Treatment of CHP in LEED® for Building Design and Construction: New Construction and Major Renovations

May 15, 2015

Introduction

Building energy performance constitutes the largest point-earning component within the LEED® green building program, and CHP can help projects maximize the number of points earned.

The purpose of this fact sheet is to:

- Introduce CHP and its benefits to architects and engineers
- Summarize how CHP is treated under the LEED® for Building Design and Construction: New Construction and Major Renovations rating system (LEED® BD+C: New Construction).

The fact sheet focuses on projects where the CHP outputs (electrical and thermal) are intended to be used primarily within the project boundary (i.e., CHP outputs do not supply a district energy system). The fact sheet addresses the "Energy & Atmosphere (EA): Minimum Energy Performance" prerequisite and the "EA: Optimize Energy Performance" credit since these have the greatest relevance to CHP within the EA credit category.[1,2] Information for both LEED® v2009 and LEED® v4 is presented.[3,4]

Specific sections address:

- What is CHP?
- Importance of the "Energy & Atmosphere: Optimize Energy Performance" Credit
- CHP's Demonstrated Point Impact
- Summary of the "Energy & Atmosphere: Minimum Energy Performance" Prerequisite
- Summary of the "Energy & Atmosphere: Optimize Energy Performance" Credit
- USGBC Methodology for Modeling CHP.

Appendices include:

- Appendix A: LEED® Research Conducted by the CHP Partnership
- Appendix B: Summary of Options 2 and 3 Under the "Energy & Atmosphere, Minimum Energy - Performance" Prerequisite and "Optimize Energy Performance" Credit -
- Appendix C: Project Profiles of LEED®-Certified Buildings with CHP.

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[1] Other EA credits may also relate to CHP [e.g., those that relate to Demand Response, Renewable Energy Production, - Enhanced Refrigerant Management]. Future research may explore to what extent these credits (and non-EA credits) relate to - CHP. -

[2] In both LEED® v2009 and LEED® v4, Minimum Energy Performance is required of all projects seeking certification. Optimize - Energy Performance is a credit and allows projects to earn points. In LEED® v2009 and LEED® v4, Minimum Energy - Performance is known as Energy & Atmosphere Prerequisite 2 (EAp2). In LEED® v2009, Optimize Energy Performance is - known as Energy & Atmosphere Credit 1 (EAc1), and in LEED® v4 it is known as Energy & Atmosphere Credit 2 (EAc2). -

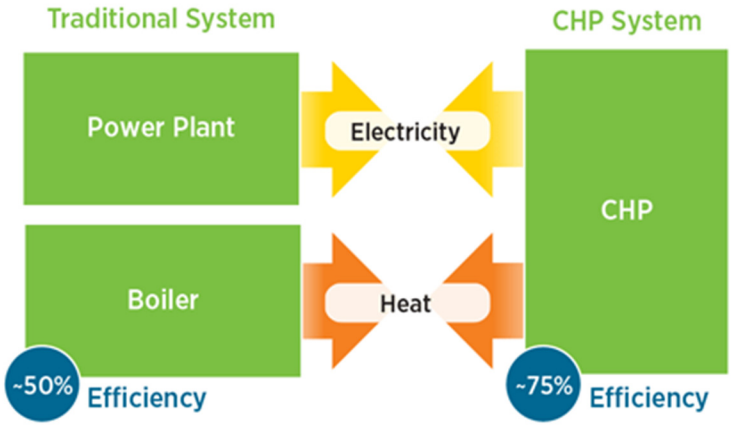
[3] The USGBC membership voted to adopt LEED® v4 on July 2, 2013. The rating system, including reference guides, was - launched at the 2013 Greenbuild International Conference & Expo. Project teams will be allowed to register for either LEED® - 2009 or LEED® v4 until October 31, 2016, after which only LEED® v4 will be available. -

[4] LEED® research conducted by the CHP Partnership to develop this fact sheet is presented in Appendix A. -

What is CHP? -

CHP is an efficient and clean approach to generating electric power and useful thermal energy from a single fuel source (most often natural gas). CHP is used either to replace or supplement conventional separate heat and power (SHP) (typically purchased electricity from a utility and an onsite boiler). Instead of purchasing electricity from the local utility and burning fuel in an on-site furnace or boiler to produce thermal energy, a facility can use CHP to provide both energy services in one energy-efficient step.

