PEER

STAKEHOLDER FEEDBACK REPORT

DECEMBER 2020

ACKNOWLEDGEMENTS

This report has been made possible only through the efforts of many staff members, dedicated volunteers, and leaders in the energy and power sector from around the world. We extend our deepest gratitude to all who participated in the development of this report, for their tireless volunteer efforts and constant support.

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HOW TO USE THIS REPORT

This PEER Stakeholder Feedback Report contains Clarifications, Corrections, and Innovation credits (Exemplary Performance) that are recommended by the Advisory Committee, in addition to the PEER Safety First Pilot Credits. In alignment with the PEER v2 rating system and PEER v2 Reference Guide, this report will help project teams further their understanding and application of the PEER system in pursuit of certification.

PEER Clarifications are intended to provide more context for a prerequisite or credit through language changes and explanations.

Corrections are permanent changes and improvements to the PEER v2 rating system and Reference Guide.

Innovation (Exemplary Performance) credits are innovative strategies not currently addressed by the PEER program, achieving double the credit requirements or the next incremental percentage threshold as stated in the relevant credit requirements.

Pilot credits are a group of credits designed to test new, innovative strategies that further sustainable power system design and/or facilitate the introduction of new credits to the PEER v2 rating system. These credits are not part of the current version of the rating system and can be used in the PEER Innovation credit category.

This report includes:

- Select project characteristics that have been determined to be precedent-setting by GBCI,
- Corrections to PEER v2 rating system, reference guide and forms,
- Advisory Committee recommendations for Clarifications, Corrections, Innovation credits (Exemplary Performance), and
- PEER Safety First Pilot Credits (under Innovation credits) launched by GBCI.

All project teams are required to adhere to all Addenda posted before their registration date. Adherence to Addenda posted after a project registers is optional but is strongly encouraged. Within this report, you will find the following PEER v2 credit changes:

Clarifications	Corrections	Innovations (Exemplary Performance)	Pilot Credits
11	17	4	3

INTRODUCTION

Over the last few years, GBCI has been working to drive environmental, economic and social transformation in sectors of the built environment beyond buildings. GBCI envisions that the next generation of green building will implement and operate a wide range of distributed energy resources that will make these buildings more valuable resources to the power grids to which they are connected. PEER, or Performance Excellence in Electricity Renewal, is a comprehensive, consumer-centric, data-driven system for evaluating power system performance that, in conjunction with other programs in the USGBC/GBCI ecosystem, improves overall system resilience, reliability and environmental performance.

PEER was the result of a collaborative effort between USGBC, GBCI and the Perfect Power Institute (part of the Galvin Electricity Initiative founded by former Motorola CEO, Bob Galvin) to catalyze urgently needed power industry transformation. Most recently, the increasing number of wildfires in California and the Western United States. have highlighted how microgrids, especially those in municipal and rural county critical facilities (such as fire stations and water districts) can be an important first step in preparing for heightened natural threats. Fortunately, a growing number of companies, particularly in California, are installing microgrids to respond to the threats of climate change and extreme weather. The power industry remains in need of major transformation that policy changes alone have yet addressed.

PEER was launched in 2013. Because of the highly collaborative nature of its development, PEER fit perfectly into the global structure of GBCI, which has administered and developed the PEER rating system since 2014. PEER is a road map for power generation that is much more environmentally sensitive, profitable and resilient — fulfilling its intended purpose to do for the energy market what LEED does for buildings. Since that time, rapid improvements in energy storage, electronics, communications and microgrids have been complemented by decreasing costs of energy storage and renewables. At the same time, natural disasters and climate change have highlighted the need for more resilience and reliability in the power grid.

We are dedicated to envisioning and growing smarter cities, and our efforts have taught us that in order to scale smart cities globally, we need to encourage all projects to measure and improve the performance of their energy supply, power grids and operations. Increasing transparency around power system performance tends to also increase focus on the outcomes generated from sustainability, resilience and reliability efforts. This increased focus on outcomes creates ideal conditions for continuous monitoring and improvement. System operators implement new technologies and practices to make improvements that address the water, energy, waste management and controls issues they are facing. They realize new ways to engage more of their businesses, residents and community members around the tangible benefits of these improvements.

Customers and system operators working in coordination create more opportunities, support improved citizen health and wellness, and provide economic growth, without compromising the environment or our resources. By focusing on integrated power systems and microgrids, cities, utilities, campuses and transit systems can revolutionize the way their electricity system is planned, developed and operated. This focus can improve the quality of life of their citizens, open the door for new businesses and new residents, and stimulate a robust, green economy. In sum, these efforts deliver continuous progress toward developing better places to live, work and play.

Thanks to a dedicated group of stakeholders, PEER has had a complete review to clarify and update each credit and prerequisite. We are excited to share the summary of our stakeholder comments in this feedback report and to highlight that many of the comments have already been incorporated in the PEER v2 rating system.

FRAMEWORK OF CATEGORIES

This report is organized by the rating system's 6 credit categories:

Reliability and Resiliency
This category addresses both energy system reliability and resilience. Reliability is measured by the power being there when you need it. Resilience measures the ability of the grid to withstand and recover from acute shocks and extreme weather events.

Energy Efficiency and Environment
This category addresses the environmental impact of electricity generation, transmission and distribution. This category encourages the adoption of clean and efficient energy by assessing air and water emissions, utilization of resources and energy efficiency of power generation and delivery. PEER's emphasis is on local sources of energy, renewable procurement, energy storage, district energy and power delivery impacts on the environment.

Operations, Management and Safety
This credit category encourages projects to leverage triple-bottom-line analysis, eliminate financial waste, improve safety and operations, mitigate risks, and improve maintenance and utilization of assets and technology investments.

Grid Services
This category recognizes that as automation, intelligent control and distributed resources are more readily available, customers become an increasingly valuable resource to grid operators. Grid Services highlights the need to assess customer contribution to grid service, demand response, load profiling, load shaping, meter data access, analysis tools, choice, incentives, net-metering and many other opportunities.

Regional Priority
This credit category incentivizes the achievements made by the projects that address geographically specific priorities. (there are no revisions to this credit category, so it is not added in this document.)

Innovation
The innovation credit category encourages projects to achieve exceptional or innovative performance. Sustainable power system design comes from innovative strategies and thinking. Innovations include any process, capability, or performance that produces improved customer participation that can be demonstrated and provide for verification.

Content highlighted in red shall be appended/added to the existing content or credit requirements in the PEER v2 Rating System and PEER v2 Reference Guide.

RELIABILITY AND RESILIENCY

Prerequisite	Reliability Performance Monitoring - CLARIFICATION
Proposal	Reference page 14 step-by-step guidance: let the project define the interruption duration that is significant to its needs as well as ensure that data storage and retrieval parameters are defined and in place to facilitate analysis after an event.
GBCI Response	GBCI agrees with the proposal.
Change	In the FURTHER EXPLANATION section, under Database Structure on page 16, append the following: In addition to the minimum requirements, define the project-specific interruption durations that are to be monitored, and how long the data must be stored, and the format(s) which the data must be available so that it can be easily organized and analyzed during a post-event assessment. If the project is implementing an automated interruption management process, validate that the metering infrastructure or Outage Management System (OMS) can support this database structure, all data can be readily extracted and organized into this structure, and any required software and/or interface hardware are in-place or readily available to obtain this data from the meters or OMS for a post-event assessment.

Credit	Reliability Performance Assessment (Credit 1) – EXEMPLARY PERFORMANCE
Proposal	Go beyond SAIDI/SAIFI.
GBCI Response	GBCI agrees with the proposal to award points for projects that estimate customer interruption cost as an exemplary performance option under the Innovation credit.
Change	Append the following to the credit requirements of this credit, before the BACKGROUND section (in page 22): Projects that estimate customer interruption cost, which assess and monetize the economic benefits customers receive from reliability improvement earn 1 additional point for exemplary performance under the Innovation credit category. Add the following to the STANDARDS AND REFERENCES section: Interruption Cost Estimator (ICE) Calculator - https://www.icecalculator.com/
Background	Refer to DOE tool, Interruption Cost Estimator (ICE) Calculator, allowing utilities to place a dollar value on the cost of outages based upon DOE research into the cost for specific industries in each state. https://www.icecalculator.com/

