AABC Commissioning Group AIA Provider Number 50111116

Energy Performance in the new "LEED Normal"

Course Number: CXENERGY1701

Christina Sprows, LEED Green Associate TD Bank

Mark Gelfo, PE, LEED Fellow, CxA, EMP TLC Engineering for Architecture

Justin Mulhollan, PE, LEED BD+C, CEM TLC Engineering for Architecture

April 26, 2017





Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request. CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

This course is registered with AIA



Course Description

This session reviews how energy modeling and renewable energy analysis guided the TD Bank's prototype redesign to improve energy performance and meet new LEED v4 certification goals.

- 1. TD Bank Prototype Redesign
- 2. LEED v4 What's Different
- 3. LEED: Starting From Scratch
- 4. Design Solutions
- 5. Commissioning
- 6. Renewable Energy
- 7. Conclusions: Is this Scalable ?



Learning Objectives

At the end of the this course, participants will be able to:

- 1. Understand the differences between LEED v2009 and LEED v4 requirements, particularly related to energy demand, renewable energy, and commissioning.
- 2. Understand how energy modeling can be used, along with first cost, maintenance, and operating cost, to determine the best system selections and design solutions.
- 3. Perform solar analysis and determine preliminary sizing of PV array along with impacts on building energy demand and LEED points.
- 4. Understand the challenges and best practices associated with attaining LEED V4 Certification for an organization with operations at multiple locations.









TD Bank Path to LEED v4



TD Bank Group

2,400+ retail locations in Canada and US

~23 million sq. ft. globally

~85,000 employees and ~22 million customers worldwide

6th largest bank in North America, by retail network



To be an Environmental Leader

TD's Strategy calls for the environment to be embedded across the organization through four pillars:



Energy & Sustainability Focus Areas

In support of TD's goal **To be an Environmental Leader**, the Enterprise Real Estate team focuses on business transformation to add value by driving green innovation, setting the strategy, and engaging teams to deliver results.

We focus on five lenses to track progress and plan our efforts, to ensure we're working collaboratively towards being as green as our **TD** logo.



TD & LEED





LEED Certified buildings

As of March, 2017

- 191 certified sites in the US and 11 in Canada
- 193 Retail and 9 Corporate certified spaces in NA
- 16 Platinum, 156 Gold, 21 Silver, 9 Certified





Our Prototype

- US retail freestanding prototype
 - LEED for Retail BD+C
- Most are Open 7 days a week
- One story, ~2,500 sq. ft.
- Prototype design that is contextualized
 & used from Maine to Florida
- ~75% of building components remain consistent
- Net electrical consumption varies greatly from 40Kwh to 83kWh*





*These numbers include PV generation which is not sub-metered

The Deadline

April, 2015 - USGBC announced the registration deadline of LEED 2009, allowing users to register projects under the LEED 2009 rating system **until Oct. 31, 2016**. Any new projects being registered after this date would need to be registered under the new LEED v4 guidelines.



- ✓ 40+ pipeline projects registered
- ✓ Not many new adds expected
- ✓ Pick a pilot location to analyze

Updating Our Prototype



The Team

TD – Design, E&S, FM, Construction

Architect Consultant – LEED PM, Project Designers MEP Engineer - HVAC Engineer - Energy Modeler

GBCI rep, General Contractor, Civil Engineer, Commissioning Agent



LEED v4 Work Sessions & Tools



LEED v4 for BD+C: New Construction and Major Renovation - Retail Project Checklist

	Project Hame: TD Bank - Denovo Prototype	
	Dute: 12-9-16	
Y		
1	cwe i lategrative Process	
		in a contract

	2.0		Luca	cion and transportation	PUSSIDIE POBILS.	10
	16		Credit 1	LEED for Heighborhood Development Location	and the other states and	16
	1		Credit 1	Sensitive Land Protection		1
	2		Credit 3	High Priority Site		2
1	3	1	credit +	Surrounding Density and Diverse Uses		5
	3	2	Credit 5	Access to Quality Transit		5
		1	credit e	Bicycle Facilities		1
	1.1	1	Credit Y	Reduced Parking Footprint		1
	1		Ciedit 3	Green Vehicles		1
_		_	-			

1	1	6	Susta	inable Sites	Possible Points:	
Υ.			Revent Construction Activity Pollution Prevention			Required
1	1111		Credit 1	Site Assessment		1
	2	1	credit 2	Site Development-Protect or Restore Habitat		2
	1		Cradit 3	Open Space		1
-		3	credit e	Reinveter Hanagement		3
		2	Credit 5	Heat Island Reduction		2
	1.1	1	Credit e	Light Pollution Reduction		1

4	3	3	Water	r Efficiency	Possible Points: 12
¥.			Photeg 1	Outdoor Water Use Reduction	Required
¥.	1		Preneg 2	Indoor Water Use Reduction	Required
¥.	1		Prierieg 2	Building-Level Water Metering	Required
6	1		Credit 1	Outdoor Water Use Reduction	2
3	2	2	CINES 1	Indoor Water Use Reduction	7
		2	(redit)	Cooling Tower Water Use	2
1			Credit 4	Water Metering	1

11 -1	a .	14	Energy	and Atmosphere Possible Points:	
	1		Prieteq 1	Fundamental Commissioning and Verification	Required
٧			Prevent	Minimum Energy Performance	Required
¥.			meneg s	Building-Level Energy Metering	Required
¥.			Preneg 4	Fundamental Refrigerant Management	Required
	4	.2	Ciedit (Enhanced Commissioning	6
8		10	Credit 1	Optimize Evergy Performance	18
0 5	5	8	Materia	als and Resources Possible Points:	13
Y	-	-	Prereg 1	Storage and Collection of Recyclables	Required
			Present 1	Advage and conection of necyclastics	_