CHP requires less fuel to produce a given energy output



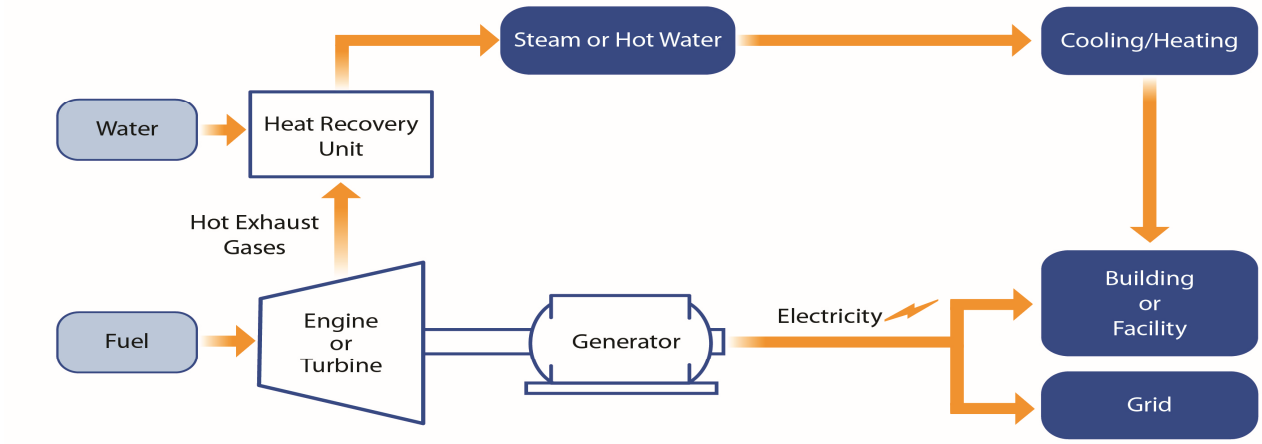
Buildings that utilize CHP can enjoy the following benefits:

- **Lower energy costs.** CHP can save buildings considerable money on their energy bills due to its high efficiency and can provide a hedge against unstable energy costs.
- **Reduced air emissions.** Because less fuel is burned to produce each unit of energy output, CHP reduces emissions of greenhouse gases and other air pollutants.
- **Reliable energy supply.** CHP can be designed to provide high-quality electricity and thermal energy to a building regardless of what might occur on the power grid, such as a grid outage.

CHP can be utilized in a variety of applications that have significant electric and thermal loads. CHP has a proven track record of success providing electricity, steam, and hot water to applications such as hospitals, schools, university campuses, hotels, nursing homes, office buildings and apartment complexes.

Typical CHP Configuration

CHP systems generate electricity by burning fuel (typically natural gas) to generate electricity and then use a heat recovery unit to capture heat from the combustion system's exhaust stream. This heat is converted into useful thermal energy, usually in the form of steam or hot water.



Is My Building a Good Candidate for CHP?
€ Are average electricity rates more than $.07/ kWh (including generation, transmission, and distribution)? € Is there a need to reduce energy costs or minimize expose to possible future increases in electricity rates? € Is the building located in a deregulated electricity market? € Is power reliability a concern? Would there be a substantial financial impact power went out? € Does the building operate for more than 5,000 hours/year? € Are there thermal loads throughout the year (including steam, hot water, chilled water, and hot air)? **"Yes" answers to any of these of these questions suggests the building may be a good candidate for CHP.**

Importance of the "Energy & Atmosphere: Optimize Energy Performance" Credit

The Optimize Energy Performance credit rewards buildings for enhanced energy efficiency, and is the maximum LEED® point-earning credit (in all LEED® credit categories).

➔ Achieving all of the available Optimize Energy Performance credits would represent 47.5 percent (LEED® v2009) and 45 percent (LEED® v4) of the points needed to earn certification at the "LEED® Certified™" level.

Table 1 illustrates the importance of this credit in both LEED® v2009 and LEED® v4.