Credit	Momentary Interruption Tracking (Credit 2) - CORRECTION
Proposal	Reference page 30 of the step-by-step guidance: Provide the project the ability to establish the momentary interruption duration that meets its requirements and (page 31) add the $MAIFI_E$ definition to allow the project to choose if MAIFI or $MAIFI_E$ meets their requirements better.
GBCI Response	GBCI agrees with the proposal to include $MAIFI_E$ under "Option 1. REPORTING OF MOMENTARY INTERRUPTIONS" and to allow the projects to choose between MAIFI and $MAIFI_E$ in reporting of momentary interruptions.
Change	Replace the existing content in OPTION 1. REPORTING OF MOMENTARY INTERRUPTIONS with the following (page 29): Calculate the project's annual momentary average interruption frequency index (MAIFI) or momentary average interruption frequency index event ($MAIFI_E$) as specified in IEEE 1366. Update the below content to STEP 2 of STEP-BY-STEP GUIDANCE (page 30): STEP 2. CALCULATE RELIABILITY INDEX FOR MOMENTARY INTERRUPTIONS Read about momentary interruptions in IEEE Standard 1366 and identify data requirements for monitoring such interruptions (see Further Explanation, Momentary Interruptions). Within IEEE Standard 1366, consider the definitions of both MAIFI and $MAIFI_E$ to determine which definition is most applicable to the project for quantifying the momentary interruptions. Some favor $MAIFI_E$ over MAIFI as a more suitable measure for comparing customer reliability service levels. The project shall define the duration of a momentary interruption that is significant to its specific tolerances, and if the existing project infrastructure is capable of monitoring interrupting device operations at that duration, collect relevant data for at least one year and calculate the reliability index using either the MAIFI or $MAIFI_E$ method based on the project's prior determination. If data are not available, establish a process to periodically record and report relevant data. Add the below content to the FURTHER EXPLANATION - MOMENTARY INTERRUPTIONS section, accordingly (in page 31): MAIFI internalizes the severity of interruptions in terms of the number of momentary interruptions experienced by each customer, weighted by the extent of the interruptions. In the above formula, "i" is the ith occurrence of a momentary interruption, and "N" is the total number of momentary interruptions in specified time frame.

	The momentary average interruption frequency index event ($MAIFI_E$) is a similar reliability index that some projects prefer as it excludes momentary interruptions that are associated with a single sustained interruption. $MAIFI_E$ therefore counts events and may provide a more accurate representation of service reliability. $MAIFI_E$ represents the average frequency of momentary interruption events experienced by each customer connected to the network and is usually expressed as number of interruptions. This index does not include the events immediately preceding a sustained interruption. The mathematical equation for calculation of $MAIFI_E$ is as follows: $MAIFI_E = \frac{\sum_{i=1}^{N} Number\ of\ Momentary\ Interruption\ Events_i \times Number\ of\ affected\ customers_i}{Total\ number\ of\ customers\ served}$ In the above formula, "i" is the ith occurrence of a momentary interruption event, and "N" is the total number of momentary interruption events in specified time frame. The project should choose the MAIFI or $MAIFI_E$ method depending upon what best meets their requirements. Use the same customer connection map as for calculating the reliability indices for sustained interruptions and use the same definition of "customer." The project's distribution network and respective switches should be represented in a single-line diagram. All the switches on the power distribution system should be clearly identified.

Credit	Damage and Exposure Prevention (Credit 3) - CORRECTION
Proposal	All projects – Additional emphasis for physical and cybersecurity of power system assets.
GBCI Response	GBCI agrees with the proposal.
Change	Under OPTION 1: EXTERNAL DAMAGE PREVENTION, replace "Vehicular or Human Interference" with the content in red (page 35): • Tree contact • Animal or bird contact • Fire or hazardous area • Weather effects • Acts of terrorism and vandalism • Vehicular interference Under RELATED CREDITS add: GS Data Privacy and Cybersecurity
Background	Technological advancements within the electric power system improve reliability but can introduce new vulnerabilities where additional means of remote access are added. Both physical and cyber security vulnerabilities, if not appropriately addressed, could result in severe and long-duration service interruptions and loss of life and property.

<table>
<tr><td>Credit</td><td>Alternative Source of Supply (Credit 5) - CORRECTION</td></tr>
<tr><td>Proposal</td><td>Recognize that the Alternative source of supply DURATION is the most important reason to have alternative power options.</td></tr>
<tr><td>GBCI Response</td><td>GBCI partially accepts this proposal. GBCI rejects the “duration” proposal as it is addressed under RR Category Credit – 6 - “Power surety and resiliency”.</td></tr>
<tr><td>Change</td><td>Update the credit requirements as below (page 49):

REQUIREMENTS

All Projects

OPTION 1. ALTERNATIVE SUPPLY (2 POINTS)

In case the primary power supply fails, have in place provisions for alternative sources of power supply for:
• At least 40% of the project’s total load and 80% of project’s critical load,
OR
• At least 80% of project’s total load and 100% of project’s critical load.

Choose one or more of the following backup power options:
• Alternative (or secondary) feeder from bulk grid
• Generation outside the project boundary (at the neighborhood level)
• Project-owned or project-operated backup power system

Calculate the fraction of the project’s load, that is protected by backup power supply options. Points are awarded according to Table 1.

<table>
<tr><th colspan="3">Table 1. Points for Alternative Supply</th></tr>
<tr><th>Total project load with backup power supply (%)</th><th>Total project’s critical load with backup power supply (%)</th><th>Points</th></tr>
<tr><td>≥ 40</td><td>≥ 80</td><td>1</td></tr>
<tr><td>≥ 80</td><td>100</td><td>2</td></tr>
</table>
</td></tr>
<tr><td>Background</td><td>As outages attributable to inclement weather and other natural disasters are becoming more severe and frequent, projects are encouraged to consider comprehensive measures to ensure power system resiliency. Examples of recent weather-related events are hurricanes on the east coast and Gulf of Mexico, torrential rains in Houston, earthquake in Puerto Rico, wildfires in California.</td></tr>
</table>

Prerequisite	Environmental Performance Disclosure - CORRECTION
Proposal	Update table 4, table 6, table 8, table 10, table 12, and table 14 current values.
GBCI Response	GBCI agrees with the proposal.
Change	Replace table 4 (page 72), 6 (page 74), 8 (page 75), 10 (page 76), 12 (page 77) and 14 (page 78) in this prerequisite with the following tables:

Table 4. U.S. electricity sector SEI values, 2014–2018

YEAR	SEI (MMBtu/MWh)		
	Excellent	Average	Poor
2014	7.76	9.71	10.81
2016	7.45	9.45	10.78
2018	7.63	9.30	10.86

Table 6. U.S. electricity sector CO2 emissions intensity, 2014–2018

YEAR	CO2 Intensity (lbs/MWh)		
	Excellent	Average	Poor
2014	19	1097	2069
2016	57	991	2026
2018	45	943	2049

Table 8. U.S. electricity sector NOx emissions intensity, 2014–2018

YEAR	NOx Intensity (lb/MWh)		
	Excellent	Average	Poor
2014	0	1.10	3.9
2016	0.1	1.02	6.6
2018	0.2	0.9	6

	(tables below)

Table 10. U.S. electricity sector SO2 emissions intensity, 2014–2018			
YEAR	SO2 Intensity (lb/MWh)		
	Excellent	Average	Poor
2014	0	1.53	7.4
2016	0	0.85	7.5
2018	0	0.75	6.9

Table 12. U.S. electricity sector water consumption intensity, 2011–2015			
YEAR	Water Consumption Intensity (gal/MWh)		
	Excellent	Average	Poor
2011	236	487	738
2013	237	463	689
2015	236	496	891

Table 14. U.S. electricity sector waste recycling, 2014–2018			
YEAR	Waste Recycling (%)		
	Excellent	Average	Poor
2014	81.1	48	15.3
2016	90.6	56.01	20.9
2018	94.2	58.12	21.9

Background	Updated the Tables based on the latest eGrid information.

Credit	Environmental Performance Improvement (Credit 1) – CORRECTION
Proposal	Update table 2 (benchmarks) with current values.
GBCI Response	GBCI agrees with the proposal.
Change	Replace table 2 in this credit (page 112) with the following table:

Table 2. EE benchmarks for U.S. projects

State		Benchmark
AK	Alaska	55
AL	Alabama	68
AR	Arkansas	58
AZ	Arizona	57
CA	California	80
CO	Colorado	61
CT	Connecticut	73
DC	District of Columbia	54
DE	Delaware	62
FL	Florida	74
GA	Georgia	61
HI	Hawaii	47
IA	Iowa	68
ID	Idaho	62
IL	Illinois	49
IN	Indiana	42
KS	Kansas	63
KY	Kentucky	49
LA	Louisiana	68
MA	Massachusetts	70
MD	Maryland	53
ME	Maine	62
MI	Michigan	59
MN	Minnesota	49
MO	Missouri	49
MS	Mississippi	76
MT	Montana	53
NC	North Carolina	64
ND	North Dakota	59

NE	Nebraska	57
NH	New Hampshire	60
NJ	New Jersey	68
NM	New Mexico	62
NV	Nevada	63
NY	New York	67
OH	Ohio	47
OK	Oklahoma	76
OR	Oregon	59
PA	Pennsylvania	63
RI	Rhode Island	80
SC	South Carolina	54
SD	South Dakota	66
TN	Tennessee	63
TX	Texas	73
UT	Utah	54
VA	Virginia	71
VT	Vermont	54
WA	Washington	59
WI	Wisconsin	53
WV	West Virginia	44
WY	Wyoming	45

Background	Updated the Tables based on the latest eGrid information.

