of the baseline period (tCO_2e)
$PC_{p=1}$ = Scope 2 cooling emissions in project year 1 (tCO_2e)
$PC_{b=1}$ = Scope 2 cooling emissions in the first year of the baseline period (tCO_2e)

Where the campus requires adjustments for square footage, as determined in Test 2 of Section 7.1, then square footage-adjusted baseline emissions, as determined in Section 7.3.2 (where b=x refers to the first year of the baseline period, ie, where b=1), must be applied for equation 16. Similarly, the square footage-adjusted parameters $PSH_{b=1}adj_{sf}$ and $PC_{b=1}adj_{sf}$ must substitute for $PSH_{b=1}$ and $PC_{b=1}$ respectively, in all the above equations. $PSH_{b=1}adj_{sf}$ and $PC_{b=1}adj_{sf}$ must be calculated using the following equations:

For scope 2 emissions from purchased steam and/or heat:

$$PSH_{b=1}adj_{sf} = PSH_{b=1} * \frac{SF_{p=1}}{SF_{b=1}} \quad (17)$$

Where:

$PSH_{b=1}adj_{sf}$ = Square footage-adjusted scope 2 steam emissions and/or scope 2 heat emissions in the first year of the baseline period (tCO_2e)
$PSH_{b=1}$ = Scope 2 steam emissions and/or scope 2 heat emissions in the first year of the baseline period (tCO_2e)
$SF_{p=1}$ = Total campus-wide square footage in project year 1 (ft^2)
$SF_{b=1}$ = Total campus-wide square footage in the first year of the baseline period (ft^2)

For scope 2 emissions from purchased cooling:

$$PC_{b=1}adj_{sf} = PC_{b=1} * \frac{SF_{p=1}}{SF_{b=1}} \quad (18)$$

Where:

$PC_{b=1}adj_{sf}$ = Square footage-adjusted scope 2 cooling emissions in the first year of the baseline period (tCO_2e)
$PC_{b=1}$ = Scope 2 cooling emissions in the first year of the baseline period (tCO_2e)
$SF_{p=1}$ = Total campus-wide square footage in project year 1 (ft^2)
$SF_{b=1}$ = Total campus-wide square footage in the first year of the baseline period (ft^2)

<u>Adjustment Test D:</u>

Provided that neither CHP nor geothermal technologies are included in the project, $PE\Delta_y$ is calculated as follows:

$$PE\Delta_y = 0.10 * (BE_y - PE_y) \quad (19)$$

Where:

$PE\Delta_y$ = Project emission adjustments for stationary combustion emissions (tCO_2e)
BE_y = Baseline stationary combustion emissions, calculated in equation 13 (tCO_2e)
PE_y = Project stationary combustion emissions, calculated in equation 14 (tCO_2e)

<u>Adjustment Test E:</u>

Provided that neither CHP nor geothermal technologies are included in the project, $PE\Delta_y$ is calculated as follows:

$$PE\Delta_y = 0.10 * PAT * (BE_y - PE_y) \tag{20}$$

Where:

$PE\Delta_y$ = Project emission adjustments for stationary combustion emissions (tCO_2e)
BE_y = Baseline stationary combustion emissions, calculated in equation 13 (tCO2e)
PE_y = Project stationary combustion emissions, calculated in equation 14 (tCO2e)
PAT = Percentage of total stationary combustion emissions in year y due to adjustment technologies (percent)

$$PAT = \frac{\sum_i AT_{y,i}}{PE_y} \tag{21}$$

Where:

PAT = Percentage of total stationary combustion emissions in year y due to adjustment technologies (percent)
$AT_{y,i}$ = Stationary combustion emissions due to adjustment technologies from fuel type i in project year y (tCO_2e)
PE_y = Project stationary combustion emissions in year y, calculated in equation 14 (tCO_2e)

<u>Adjustment Test F:</u>

$PE\Delta_y$ is calculated as follows:

$$PE\Delta_y = \Delta E_y \tag{22}$$

Where:

$PE\Delta_y$ = Project emission adjustments for stationary combustion emissions (tCO_2e)
ΔE_y = Incremental scope 2 electricity emissions, scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions in project year y due to adjustment technologies (tCO_2e)

8.1.4 Leakage Emissions

Leakage in year y (LE_y) is determined as zero, given that sources of leakage under this module are deemed de minimus.

8.2 Scope 2 Electricity Emissions

8.2.1 Baseline Emissions

Baseline emissions must be calculated over all baseline years included in the baseline period as follows:

$$BE = \frac{\sum_x E_{b=x}}{B} \tag{23}$$

Where:

BE	= Baseline emissions (tCO_2e)
$E_{b=x}$	= Scope 2 electricity emissions in year x of the baseline period (tCO_2e)
B	= Baseline period (years)

Where the campus requires adjustments for square footage, as determined in Test 2 of Section 7.1, then square footage-adjusted baseline emissions, as determined in Section 7.3.2, must be applied for equation 23 (ie, $E_{b=x}adj_{sf}$ must be substituted for $E_{b=x}$ for each baseline year x). Note that weather-based adjustments must not be applied in the quantification of baseline emissions.

To adjust for business as usual energy efficiency gains, BE must be adjusted each project year y to take account of an assumed US average 1.3 percent efficiency improvement factor using the following equation:

$$BE_y = BE * (1 - 0.013)\wedge(y - 1) \tag{24}$$

Where:

BE_y	= Baseline emissions for year y (tCO_2e)
y	= Project year (number)
BE	= Baseline emissions (tCO_2e)

8.2.2 Project Emissions

Project emissions must be calculated as follows:

$$PE_y = E_{p=y} \tag{25}$$

Where:

PE_y	= Project emissions for year y (tCO_2e)
$E_{p=y}$	= Scope 2 electricity emissions in project year y (tCO_2e)

8.2.3 Project Emission Adjustments

Where the project only qualifies for GHG emission reductions for scope 2 electricity emissions, the quantification of reductions must be adjusted when technologies or measures implemented to reduce scope 2 electricity emissions result in increases in stationary combustion emissions and/or scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions. Such technologies or measures are referred to as adjustment technologies, and the procedure below must be followed to determine project emission adjustments ($PE\Delta_y$).

For projects reducing scope 2 electricity emissions, $PE\Delta_y$ is defined as the increase in stationary combustion emissions and/or scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions emissions due to the implementation of scope 2 electricity technologies or measures.

It must be assessed whether any of the activities undertaken to reduce scope 2 electricity emissions lead to a net increase in emissions from on-site energy generation systems (and thus stationary combustion emissions) and/or scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions. Any increase in stationary combustion emissions and scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions must be estimated on a net basis in comparison to those same emission sources required before the systems reducing the scope 2 electricity emissions were installed.

Scope 2 electricity adjustment technologies are rare and are likely to be conspicuous. Where they are implemented they tend to represent substantial changes to on-site campus energy generation systems (eg, a shift from external utility sourced electricity to on-site generation systems). Thus the adjustment estimates required can be reasonably made since they are infrequent and they involve large scale shifts in the stationary combustion emissions, for which sub-estimates can reasonably be made. Often simplifying assumptions can also be made. For example, if, as external utility-source electricity declines, on-site electricity generation is added onto an existing steam-based stationary combustion generation systems, there would be no incremental stationary combustion emissions.

$PE\Delta_y$ is set at zero where the conditions in Adjustment Tests G, H or I (see below) are met. These tests are presented in order of increasing data requirements with the latter tests requiring more detailed data. Note that de minimis is given as the situation where emissions would form less than five percent of the total emissions reductions.

Where the conditions of these three tests are not met, $PE\Delta_y$ must be calculated using the Adjustment Tests J. More detailed data and information is required for this test, and although sub-metering is not required, credible estimates must be provided.

Project Emission Adjustment Calculations

This section provides the tests and calculations for project emission adjustments.

Adjustment Test G:

$PE\Delta_y$ is deemed to be zero if the increases in scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions due to the adjustment technologies in project year y is considered de minimis (ie, less than five percent) relative to the size of the scope 2 electricity emissions in project year y, and the project meets the additionality performance benchmark tests Test 4a-S or Test 4b-S for stationary combustion emissions.

Adjustment Test H:

$PE\Delta_y$ is deemed to be zero if increases in the total stationary combustion and scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions due to the adjustment technologies, in project year y is considered de minimis (ie, less than five percent) relative to the size of the scope 2 electricity emission reductions in project year y, as calculated using equation 26.

$$\sum_{i} \Delta F_{y,i} \leq 0.05 * (BE_y - PE_y) \qquad (26)$$

Where:

$\Delta F_{y,i}$ = Incremental scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions and stationary combustion emissions and in project year y from fuel type i due to adjustment technologies (tCO_2e)

BE_y = Baseline scope 2 electricity emissions, calculated in equation 24 (tCO_2e)

PE_y = Project scope 2 electricity emissions, calculated in equation 25 (tCO_2e)

Adjustment Test I:

$PE\Delta_y$ is deemed to be zero if the following test is passed:

$$\sum_{p=1}^{y} \sum_{i} \Delta F_{y,i} \leq PSH_{b=1} - PSH_{p=1} + PC_{b=1} - PC_{p=1} + \sum_{i} (F_{b=1,i} - F_{p=1,i}) \qquad (27)$$

Where:

$\Delta F_{y,i}$ = Incremental scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions and stationary combustion emissions and in project year y from fuel type i due to adjustment technologies (tCO_2e)

$F_{p=1}$ = Stationary combustion emissions from fuel type i in project year 1 (tCO_2e)

$F_{b=1}$ = Stationary combustion emissions from fuel type i in the first year of the baseline period (tCO_2e)

$PSH_{p=1}$ = Scope 2 steam emissions and/or scope 2 heat emissions in project year 1 (tCO_2e)

$PSH_{b=1}$ = Scope 2 steam emissions and/or scope 2 heat emissions in the first year of the baseline period (tCO_2e)

$PC_{p=1}$ = Scope 2 cooling emissions in project year 1 (tCO_2e)

$PC_{b=1}$ = Scope 2 cooling emissions in the first year of the baseline period (tCO_2e)

Where the campus requires adjustments for square footage, as determined in Test 2 of Section 7.1, then square footage-adjusted baseline emissions, as determined in Section 7.3.2 (where b=x refers to the first year of the baseline period, ie, where b=1), must be applied for equation 27. Similarly, the square footage-adjusted parameters $PSH_{b=1}adj_{sf}$ and $PC_{b=1}adj_{sf}$ must substitute for $PSH_{b=1}$ and $PC_{b=1}$ respectively, in all the above equations. $PSH_{b=1}adj_{sf}$ and $PC_{b=1}adj_{sf}$ must be calculated using equations 17 and 18.

<u>Adjustment Test J:</u>

$PE\Delta_y$ is calculated as follows:

$$PE\Delta_y = \sum_i \Delta F_{y,i} \tag{28}$$

Where:

$PE\Delta_y$	= Project emission adjustments for scope 2 electricity emissions (tCO_2e)
$\Delta F_{y,i}$	= Incremental increase in scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions and stationary combustion emissions and in project year y from fuel type i due to adjustment technologies (tCO_2e)

8.2.4 Leakage

Leakage in year y (LE_y) is determined as zero, given that sources of leakage under this module are deemed de minimis.