Table 1: Importance of Energy & Atmosphere: Optimize Energy Performance

LEED Version	Total Number of Points Available	Total Number of Points Needed to Earn LEED® Certified™*	Total Number of Optimize Energy Performance Points Available
LEED® v2009	110	40	19
LEED® v4	110	40	18 (16 for Schools; 20 for Healthcare)

*LEED® Certified™ is the lowest level that can be achieved under LEED. LEED Silver® is earned with 50 points; LEED Gold® is earned with 60 points; LEED Platinum® is earned with 80 points.

CHP's Demonstrated Point Impact

CHP's efficiency and cost saving benefits can greatly contribute to a project's ability to earn points under the Optimize Energy Performance credit. One of EPA's CHP Partners calculated the point contribution for eight buildings in design (as of October 2014), modeling each building twice—once using separate heat and power (SHP) and once using CHP. Table 2 shows the anticipated point impact CHP has on these eight buildings, which ranges from 5-9 additional points. For two of the projects (Buildings 7 and 8), the Minimum Energy Performance prerequisite would not be met without the use of CHP.

Differences in the point impact of CHP among the various buildings are due to building-specific variables including the performance parameters of the specific system, how many hours it runs, its power/heat ratio, and usable power and heat outputs relative to the specific building loads.

Table 2: CHP's Demonstrated Point Impact on 8 High-Rise Residential Buildings

Building	# of Apts.	CHP Size/Type	Pts. w/out CHP	Pts. w/CHP
1	620	130 kW Microturbine	2	8
2	340	65 kW Microturbine	2	10
3	500	200 kW Microturbine	2	7
4	100	65 kW Microturbine	1	7
5	185	65 kW Microturbine	3	9
6	250	65 kW Microturbine	1	7
7	230	200 kW Microturbine	0*	9
8	40	75 kW Reciprocating Engine	0*	4

* Would not meet Minimum Energy Performance Prerequisite without CHP.

Estimate Energy Cost Savings and Points Achieved with CHP

The LEED® CHP Calculator is an Excel-based tool that estimates the energy cost savings and Optimize Energy Performance points a building can achieve with CHP. The calculator is intended to be used by building design teams at the very early stages of building design to approximate the energy cost savings and LEED® points from a CHP system.

- Users answer 8 simple questions about the Baseline Building energy use. Default values are available, but the user must know the baseline building's average monthly electric and heating demands.
- The calculator then selects a CHP system based on user inputs and provides an annual estimate of energy cost savings with CHP compared to using SHP, as well as an estimate of the number of Optimize Energy Performance points a building could achieve with CHP in both LEED® v2009 and LEED® v4.

Download the LEED® CHP Calculator.

Summary of the "Energy & Atmosphere: Minimum Energy Performance" Prerequisite[5]

The Minimum Energy Performance prerequisite (EAp2) must be met by all projects seeking LEED® certification. LEED® provides three compliance pathways for meeting EAp2 (certain compliance pathways—Options 2 and 3—are available only for certain building types, but Option 1 is available to all building types). However, only Option 1 is likely to be considered for buildings with CHP systems as it allows projects with CHP to earn the most points for its superior efficiency.[6]

The compliance path (i.e., option) chosen for EAp2 must also be used to earn points under the Optimize Energy Performance credit. This is important because there are a significantly fewer points available under Optimize Energy Performance for the prescriptive paths—Option 2 has a maximum of 1 point available under LEED® v2009

[5] LEED® credit language for Minimum Energy Performance is available at: http://www.usgbc.org/node/1731017?return=/credits/new-construction/v2009/energy-%26-atmosphere (LEED® v2009) and http://www.usgbc.org/node/2613358?return=/credits/new-construction/v4/energy-%26-atmosphere (LEED® v4).

[6] Projects with CHP are not precluded from using Options 2 or 3 to comply with EAp2, but it is unlikely that these options would be chosen given that their use for EAp2 also requires their use under the Optimize Energy Performance credit, where few points can be earned using these options.

and 6 points available under LEED® v4; Option 3 has a maximum of 3 points available (Option 3 is only available under LEED® v2009).

Of the three options, only Option 1 allows a project to use Option 1 under the Optimize Energy Performance credit, with the potential to earn 19 points under LEED® v2009 and 18 points under LEED® v4. Use of Option 2 or 3 to meet EAp2 limits the potential points that can be earned under the credit from zero to six points (depending on the Option and the version of the rating system).