Credit/ Prerequisite	System Energy Efficiency Coefficient Disclosure (Prereq 2) and System Energy Efficiency Coefficient Improvement (Credit 2) - CLARIFICATION
Proposal	Develop an alternative methodology and guidance to calculating the SEEC.
GBCI Response	GBCI partially accepts the proposal. We are not developing an alternative methodology, but we provide a guidance document for projects to calculate the SEEC value.
Change	Projects attempting this Prereq/Credit must fill required data in the "SEEC Calculator." Calculator and guidance document shall be provided to project teams upon successful completion of project registration with GBCI.

Credit	Renewable Energy and Carbon Offsets (credit 3) – CORRECTION
Proposal	To encourage development & adoption of renewable energy technologies at a large scale to enhance reduction of GHG emissions, recognize the difference between bundled and unbundled REC's, recognize the value add from on-site power options such as CHP, co-gen and fuel cells.
GBCI Response	GBCI partially accepts the proposal. The concept of onsite CHP/ cogeneration/ fuel cells is addressed in EE Category Credit – 4: "Distributed Energy Resources" under Option 1: Local Renewables and Clean Generation.
Change	Update the % energy addressed equation (in page 117) as follows: $\%\ \text{energy addressed} = \left\{ \left[\frac{\text{Renewable Energy purchased or contracted through bundled REC's (MWh)}}{\text{Total energy consumption} \left(\text{excluding local renewable renewables}\right) \text{MWh}} \times 0.75 \right] + \left[\frac{\text{Equivalent Energy purchased through carbon offsets} + \text{Electricity purchased through unbundled RECs (MWh)}}{\text{Total energy consumption} \left(\text{excluding local renewable renewables}\right) \text{MWh}} \times 0.25 \right] \right\} \times 100$
Background	Renewable energy generation and RECs must be Green-e Energy certified or the equivalent. If RECs are sold with their associated energy, then they are known as bundled RECs. If they are sold separately from the underlying energy, then they are known as Unbundled RECs. Unbundled RECs can be sourced from a single type of resource such as solar or wind. REC's are tradeable, market-based instruments that represent the legal property rights to the "renewable-ness" (i.e. environmental attributes) of one megawatt-hour (MWh) of renewable electricity generation. A REC is issued for every MWh of electricity generated and delivered to the electric grid from a renewable energy resource. Carbon offsets may be used to mitigate emissions on a metric ton of carbon dioxide–equivalent basis and must be Green-e Climate certified or the equivalent. Carbon offsets must be purchased from recognized greenhouse gas emissions reduction projects within the country where the project is located. Renewable energy power purchase agreements (PPAs) are also acceptable. The PPA will determine whether the REC's are bundled or unbundled. PPAs must be signed within one year of the date of registration for PEER certification. The purchase of renewable energy is valid only if the project starts receiving renewable energy within one year of the registration date and only until the end date of the signed PPA. Example: Project uses 3 GWh of electricity a year (3000 MWh). 1000 MWh generated from fossil fuel-based power plants. 500 MWh are through a PPA, a contract for electricity produced from solar photovoltaics in which the REC's are included (bundled REC's). 1000 MWh are through unbundled REC's where the REC's are received as carbon offsets, but no electricity. { [(500/3000) x 0.75] + [(1000/3000) x 0.25] } x 100 = { 0[.125] + [0.084] } x100 = 20.83% or 2 points

Credit	Environmental Impact Disclosure and Management (Credit 5) - CORRECTION
Proposal	Monitoring and tracking must be part of policy measures and point adjustment.
GBCI Response	GBCI agrees with the proposal. Based on the certification experience, GBCI has assessed that the point structure for this credit has to be equalized across project types. In this regard, to award a point for the new requirement under Cities and Utilities, 1 point is adjusted from OP – Operational Process credit (Failure Identification). To give equal importance and avoid over rating for Campus and Transit, 2 points are reduced.
Change	Existing credit requirements must be replaced with the following (pages 129 and 130): Applicability: • Cities and Utilities (1–3 points) • Campuses (1–3 points) • Transit (1–3 points) REQUIREMENTS All Projects Implement policies and programs to reduce or prevent harm to the local environment, including trees, wildlife, and wildlife habitat. In addition, project shall track and record the following information, and make a commitment to its disclosure: • Trees cut or trimmed, and wildlife disturbed for project construction and operation (1 point). • Area (m2) and type of land (e.g., agricultural, brownfield) used for project systems (1 point). • Noise levels emitted by generation assets, overhead cables, substations, and switchyards (1 point). To achieve above 1 point on Noise level, project must additionally address the following: • Determine the maximum acceptable noise level at the project's property line. • Conduct screening measurements, then refine measurements to determine the loudest location on the property line using slow time response. • Conduct measurements with IEC 60651 Type 1, IEC 61672 Class 1, ANSI S1.4-Type 1 sound level meter or equivalent. • Identify strategies to reduce noise to acceptable levels.

Credit	Environmental Impact Disclosure and Management (Credit 5) – EXEMPLARY PERFORMANCE
Proposal	Add in scoring for activities taken to increase attraction of pollinators and insects.
GBCI Response	GBCI agrees with the proposal to award points for projects which take action in support of pollinator population by considering it as an exemplary performance option under the Innovation credit.
Change	Append the content highlighted in red to the credit requirements (in page 130): Projects that support the growth of pollinator population by adopting at least one of the following strategies earn 1 additional point for exemplary performance under the Innovation credit category: • Meet the requirements in LEED BD+C: New Construction – LEED v4.1, Sustainable Sites Protect or Restore Habitat. • Obtain Pollinator Habitat Certification from a national or local organization[1]. • Follow USDA guidance to provide habitat to help pollinators rebound from the challenges they face.
Background	There is evidence that populations of native and managed pollinators are in decline, and the loss of benefits derived from them is being felt by the agricultural community. Human activity such as urbanization can lead to habitat fragmentation or destruction. Changes in agricultural practices and the use of broad-spectrum pesticides can disrupt or destroy long-established pollinator habitats. Other factors leading to pollinator decline include disease, and the spread of invasive plant species.[2] Birds, bats, bees, butterflies, beetles, and other small mammals that pollinate plants are responsible for bringing us one out of every three bites of food. They also sustain our ecosystems and produce our natural resources by helping plants reproduce. Pollinating animals travel from plant to plant carrying pollen on their bodies in a vital interaction that allows the transfer of genetic material critical to the reproductive system of most flowering plants – the very plants that: • bring us countless fruits, vegetables, and nuts, • half of the world's oils, fibers, and raw materials; • prevent soil erosion, • and increase carbon sequestration[3]. Pollinators are essential to our environment. The ecological service they provide is necessary for the reproduction of over 85% of the world's flowering plants, including more than two-thirds of the world's crop species. The United States alone grows more than 100 crops that either need or benefit from pollinators, and the economic value of these native pollinators is estimated at $3 billion per year in the U.S.[4]

1 https://www.eealliance.org/pollinator-habitat-certification-program
2 https://www.nrcs.usda.gov/wps/portal/nrcs/detail/pa/plantsanimals/?cid=nrcs142p2_018171
3 https://www.pollinator.org/pollinators
4 https://xerces.org/pollinator-conservation

OPERATIONS, MANAGEMENT AND SAFETY

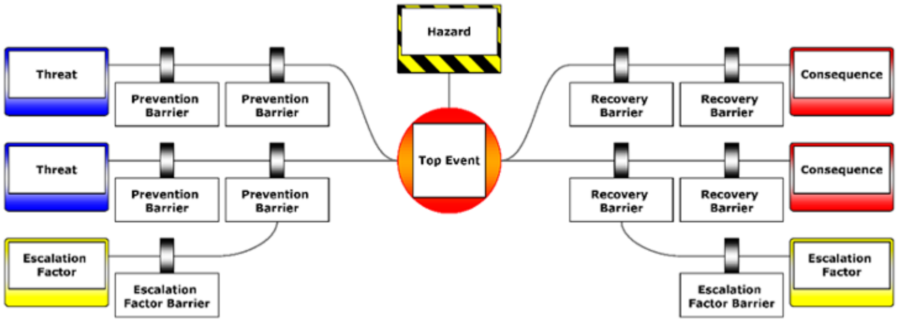
<table>
<tr><td>Prerequisite</td><td>Triple-Bottom-Line Analysis (Prerequisite 1) - CLARIFICATION</td></tr>
<tr><td>Proposal</td><td>Update the language by adding examples for all 3 categories.</td></tr>
<tr><td>GBCI Response</td><td>GBCI agrees with the proposal.</td></tr>
<tr><td>Change</td><td>
Append the following to FURTHER EXPLANATION section of this credit (to page 140):
Example:
Environmental Benefits:
Considering the same campus for environmental benefit calculation under the Baseline, Improved and Upper Limit Scenario is provided in Table 3.
<table>
<tr><th colspan="4">Table 3. Environmental benefits example scenario and capabilities with reference to Table 1.</th></tr>
<tr><th></th><th>Baseline scenario</th><th>Improved scenario</th><th>Upper Limit scenario</th></tr>
<tr><td>Description</td><td>No on-site generation</td><td>2 MW on-site rooftop solar PV generation system</td><td>Rooftop Solar PV system + Battery storage</td></tr>
<tr><td>Renewable Energy generated (MWh)</td><td>-</td><td>1500</td><td>1500 + 110</td></tr>
<tr><td>Carbon emission mitigated (kilo tons)</td><td>-</td><td>2</td><td>2 + 0.2</td></tr>
</table>
Social Benefits include but not limited to:

Energy access and quality power delivery to the campus,
Providing reliable and resilient power during catastrophic events by meeting the community needs of the campus,
Creating new business opportunities and job creation.

