T-24 energy and LEED energy modeling credits: Understanding the similarities and differences

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Introduction

- We have 40 minutes to take a quick look at two similar but not identical processes
- Use California T-24-2005 performance energy budget in place of ANSI/ASHRAE/IESNA Standard 90.1-2007 approach to the LEED2009 NC EAcr1 Option 1 approach
- Assume that the audience is very familiar with building energy modeling and simulation tools and the California Non Residential ACM model

Agenda

- Brief overview of LEED point structure
- Review LEED program goals
  - LEED EAcr1 - 3 options to credits
  - LEED program is cost based not energy (kbtu/sqft/yr) based
  - How are T-24 and ANSI/ASHRAE/IESNA standards used in this context
- Where does the LEED energy modeling requirements differ with the T-24 procedures

LEED2009 NC point structure

- LEED2009 NC point structure has changed.
  - Now based on a possible 110 points instead of the old 69 points for LEED NCv2.2
- Sustainable Sites 26 points
- Water Efficiency 10 points
- Energy & Atmosphere 35 points
  - Double the possible impact now (32% total)
- Materials & Resources 14 points
- Indoor Environmental Quality 15 points
- Innovation & Design 6 points
- Regional Priority (NEW) 4 points

LEED EA credit 1 Optimize Energy Performance

- Currently three approaches to achieving LEED credits
  - Option 1. Whole Building Energy Simulation – up to 20 points
    - ANSI/ASHRAE/IESNA Standard 90.1-2007 energy budget
    - California T-24-2005 performance energy budget
  - Option 2. Prescriptive Compliance Path: ASHRAE Advanced Energy Design – up to 1 point
  - Option 3. Prescriptive Compliance Path: Advanced Buildings “Core Performance” – up to 3 points

LEED EA credit 1 Optimize Energy Performance

- CABEC members will typically focus on the Option 1 energy model approach
- It is important that the energy modeler download and be familiar with the rules that govern the baselines for both the California Energy Code and the ANSI/ASHRAE/IESNA standards.
- We find that using EnergyPro the energy modeler has an opportunity to look at T-24 and the 90.1 side by side.
  - Some of the inputs in EnergyPro are different for ASHRAE so be sure to make the appropriate adjustments.

LEED EA credit 1 Optimize Energy Performance

- EA credit 1 – up to 19 points
  - Exemplary Performance. New Buildings: 50%+ - 1 additional credit
- EA credit 2. Onsite Renewable Energy – up to 7 points
  - Renewable energy counts towards EA credit 1 energy performance
  - Exemplary Performance. New Buildings: 15%+ - 1 additional credit
- EA credit 1 & 2 credits together represent
  - Total impact can be up to 25% of a LEED certification and definitely can in easily change a project one level of certification

LEED EA credit 1 Optimize Energy Performance

- EA credit 1 & 2 credits together represent
  - Another opportunity for the CABEC consultant to add another scope of work that can have a large impact.
    - PG&E and other non profits have all sorts of solar classes to get energy consultants up to speed.
    - The solar analysis can be done to determine % of total building energy contribution, system sizing and form the basis for a solar RFP.

LEED EA credit 1 Optimize Energy Performance

- Important difference in evaluating performance between T-24 and LEED
  - T-24 energy analysis and savings are in terms of energy ie Kbtu/SqFt/Year adjusted for TDV.
  - LEED EA credit 1 and 2 are based on energy savings in terms of dollars
    - Expect to use real tariffs (rate structure).
    - Exceptional method savings and additional energy use must be converted to dollars as well.
    - LEED credit documentation is a separate live Adobe document used to document all of the building energy usage.
      - Note this document alone can sometimes take up to 10-15 hours to complete depending on the project complexity. EP5 now has a document that can help simplify this process.

LEED EA credit 1 Energy Modeling Issues

- T-24 energy standards covers basically the following and most measures are easily modeled in EnergyPro
  - Building envelope for spaces that are comfort conditioned
  - HVAC for occupant comfort
  - DHW for domestic water use
  - Lighting indoor and outdoor for people usage
- EA credit 1, Option 1 Whole Building Simulation takes the above measures and adds in the rest of the energy usage on a typical project that most CABEC members would now happily ignore

LEED EA credit 1 Energy Modeling Issues

- Regulated (non-process) energy includes
  - Lighting (e.g., for the interior, parking garage, surface parking, facade, or building grounds, etc. except as noted above), heating, ventilating, and air conditioning (HVAC) (e.g., for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.
- Process energy is considered to include
  - Office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance (e.g., lighting integral to medical equipment) and other (e.g., waterfall pumps)
- Process energy must be at least 25% unless otherwise documented.
- Energy modeling tip: include as much of the building process energy in the energy model as possible to simplify documentation.