Some building types may not have a choice and may have to comply with Option 1—both Options 2 and 3 are prescriptive compliance paths that are available only to specific building types and sizes.

See Appendix B for information related to Options 2 and 3.

Option 1: Whole Building Energy Simulation (Performance-based)

- LEED® v2009
    - Projects must demonstrate savings of 10% (New Construction) or 5% (Major Renovations) in the proposed building (the "Design Building") compared to a baseline case meeting the minimum requirements of ASHRAE 90.1-2007 (the "Baseline Building"). This is done by using a model as described in the Appendix G Performance Rating Method (PRM) of ASHRAE 90.1-2007.
    - The model described in the Appendix G PRM of ASHRAE 90.1-2007 is based on cost performance of the building (e.g., the above referenced 10% [New Construction] savings are based on cost rather than on energy or emissions savings.
- LEED® v4
    - Projects must demonstrate savings of 5% (New Construction), 3% (Major Renovations), and 2% (Core and Shell) in the proposed building (the "Design Building") compared to a baseline case meeting the minimum requirements of ASHRAE 90.1-2010 (the "Baseline Building"). This is done using a model as described in the Appendix G PRM of ASHRAE 90.1-2010.
    - The model described in the Appendix G PRM of ASHRAE 90.1-2010 is based on cost performance of the building (e.g., the above referenced 5% [New Construction] savings are based on cost rather than on energy or emissions savings.

Methodology for Modeling Combined Heat & Power for EAp2/c1 in LEED® 2009

The U.S. Green Building Council issued a guidance document presenting a methodology for incorporating CHP into the simulation required through Option 1: Methodology for Modeling Combined Heat & Power for EAp2/c1 in LEED® 2009 (onsite systems only).

The U.S. Green Building Council indicates that this methodology also applies to LEED® v4.

It is available for download at:
http://www.usgbc.org/resources/methodology-modeling-combined-heat-amp-power-eap2c1-leed-2009

Summary of the "Energy & Atmosphere: Optimize Energy Performance" Credit[7]

The Optimize Energy Performance credit (EAc1—LEED® v2009, EAc2—LEED® v4) includes the same compliance pathways as EAp2 (Option 3, however, is not available in LEED v4). Whichever compliance pathway is chosen for EAp2 is also used to earn points under the Optimize Energy Performance credit:

See Appendix B for information related to Options 2 and 3.

Option 1: Whole Building Energy Simulation (Performance-based)

- Option 1 is the only option that offers the potential to earn the maximum number of points available for this credit.[8] This requires whole building energy simulation using a computer model.
- As discussed above, to meet the prerequisite, EAp2, the project must reduce energy cost by a minimum percentage compared to a Baseline Building meeting the minimum requirements of ASHRAE 90.1.
    - LEED® v2009 – Projects must demonstrate savings of 10% (New Construction) or 5% (Major Renovations) in the proposed building (the "Design Building") compared to a baseline case meeting the minimum requirements of ASHRAE 90.1-2007 (the "Baseline Building"). This is done using a model as described in the Appendix G PRM of ASHRAE 90.1-2007.
    - LEED® v4 – Projects must demonstrate savings of 5% (New Construction), 3% (Major Renovations), and 2% (Core and Shell) in the proposed building (the "Design Building") compared to a baseline case meeting the minimum requirements of ASHRAE 90.1-2010 (the "Baseline Building"). This is done using a model as described in the Appendix G PRM of ASHRAE 90.1-2010.

**Once the prerequisite has been met, projects can then earn points for additional percentage increases in energy cost reduction up to 19 points (LEED® v2009) and 18 points (LEED® v4). Table 3 presents the points available under the Optimize Energy Performance credit within the LEED® BD+C: New Construction rating system (LEED® v2009 and LEED® v4).

The energy modeling and documentation process is identical for EAp2 and Optimize Energy Performance, Option 1. The exact reduction is established through running of the energy model.