An example of societal benefits is the EcoBlock model in California which combines and standardizes technical components of renewable energy into a microgrid cooperative with the right financing structure to make the investment affordable for everyone.
</td></tr>
</table>

Credit	Risk Assessment and Mitigation (Credit 1) - CLARIFICATION
Proposal	Add examples of hazards that can be included in risk assessment, provide language to clarify how the (4) risk mitigation events should be selected, Identify risks by category and provide form listing those in each category and risk level by following a criteria based on a multiplier (likelihood (0-10), impact (0-10), restoration time (0-10). Provide analysis listing higher to lower risks and mitigation plans.
GBCI Response	GBCI agrees with the proposal to: • include language in clarifying the hazard identification and bow-tie diagram; • mandate the inclusion of at least two high or very high probability events and at least one high or very high impact events in the requirements; • include risk event categorization in the credit requirement.
Change	Update the credit requirements as follows (in page 141): Conduct a risk assessment of at least four risk events for each of the following subsystems, including their individual assets. The selected four risk events should include at least two high or very high probability events and at least one high or very high impact events. [The project can select the 4th risk event at their discretion]: • Main substations or switchyards • Distribution substations or switchyards • Distribution transformers • Overhead distribution lines • Underground power cables • Local generation • Energy storage systems • Communication and control infrastructure • Backup power supply • Metering Infrastructure Risk events identified may be categorized as: • Natural Hazards • Human-caused Events Facility Risks • Technology-caused Events • Departmental Risks In STEP-BY-STEP GUIDANCE section, below content (in red) to be added in corresponding steps (page 142): STEP 2. IDENTIFY HAZARDS, SOURCES, AND CONSEQUENCES List potential hazards for the assets based on a literature review, experience, and historical failure reports. Trace each hazard's causal factors or sources of failure, describe any past occurrences, and determine associated damage to assets; provide images if possible. Alternatively, use a bowtie diagram to visualize the hazard, its threats, and consequences. Evaluate each hazard across four impact criteria: financial, environmental, safety, and quality of service (see Further Explanation, Hazard Identification).

	STEP 5. ANALYZE RESULTS AND DEVELOP MITIGATION PLANS (page 143) For each subsystem, rank the risks based on the risk levels established in Step 3. Define at least three risk acceptability levels (Figure 1), classify and prioritize the hazards, accordingly, based on their acceptability levels and severity. Develop strategies to mitigate, avoid, or transfer risks based on the identified risk characteristics. Mitigation strategies or control measures added to the bowtie diagram can also be considered. (see Further Explanation, Risk Treatment). In FURTHER EXPLANATION section, below content to be added under Hazard Identification (page 143): FURTHER EXPLANATION HAZARD IDENTIFICATION Identifying potential hazards to the project's subsystems is fundamental to risk assessment. Use historical failure data, the experience of operators, or a combination. Establish a methodology for identifying a full range of hazards and gather information regarding their likelihood of occurrence. Examples of hazards include but are not limited to: • Natural hazards such as: earthquake, storms, floods, lightning, etc. • Human-caused events such as: sabotage, construction error, unplanned shutdown, strike or labor dispute, terrorism, war, accidental hazardous material spill, etc. • Technology-caused events such as: software or application failure, loss of electronic information, hacking, virus or trojan horse attack, etc. • Departmental risks such as: unavailability of key personnel, key-missing, access failure to key areas, etc. A "bow-tie" diagram is commonly used: it helps in identifying possible causes/ threats as well as expected consequences of a hazard. For each hazard, the likelihood that it will happen again can be used to estimate the probability of occurrence; this is the risk. Damage can be similarly assessed. It is useful to define a boundary within which causes, and effects are to be assessed. Projects, through the bowtie diagram can get an overview of multiple plausible scenarios, in a single picture.

	Figure 1. General Bowtie Diagram  The start of any bowtie is the 'hazard'. A hazard is something in, around or part of the organization which has the potential to create a negative impact if control over that aspect is lost. Once the hazard is chosen, the next step is to define the 'top event. This is the moment when control is lost over the hazard. Top event is chosen just before events start causing actual damage. Left side of the bowtie diagram describes the threats. 'Threats' are whatever will cause your top event. There can be multiple threats. Right side of the bowtie diagram describes the consequences – the result from the top event. There can be more than one consequence for every top event. Once all these are identified, the 'barriers' or control and safety measures or layers of protection for these threats and consequence can be considered. Barriers in the bowtie appear on both sides of the top event. Barriers on the left side interrupt the scenario so that the threats do not occur, and if they do, it does not result in a loss of control (the top event). Barriers on the right side make sure that if the top event is reached, the scenario does not escalate into an actual impact (the consequences) and/or they mitigate the impact. In STANDARDS AND REFERENCES section, append the following (page 146): National Fire Protection Association (NFPA) 1600 - 2019: Standard on Continuity, Emergency, and Crisis Management Central Electricity Authority (CEA) (Grid Standards) Regulations, 2010

Credit	Emergency Response Planning (Credit 2) - CORRECTION
Proposal	Prioritize the lists on page 147 with at least the top 5 being a requirement to get 1 point. 6 would get 2 points and 7 and 8 to get 3 points.
GBCI Response	GBCI agrees with the proposal.
Change	The credit requirement needs to be modified as suggested below (including the points table) (page 147 & 148): All Projects Prepare an emergency response plan written specifically for the project or the project's customers, addressing both short-term and extended power interruptions. Incorporate at least the first five of the following strategies: 1. Create operating procedures, including instructions to start generators and placement of power switches for restoring power during a grid interruption and power restoration. 2. Develop a load priority list describing the order and priority in which power to loads or circuits should be restored after a power interruption. 3. Perform and provide proof of risk assessment performed and its association with emergency response plan (see OP Credit Risk Assessment and Mitigation) 4. Establish plans and/or procedures for conducting emergency drills and training for the personnel responsible to restore power during power interruption and for the personnel responsible for operating the project's command and control centers during power interruptions. 5. Equip the project grid with at least two forms of pre-arranged backup communications for internal use and external communication. 6. Provide backup power for the project's command and control to be used during emergencies. 7. Perform a needs assessment to determine the capacity of backup power and stored energy or fuel required for each critical load and essential service. 8. Create plans for managing traffic during power interruptions. Points are awarded according to Table 1.

Table 1. Points for emergency response strategies

Strategies	Points
≥ 5	1
≥ 6	2
8	3

Credit	Safety Review Process (Credit 3) - CLARIFICATION
Proposal	Provide clarification on requirements 1 and 2 for this process.
GBCI Response	GBCI agrees with the proposal.
Change	The content highlighted in red needs to be updated in this credit requirement (in page 151): All Projects Comply with safety code requirements for any design or operational changes as described by the authority having jurisdiction or NESC C2–2012. Develop and implement at least two of the following strategies: • Have in place a program equivalent to OSHA for investigating accidents involving project staff and members of the public. The reports must document the cause of any accident and identify solutions to prevent its recurrence. • Establish a safety program following CFR 1910 or local equivalent where all procedures that apply to project are followed and documented i.e. LOTO, Confined Space, Electrical safety. • A policy to hold safety review meetings for significant design or operational changes and new product rollouts. • Procedures for incorporating safety review results into design standards and/or operating documents (e.g., procedures, manuals, diagrams) for safely installing and operating local generation and electric system assets. STANDARDS AND REFERENCES OSHA Laws and Regulations (Standards - 29 CFR) Part 1910 – Occupational Safety and Health Standards Central Electricity Authority (CEA) (Grid Standards) Regulations, 2010 National Fire Protection Association (NFPA) 1600 - 2019: Standard on Continuity, Emergency, and Crisis Management National Policy Safety, Health and Environment at Workplace – Ministry of Labor and Employment, Government of India EU Strategic Framework on Health and Safety at Work 2014-2020 NESC–2012, National Electrical Safety Code CS–2012 NFPA 70, National Electrical Code NFPA 70 E, Standard for Electrical Safety in the Workplace