8.3 Net GHG Emission Reduction and/or Removals

Separate procedures are provided for calculating net GHG emission reduction for stationary combustion emissions and for scope 2 electricity emissions. Where the project includes both sources of emissions, the project's total emission reductions is their sum.

$$ER_y = (BE_y - PE_y - PE\Delta_y - LE_y) * SF\Delta_y \tag{29}$$

Where:

ER_Y	= Net GHG emissions reductions and/or removals in year y (tCO_2e)
BE_y	= Baseline emissions in year y (tCO_2e)
PE_y	= Project emissions in year y (tCO_2e)
$PE\Delta_y$	= Project emissions adjustments in year y (tCO_2e)
LE_y	= Leakage in year y (tCO_2e)
$SF\Delta_y$	= Percentage adjustment factor for declines in square footage in year y (%)

All campuses must consider adjustments for square footage that may be required during the project crediting period following the procedures for determining the percentage adjustment factor for declines in square footage in year y, $SF\Delta_y$, as specified in the section below.

Square Footage Adjustments for Declines during Project Crediting Period

In order to account for any annual decline in total campus-wide square footage that occurs during the project crediting period, adjustments must be made.

For project year 1 and where campus square footage has not decreased between project year y and y+1, $SF\Delta_y$ is given as 1.[19]

For project years after project year 1, and where campus square footage has decreased, $SF\Delta_y$ is calculated as follows:

$$SF\Delta_y = 1 + \frac{SF_{p=y} - SF_{p=y-1}}{SF_{p=y-1}} \tag{30}$$

Where:

$SF\Delta_y$ = Percentage adjustment factor for declines in square footage in year y (%)
$SF_{p=y}$ = Total campus-wide square footage in year y (ft^2)
$SP_{p=y-1}$ = Total campus-wide square footage in year y-1 (ft^2)

Where campus-wide square footage has declined in year y, adjustments must continue to be performed as described below.

Where $SF\Delta_y < 1$, square footage adjustments must be made to emissions reductions in subsequent years until the campus square footage exceeds that in year y–1. For all subsequent years, y + n, beyond the project year y (where y is the year in which the square footage declined), the calculation of ER_{y+n} must be made using a percentage adjustment factor $SF\Delta_{y+n}$, calculated in equation 31 below, until the total campus-wide square footage has exceeded that of year y–1.

$$SF\Delta_{y+n} = 1 + \frac{SF_{p=y+n} - SF_{p=y-1}}{SF_{p=y-1}} \tag{31}$$

Where:

$SF\Delta_{y+n}$ = Percentage adjustment factor for declines in square footage in year y+n (%)
$SF_{p=y+n}$ = Total campus-wide square footage in year y+n (ft^2)
$SP_{p=y-1}$ = Total campus-wide square footage in year y-1 (ft^2)

Where the campus-wide square footage in year y+n exceeds the campus-wide square footage in year y-1, no adjustments to ER_{y+n} need to be made since the total campus-wide square footage is now larger than it was in year y–1.

Where both campus-wide and LEED-certified building modules are being applied, the LEED-certified building reductions must be subtracted from the campus-wide total as described in *VM0025 Campus Clean Energy and Energy Efficiency Methodology*.

[19] Any decrease in campus-wide square footage between project year 0 and 1 would have been made via the application of square footage-adjusted baseline parameters and therefore does not need to be made a second time here.

9 MONITORING

The data and parameters available at validation, and monitored, are provided in Sections 9.1 and 9.2 respectively. Section 9.3 sets out the monitoring plan, as well as additional requirements regarding consistency of data applied in the project with the data reported under third-party GHG reporting programs such as ACUPCC.

9.1 Data and Parameters Available at Validation

The data and parameters required at validation include the parameters provided in this section, plus the parameters $SF_{b=x}$, $SF_{p=1}$, $F_{b=x}$, $F_{p=1}$, $E_{b=x}$, $E_{p=1}$ and y provided in Section 9.2 below. The parameters in Section 9.2 must also be monitored annually, which is why they are provided in that section.

Data Unit / Parameter	PBS_c
Data unit	Percent
Description	Stationary combustion additionality performance benchmark for Carnegie class c. The level of the additionality benchmark is set at the annual percent reduction in campus-wide stationary combustion emissions achieved by campuses of equivalent Carnegie class which also achieve annual average reductions in total energy-based emissions.
Equations	8 and 9
Source of data	ACUPCC
Value applied	The levels of the additionality benchmarks are set out in Table 2.
Justification of choice of data or description of measurement methods and procedures applied	Justification for the benchmark is provided in Appendix 1.
Purpose of data	Determination of additionality
Comment	

Data Unit / Parameter	PBE_c
Data unit	Percent
Description	Scope 2 electricity additionality performance benchmark for Carnegie class c. The level of the additionality benchmark is set at the annual percent reduction in campus-wide scope 2 electricity emissions achieved by campuses of equivalent Carnegie class which also achieve reductions in total stationary combustion emissions, and stationary combustion emissions plus scope 2 electricity

	emissions.
Equations	10 and 11
Source of data	ACUPCC
Value applied	The levels of the additionality benchmarks are set out in Table 2.
Justification of choice of data or description of measurement methods and procedures applied	Justification for the benchmark is provided in Appendix 1.
Purpose of data	Determination of additionality
Any comment	

Data Unit / Parameter	B
Data unit	Number
Description	Baseline period
Equations	2, 12 and 23
Source of data	Determined based on emissions data reported to third party GHG reporting program.
Value applied	3, 4 or 5
Justification of choice of data or description of measurement methods and procedures applied	The baseline period must meet the following conditions: • The baseline period must include project year 0 and three to five consecutive years prior to the project start date. • For at least one of the baseline years, data must be publicly-available through ACUPCC or a third-party GHG reporting program. The baseline period must be justified relative to the data that most accurately reflects historical emissions that are comparable to the campus conditions during project crediting period (eg, similar square footage and attendance). The baseline period must be calculated by subtracting the calendar year for the first year of the baseline period from the calendar year of project year 1.
Purpose of data	Calculation of baseline emissions
Any comment	

Data Unit / Parameter	$HDD_{p=y}$
Data unit	Number
Description	Heating degree days in the applicable year

Equations	6
Source of data	The number of heating degree days in the applicable year is defined as the number of heating degree days as published by reputable regional or national meteorological organizations (eg, NOAA) and as reported by campuses to third-party GHG reporting programs.
Value to be applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of data	Determination of additionality
Comment	

Data Unit / Parameter	$CDD_{p=y}$
Data unit	Number
Description	Cooling degree days in the applicable year
Equation	7
Source of data	The number of cooling degree days in the applicable year is defined as the number of cooling degree days as published by reputable regional or national meteorological organizations (eg, NOAA) and as reported by campuses to third-party GHG reporting programs.
Value to be applied	
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of data	Determination of additionality
Comment:	

Data Unit / Parameter	SCAP
Data unit	Number
Description	Stationary combustion additionality eligibility period
Equations	8 and 9
Source of data	
Value applied	1, 2, 3, 4 or 5
Justification of choice of	This period must include project year 0 and one to five

data or description of measurement methods and procedures applied	consecutive years prior to the project start date. This period must be calculated by subtracting the calendar year for the additionality testing year, used for stationary combustion additionality benchmark testing, from the calendar year for project year 1.
Purpose of data	Determination of additionality
Comment	In some cases, the additionality eligibility period is not the same as the baseline period or the scope 2 electricity additionality eligibility period.

Data Unit / Parameter	E2AP
Data unit	Number
Description	Scope 2 electricity additionality eligibility period
Equations	10 and 11
Source of data	
Value applied	1, 2, 3, 4 or 5
Justification of choice of data or description of measurement methods and procedures applied	This period must include project year 0 and one to five consecutive years prior to the project start date. This period must be calculated by subtracting the calendar year for the additionality testing year, used for scope 2 electricity additionality benchmark testing, from the calendar year for project year 1.
Purpose of data	Determination of additionality
Any comment	In some cases, the additionality eligibility period is not the same as the baseline period or the stationary combustion additionality eligibility period.

9.2 Data and Parameters Monitored

Data Unit / Parameter	$SF_{b=x}$, $SF_{p=y}$
Data unit	ft^2
Description	Total campus-wide square footage in the applicable year
Equations	1, 2, 3, 4, 9, 11, 30 and 31
Source of data	The campus' historical GHG inventory reporting to relevant third-party GHG reporting program (eg, ACUPCC).
Description of measurement methods and procedures to be applied	Measured according to the reporting framework of the relevant third-party GHG reporting program.
Frequency of	Annual

monitoring/recording	
QA/QC procedures to be applied	
Purpose of data	Determination of additionality Calculation of baseline emissions Calculation of project emissions
Comment	Campus square footage data is typically reported to ACUPCC

Data Unit / Parameter	$F_{b=x,i}$, $F_{p=y,i}$
Data unit	tCO_2e
Description	Stationary combustion emissions in the applicable year from fuel type i, in the applicable year
Equations	3, 5, 6, 8, 9, 12, 14 and 28
Source of data	GHG reports submitted to third-party GHG reporting programs such as ACUPCC, as generated through credible GHG reporting tools such as the CAPC calculator or The Climate Registry reporting protocols.
Description of measurement methods and procedures to be applied	GHG emissions must be calculated by multiplying the quantity of fuel type i used campus-wide by the appropriate emissions factor for fuel type i, for the applicable year. Emissions factors for fuels must be consistent with those permitted under the third-party GHG reporting program.
Frequency of monitoring/recording	Annual
QA/QC procedures to be applied	
Purpose of data	Determination of additionality Calculation of baseline emissions Calculation of project emissions
Comment	The parameter $F_{b=1,i}$ is referenced in both Section 7 where it applies to the additionality testing year and Section 8 where it applies to the first year of the baseline period. In some cases, the additionality testing year is not the same as the first year of the baseline period.

Data Unit / Parameter	$E_{b=x}$ or $E_{p=y}$
Data unit	tCO_2e
Description	Scope 2 electricity emissions in the applicable year
Equations	4, 5, 7, 10, 11, 20, 23 and 25
Source of data	GHG reports submitted to third-party GHG reporting programs

	such as ACUPCC, or generated through credible GHG reporting tools such as the CAPC calculator or The Climate Registry reporting protocols.
Description of measurement methods and procedures to be applied	$E_{b=1}$ must be calculated by multiplying the total electricity consumed campus-wide by the appropriate grid emissions factor, for the applicable baseline year. Emission factors must be consistent with those permitted under the third-party GHG reporting program, preferably consistent with those permitted under the CACP calculator. The default emissions factor is the regional eGRID combined margin. Other GHG emission factors should only be used if justification is provided that they are reasonable and conservative (eg, factors tailored to the specific utilities from which campuses' electricity is sourced). In such cases, the factors must have been published by the utilities in year y or, if published previously, must be used for no more than three years of emission reductions (ie, years y, y+1 and y+2, where y can be either a project year or a baseline year).
Frequency of monitoring/recording	Annual
QA/QC procedures to be applied	
Purpose of data	Determination of additionality Calculation of baseline emissions Calculation of project emissions
Comment	The parameter $E_{b=1}$ is referenced in both Section 7 where it applies to the additionality testing year and Section 8 where it applies to the first year of the baseline period. In some cases, the additionality testing year is not the same as the first year of the baseline period.