[7] LEED® credit language for Optimize Energy performance is available at: http://www.usgbc.org/node/1731022?return=/credits/new-construction/v2009/energy-%26-atmosphere (LEED® v2009) and http://www.usgbc.org/node/2614273?return=/credits/new-construction/v4/energy-%26-atmosphere (LEED® v4).

[8] Note that in LEED® v2009, projects with an improvement over baseline of 50% or more may be considered for an additional point under the Innovation in Design Category.

Table 3: Points for Percentage Improvement in Energy Costs (New Construction) -

Percent Improvement over Baseline	Points	
	LEED® v2009	LEED® v4
6%	---	1
8%	---	2
10%	---	3
12%	1	4
14%	2	5
16%	3	6
18%	4	7
20%	5	8
22%	6	9
24%	7	10
26%	8	11
28%	9	---
29%	---	12
30%	10	---
32%	11	13
34%	12	---
35%	---	14
36%	13	---
38%	14	15
40%	15	---
42%	16	16
44%	17	---
46%	18	17
48%	19	---
50%	---	18

USGBC Methodology for Modeling CHP

To account for CHP in the energy model required for Option 1 of EAp2 and the Optimize Energy Performance credit USGBC developed the document *Methodology for Modeling Combined Heat & Power for EAp2/c1 in LEED® 2009* (available at: http://www.usgbc.org/resources/methodology-modeling-combined-heat-amp-power-eap2c1-leed-2009).[9] The document applies only to on-site CHP systems which can either have the same ownership as the project (Case 1) or different ownership than the project (Case 2).

In accordance with the Appendix G PRM of ASHRAE 90.1, the parameters of the calculation of the CHP performance are as follows:

CHP Methodology Basics:

- Energy requirements for the Baseline Building (which must meet requirements of ASHRAE 90.1) are estimated using an energy model.
- Based on the model output, the cost of purchased grid electricity and purchased fuel to generate thermal energy is calculated.
- The same process is used with the Design Building (the one with CHP).
- The cost of fuel for the CHP and any purchased electricity or fuel used to produce thermal energy is calculated.
- Optimize Energy Performance points are calculated based on the percentage reduction in energy cost for the Design Building.

Case 1 – Same ownership, CHP inside project site boundaries

- The Baseline Building heating and cooling plant utilizes the backup energy source(s) of the Design Building, or electricity if no backup source is present or specified.
    - For the electrical output of the CHP system the backup source is purchased electricity.
    - For the CHP thermal output, the backup energy source in the context of the methodology is the actual backup energy source planned for the Design Building. For example, if a boiler is planned to back up the CHP thermal output, the backup energy source would be the boiler fuel (e.g., electricity or natural gas).
    - For CHP systems with no thermal backup, the Baseline Building must utilize purchased electricity to meet all applicable ASHRAE requirements.
- When all electricity and thermal outputs (heating or cooling) of the CHP are used within the Design Building, the electricity produced is considered "free", as is the produced thermal energy. The input fuel for the CHP and any additional purchased energy is charged to the Design Building.
- In some cases some electricity generated by the CHP is sold to the grid or an external customer. In such cases, thermal and electrical outputs of the CHP used within the Design Building are treated as above. All electricity sold externally is termed a "process", and both the Design and Baseline Buildings are charged with the input fuel associated with the generation of that electricity. The thermal output associated with the generation of sold electricity and used by the Design Building is considered "free", i.e., no additional fuel is charged to the design building for this thermal output, because none is used to produce it. Revenue, if any, associated with the sale of exported electricity does not reduce the energy costs of the design building for the purpose of calculating the percentage improvement in the design building performance rating.

Case 2 – Different ownership, CHP inside project site boundaries

- The rates charged to a building by a CHP developer or operator for electricity and thermal outputs typically include factors for capital recovery, maintenance, and other non-energy costs. Since these types of costs are not included in the PRM calculation for other energy efficiency equipment and measures within the Design Building, they are also excluded for the CHP calculation regardless of the ownership of the system.

[9] USGBC indicated this document also applies to LEED® v4.

- Essentially the CHP system in Case 2 is treated the same as Case 1, with the input fuel charged to the Design Building (at the prevailing utility rate as it applies to the Design Building) for all CHP outputs used within the building, and charged to both the Design and Baseline Buildings for "process" electricity sold externally.
- As with Case 1, the thermal output associated with the generation of sold electricity and used by the Design Building is considered "free."