Credit	Operational Processes (Credit 4) - CLARIFICATION
Proposal	Propose language to rephrase the requirements for Option 1 (Waste Identification and Reduction). Change the title to "Maintenance Optimization."
GBCI Response	GBCI agrees with the proposal.
Change	Update the credit requirements as follows (in page 157): ALL PROJECTS OPTION 1. MAINTENANCE OPTIMIZATION (1–2 POINTS) Implement at least two (1 point) or three (2 points) of the following: • Preventive maintenance program for all critical assets. • Condition-monitoring program for all critical assets. • Life-cycle cost approach for selecting equipment and assets with regular maintenance requirements.
Background	**Preventive maintenance program** is a planned or scheduled maintenance, performed even when machines or the systems are in complete functional mode, to prevent any breakdowns or issues from occurring in the future. Basically, it is very similar to a regular check-up. While its main purpose is to prevent breakdowns, using preventive maintenance software also helps extend the lifespan of the machine or asset, and increase efficiency and productivity. **Predictive maintenance (Also known as condition monitoring program)** differs from preventive maintenance in the sense that it requires predetermined and preset conditions. Variances from the conditions, identified during continuous or routine measurements, provide the information needed to perform any maintenance required to avoid equipment failures or to coordinate repairs with scheduled maintenance, thus reducing costs. Ex: **Vibration analysis:** Rotating equipment such as compressors, pumps and motors all exhibit a certain degree of vibration. As they degrade, or fall out of alignment, the amount of vibration increases. Vibration sensors can be used to detect when this becomes excessive. **Infrared (or Thermal Scanning)**: IR cameras can be used to detect high-temperature conditions in energized equipment.

Credit	Operational Processes (Credit 4) - CORRECTION
Proposal	Credit option 2 – Failure Identification is over emphasized and hence, reduced by 1 point.
GBCI Response	GBCI agrees with the proposal.
Change	1 point is reduced for all project types. The credit requirement of OP Credit 4 is to be updated as (in page 157): Applicability: • Cites and Utilities (1–3 points) • Campuses (1–3 points) • Transit (1–3 points) REQUIREMENTS All Projects OPTION 1. MAINTENANCE OPTIMIZATION (1–2 POINTS) No Change OPTION 2. FAILURE IDENTIFICATION AND REDUCTION (1 Point) Implement a formal process for identifying and reducing process failures that includes the following features (1 point): • Failure tracking and trending • Failure cause analysis • Tracking of corrective actions for all failures

Credit	Advanced Metering Infrastructure (Credit 5) – EXEMPLARY PERFORMANCE
Proposal	Provide an Innovation Credit for metering loads other than electrical.
GBCI Response	GBCI agrees with the proposal.
Change	Append the following content to the credit requirements (before Background section, in page 162): All Projects Metering loads beyond electrical loads is important to understand and optimize building operations. Projects which have metering devices with the below listed capabilities to measure their volumetric and thermal loads such as chilled or hot water, steam, domestic water or natural gas, earn 1 additional point for exemplary performance under the Innovation credit category: • Ability to record data at intervals of one hour or less and transmit data to a remote location • Ability to record both consumption and demand • Ability to store all meter data
Background	Applying submetering to the building, system, tenant, circuit, or device levels can provide building utility bills, operations & maintenance, and problem-solving value-add at various levels and costs. The value and effectiveness of any submetering effort will depend on its purpose, goals, design, and implementation.[1] Submeters can measure resource use for different buildings in a multi-building campus, different floors of the same building, different tenants in a multi-tenant office or facility, individual building systems, electrical circuits, or even specific devices. Data from well-designed submetering systems can guide management strategies to significantly reduce energy and greenhouse gas emissions in buildings and portfolios[2]. Developing a prioritization for building-level water metering requires investigation of specific water uses. Prioritizing water meter implementation should recognize unique uses among the buildings, as well as any special requirements that might apply to any of the buildings. The prioritization process should also assess the schedule of installation because water meters will likely be phased over several years due to resource constraints. An oversimplified approach that only takes into consideration building square footage, for example, will likely overlook water-intensive buildings.[3]

1 https://www.gsa.gov/cdnstatic/Submetering_Business_Case_How_to_calculate_cost-effective_solutions_in_the_building_context.pdf
2 https://sftool.gov/explore/green-building/section/86/submetering/system-overview
3 https://www.energy.gov/eere/femp/prioritizing-building-water-meter-applications

Credit	Master Controller (Credit 6) - CORRECTION
Proposal	Add forecasting functionality as an exemplary credit option for the advanced capability of a master controller.
GBCI Response	GBCI agrees with the concept but disagrees with considering it as the exemplary credit. Instead, we have added it into the credit requirement.
Change	Add the content highlighted in red as a 5th bullet to the advanced capabilities listed in the credit requirement (page 165): • Ability to generate and/or use third-party forecasted data to improve operational decisions.
Background	Forecasts have been shown to optimize microgrid operations while considering future renewable generation and loads. This functionality can significantly improve the economics and resilience of microgrids.

Credit	Master Controller (Credit 6) - CLARIFICATION
Proposal	Propose language to rephrase the advanced capabilities requirements.
GBCI Response	GBCI agrees with the proposal.
Change	Update the 3rd bullet in the advanced capabilities listed in this credit requirement as (in page 165): • Ability to operate under loss of both primary power, and primary communication used by the master controller (or otherwise eliminate Common-cause failure modes).
Background	Master controller must be equipped with redundant backup power supply and redundant communication network.

Credit	Communications Network and Information Processing (Credit 7) - CORRECTION
Proposal	Provide suggested language for how cybersecurity could be implemented into this category and include appropriate standards to reference in this section.
GBCI Response	GBCI agrees with the proposal.
Change	Add the content in red accordingly to the credit requirements (page 169): REQUIREMENTS All Projects Install communications infrastructure connected to all major assets of the project using operational technology (OT) hardware and software that detects or causes a change through the direct monitoring and/or control of physical devices, processes and events in the enterprise, monitors and manages assets and equipment with a future implementation plan and schedule to address cybersecurity protection measures in accordance with the referenced standards (1 point). Install a data acquisition and control system that performs the following functions (1 point): • Monitoring and recording of project load data • Monitoring and recording of equipment fault data • Display of information for project operators and notification of faults • For district energy or central plant heating and cooling, monitoring, and recording of heating and cooling data • For central plant local generation, monitoring, and recording of the generator output • For a smart distribution system, monitoring, and recording of switch and fault status • Full implementation of cybersecurity protection measures in accordance with the referenced standards In the STANDARDS AND REFERENCES add these new standards/references (page 171): NIST SP 800-82 - 2015, Guide to Industrial Control Systems (ICS) Security North American Electric Reliability Corporation (NERC) – Critical Infrastructure Protection (CIP) Program National Institute of Standards and Technology (2012), NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 2.0 NISTIR 7628 (September 2014), Chapter 3, Guidelines for Smart Grid Cyber Security, vol. 1, Smart Grid Cyber Security Strategy, Architecture, and High-Level Requirements

	Microgrid Cyber Security Reference Architecture, Version 1.0, SAND2013-5472 (July 2013)
Background	The referenced NIST Standard deals with guidance on how to secure Industrial Control Systems (ICS), including Supervisory Control and Data Acquisition (SCADA) systems, Distributed Control Systems (DCS), and other control system configurations such as Programmable Logic Controllers (PLC), while addressing their unique performance, reliability, and safety requirements. It also identifies typical threats and vulnerabilities to these systems and provides recommended security countermeasures to mitigate the associated risks[1]. This reference would be an essential addition to ensure that the points awarded for this credit reflect the incorporation/development of a fully secure microgrid.

Credit	Energy Management System (Credit 8) - CLARIFICATION
Proposal	Additional information for calculating the percentage of buildings with BAS/EMS capabilities.
GBCI Response	GBCI agrees with the proposal.
Change	Append the content highlighted in red to the credit requirements as follows (in page 174): %TypeD = Percentage of buildings with a BAS or EMS capable of communicating with and providing data to the project's master controller or central plant operators (not just building operators) Percentage of buildings calculation: For calculating the percentage of buildings with Type A, Type B, Type C, and Type D - BAS/EMS capabilities, consider only the buildings where cooling loads and/or are supplied from a centralized cooling system or heating system (Chillers, AHU, etc.). Buildings using DX Units, Cassette units (portable units) for cooling, and/or heating can be ignored for calculations.