LEED EA credit 1 Energy Modeling Issues

- Process loads must be identical for both the baseline building performance rating and the proposed building performance rating.
- Exceptional calculation method may be used to document measures that reduce process loads.
  - Documentation of process load energy savings must include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.

LEED EA credit 1 Energy Modeling Issues

- What does this mean to you as the energy modeler?
  - Significant time and effort evaluating areas of the building energy use that you have not considered before. There may be areas in which you have no familiarity.
  - Much more coordination with design and construction team as well as the building owner to learn more about the anticipated building operation.
    - For instance you will need to determine outdoor lighting operation in order to determine what the overall impact of the lighting in relation to total building energy use as well as to determine energy savings.
    - Another good example is to determine how big an impact of a commercial kitchen might be in a facility that only uses the commercial kitchen 20 or so times a year. A winery is a good example of this issue.

LEED EA credit 1 Energy Modeling Issues

- Here is an example of a summary calculation that includes regulated energy use that must go in the LEED template but is not calculated by EnergyPro

XYZ Production Facilities for XYZ Winery **Baseline Design Energy Cost Not Included in Computer Models**				
Description	**Annual Energy Use**	**Units of annual Energy**	**Cost/Unit of Energy ***	**Total Cost**
Electricity				
Regulated Exterior Lighting	2802	kWh	0.1833	$521.69
Regulated Interior Lighting (Unheated Building)	45801	kWh	0.1833	$8,395.32
				$8,917.01
Proposed Design Energy Cost Not Included in Computer Models				
Electricity				
Description	**Annual Energy Use**	**Units of annual Energy**	**Cost/Unit of Energy**	**Total Cost**
Regulated Exterior Lighting	2683	kWh	0.1833	$499.21
Regulated Interior Lighting (Unheated Building)	38558	kWh	0.1833	$7,067.68
				$7,566.89
* kWh Energy Cost from DOE-2 SIM output file: XYZ_LEED-Final-121009-Proposed-SIM.doc				

LEED EA credit 1 Energy Modeling Issues

- Here is an example of a summary calculation that includes non-regulated energy use that must go in the LEED template but is not calculated by EnergyPro

XYZ Production Facilities for XYZ Winery **Baseline Design Energy Cost Not Included in Computer Models** **Costs have been added to total in LEED EAc1 Table 1.8.1(b) and 1.8.2(b)**				
Description	**Annual Energy Use**	**Units of annual Energy**	**Cost/Unit of Energy ***	**Total Cost**
Electricity				
Unregulated Exterior Lighting (Process)	3012	kWh	0.1833	$552.10
Unregulated Fermentation (Process)	2626	kWh	0.1833	$481.35
Unregulated Barrel Building Cooling/Fans (Process)	30453	kWh	0.1833	$5,582.03
Hot Water Loop Pump (Process)	226	kWh	0.1833	$41.43
				$6,656.91
Propane				
Process Water Heating Summer	385	therms	1.615	$621.78
Process Water Heating Winter	217	therms	1.885	$409.05
				$1,030.82
			Grand Total	**$7,687.73**

Summary

- The USGBC LEED program and the LEED energy credits are great opportunities for energy consultants to learn more about whole building energy modeling.
- There is also potentially greater liability in this consulting.
  - Owners are depending on your energy analysis to be correct and acceptable to the USGBC certification reviewers.
  - Because the LEED energy credits represent such a large percent of a building's LEED certification credits it is vital that the energy consultant understand the California energy code or ANSI/ASHRAE/IESNA standards as much or more than the prospective LEED reviewer.
  - The LEED review process is a closed system with little to no direct contact with the LEED reviewers. Keep this in mind when attempting to model something that may not be well understood.

LEED credits: T-24 & 90.1 modeling

- Questions?

Where to Get More Information

- USGBC: LEED 2009: Technical advancements to the LEED rating system
  - http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1971
- California Energy Commission
  - NonResidential ACM Manual
- ASHRAE
  - *ANSI/ASHRAE/IESNA Standard*90.1-2007 *User's Manual*
- Gilleran Energy Management
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