Data Unit / Parameter	y
Data unit	number
Description	Project year
Equations	13 and 24
Source of data	
Description of measurement methods and procedures to be applied	y is the project year determined by counting the number of years since the project start date (ie, the first project year = 1, the second project year = 2, etc.)
Frequency of monitoring/recording	Annually
QA/QC procedures to be	

applied	
Purpose of data	Calculation of baseline emissions
Comments	

Data Unit / Parameter	ΔE_y
Data unit	tCO_2e
Description	Incremental scope 2 electricity emissions and scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions in project year y due to stationary combustion adjustment technologies
Equations	15, 16 and 22
Source of data	GHG reports submitted to third-party GHG reporting programs such as ACUPCC, or generated through credible GHG reporting tools such as the CAPC calculator or The Climate Registry reporting protocols.
Description of measurement methods and procedures to be applied	Credible estimation approaches are allowed and sub-metering is not required. ΔE_y must be calculated consistent with calculations above for $E_{p=y}$ ΔE_y must be calculated by multiplying the incremental electricity consumed due to stationary combustion adjustment technologies in project year y by the appropriate grid emissions factor in project year y, then adding the incremental units of purchased heat, cooling and/or steam consumed due to stationary combustion adjustment technologies in project year y multiplied by an appropriate emissions factor. Emission factors must be consistent with those permitted under the third-party GHG reporting program, preferably consistent with those permitted under the CACP calculator. The default emissions factor is the regional eGRID combined margin. Other GHG emission factors should only be used if justification is provided that they are reasonable and conservative (eg, factors tailored to the specific utilities from which campuses' electricity is sourced). In such cases, the factors must have been published by the utilities in year y or, if published previously, must be used for no more than three years of emission reductions (ie, years y, y+1 and y+2, where y can be either a project year or a baseline year). Emissions factors for fuels must be consistent with those permitted under the third-party GHG reporting program.
Frequency of monitoring/recording	Annually
QA/QC procedures to be	

applied	
Purpose of data	Calculation of project emissions
Comment	

Data Unit / Parameter	$AT_{y,i}$
Data unit	tCO_2e
Description	Stationary combustion emissions due to the stationary combustion adjustment technologies from each fuel type i in project year y
Equations	21
Source of data	GHG reports submitted to third-party GHG reporting programs such as ACUPCC, or generated through credible GHG reporting tools such as the CAPC calculator or The Climate Registry reporting protocols. Since data may require estimates for project emissions from energy sub-systems, project must use identical procedures for reporting these emissions to those required by the third-party GHG program.
Description of measurement methods and procedures to be applied	GHG emissions must be calculated by multiplying the quantity of fuel type i used campus-wide by the appropriate emissions factor for fuel type i, for the applicable year. Emissions factors for fuels must be consistent with those permitted under the third-party GHG reporting program.
Frequency of monitoring/recording	Annually
QA/QC procedures to be applied	
Purpose of data	Calculation of project emissions
Comment	

Data Unit / Parameter	$PSH_{b=x}$, $PSH_{p=y}$
Data unit	tCO_2e
Description	Scope 2 emissions from purchased steam and/or heat emissions in the applicable year
Equations	16, 17 and 27
Source of data	GHG reports submitted to third-party GHG reporting programs such as ACUPCC, or generated through credible GHG reporting tools such as the CAPC calculator or The Climate Registry reporting protocols.
Description of	$PSH_{b=x}$ or $PSH_{p=y}$ must be calculated by multiplying scope 2

measurement methods and procedures to be applied	emissions from purchased steam and/or heat in the relevant year by an appropriate grid emissions factor or emission factor for fuels used. Emission factors must be consistent with those permitted under the third-party GHG reporting program, preferably consistent with those permitted under the CACP calculator.
Frequency of monitoring/recording	Once per project crediting period
QA/QC procedures to be applied	
Purpose of data	Calculation of project emissions
Comment	

Data Unit / Parameter	$PC_{b=x,}$ $PC_{p=y}$
Data unit	tCO_2e
Description	Scope 2 emissions from purchased cooling in the applicable year
Equations	16, 18 and 27
Source of data	GHG reports submitted to third-party GHG reporting programs such as ACUPCC, or generated through credible GHG reporting tools such as the CAPC calculator or The Climate Registry reporting protocols.
Description of measurement methods and procedures to be applied	$PC_{b=x,}$ or $PC_{p=y}$ must be calculated by multiplying scope 2 emissions from purchased cooling in the relevant year by an appropriate grid emissions factor. Emission factors must be consistent with those permitted under the third-party GHG reporting program, preferably consistent with those permitted under the CACP calculator.
Frequency of monitoring/recording	Once per project crediting period
QA/QC procedures to be applied	
Purpose of data	Calculation of project emissions
Comment	

Data Unit / Parameter	$\Delta F_{y,i}$
Data unit	tCO_2e
Description	Incremental increase in scope 2 heat emissions, scope 2 cooling emissions and/or scope 2 steam emissions and stationary combustion emissions in project year y from each fuel type i due to scope 2 electricity adjustment technologies

Equations	26, 27 and 28
Source of data	GHG reports submitted to third-party GHG reporting programs such as ACUPCC, or generated through credible GHG reporting tools such as the CAPC calculator or The Climate Registry reporting protocols.
Description of measurement methods and procedures to be applied	Credible estimation approaches are allowed and sub-metering is not required. $\Delta F_{p=y,i}$ must be calculated consistent with calculations for $F_{p=y,i}$. $\Delta F_{p=y,i}$ must be calculated by multiplying the incremental fuel inputs per unit consumed due to scope 2 electricity adjustment technologies in project year y by an emissions factor, then adding the incremental units of purchased heat, cooling or steam consumed due to scope 2 electricity adjustment technologies in project year y multiplied by an appropriate emissions factor. Emission factors must be consistent with those permitted under the third-party GHG reporting program, preferably consistent with those permitted under the CACP calculator. Emissions factors for fuels must be consistent with those permitted under the third-party GHG reporting program.
Frequency of monitoring/recording	Annually
QA/QC procedures to be applied	
Purpose of data	Calculation of project emissions
Comment	

9.3 Description of the Monitoring Plan

The project proponent must establish, maintain and apply a monitoring plan and GHG information system that includes criteria and procedures for obtaining, recording, compiling and analyzing data, parameters and other information important for quantifying and reporting GHG emissions.

All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last project crediting period. All data must be monitored unless indicated otherwise in the tables above.

Monitoring data must be drawn from the relevant ACUPCC, STARS, The Climate Registry or other third-party GHG reporting program reports. Use of any other date must be clearly justified by the project proponent, including justification of any discrepancies with third-party GHG reporting program data.

Where data for GHG inventories have not be reported publicly, the same reporting framework as used for publically reported data must be consistently applied (ie, the reporting framework used by ACUPCC, STARS or other third-party GHG reporting programs must be applied). The project proponent should use an established reporting calculator such as the CACP calculator, consistent with ACUPCC reporting or the selected third-party GHG reporting program guidance. Use of any custom calculators must follow ACUPCC guidance. Comparable data quality management procedures must be applied as are required for reporting under ACUPCC, STARS or The Climate Registry.

Project proponents must make available evidence and data to enable the validation/verification body to:

- Review the project's data to ensure that the reporting procedures used are consistent with those required under the applicable third-party GHG reporting program's guidelines.
- Review the supporting documentation used to generate the GHG inventory reports submitted to the relevant third-party GHG program (eg, fuel consumed, electricity consumed, emission factors, contextual data) to ensure that the information used to develop the GHG inventory conforms to the third-party GHG program guidance and reflects campus-wide energy consumed.

Projects must ensure that primary data documentation supporting the data used to generate the GHG emissions inventory reflects accurate submissions consistent with ACUPCC or other relevant third-party GHG reporting program. For example, primary documentation regarding the campus square footage, the units of fuel consumed and the CO_2e/unit emission factors used for stationary combustion emissions; and the kwh purchased and CO_2e/kwh emission factors used for scope 2 electricity emissions.

10 REFERENCES

None

APPENDIX 1: PERFORMANCE BENCHMARK JUSTIFICATIONS

Performance benchmarks are based upon performance distributions. The performance benchmarks have therefore been calculated by creating a numerically ordered arrangement of the specified database parameters from greatest to least. For example, the 85th percentile value is equal to the value of the data point $V_{0.85n}$ – that is, the data point whose rank is such that 85 percent of the data points fall below its value. The 50th percentile value is equal to the value of the data point $V_{0.5n}$ – that is, the data point whose rank is such that 50 percent of the data points fall below its value.

Performance Benchmark Explanation and Justifications

Based upon analysis of ACUPCC reporting colleges GHG performances and stakeholder consultations, it is clear that:

1) The additionality performance benchmarks (PBS_c and PBE_c) selected, which are specified for each Carnegie category, are higher than the 80th percentile and are reasonable, conservative and well justified, evidenced as follows:

    - The UNFCCC established in its Marrakech Accords that additionality benchmarks for CDM project additionality testing are sufficient if the benchmark surpassed the 80th percentile of comparable peers. Paragraph 48(c) defines the benchmark as “The average emissions of similar project activities undertaken in the previous five years in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 percent of their category”. This module is at least this conservative, setting the performance cut off at the average annual percent reductions achieved by those campuses in the relevant Carnegie class that deliver absolute reductions in stationary combustion emissions and/or scope 2 electricity emissions, provided that they also achieve a net decrease in total GHG emissions (ie, stationary combustion and scope 2 electricity emissions). These benchmarks PBS_c and PBE_c are set at a level above the respective 80th percentile levels in each Carnegie class. Furthermore, they typically lie towards or even exceed the even more aggressive 85th percentile levels.

    - This module’s performance benchmarks are far more conservative than UNFCCC’s recommended level since the ACUPCC database is not representative of nation-wide performance but rather represents a sub-set of campuses which have elected to voluntarily report their GHG emissions to ACUPCC. Furthermore, ACUPCC has 650 colleges which have developed Presidential level commitments to GHG reduction goals and transparent reporting: this compares to 4,076 campuses nationally.[20] The 85th percentile performance of ACUPCC campuses is therefore reasonably expected to be more demanding than the 85th percentile performance of all US campuses nationwide given these campuses’ Presidential level commitment to GHG reductions. The performance benchmarks in this module are therefore at least as conservative as those set out in VCS and CDM methodologies VM0008 and NM0302 respectively.

[20] 4076 campuses, personal communication Prof Robert Koester, Ball State

The extent to which this average annual reduction rate, which sits above the ACUPCC 80/85th percentile in each Carnegie class, represents a beyond business as usual performance has been determined through other analysis as follows:

- First, total energy-based emissions (ie, stationary combustion emissions and scope 2 electricity emissions) are also not allowed to rise. This limits consideration to a subset of campuses within the ACUPCC Carnegie classes. Second, absolute reductions in stationary combustion emissions and/or scope 2 electricity emissions are relatively rare for US campuses, particularly when, to avoid GHG displacement considerations, absolute reductions in total energy-based emissions are also achieved.[21] For example, even among those colleges with ambitious overall ACUPCC GHG reductions goals, a surprisingly small proportion of campuses (roughly a third) achieve any absolute reductions in stationary combustion emissions. For scope 2 electricity emissions, roughly two thirds of campuses achieve this goal.
- The following tables are based on an analysis of ACUPCC college reporting data 2007-11:[22]

Table 3: Proportion of campuses with at least two years' reporting data (including outliers) which achieve a net decrease in the following scopes of emissions:

Carnegie Class	Stationary Combustion Emissions	Stationary Combustion and Total Energy-Based Emissions	Scope 2 Electricity Emissions	Scope 2 Electricity and Total Energy-Based Emissions
Doctoral	47%	38%	70%	56%
Associate	48%	27%	48%	27%
Baccalaureate	57%	47%	70%	59%
Masters	56%	38%	52%	48%
Special	50%	33%	54%	45%

Table 4: Proportion of all reporting campuses which achieve a net decrease in the following scopes of emissions:

Carnegie Class	Stationary Combustion Emissions	Stationary Combustion and Total Energy-Based Emissions	Scope 2 Electricity Emissions	Scope 2 Electricity and Total Energy-Based Emissions
Doctoral	40%	32%	58%	47%
Associate	25%	14%	28%	24%
Baccalaureate	42%	35%	53%	45%
Masters	37%	25%	34%	32%

[21] Thus decreases, for example, in stationary combustion emissions cannot take place at the expense of absolute increases in total stationary combustion emissions and scope 2 electricity emissions (eg, on-site energy reductions do not take place by merely increasing scope 2 energy demands in ways that would create displaced emissions.