1 NIST SP 800-82, Guide to Industrial Control Systems (ICS) Security, May 2015

GRID SERVICES

Prerequisite	Customer and Load Survey - CORRECTION
Proposal	Revise the process for load survey to make it simple and less onerous. The load survey should only address requirements for credits in the Grid Services section. The portion on power quality should be removed; such information is necessary to design the power system to deliver the power quality expected by the building processes and is therefore, more appropriate for the RR Power Quality credit.
GBCI Response	GBCI disagrees with portions or parts of these recommendations. GBCI believes that surveying either the customers or the load on a periodic basis is a good practice. Because the load uses in a building can change due to tenant operations, a periodic load survey of the building can be useful to better optimize the overall system. Several clarifications are being provided.
Change	Update the following under the Case 1 & 2 credit requirement for Campuses and Transit (on page 179): Campuses and Transit CASE 1. CUSTOMER SURVEY OR CASE 2. LOAD SURVEY Projects can conduct a load survey as follows: • Conduct a survey of project loads with qualitative and quantitative characteristics across operational and design parameters. • Identify interdependencies between multiple loads and/or processes in terms of operational schedules and input and output parameters. • Have in place programs to improve project infrastructure and processes to optimize energy performance and incorporate this as part of future improvement plans. Update the following in the FURTHER EXPLANATION section under Campuses and Transit – 2. Load Survey (on page 183): A. Process Characteristics Each of the identified loads or processes are then analyzed or classified across different parameters as listed below in the Table 3.

	Table 3. Parameters and sub-parameters of process characteristics

No	Parameters	Sub-Parameters
1	Process Criticality	Essential, Critical, Non-Essential (Alternately, use power priority levels appropriate for the building type, such as life safety, emergency, business critical - 1, business critical – 2, deferrable load, EV charging, etc.)
2	Total Load (kW)	Connected Load, Nominal Demand, and Peak Demand
3	Energy Consumption	Summer and Winter average daily consumption
4	Energy Storage (only required if attempting Option 2: Local Energy Storage in EE Credit -Distributed Energy Resources)	Electrical Energy, Thermal Energy, etc.
5	Demand Response Assessment (only required if attempting GS Credit: Demand Response)	Load shedding capability, Advanced notification, response time, down time, etc.
6	Alternate Source of Power supply (only required if attempting RR Credit: Alternative Source of Supply)	Backup power requirement, Backup power type, minimum start up time, etc.

B. Project Operation – no change

C. Load Characteristics

Each of the identified loads or processes load characteristics are then analyzed or classified across different parameters as listed below in the Table 6.

Similarly, characteristics of the campus or building aggregate load shall be analyzed. When not practical, for instance, campus is supplied by multiple utility grid services, data is recorded as close as possible to the utility service entrance.

	Raw measurement data is obtained with the help of meters or power analyzers with event capture and data-logging capabilities. The recorded data may span a day, week, month or any such duration adequate to determine characteristics of the load under various operational scenarios with a high degree of confidence.

Table 6. Parameters and sub-parameters of load characteristics

S. No.	Parameters	Sub-Parameters
1	Load	Name of major identified loads such as Chilled Water pump, Compressor, Process heater#1, etc.
2	Associated Process	
3	Supply Type	
4	Supply voltage	
5	Nominal Power (kW)	
6	Nominal Power Factor	
7	Peak Power (kW)	
8	Transient / Inrush (kVA)	
9	Harmonic	Voltage and current harmonics
10	Monitoring voltage characteristics	Voltage sags or dips, Voltage Swells, Voltage Transients etc.

Credit	Customer Engagement (Credit 1) - CORRECTION
Proposal	Address engagement and participation, through customer awareness, understanding and engagement. Increase reach to underserved communities if possible. Supports Transparency and Credible/Consensus Driven guiding principles. Merge options 1 and 2. Expand to campuses.
GBCI Response	GBCI does not believe that Options 1 and 2 should be merged but agrees that expanding this credit to Campuses and Transit is appropriate.
Change	Update the credit as follows (in page 189): Applicability: • Cities and Utilities (1–3 points) • Campuses (1–3 points) • Transit (1–3 points) REQUIREMENTS All Projects OPTION 1: COMMUNICATION AND OUTREACH (1 POINT) No Change OPTION 2: PLANNING AND IMPLEMENTATION (1 POINT) Prioritize approaches to communication and outreach in terms of awareness, satisfaction, and participation for all customer types and classes. Focus on awareness and increased participation through stakeholder workshops and outreach. Develop comprehensive improvement strategies for at least three existing or planned programs, with the following objectives. • Improved customer satisfaction • Customer participation The strategies should be based on survey results of customer satisfaction and participation and may include strategies such as: • Awareness and participation through dashboards or apps measuring participation by building or department (campuses) OPTION 3: CUSTOMER SATISFACTION (1 POINT) Measure satisfaction with program objectives, ease of participation, etc. Advertise successes. Calculate a customer satisfaction index for individual programs, processes, and services using the methodology specified in Further Explanation and achieve an overall satisfaction score of 3.5 or greater.

Background	Engaging customers by increasing awareness of the impact of their behaviors, and the options to participate in sustainable, resilient and reliable energy, is essential to affecting change and broad acceptance and adoption. **For Cities and Utilities:** Customer engagement can make a city/utility project more effective by encouraging end users to take a more active role as the future electricity system is developed. Customer engagement programs are comprehensive, integrated campaigns that build on existing efforts to anticipate, inform, and respond to customers' needs. These programs leverage a range of communication channels, particularly as service changes occur or new programs become available. Through customer engagement, the project operator learns what customers need to understand and manage their electricity usage. Building on the customer surveys in the pre-requisite, develop an outreach strategy that identifies key stakeholders, project objectives, and a plan to engage the stakeholders to achieve the project objectives. Engagement activities can include stakeholder workshops, public meetings, and virtual consultation "rooms". The intent is to identify specific participation opportunities for stakeholder groups such as demand response, load shifting, behavior modification, and hosting distributed generation. Reliable and interoperable technologies now provide opportunities for end users to modify and adapt their energy behavior and become active participants in the energy system. Participation programs range from passive measures such energy consumption reports and peer usage comparisons to multiple payment options, such as online, e-bill, and electronic funds transfer, to active measures where customers make decisions to alter their behavior in a way that positively impacts the performance of the project. Ideally, customers receive feedback on how their behavior positively, or adversely, affected performance. **For Campuses and Transit:** Green University Campus Initiatives are beginning to expand and help focus on efficiency at universities. GCIs are student groups that focus on different events to promote efficiency to other students, as well as engaging with their local Student Government Association to various programs. Some such projects are Bike-Friendly Campus initiatives, programs that create notebooks from recycled paper, and energy audits that calculate the waste level of the campus and how it can run more efficiently.

	Delhi Metro installed energy saving devices (variable speed drives) for all the escalators to save energy more than 30% of normal escalator during no load operation. This is achieved by running escalators at 0.2 m/s speed if no passenger is there for more than two minutes, and in addition there is also provision of two speeds i.e. 0.5 m/s & 0.65 m/s in normal running conditions, which will be decided based on the passenger foot fall of the stations. The ENERGY STAR Student Activity Guide provides a comprehensive overview of ENERGY STAR tools and resources available to colleges and universities that are looking to improve energy performance. It also offers ideas for hosting activities on campus that will appeal to and motivate students, faculty, staff, administrators, and the local community to learn how to protect the environment by using energy-efficient practices and products. The guide is organized in three separate tiers of activity and concludes with a section on how you can communicate your successes to students, staff, the administration, and others in the community[1]. New technologies to measure, store, and display energy information (e.g., smart meters, dashboards, mobile phone applications) are available and provide data that allow consumers to make informed choices.

1 https://www.energystar.gov/sites/default/files/buildings/tools/ENERGYSTAR_Student_Activity_Guide_0.pdf

Credit	Data Privacy and Cybersecurity (Credit 3) - CORRECTION
Proposal	Update to reflect current cybersecurity best practices.
GBCI Response	GBCI agrees with the proposal.
Change	Replace the existing credit requirements with the content highlighted in red (in page 197): OPTION 1. CYBERSECURITY (1 POINT) Have in place at least six of the following policies and practices to address cybersecurity threats: • Inventory of secure configuration baselines or images of operating systems, software applications and firmware. Reviews include determining if vendor still supports product. • Physical access control for all local and remote wired, wireless, and virtual access points, including physical protections and limited access to substations and networked equipment • Boundary defenses that limit traffic only to allowed, utilize de-militarized zones (DMZs) and network segmentation, log and inspect traffic to detect (and prevent) intrusions and anomalous activity, and securely manage remote connections. • Encryption of sensitive information both at rest and when in transit. • Host-based security through access control lists, network and application white listing, controlled use of elevated privileges, secure configuration (hardening) of devices, disable removable media (optical drives allowed). • Network audit information and system logs are configured to capture events, detail successful/unsuccessful actions, are monitored and are aggregated to a centralized data collector. • Role-based access limiting access to least privilege and need to know; account management processes include strong passwords, disabling inactive accounts, individual identifiers, screen locks, account event logging, and strong authentication. Shared/group accounts are used sparingly. • Secure versions of network protocols are used (e.g., TLS, SSL, HTTPS, SFTP, SSH, IPSEC) and remove or disable unused ports, protocols and services. • Continuous and automated vulnerability scanning where possible or scheduled, manual checks with mitigation, or mitigation plans for all findings. • Automatic intrusion detection and operator notification. • Incident response plan including reporting/notification process, roles and responsibilities, and data and system recovery capabilities. • Firewall, adaptive security appliance, or router security. • Regular, up-to-date security awareness training for all personnel and cybersecurity plan/procedure training for system operators. Practical exercises that simulate actual cyber-attacks should be included in the security training. In STANDARDS AND REFERENCES append the following (in page 199): Center for Internet Security (CIS) Controls® V6.1