EPA's Combined Heat and Power Partnership

The CHP Partnership seeks to reduce the environmental impact of electric power generation by promoting the use of CHP. The Partnership works closely with energy users; the CHP industry; state, local, and tribal governments; clean air officials; and other clean energy stakeholders to facilitate the development of new projects.

The CHP Partnership offers its Partners and other stakeholders:

- Basic information about CHP and its benefits
- Technical tools and resources such as the Catalog of CHP Technologies and the CHP Emissions Calculator
- Information about state and federal CHP policies and incentives
- Guidance on CHP project development
- ENERGY STAR® CHP Awards
- CHP news and webinars

Visit us at: www.epa.gov/chp

Appendix A: LEED® Research Conducted by the CHP Partnership

Research conducted by the CHP Partnership has focused on the treatment of CHP in the LEED® BD+C: New Construction rating system (LEED® v2009 and LEED v4). EPA reviewed the following resources:

- LEED® credit language for EA: Minimum Energy Performance and EA: Optimize Energy Performance for both LEED® v2009 and LEED® v4 [available at: http://www.usgbc.org/credits/new-construction/v2009/energy-%26-atmosphere (LEED® v2009) and http://www.usgbc.org/credits/new-construction/v4/energy-%26-atmosphere (LEED® v4)].
- LEEDuser (www.leeduser.com).
- USGBC's *Methodology for Modeling Combined Heat & Power for EAp2/c1 in LEED® 2009* (available at: http://www.usgbc.org/resources/methodology-modeling-combined-heat-amp-power-eap2c1-leed-2009).[10]
- USGBC Credit Interpretation Requests relevant to CHP.

EPA CHPP also spoke with the following:

- Stakeholders involved with LEED® project certification.
- USGBC staff, Green Building Certification Institute (GBCI) staff, and LEED® Energy & Atmosphere Technical Advisory Group members.
- Stakeholders involved with projects where CHP is being used to help earn LEED® points.

[10] The U.S. Green Building Council has indicated that this methodology is also to be used for LEED® v4.

Appendix B: Summary of Options 2 and 3 Under the "Energy & Atmosphere, Minimum Energy Performance" Prerequisite and "Optimize Energy Performance" Credit

Minimum Energy Performance Prerequisite:

Option 2: ASHRAE Advanced Energy Design Guides (Prescriptive)[11]

- LEED® v2009
  - Projects must comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide[12] appropriate to the project scope.
  - Applicable Advanced Energy Design Guides include:
    - Small Office Buildings (less than 20,000 square feet)
    - Small Retail Buildings (less than 20,000 square feet)
    - Small Warehouses and Self Storage Buildings (less than 50,000 square feet)
- LEED® v4
  - Projects must comply with the mandatory and prescriptive provisions of ANSI/ASHRAE/IESNA Standard 90.1–2010, with errata.
  - Projects must comply with the HVAC and service water heating requirements, including equipment efficiency, economizers, ventilation, and ducts and dampers, in Chapter 4, Design Strategies and Recommendations by Climate Zone, for the appropriate ASHRAE 50% Advanced Energy Design Guide and climate zone. ASHRAE 50% Advanced Energy Design Guides are available for:
    - Small to Medium Office Buildings (less than 100,000 square feet)
    - Medium to Large Box Retail Buildings (20,000 to 100,000 square feet)
    - K–12 School Buildings
    - Large Hospitals (over 100,000 square feet)

Option 3: Advanced Buildings Core Performance Guide (Prescriptive)[13]

- LEED® v2009
  - Projects must comply with the prescriptive measures identified in the Advanced Buildings™ Core Performance™ Guide (CPG) developed by the New Buildings Institute.
  - The building must meet the following requirements:
    - Less than 100,000 square feet.
    - Comply with Section 1: Design Process Strategies, and Section 2: Core Performance Requirements.
    - Health care, warehouse and laboratory projects are ineligible for this path.
- LEED® v4
  - Projects must comply with the mandatory and prescriptive provisions of ANSI/ASHRAE/IESNA Standard 90.1-2010, with errata.
  - Projects must comply with Section 1: Design Process Strategies, Section 2: Core Performance Requirements, and the following three strategies from Section 3: Enhanced Performance Strategies, as applicable:
    - 3.5 Supply Air Temperature Reset (VAV).
    - 3.9 Premium Economizer Performance.
    - 3.10 Variable Speed Control.
  - To be eligible for Option 3, the project must be less than 100,000 square feet.