[22] ACUPCC, 28 Nov 2012

Special	33%	22%	39%	33%

- For energy efficiency measures, merely adopting the measure does not necessarily lead to beyond business as usual performance. Human factors and implementation variances are extremely common to the point where, as has been demonstrated for LEED buildings, a well-designed energy efficiency strategy is not assurance of improved performance. Indeed, many campuses may adopt certain measures (eg, behavioral change) but delivering on the potential these measures offer can vary considerably. Thus performance delivery is particularly important when energy efficiency measures, although each may be implemented independently, compound in terms of benefits as each new measure is adopted.
- For ACUPCC doctoral colleges analyzed, the average annual percent reduction in stationary combustion emissions, amongst those campuses qualifying under this module (ie, those with a net decrease in stationary combustion and total energy-based emissions), was just over five percent a year. Stakeholder feedback indicated that such a threshold for a methodology would be extremely hard for campuses to achieve. A typical response indicated that achieving any absolute reduction in stationary combustion emissions was far beyond their reach let alone a five percent average annual reduction. Since only 32 percent of doctoral colleges analyzed achieved a net decrease in both stationary combustion and total energy-based emissions, their average performance would position this five percent annual reduction level within the top 15 percent of these colleges– that is the 85th percentile of ACUPCC doctoral colleges (with at least two years data reported). Such an 85th percentile performance expectation from this population of campuses is more stringent than an 85th percentile of campuses nationally since this data set:
  - represents campuses which have voluntarily decided to pursue emission reductions as a goal; and
  - is further constrained to those with at least two years' data reported to ACUPCC.

  Stakeholder feedback indicated that using a comparable approach to establish, symmetrically, the additionality benchmarks for scope 2 electricity emissions was similarly reasonable, particularly when those benchmarks were also above the 80th/85th percentile levels.
- Furthermore, the level of the additionality benchmark has been set such that half of the campuses which achieve a net decrease in both stationary combustion and total energy-based emissions or achieve a net decrease in both scope 2 electricity and total energy-based emissions will not meet the additionality benchmark, PBS or PBE respectively. Thus the level of the additionality benchmark is set evenly across those campuses achieving absolute reductions in stationary combustion and/or scope 2 electricity emissions, while total energy-based emissions also decline. False positives and false negatives are minimized in this fashion. This additionality benchmark provides a preferable approach than adopting a fixed 85th percentile additionality benchmark which would not ensure that half the eligible campuses will, and half would not, meet the additionality benchmark. Thus, this benchmarking approach is grounded and fair. Furthermore, since the levels of the additionality performance benchmarks are around the 85th percentile performance level for the relevant Carnegie class, this demonstrates the reasonableness of the performance benchmarks compared to the UNFCCC 80th percentile parameters used to justify the

additionality benchmark. VCS requirements do not require the UNFCCC 80th percentile parameter to be followed and the UNFCCC is also considering ways to rely more intrinsically on the historical data to determine appropriate business as usual thresholds rather than relying upon a single percentile figure for all sectors and technologies.

- Thus setting the performance at the average annual percent reduction for ACUPCC campuses, which achieve a net decrease in stationary combustion emissions and/or scope 2 electricity emissions and in total energy-based emissions, is both conservative and well founded.

Based on an analysis of ACUPCC doctoral colleges' achievements, the potential carbon revenues for projects applying this module can be expected to make a meaningful contribution to campuses' ability to achieve this demanding performance level:

- On average, for example, assuming a $3 per square foot incremental capital investment (which is USGBC's estimate to upgrade buildings to be eligible for LEED certification based on its NIH study[23]), a 5 percent reduction in stationary combustion emissions for ACUPCC doctoral college projects, over a 10 year crediting period, would yield a 13 to 64 percent contribution to incremental capital at $5 to $25 per ton carbon revenues. Several factors could increase this further such as:
    - a higher-than-average reduction achievements each year; or
    - a baseline which had already been reducing prior to project submission.
- This salient financial contribution has been borne out in analysis of candidate pilot projects seeking certification under this module.

2) The design of the additionality performance benchmark metric is appropriate for the sector to which it applies and meets VCS requirements

- The rate of annual reductions in stationary combustion and/or scope 2 electricity emissions has been used as the performance benchmark metric to reflect current best practice, and capacity, within the college sector and to encourage campuses to adopt GHG monitoring approaches that support the best practices which non-profits (such as ACUPCC and STARS) encourage.
    - An annual percent reduction in the relevant scope of emissions very closely correlates to the improvement in emissions that projects would deliver over historical baseline. It is therefore, mathematically, more tightly correlated to the real reductions that projects deliver than an intensity style metric such GHG per square foot.
    - This metric reflects the fact that the college sector, and programs such as ACUPCC, wants to encourage campuses to track their actual GHG performance using exactly this kind of measure (namely, improvement over baseline performance). This approach is therefore consistent with and supportive of the metrics which college Presidents use to set overall GHG reductions goals against a specified baseline year.
    - It is consistent with the format against which leading campuses report their GHG emissions through third party GHG reporting programs which require periodic reporting of emissions data. For campuses which are just beginning to report GHG

[23] Reference for the USGBC NIH study

emissions, this metric also conforms to the metrics used in the ACUPCC/STARS leadership performance tracking system, a GHG reporting systems adopted by non-profits recognizing and tracking leadership across campus GHG performance. This metric therefore supports capacity development in the college sectors towards beyond business as usual leadership.

- The definition of this additionality performance metric is also consistent with VCS requirements as provided by the following:
  - o The metric conforms to the requirements for a performance metrics as outlined in the IPMVP (eg, energy per residential building) which VM0018 endorses as an acceptable source for defining performance metrics for EE projects and their methodologies.
  - o The performance metric is consistent with the VM0008 precedent which also uses an energy percent improvement average over baseline as the performance metric and is based on their stakeholder feedback. This module's stakeholder feedback also endorsed the average percent improvement as appropriate, consistent with best practice in the college domain, and well suited to the data sources from which the additionality benchmarks were developed.
  - o Alternative metrics, such as stationary combustion emissions per square foot, were evaluated during the process of building this module and found to be less reliable.

Performance Benchmark Analysis

The distributions by Carnegie class for stationary combustion emissions and for scope 2 electricity emissions based annual average GHG reduction rates are found in this Appendix. The average annual reduction rates for campuses achieving absolute reductions are reported as the qualifying performance metrics by Carnegie class in Section 7.

<u>Emission Reduction Distributions</u>

The annual percent reduction in stationary combustion emissions and annual percent reduction in scope 2 electricity emissions achieved by each college which achieves a net decrease in total energy-based emissions were compared to determine the average annual percent reduction in stationary combustion and/or scope 2 electricity emissions and the respective 80th and 85th percentile of performance for each Carnegie class. [24] The average annual percent reduction in stationary combustion emissions and/or scope 2 electricity emissions was found to be conservative for each Carnegie class because it established a level for the additionality benchmark that was more stringent that the 80th percentile and typically more consistent with the 85th percentile achievements. Therefore, fewer campuses with above average reductions in stationary combustion or scope 2 electricity emissions would meet the level of the additionality benchmark under this module than if the level of the additionality benchmark would have been set at the UNFCCC 80th percentile level. Furthermore, using the sector averages by Carnegie class

[24] For calculation of average annual percent reduction in stationary combustion emissions and average annual percent reduction in scope 2 electricity emissions and the corresponding 80th and 85th percentile performance levels, outliers were removed if the annual percent reduction exceeded 20 percent because no campus has achieved carbon neutrality within 5 years (without external offset credit purchases). Such data points are therefore excluded from the performance benchmark analyses.

more accurately reflects the actual beyond business as usual performance achievements than any selection of an 80th or 85th percentile figure. Furthermore, there are no false positives or negatives that result from the selection of a particular percentile point on the performance curve. Rather, among what is already an extremely elite population of campuses that achieve absolute reductions in stationary combustion and scope 2 electricity emissions, there will not, for example, be a campus that achieved a better than average reduction performance rate (eg, 6 percent baccalaureate – average the stationary combustion emissions 5.88 percent PBSc threshold) but which nonetheless was not deemed additional as the result of the choice of an 85th percentile performance level (which would be 6.18 percent for baccalaureates).

Comparisons between the average annual percent reduction in stationary combustion and/or scope 2 electricity emissions achieved by campuses and the respective 80th and 85th percentile performance levels for campuses achieving reductions in total energy-based GHG emissions in the relevant Carnegie class are specified in Table 5 and 6 below.

Table 5: Annual percent reduction in stationary combustion emission reductions for campuses achieving net reductions in total energy-based GHG emissions

Carnegie Class	Average for campuses achieving a reduction in stationary combustion emissions	80th percentile	85th percentile
Doctoral	5.68%	3.27%	5.58%
Masters	6.05%	2.80%	4.44%
Baccalaureate	5.88%	5.10%	6.18%
Associate	7.66%	0.0%	4.34%
Special	4.69%	3.87%	5.4%

Table 6: Annual percent reduction in scope 2 electricity emission reductions for campuses achieving net reductions in total energy-based GHG emissions

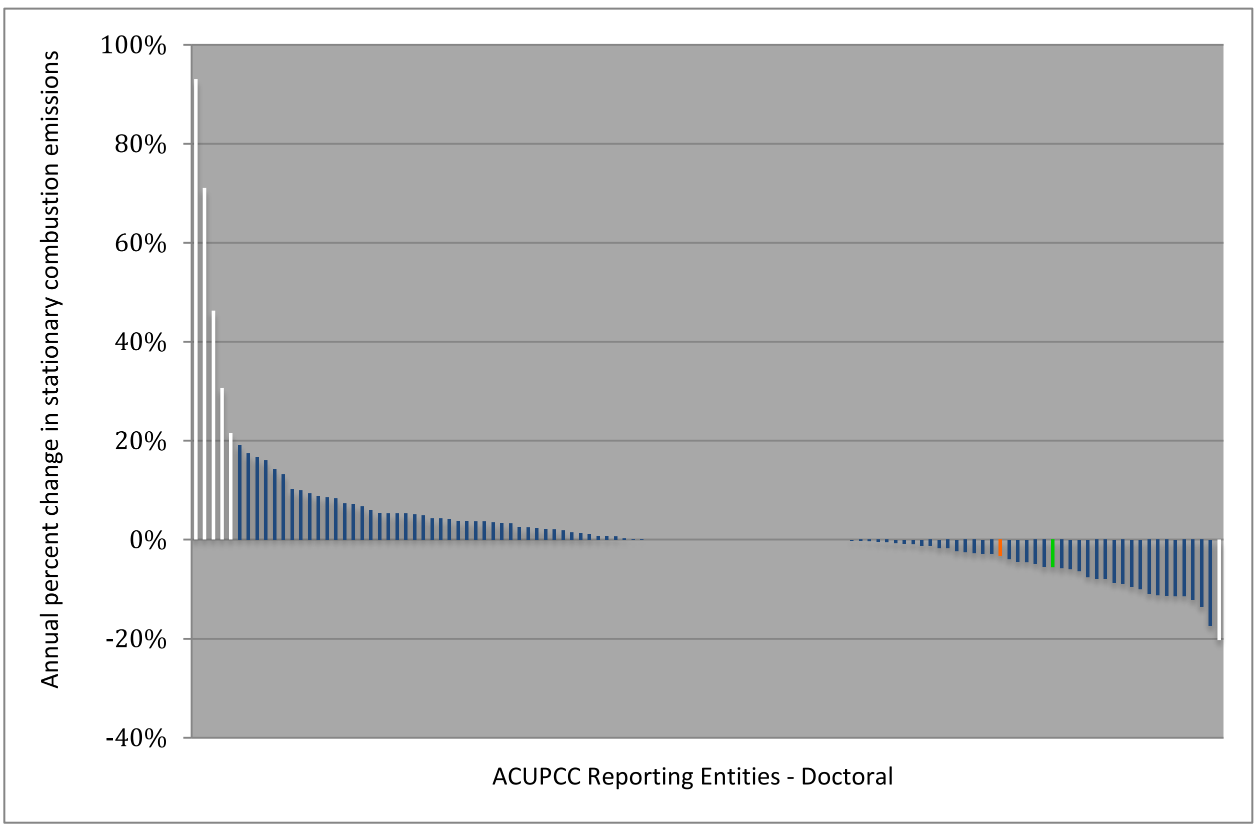
Carnegie Class	Average for campuses achieving a reduction in scope 2 electricity emissions	80th percentile	85th percentile
Doctoral	6.85%	6.36%	8.35%
Masters	6.78%	1.90%	4.81%
Baccalaureate	6.60%	6.05%	6.70%
Associate	6.74%	0.31%	2.31%
Special	3.98%	2.29%	2.29%