Credit	Access to Energy Usage Data (Credit 4) - CORRECTION
Proposal	Add in a requirement or recommendation to provide customers with benchmark energy usage data.
GBCI Response	GBCI agrees with the proposal.
Change	Under OPTION 1. EFFECTIVE DATA-SHARING PRACTICES, append the following to the advanced capabilities listed in the requirements (in page 202): • The platform gives users the ability to benchmark their buildings energy performance to similar type buildings in their region (can use building energy use intensity or EUI data).
Background	There are many benchmarking tools that can be utilized, whether from a local database or from one of those available nationally such as: DOE EERE Cities-LEAP data set: Benchmarking is the practice of comparing the measured performance of a device, process, facility, or organization to itself, its peers, or established norms, with the goal of informing and motivating performance improvement. When applied to building energy use, benchmarking serves as a mechanism to measure energy performance of a single building over time, relative to other similar buildings, or to modeled simulations of a reference building built to a specific standard (such as an energy code).[1] GBCI ARC: Projects can leverage comprehensive global data analytics to help benchmark performance and view project ratings on a local and international scale.[2] EPA's 1 – 100 ENERGY STAR score is the industry standard for measuring energy performance. Over the past five years, the number of buildings actively using Portfolio Manager to benchmark their energy performance increased by more than 30% and the amount of commercial building square footage actively benchmarked grew by more than 40%. [3]

1 https://www.energy.gov/eere/slsc/building-energy-use-benchmarking
2 https://gbci.org/press-kit-arc#:~:text=Arc%20helps%20buildings%20and%20places,of%20100%2C%20based%20on%20data.
3 https://www.energystar.gov/about/origins_mission/energy_star_overview/about_energy_star_commercial_buildings

Credit	Supply Choice (Credit 5) - CORRECTION
Proposal	To provide a choice to customers on where they procure electricity, for Campuses and Transit, self-generation using a renewable technology should be considered equivalent to having a choice in electric supply. The self-generated (on-site) power shall be a dispatchable (or firm) resource and shall supply at least 50% of project's energy need.
GBCI Response	GBCI agrees with the proposal.
Change	Update the credit requirement as follows (in page 207): REQUIREMENTS All Projects Offer supply choice by providing more than one power supplier option to at least 50% of tenants or customers (Campuses and Transit) or all customer classes (Cities and Utilities) (1 point). Campuses and Transit Opt in to preferred electric supply offered by the local utility (1 point). CASE 1. SUPPLY CHOICE AVAILABLE Participate in a supply choice program and select an option that performs better than the state or regional average for at least one of the following measures: • Renewables content • Reliability performance • Power quality performance OR CASE 2. SUPPLY CHOICE NOT AVAILABLE Discuss participation in future supply choice programs with grid operators. Provide self-generated (on-site) power which is a dispatchable (or firm) resource and shall supply at least 50% of project's energy need.

Credit	Demand Response (Credit 7) - EXEMPLARY PERFORMANCE
Proposal	Add in an innovation credit idea regarding bi-directional EV's, grid-responsive or grid-interactive buildings.
GBCI Response	GBCI agrees with the proposal.
Change	Append the following content highlighted in red to the credit requirements (in page 218): REQUIREMENTS Cities and Utilities: By having feed-in tariff options for at least one of the following innovative strategies, projects can earn 1 additional point for exemplary performance under the Innovation credit category: • Grid-responsive or grid-interactive programs • Vehicle to grid (V2G) Campuses and Transit: Projects that adopt at least one of the following innovative strategies earn 1 additional point for exemplary performance under the Innovation credit category: • Participate in grid-responsive or grid-interactive program with the local or adjacent power grid or microgrid • Offer grid-responsive or grid-interactive services to customers on the power grid • Install bi-directional electric vehicle (V2X) charging • Participate in a "Buildings as Thermal Batteries" program
Background	**Grid-Responsive or Grid-Interactive Program** "Grid-responsive" means that a building can respond to the needs and requests of the smart grid, contributing to the grid power balance timely and effectively, in order to enhance the reliability of the power grid and optimize the overall efficiency of the grid-building ecosystem. This has also been called grid-interactive efficient building (GEB) strategy. The Department of Energy (DOE) is researching how buildings, linked to one another across the grid and the internet, can be joined to improve themselves, each other, and America's energy system. That's the vision of DOE's Grid-interactive Efficient Buildings (GEB) Initiative, led by the Office of Energy Efficiency and Renewable Energy (EERE) and [the] Building Technologies Office (BTO). Through the GEB Initiative, DOE is working toward a future in which buildings can serve as reliable grid assets that operate dynamically with the grid to enhance efficiency, flexibility, and resilience.[1]

1 https://www.energy.gov/eere/articles/grid-interactive-and-efficient-buildings-are-emerging-dynamic-solutions-many-energy-0

	GEBs can reduce energy demand and utility costs and increase customer energy bill savings. They have great potential as a demand resource and as a tool for more-efficient management of the utility grid. They can help mitigate grid stresses, for example by shifting loads to avoid steep ramps and high demand peaks. GEBs can also assist with curtailing renewable energy during times when it is overproduced. From a distribution perspective, GEBs function as a non-wire based alternative that helps utilities avoid or defer grid upgrades. The GEB's unique feature as compared to an efficient smart building is its ability to connect and interact with the local grid system. The two-way flow of information between the grid and a GEB enables the building to act as a flexible resource for grid managers. For instance, the building can draw on energy storage when the grid is at peak use, thereby shifting its load. It can also reduce load during peak times, such as through dimming lights or reducing HVAC energy consumption. Some utilities such as Sacramento Municipal Utility District (SMUD) and Southern Company are implementing pilots to explore how they can aggregate a fleet of DERs to provide greater load-shifting control and flexibility. Fleets can include a variety of DERs such as residential and commercial rooftop solar, hot-water heater controllers, and electric vehicles; the ability to simultaneously manage these different resources allows for additional grid-flexible options. Aggregation pilots can support future GEB programs by providing key insights into how utilities and third-party aggregators can integrate and manage multiple DERs, as well as identify the remaining barriers to maximize benefits from integrating grid interactive technologies[1]. **Bidirectional EV charging** Bidirectional EV charging allows energy to flow both ways - in and out of a vehicle. V2X: Vehicle to Grid or Home is when a bidirectional EV charger is used to supply power (electricity) from an EV car's battery to the grid or a home via a DC to AC converter system usually embedded in the EV charger. V2G can be used to help balance and settle local, regional or national energy needs via smart charging. It allows EVs to charge during off-peak hours and give back to the grid during peak hours, when there is extra energy demand. This makes perfect sense: cars sit in parking spaces 95% of the time, thus with careful planning and the right infrastructure, parked and plugged-in EVs could become mass power banks, stabilizing the electric grids. V2X can help ensure our homes have enough power when they most need it, notably during power outages. As a result, it can also reduce the pressure on the electricity grid.

1 https://www.aceee.org/sites/default/files/gebs-103019.pdf

	With bidirectional charging, the full potential of EV battery storage can be realized to benefit the entire energy system. In other words, EVs can be used for renewable load following: capturing and storing excess solar or wind power when it is generated so that it can be made available for use during times of high demand, or when energy production is unusually low.[1] **Buildings as Thermal Batteries** The systems that heat and cool large commercial and residential buildings are often powered by variable-speed electrical motors. These variable-speed drives can be rapidly modulated in response to signals from grid operators. The heating or cooling output of variable-speed systems will vary in response, but temperatures inside the building can be kept within a comfortable range. Buildings are effectively big thermal batteries, storing heat or cold within materials in the walls, floors, and ceilings, and in the air inside the building envelope. That thermal storage buffer gives buildings the ability to vary heating and cooling output to help regulate the grid without sacrificing the comfort of occupants. Microgrids, local networks of distributed generators, energy storage devices, and smart electrical loads, must also keep frequency in a tight range. Yet with just a few small-scale generators or batteries, microgrids have fewer options to regulate frequency than the larger grid. Buildings with variable-speed heating and cooling systems (and digital control systems) can help keep microgrids running in safe ranges while ensuring occupant comfort and avoiding long-term damage to building systems.[2] Buildings outfitted with smart, efficient electric appliances such as heat pumps can become potent sources of grid flexibility. Automated operators can signal appliances to adjust energy use when needed, aligning the grid's variable supply and demand. Actively calling upon buildings to operate flexibly could boost grid reliability, help get the most from clean energy, and save billions of dollars. Rather than operating as net zero islands, these smart buildings would contribute to overall energy system efficiency, helping lower costs for all energy users. As cooling demand rises, we have the opportunity to re-imagine all of our buildings as a vast fleet of thermal batteries. Refrigerators, freezers, and whole buildings can be pre-cooled to ride through the hottest parts of the day, or electric water heaters can turn on at intelligent times effectively storing electricity in thermal energy and thus providing a steady ballast for the electric grid's shorter variations.[3]