[11] ASHRAE's Advanced Energy Design Guides are available at: https://www.ashrae.org/standards-research--technology/advanced-energy-design-guides. -

[12] ASHRAE Advanced Energy Design Guides are Available at: https://www.ashrae.org/standards-research--technology/advanced-energy-design-guides. -

[13] The Core Performance Guide is available for purchase at: http://www.advancedbuildings.net/core-performance. -

Optimize Energy Performance Credit:

Option 2: ASHRAE Advanced Energy Design Guides (Prescriptive)

- LEED® v2009
    - Projects can only earn 1 point.
    - Projects must comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide appropriate to the project scope. Applicable Advanced Energy Design Guides include:
        - Small Office Buildings (less than 20,000 square feet)
        - Small Retail Buildings (less than 20,000 square feet)
        - Small Warehouses and Self Storage Buildings (less than 50,000 square feet)
- LEED® v4
    - Projects can earn 1-6 points.
    - Projects must implement and document compliance with the applicable recommendations and standards in Chapter 4, Design Strategies and Recommendations by Climate Zone, for the appropriate ASHRAE 50% Advanced Energy Design Guide and climate zone. ASHRAE 50% Advanced Energy Design Guides are available for:
        - Small to Medium Office Buildings (less than 100,000 square feet)
        - Medium to Large Box Retail Buildings (20,000 to 100,000 square feet)
        - K–12 School Buildings
        - Large Hospitals (over 100,000 square feet)

Option 3: Advanced Buildings Core Performance Guide (Prescriptive)

- Under LEED® v2009, compliance with the prescriptive measures of the CPG offers an opportunity for a maximum of 3 points. One point is earned for compliance with the CPG. Up to two additional points are available to projects that implement performance strategies listed in Section 3: Enhanced Performance. For every 3 strategies implemented from this section, 1 point is available.
- LEED® v4 only allows projects to earn points by following Option 1 or Option 2.

Appendix C: Project Profiles of LEED®-Certified Buildings with CHP

Whole Foods Market – Brooklyn, NY

- Project completion 2014
- 56,000 square feet
- Seeking LEED Platinum®
- Plans to achieve all 19 Optimize Energy Performance points
- CHP system
    - 157 kW Caterpillar reciprocating engine with additional 250 kW backup generator
    - Offers the store black start and islanding capability (meaning it can continue to operate in the event of a grid outage).
- 100 and 168 ton Broad absorption chillers
    - No (synthetic) man-made chemical refrigerants
    - CO_2 direct expansion (transcritical) refrigeration system
    - Sub cooling provided by CHP for added efficiency
- 320 kW solar PV canopy array with rain water catchment for irrigation
- NYSERDA incentive participant

Macedonia Apartments – Flushing, NY

- Project completion estimated 2015
- 147,950 square feet; 14 stories
- 200 kW CHP plant consisting of two Tecogen InVerde 100 kW - modules -
- On track for LEED Gold® (75 points)-v2009
- CHP contributed to 16 points awarded for the “Energy and - Atmosphere, Optimize Energy Performance” credit -
- Projected annual savings ~ $200,000
- Heat recovered from the CHP plant used to make building HVAC heat, domestic hot water, and heat input into the absorber chillers
- CHP system capable of operating off grid if the utility goes down

Lafayette Apartments – Harlem, NY

- Project completion estimated 2015
- 169,163 square feet; 8 stories
- 300 kW CHP plant consisting of three Tecogen InVerde 100 kW modules
- On track for LEED Gold® (75 points)-v2009
- CHP contributing to an estimated 10 points awarded for the “Energy and Atmosphere, Optimize Energy Performance” credit
- Projected annual savings ~ $300,000
- Heat recovered from the CHP plant used to make building HVAC heat, domestic hot water, and heat input into the absorber chillers
- CHP system capable of operating off grid if the utility goes down