<u>Stationary Combustion Emissions Performance Curves</u>:

The following figures, segmented by Carnegie class, present the annual percent change in stationary combustion emissions for each ACUPCC college. These figures also highlight the average annual percent reduction in stationary combustion emissions achieved by colleges also achieving a net decrease in total energy-based emissions, the annual percent change for the 80th percentile of performance and the annual percent change for the 85th percentile of performance.

Performance Curves Color Key	
Average annual percent reduction in stationary combustion emissions	
Annual percent reduction for the 80th percentile of performance	
Annual percent reduction for the 85th percentile of performance	
Campuses reporting	
Outliers	

Figure 1: Annual percent change in stationary combustion emissions from reporting Doctoral colleges



For Doctoral colleges, the average annual percent reduction in stationary combustion emissions falls on the same entry as the 85th percentile, both are denoted by the green entry.

Figure 2: Annual percent change in stationary combustion emissions from reporting Masters colleges

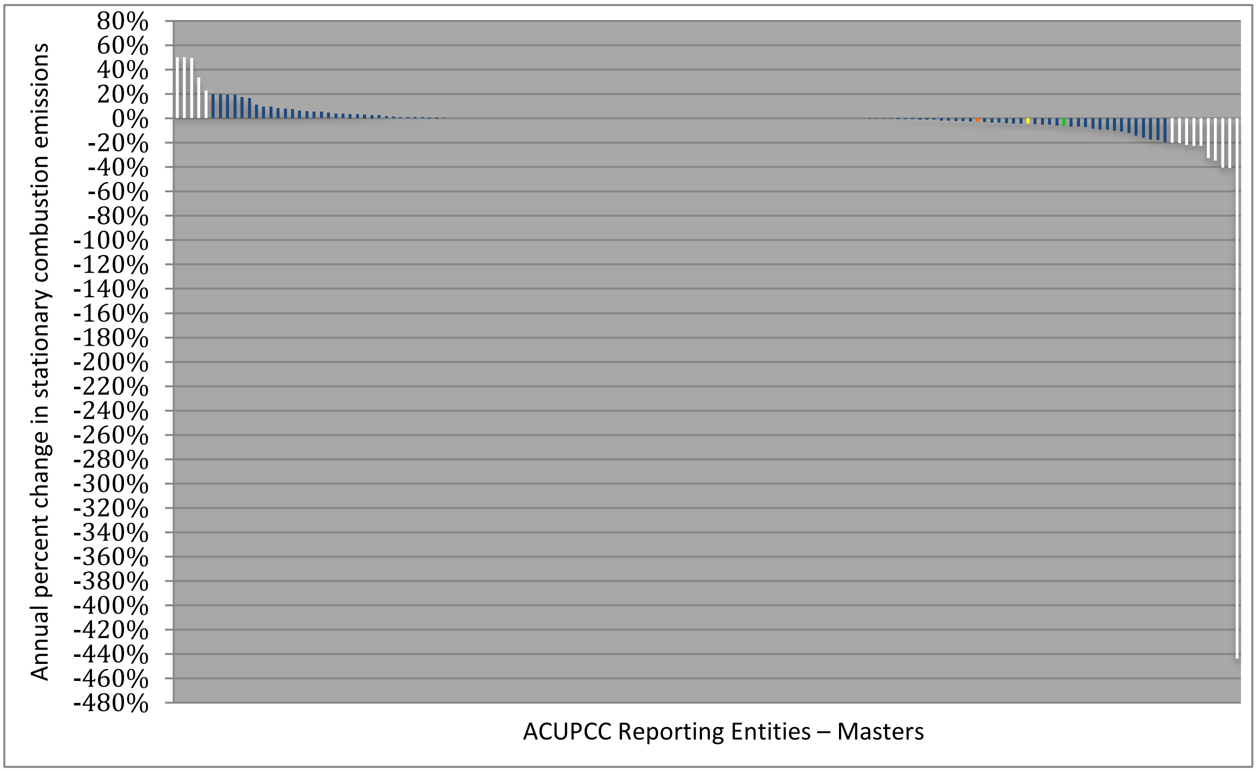


Figure 3: Annual percent change in stationary combustion emissions from reporting Baccalaureate colleges

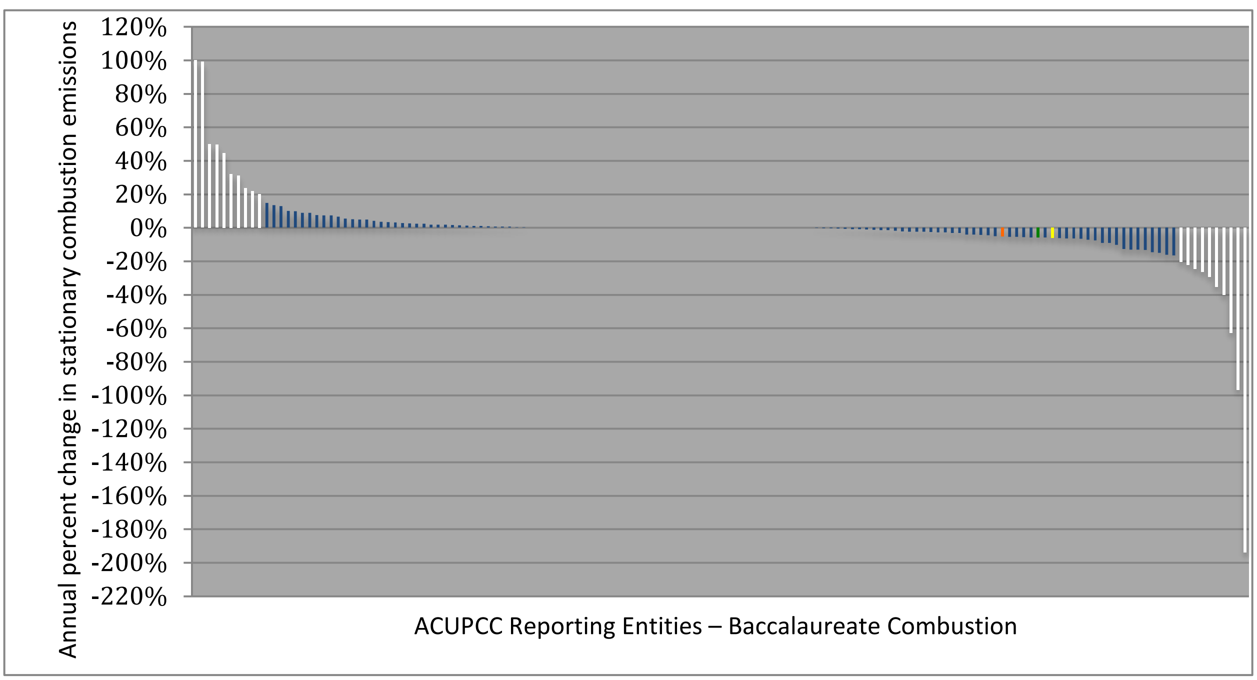
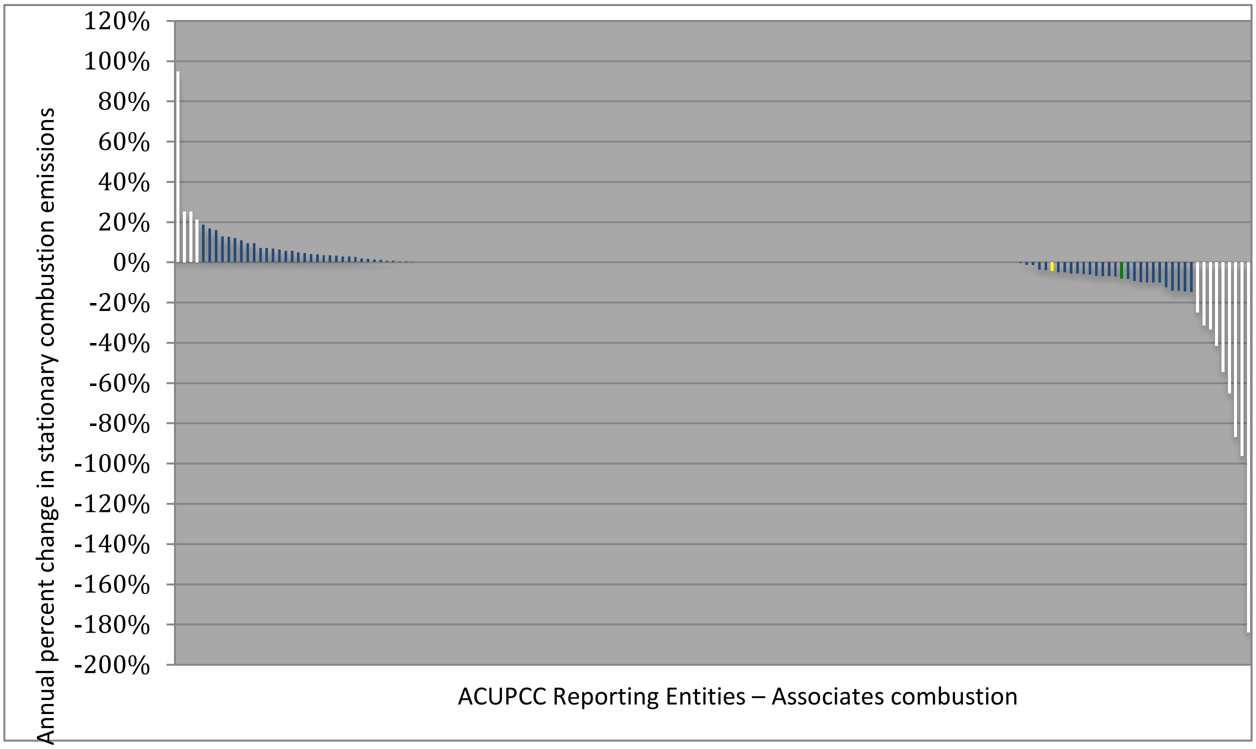
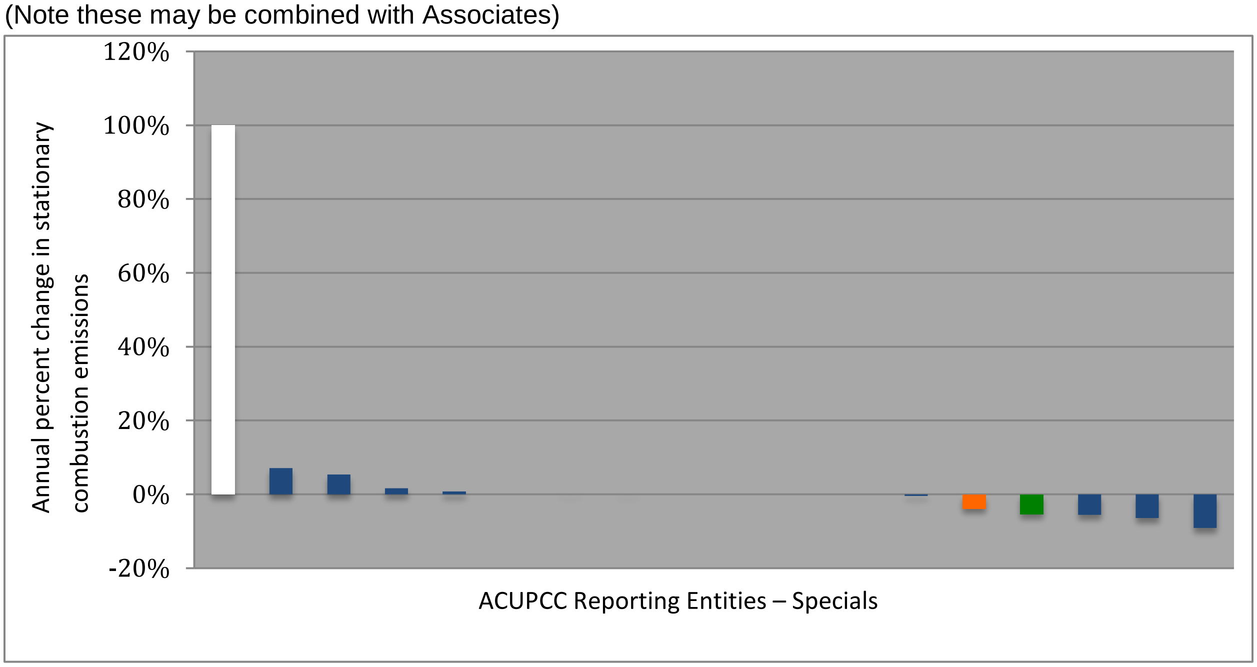