1 https://wallbox.com/en_us/bidirectional-ev-charger
2 https://energycentral.com/c/ec/can-buildings-help-regulate-power-grid-and-integrate-renewable-energy
3 https://www.forbes.com/sites/energyinnovation/2019/08/26/building-electrification-could-add-hundreds-of-millions-of-batteries-to-the-grid/#2f1d92a6213f

Credit	Streamlined Interconnection and Net Metering Policies (Credit 8) - CLARIFICATION
Proposal	Contribute references to best practices.
GBCI Response	GBCI agrees with the proposal.
Change	Append the following to the STANDARDS AND REFERENCES section of this credit (in page 225): EPA Energy and Environment Guide to Action: State Policies and Best Practices for Advancing Energy Efficiency, Renewable Energy, and Combined Heat and Power California Public Utilities Commission Electric Rule No. 21 for Generating Facility Interconnections
Background	https://www.epa.gov/statelocalenergy/energy-and-environment-guide-action The EPA has interconnection and net metering policy guidelines (Chapter 7.3): Standard interconnection and net metering rules for distributed generation (DG) systems, such as renewable energy and combined heat and power (CHP), are policies used by states to accelerate the development of clean energy supply. Grid-connected DG systems can meet some or all their host's electricity needs. Renewable energy systems potentially offer reliable, but intermittent, zero emissions energy at or near the point of energy use. CHP offers an efficient, clean, and reliable approach to generating both power and thermal energy from a single fuel source by recovering the waste heat for another beneficial purpose. [1]

Credit	Other Tools and Financial Incentives (Credit 9) - CORRECTION
Proposal	Add in controllable water heaters as a technology option.
GBCI Response	GBCI agrees with the proposal.
Change	Add the content highlighted in red as 4th bullet to OPTION 1. THIRD-PARTY TOOLS AND SERVICES (in page 227): • Advanced thermostats that can communicate directly with advanced meters • Building energy management systems • Electricity or chilled water storage • Grid integrated controllable water heater and appliances
Background	Controllable water heaters and smart appliances are becoming a more common option to shift energy consumption and should be featured as a relevant technology to provide utility services. An example article that describes this market can be found here: https://www.utilitydive.com/news/utilities-in-hot-water-realizing-the-benefits-of-grid-integrated-water-hea/445241/

1 https://www.epa.gov/sites/production/files/2017-06/documents/gta_chapter_7.3_508.pdf

Credit	Aggregation (Credit 10) - CLARIFICATION
Proposal	Add in additional context around the definition of aggregation.
GBCI Response	GBCI agrees with the proposal.
Change	Update the Further Explanation section of this credit as follows (in page 231): FURTHER EXPLANATION Aggregation is a general term that can be defined as the act of grouping distinct agents in a power system (i.e. consumers, producers, prosumers, or any mix thereof) to act as a single entity when engaging in power system markets (both wholesale and retail) or selling services to the system operator(s). Other PEER topics provide points toward supply choice as well as demand response. In both cases, these areas can be amplified through aggregation. From a supply perspective, aggregation can be achieved in three ways. 1. In community aggregation, a municipality pools the buying power of its buildings, residents, and small businesses to purchase electricity on their behalf. This creates an opportunity to reduce costs and generate revenue from new electricity markets while keeping local government officials accountable to their constituents and open to public scrutiny. Community aggregation includes market segments, such as low-income groups, that may be unattractive to suppliers. 2. In addition, energy supply aggregation can also occur when a group of companies or local institutions partner together to directly purchase energy from a single developer, or multiple developers, at smaller volumes while retaining the economic advantages of a high-volume purchase. 3. Finally, energy supply aggregation can take the form of digital aggregation in deregulated states such as Texas and Ohio. In these markets, software companies provide energy procurement choice where they can bundle customers together to get a preferred rate / structure. Regardless of how customers work together to achieve scale in their energy procurement, there can be benefits to uniquely offset bills from purchased or self-generated energy. There are two approaches to implementing meter aggregation. Physical aggregation requires all meters on properties owned and leased by a customer feed into a single point of contact for the utility. This simplifies the transaction by allowing a single meter to measure the customer's total electric service. Virtual aggregation uses the billing process, rather than physical wiring, to pool customers: meter readings are totaled at the time of billing.

	Virtual aggregation uses the billing process, rather than physical wiring, to pool customers: meter readings are totaled at the time of billing. This approach has the advantage of allowing the owner of multiple properties in different locations to offset the electricity use of all properties by installing renewable generation systems on the best-suited properties; those that generate surplus energy, then offset the usage of the others. The credit or compensation or billing terms for the excess electricity produced by customer or tenant should be stated in the service agreement with the utility. The distribution kilowatt-hour rate credit can be applied monthly or annually (depending on the utility or local jurisdiction) against kilowatt-hour distribution usage. Finally, from a demand perspective, aggregation can also be used to group customers together to participate in demand response. As a group, customers can more easily participate in utility programs and/or wholesale markets where they get paid for reducing net load.

Credit	Advanced External Interface (Credit 11) - CLARIFICATION
Proposal	Add in other well recognized and regarded communication protocols.
GBCI Response	GBCI agrees with the proposal.
Change	Add the following content to the Further Explanation section of this credit (page 235): COMMUNICATION PROTOCOLS Industry communication protocols such as IEEE 2030.5, IEC 61850, IEEE 1815 (DNP3), and Sunspec Modbus will support some - if not all - of these functions and should be leveraged to the full extent possible. DNP3, Modbus, Goose (Generic Object Oriented Substation Event) messaging can be considered. EXTERNAL INTERFACE MODULES – No Change OPENADR 2.0 – No Change
Background	IEEE 1547 was revised in 2018 to require Distributed Energy Resources (DERs) to include three core communications specifications: Sunspec Modbus, IEEE2030.5, or IEEE1815 (DNP3). They provide significant benefits to the features required for DERS: https://sunspec.org/wp-content/uploads/2020/01/Recommendations-for-Trust-and-Encryption-in-DER-Interoperability-Standards-SAND2019-1490.pdf IEC 61850 is an international standard defining communication protocols for intelligent electronic devices at electrical substations. It enables integration of all protection, control, measurement, and monitoring functions and additionally provides the means for high-speed substation protection applications.

INNOVATION

Credit	Innovation (Credit 1) - CORRECTION
Proposal	Credit Option 1 – Innovation: Addition of Pilot credits Credit Option 2 – Exemplary Performance: Addition of new exemplary performance credits recommended by Advisory Committee
GBCI Response	This is part of GBCI's COVID response strategies.
Change	The following content (highlighted in red) to be updated to the credit requirements (in page 247): REQUIREMENTS Project teams can use any combination of innovation and exemplary performance strategies. OPTION 1. INNOVATION (1-2 POINTS) Achieve significant, measurable energy and environmental performance using a strategy not addressed in the PEER rating system. Identify the following: • Intent of the proposed innovation credit • Proposed requirements for compliance • Proposed submittals to demonstrate compliance • Approaches or strategies to meet the requirements OR PEER PILOT CREDITS (1–2 POINTS) Achieve any one of the PEER Pilot Credits listed below: • PEER Pilot Credit 1 – Safety First: Electrical System Operations, Management and Safety (Cities and Utilities and Campuses Only) • PEER Pilot Credit 2 – Safety First: Transit – Electrical System Operations, Management and Safety (Transits Only) • PEER Pilot Credit 3 – Safety First: Accelerate Digital Transformation (Cities and Utilities and Campuses Only) OPTION 2. EXEMPLARY PERFORMANCE (1–3 POINTS) Achieve exemplary performance—typically, achieving double the credit requirements (1 point) or the next incremental percentage threshold as stated in the relevant credit requirements (1 point per threshold, up to a maximum of 3).

	Projects may attempt Innovation points for the following credits: • RR Credit: Reliability Performance Assessment • RR Credit: Damage and Exposure Prevention • EE Credit: System Energy Efficiency Coefficient Improvement • EE Credit: Environmental Impact Disclosure and Management • OP Credit: Risk Assessment and Mitigation • OP Credit: Advanced Metering Infrastructure • GS Credit: Load Duration Curve Optimization • GS Credit: Demand Response

Credit	PEER Education (Credit 2) - CORRECTION
Proposal	To include information about PEER Pro Badge.
GBCI Response	PEER Pro Badge was introduced October 1, 2020.
Change	The content highlighted in red to be updated to the credit requirement in page 251: REQUIREMENTS At least one member of the project team or a project consultant must achieve the PEER Pro Badge, must participate in a PEER workshop given by GBCI and/or complete a certification program or course in smart grid technology accredited by an international organization (1 point).