Figure 4: Annual percent change in stationary combustion emissions from reporting Associates colleges



For Associate colleges, the 80th percentile of annual percent change in stationary combustion emissions is positive and thus the annual percent reduction in station combustion is 0 percent.

Figure 5: Annual percent change in stationary combustion emissions from reporting Specials colleges (Note these may be combined with Associates)



For Special colleges, the average annual percent reduction in stationary combustion emission falls on the same entry as the 85th percentile, both are denoted by the green entry.

Scope 2 Electricity Emissions Performance Curves:

The following performance curves, by Carnegie class, present the annual percent change in scope 2 electricity emissions for each ACUPCC college. These charts also highlight the average annual percent reduction in scope 2 electricity emissions achieved by colleges that also achieve a net decrease in total energy-based emissions, the annual percent change for the 80th percentile of performance and the annual percent change for the 85th percentile of performance.

Performance Curves Color Key	
Average annual percent reduction in scope 2 electricity emissions	
Annual percent reduction for the 80th percentile of performance	
Annual percent reduction for the 85th percentile of performance	
Campuses reporting	
Outliers	

Figure 6: Annual percent change in scope 2 electricity emissions from reporting Doctoral colleges

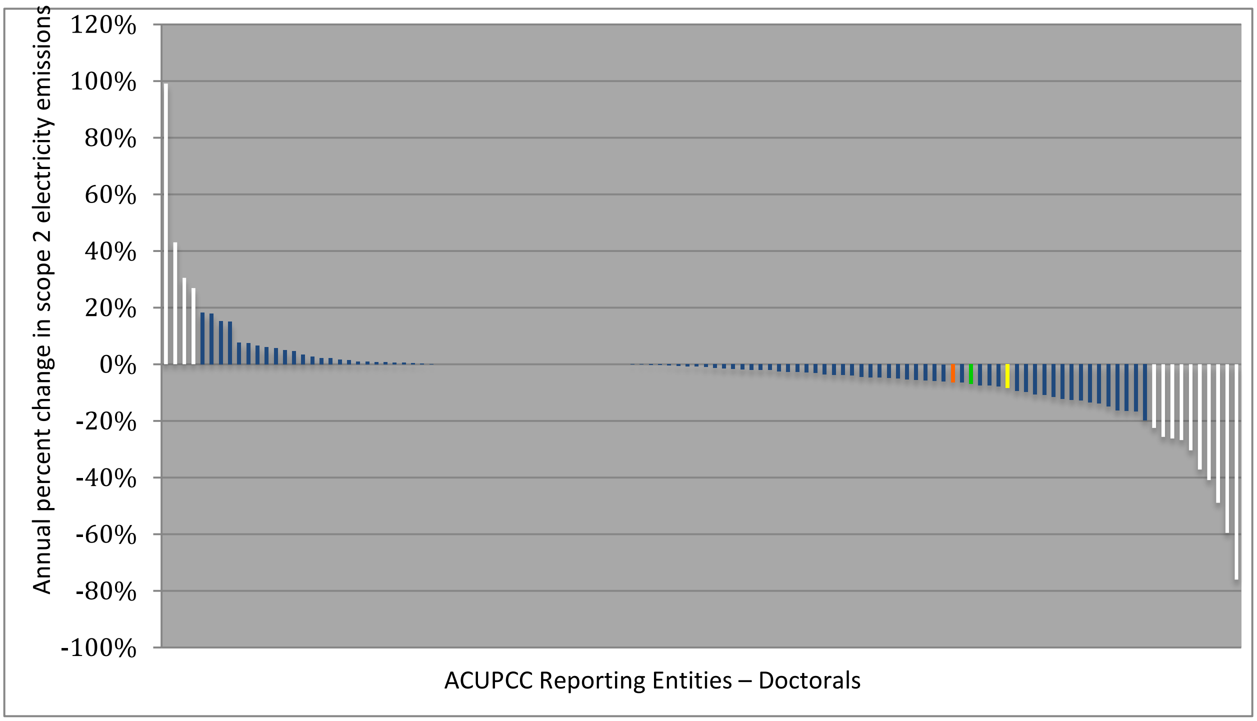


Figure 7: Annual percent change in scope 2 electricity emissions from reporting Masters colleges

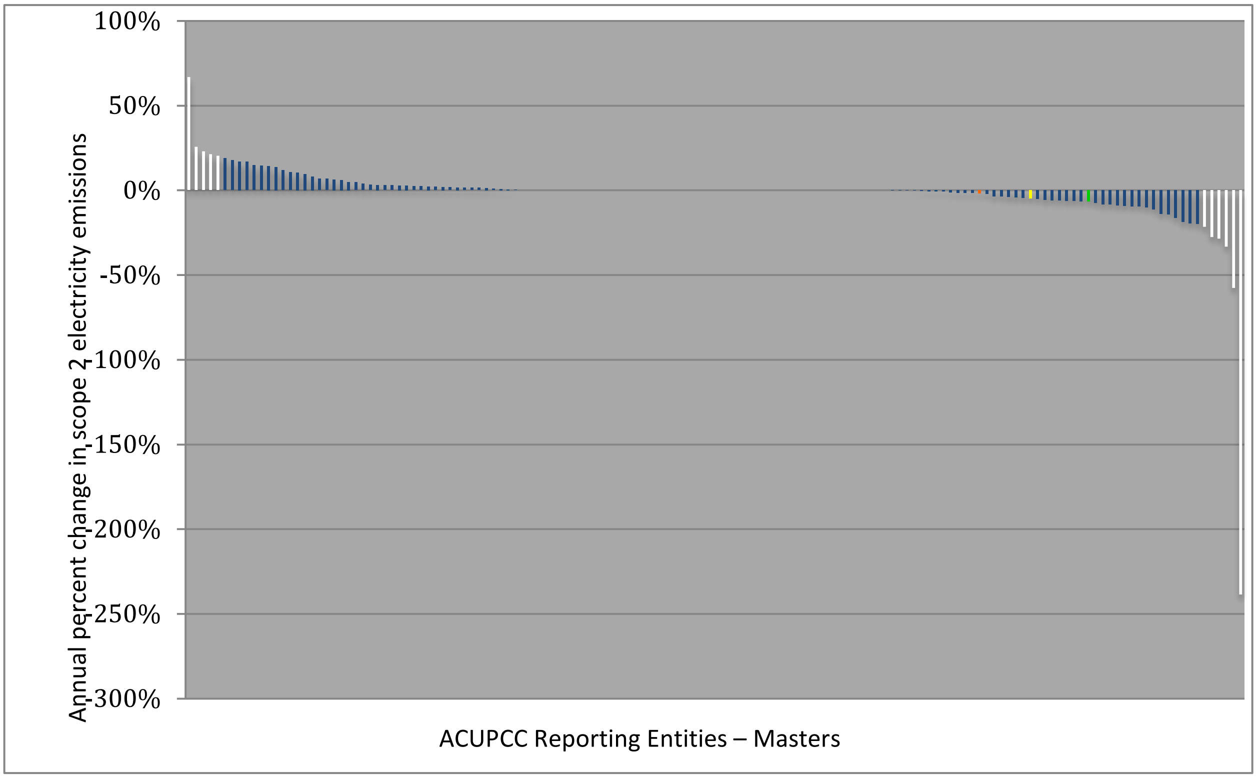


Figure 8: Annual percent change in scope 2 electricity emissions from reporting Baccalaureate colleges

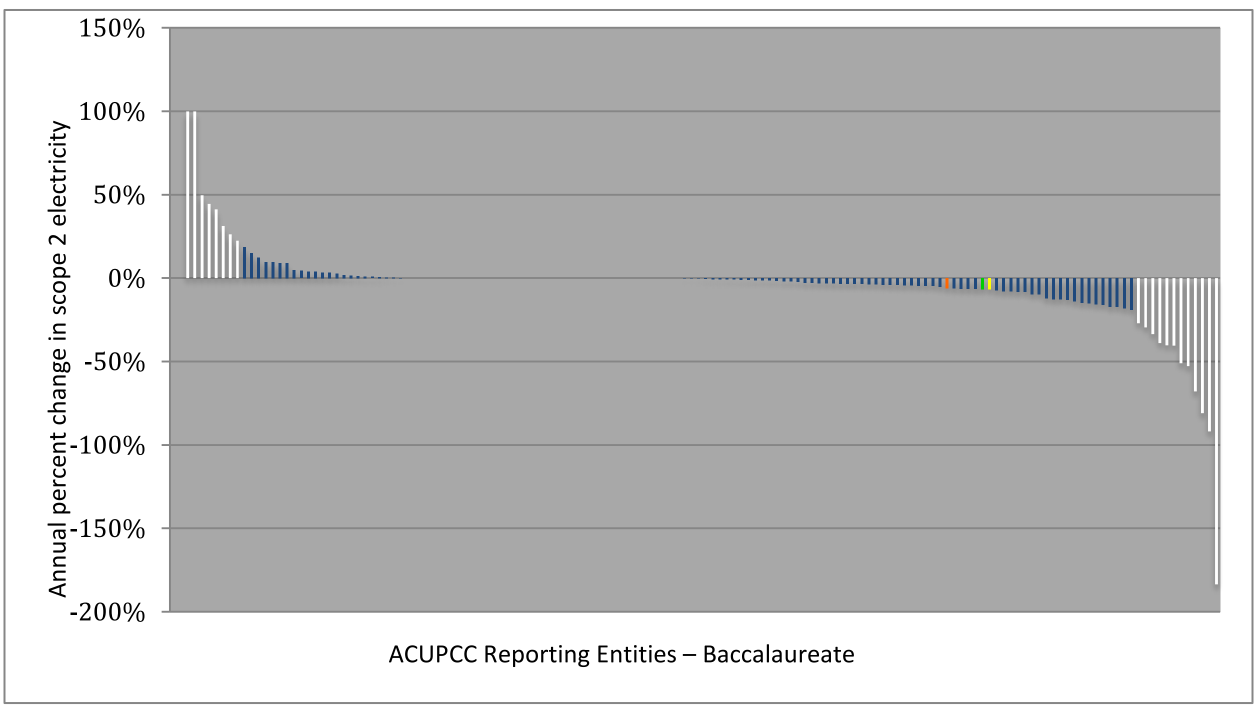


Figure 9: Annual percent change in scope 2 electricity emissions from reporting Associates colleges

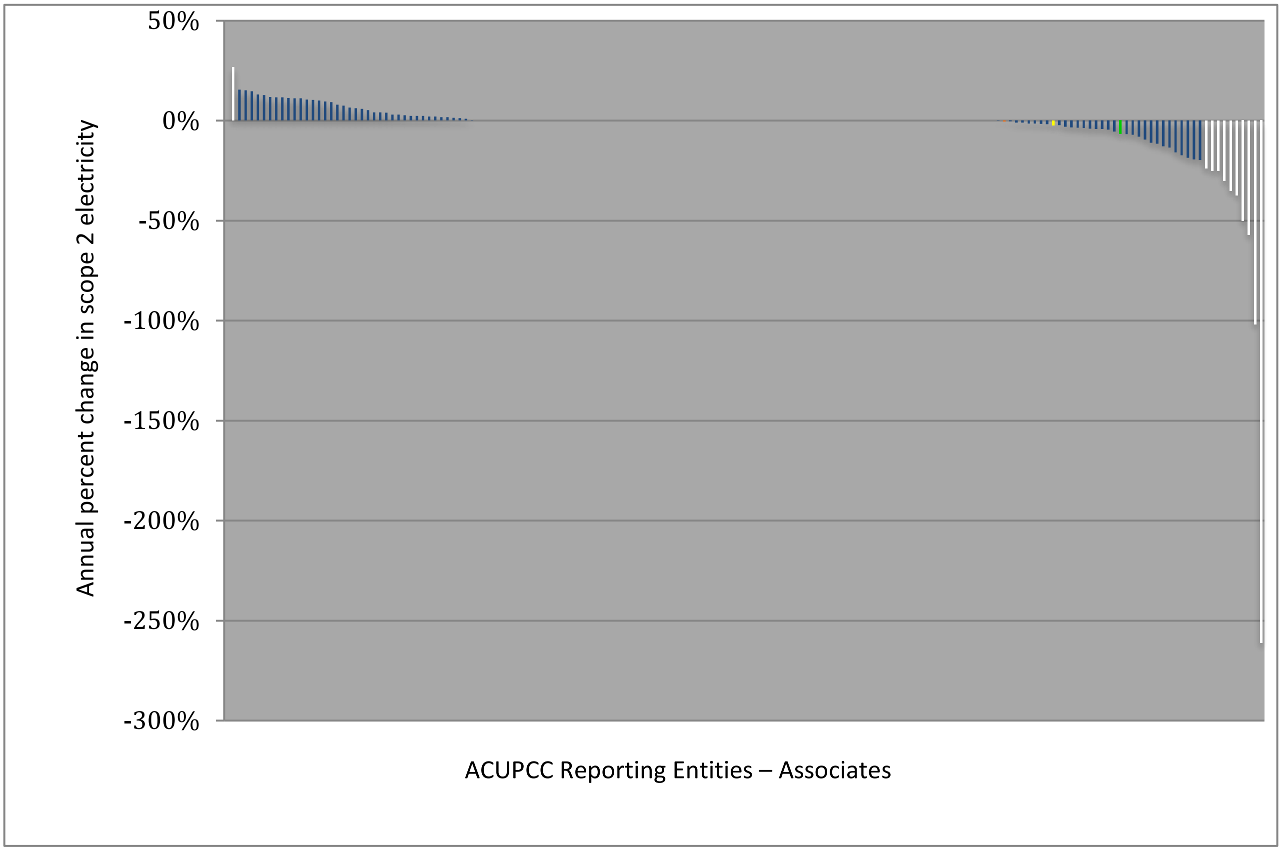
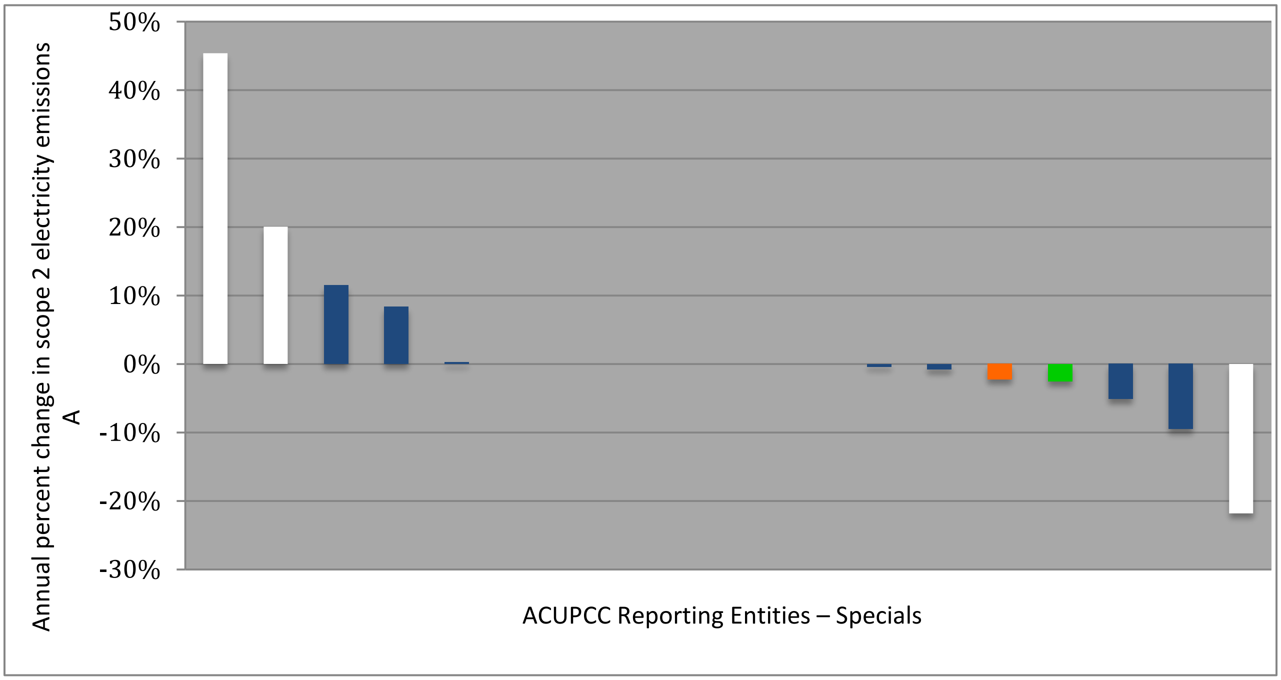


Figure 10: Annual percent change in scope 2 electricity emissions from reporting Specials colleges (Note



For Special colleges, the 80th and 85th percentile fall on the same entry, both are denoted by the orange entry.

Beyond Business as Usual (BAU) Considerations

<u>Additionality Performance Benchmarks</u>

The additionality benchmarks have been developed to ensure environmental integrity of the module to avoid undue or unfair crediting of projects relative to their eligibility.

The development of the additionality benchmark was founded upon the following:

- The parameters set by the UNFCCC (relative to the 80th percentile considerations).
- Analysis to determine how the levels of the additionality benchmarks compare to the 80th and 85th performance percentiles to ensure the module is conservative.
- Financial analyses to confirm that financial incentives from carbon revenues, should they become available, would make a meaningful contribution to the incremental capital required to deliver the superior performance that the module requires.
- Careful stratification of the data sets and applicable categories for the performance benchmarks. Without careful stratification, variances are introduced into the module as a result of unduly coarse segmentation when stratifying data sets and applicable categories. As a result, several parameters that could in principle introduce undue variances (which VCS specifies modules should review) are adequately addressed, including such factors as:
    - o Socio-economic conditions.

  - Electricity grid emission factor.
  - Plant age, access to raw materials, and raw material/energy pricing.
  - Geography, location considerations – including data applicability to said regions.
  - Greenfield versus brownfield sites.
  - Larger and smaller scale projects.
  - Climatic conditions.
- Applicability conditions to further constrain and refine the additionality benchmarks.
- Sensible design of performance benchmark metrics to avoid other undue variances within the calculations.
- Stakeholder discussions examining the approaches considered in order to reach a consensus regarding the performance levels selected.
- Pressure testing for the proposed methodology against pilot candidate projects.

<u>Stratification</u>:

Stratification for Campus-wide is achieved by segmenting colleges by Carnegie class, according to the classifications which ACUPCC has developed for reporting purposes. These include:

- Doctoral colleges.
- Baccalaureate colleges.
- Masters colleges.
- Associate (2 year) colleges.
- Specialist colleges.

Sensible stratification is an essential foundation to help preclude false positives and negatives which can arise from overly-generalized application of additionality benchmarks.

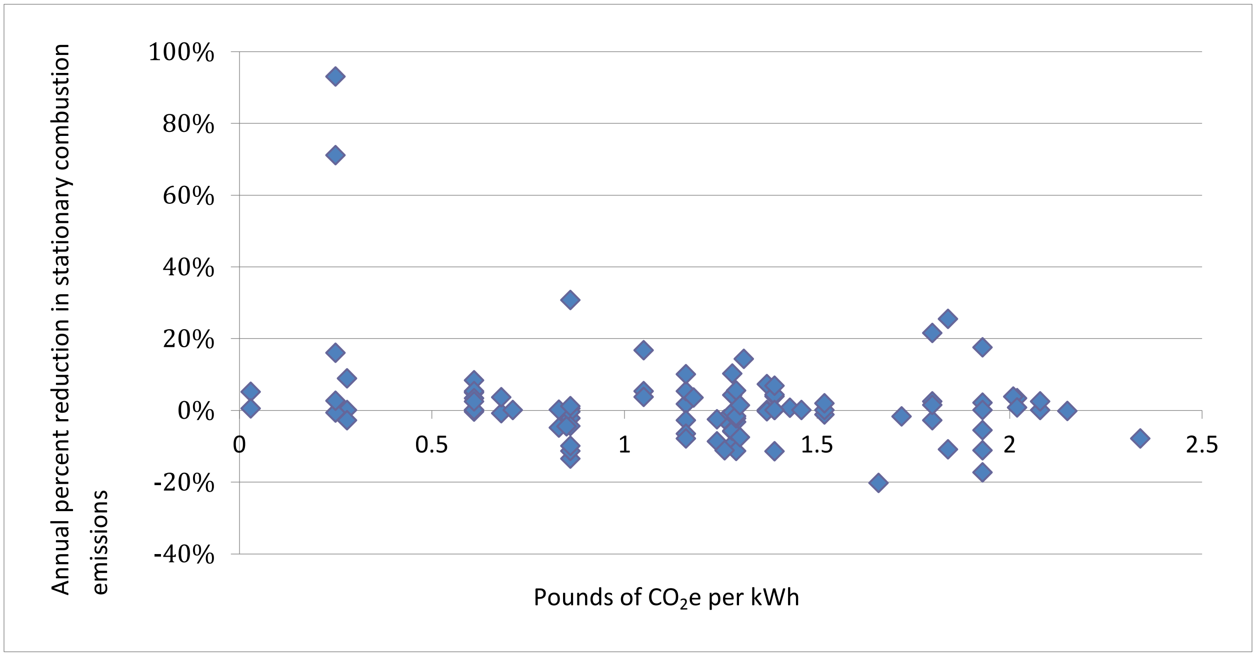
It should be noted that the module follows ACUPCC's segmentations since ACUPCC has not adopted performance/certification parameters with any other further or significant sub-segmentations.

The ACUPCC stratification already takes into account, to the extent that universities serve populations where this varies, the socioeconomic status of its clients/alumni, which, as a group nationwide, have been demonstrated to be relatively advantaged (eg, in terms of final income levels). For example, Doctoral colleges are found in one Carnegie class while 2 year Associate colleges (community colleges) are segmented into a different Carnegie class. Using ACUPCC's Carnegie class stratification represents the best stakeholder-endorsed approach in this regard.

Other potential performance drivers were also screened in depth against the complete ACUPCC Doctoral college data set (since these campuses comprise the largest portion of total ACUPCC GHG emissions (46 percent)) to assess their influence on reduction in stationary combustion emissions, including:

- GHG/kWh which was not indicative of superior performance in terms of reduction stationary combustion emissions (see Figure 11).
- Geographic location (as defined by eGRID region) which was not correlated (see Table 7).

Figure 11: CO_2e per kWh versus annual percent reduction in stationary combustion emissions



No visible correlation between geographic region (for which GHG per kWh for the relevant state is a proxy) and the annual percent reduction in stationary combustion emissions was found.

Table 5: Geographic Trends

<table>
<tr><th>EGRID Region</th><th># in sample</th><th># qualified</th><th colspan="2">Qualified as % total:</th><th>Region: South/North (S, N)</th><th></th></tr>
<tr><td>WECC</td><td>35</td><td>6</td><td colspan="2">17%</td><td>S/N</td><td></td></tr>
<tr><td>MRO</td><td>4</td><td>2</td><td colspan="2">50%</td><td>N</td><td>sample small</td></tr>
<tr><td>SPP</td><td>1</td><td>1</td><td colspan="2">100%</td><td>S</td><td>sample small</td></tr>
<tr><td>TRE</td><td>3</td><td>1</td><td colspan="2">33%</td><td>S</td><td>sample small</td></tr>
<tr><td>SERC</td><td>30</td><td>9</td><td colspan="2">30%</td><td>S</td><td></td></tr>
<tr><td>FRCC</td><td>6</td><td>1</td><td colspan="2">17%</td><td>S</td><td>sample small</td></tr>
<tr><td>RFC</td><td>13</td><td>3</td><td colspan="2">23%</td><td>N</td><td>sample small</td></tr>
<tr><td>NPCC</td><td>22</td><td>13</td><td colspan="2">59%</td><td>N</td><td></td></tr>
<tr><td colspan="5"></td><td>S</td><td>N</td></tr>
<tr><td>Subtotals</td><td>114</td><td>36</td><td>Averages:</td><td>32%</td><td>26%</td><td>37%</td></tr>
</table>

Since GHG/kWh was not a performance driver, access to fuels (particularly those with low carbon/lower costs) would not be expected to be a driver either. Low GHG/kWh eGRID factors for utilities are widely understood to have been driven by accessibility within a region of such lower cost low carbon fuels for the electricity-generating companies. However, the lack of correlation between campuses' reductions in stationary combustion emissions and GHG/kWh reinforces the module's stratification relative to geography, fuels access and GHG grid emission factors.

The ACUPCC data set, which is national in scope, is also well-aligned to the US scope of the module. ACUPCC's data includes all US reporting campuses in its analysis. No extension of the additionality benchmarks from US campuses to other non-US regions is considered within this module, and application of this module outside the US is precluded under applicability conditions. ACUPCC, through its extensive stakeholder process, has not set different criteria by US sub-region, confirming that a US-wide geographic basis is appropriate.

Relative to greenfield/brownfield and project size criteria, the module applies to existing US campuses only. Separate procedures apply (for additionality and quantification of emission reduction) for campuses which grow at more than five percent per year: these adjustments will reflect updated CO_2e per square foot averages for the more newly constructed areas of campus if their square foot growth rates exceed five percent annually, the WRI default threshold for acceptable variance factors.[25] For campuses whose square footage declines during the project period, their emission reductions are also adjusted proportionally for that year, and subsequent years, until the campus square footage returns to exceed its previously highest level. For campuses whose growth exceeds five percent annually during the project period, to not make adjustments to the emission reductions is conservative. These adjustments ensure that the baseline scenario is credibly developed for all campuses. All projects are also expected to be small. For example, while some variation in the size of campuses' stationary combustion emissions could be expected, analysis of two segments of colleges (Doctoral colleges in high GHG/kWh regions and low GHG/kWh regions) indicates that the average stationary combustion emissions for each group only ranges from 33,000 to 84,000 tonnes a year. With the levels of the additionality performance benchmarks set at roughly five percent annually, emission reductions from project would range from 1,600 -4,000 tonnes/year, (if thresholds were met at a minimum).

Consistent with WRI's GHG Protocol, the square foot variance adjustments also incorporate occupancy changes in the situation where GHG reductions have been achieved through more efficient delivery of services per student through reduced footprint. Leading campuses are now striving to reduce GHG's using this approach.

Applicability Conditions:

Applicability conditions then further constrain and refine both eligibility and crediting parameters to address other potential variances. The module sets extensive applicability conditions (see Section 4) including that the campus must be located in the US and must publically report emissions to ACUPCC, STARS or other third party GHG reporting programs.

[25] WRI GHG Protocol

Performance Benchmark Metric:

Sensible design of the eligibility metric helps constrain other variances that could be intrinsic to the module's algorithms. This module's performance benchmark metric (annual percent improvement in stationary combustion and/or scope 2 electricity emissions) aligns closely to the improvement in GHG over respective baselines which minimizes possible false positive or false negatives. The variability that arises with an intensity-style metric (eg, GHG/sq ft) has been avoided. (see above).[26] By selecting the average annual percent reduction as the performance benchmark metric a careful balancing between campuses that are eligible and those not eligible for crediting is also achieved.

Expert Consultation:

Expert consultation (see report in *VM0025 Campus Clean Energy and Energy Efficiency*) was conducted to establish the performance benchmarks across a diverse, representative groups of experts including: AASHE, independent environmental experts, college-focused NGO's, college sustainability officers, college business officers, carbon experts, EE experts etc. Experts confirmed this module's approach and performance metrics. Experts were asked open-ended questions regarding what kinds of project activites would be most impactful on college campuses if stronger energy efficiency and clean energy systems were to be encouraged. As the stakeholder consensus converged towards approaches that were not technology-specific but could be applied campus-wide or building-wide, the module sought out the most comprehensive and credible (third party reported) sources of historical data through which to analyze campuses' GHG performance. Stakeholder dialogue called for the module to focus on stationary combustion emission reductions, since they represent one of the largest segments of campuses' emissions (29 percent per ACUPCC), yet have been historically resistant to transformative change, since on-site energy production systems are so capital intensive and thus challenging to address. Given the integrative nature of EE savings, stakeholders then supported the symmetric expansion of the module to include reductions in scope 2 electricity emissions, assuming a comparable approach was followed based on ACUPCC performance curves.

Pilot Project Design/Discussion:

Discussions with pilot projects further confirmed and refined the validity of the approach. It was found that eligible projects were hard to find, even those which initially were deemed intriguing by leading expert non-profits seeking to promote clean energy innovation in the college sector. Furthermore, when several particularly aggressive programs, which reduced both stationary and scope 2 electricity emissions, were repeatedly discovered, the module was extended to allow for quantification of scope 2 electricity emissions based upon the methodology for developing the additionality performance benchmark for stationary combustion emissions. Thus, eligible projects, when identified, were soundly based. They exceeded additioanlity benchmarks and reflected major upgrades in on-campus energy combustion and

[26] Consideration was given to using a CO_2e/ft^2 metric for performance additionality testing purposes: an analysis of false positives/negatives was undertaken relative to the qualifying campuses included in the percent CO_2e improvement over baseline analysis and percent annual improvement analysis. Although a potential approach, we do not advocate using this CO_2e/ft^2 metric as the meth's qualification performance metric: it is not as consistent with the ACUPCC/STARS reporting structure which ideally projects would encourage campuses to adopt more widely; it therefore also reflects the expertise/capacity which the college sector is already growing for carbon management (so the complexity hurdles are lower for project development – a core purpose to a perf methodology). It is also not fully correlated to the percent improvement over baseline metric, which most closely parallels project-based additionality reviews.

energy demand systems that were being applied campus-wide. Return on incremental capital contributions from the carbon funding were understood to be ‘drivable’ by the systematic evaluation of market value of carbon reduction for capital intensive initiatives, contributing 5-20 percent based upon pilot project analyses at $5-10/ton carbon pricing ranges.

Data Selection, Use and Maintenance

The datasets for this module meet all the criteria set out by VCS Guidance documents. The module expressly set out to identify historical datasets for campuses’ GHG performance that would bear serious scrutiny, seeking out those which were either already subject to third party certification (LEED buildings) or were third party, publicly, transparently reported and peer reviewed (ACUPCC).

The evaluation of a project’s additionality and performance is anchored on the third-party-reported data to ACUPCC, STARS or other third party GHG reporting programs. Such programs, given their public transparency and peer-based review processes, can be expected to have more integrity than most self-audited reports. Some campuses report this data to ACUPCC and STARS on a third-party-audited basis. This provides credible secondary data for the analysis and stakeholder consultation.

The ACUPCC data set has not been selectively sampled (all entries have been included in the analysis to establish performance benchmarks) and the data are publicly available through the colleges’ annual ACUPCC reports. In the calculation of average annual percent reductions for both stationary combustion and scope 2 electricity emissions statistical outliers were removed to avoid distortions. Outliers were removed based on the assumption that any annual percent reduction which exceeded 20 percent a year merited further scrutiny. This is because, absent offset purchases, no campus has set and achieved a carbon neutral goal within five years (what a 20 percent improvement rate in reductions in stationary combustion emissions would imply).

Given the ACUPCC college President’s GHG commitments, the choice of ACUPCC data for establishing the performance metrics also reflects some of the most established and progressive application of available technologies and/or current practices, and trends, within the sector. The strategies and tactics that can deliver such superior performance are also transparent through the colleges’ reported Climate Action Plans. The technologies and measures in these Climate Action Plans in turn have provided the basis for the applicability criteria in Section 4.

The ACUPCC data can be used to update the performance benchmarks every 5 years. The ACUPCC data set was selected to support this campus-wide module because it already has a five-year span of historical data, consistent with UNFCCC parameters.

DOCUMENT HISTORY

Version	Date	Comment
v1.0	12 Feb 2014	Initial version released