Y			Prereg 1	Storage and Collection of Recyclables	Required
Y			Prereq I	Construction and Demolition Waste Management Planning	Required
	3	2	Credit 1	Building Life-Cycle Impact Reduction	5
		2	Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2	Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
		2	Credit 4	Building Product Disclosure and Optimization - Material Ingredients	2
	2		Credit 5	Construction and Demolition Waste Management	2

2	3	10	Indoor	Environmental Quality	Possible Points:	15
	1		Preneg 1	Minimum Indoor Air Quality Performance		Required
Y			Prereq 2	Environmental Tobacco Smoke Control		Required
	1	2	Credit 1	Enhanced Indoor Air Quality Strategies		2
		3	Credit 2	Low-Emitting Materials		3
1			Credit 3	Construction Indoor Air Quality Management Plan		1
	2		Credit, 4	Indoor Air Quality Assessment		2
		1	Credit 5	Thermal Comfort		1
		2	Credit 6	Interior Lighting		2
	1	2	Credit 7	Daylight		3
1			Credit 8	Quality Views		1

2	4	0	Innovation Possible Points:	6
1	1	1	Credit 1 Innovation: Education Program	1
	1		credit 1 Innovation: Green Cleaning Plan & IPM Policy	1
	1		Credit 1 Exemplary Performance - Renewable Energy Production - 15%	1
	1		credit I Innovation: Green Advantaged Certified	2
	1		credit 1 Innovation or Exemplary Pefromance	2
1			Criwiti 2 LEED Accredited Professional	1

0	2	2	Regional Priority	Possible Points:	4
	1		credit 1 Regional Priority:		1
	1		Credit 2 Regional Priority:		1
		1	Credit 3 Regional Priority:		1
		1	Credit + Regional Priority:		1

22 54 50 Total

	PRENEQUEITES
Transformation Presention	
	Designer Water fan Nalastron 1976
	Indian Valuer Can Malagram - 200-
Building Leviel Vallar Statemet	
	Parallel and the Community of
and the second	and the second s
Annual sector of the	Aparteria and References
	Surger and Surgers and Surgers
Caratory Print and Char	
-	Management and Constrainty -
2	Personal States States
	Statistics and statistics of the

of Real Property lies



1-11



Cartified 40 to 49 points silver 50 to 19 points. Gold 40 to 79 points. Platinum 80 to 11

Possible Points:





LEED v4 – What's Different?





LEED v4: Performance



- Building Codes
- ➢ LEED v4
- Owner Demands
- Value & Cost of Energy Sources
- > Cx, M&V, RetroCx
- Energy Modeling
- Data & Metrics

LEED v4: not just a faster horse....



"If I had asked people what they wanted, they would have said 'faster horses'."

-Henry Ford



...it's about performance

Energy Code Adoption by State



^{*} Adopted new Code to be effective at a later date

Energy Codes Over Time

Relative Energy Performance of ASHRAE 90.1 & IECC



-ASHRAE 90.1 -- IECC

LEED v4 BD+C

Building Design & Construction

- ➢ New Construction
- ≻ Core & Shell
- ➢ Schools
- ➢ Retail
- ➤ Hospitality
- Data Centers
- Warehouses & Distribution Centers

➤ Healthcare

Applies to buildings that are being newly constructed or going through a major renovation















LEED v4 TECHNICAL IMPROVEMENTS: Integrative Process

Identify and use

opportunities to achieve synergies across disciplines and building systems

v4

Use the analyses to inform the **OPR, BOD**, design documents,

Energy Related Systems

- Discovery
- Implementation

Water Related Systems

- Discovery
- Implementation

Energy

Simple Box Energy Model During SD's

- ✓ Site Conditions
- ✓ Massing & Orientation
- ✓ Envelope Attributes
- Lighting Levels
- Thermal Comfort
- ✓ Plug & Process Loads
- ✓ Operational Parameters

Water

Water Budget

- ✓ Indoor Water Demand
- ✓ Outdoor Water Demand
- ✓ Process Water Demand
- Supply Sources



LEED V4 TECHNICAL IMPROVEMENTS:



LEED v4 TECHNICAL IMPROVEMENTS: SUSTAINABLE SITES

- Pr: Construction Activity Pollution Prevention
- Site Assessment
- Protect or Restore Habitat
- Open Space
- Rainwater Management
- Heat Island Reduction
- Light Pollution Reduction: (Includes the BUG!)





LEED v4 TECHNICAL IMPROVEMENTS: ENERGY & ATMOSPHERE

EFFICIENCY FIRST

- Pr: Fundamental & Cx and Verification
- Pr: Minimum Energy Performance
- Pr: Building-Level Energy Metering
- Pr: Fundamental Refrigerant Management
- Enhanced Commissioning
- Optimize Energy Performance
- Advanced Energy Metering
- Demand Response
- Renewable Energy Production
- Enhanced Refrigerant Management
- Green Power and Carbon Offsets

REWARDED FOR THE REDUCTION AND PRODUCTION OF YOUR OWN ENERGY

LEED v2009 BD+C

Energy

LEED v4 BD+C

Energy



Energy Metering

Pre-requisite

Building Level Energy Metering

electricity, natural gas, chilled water, steam, fuel oil, propane, biomass etc.

- Aggregate total building energy consumption
- Track at one-month intervals
- Commit to sharing with USGBC for 5 years

Credit

Advanced Energy Metering

Capture individual end use that is 10% or more of the total annual use.

- Meters must be permanently installed
- Max recording interval of 1hr
- Ability to report hourly, daily, monthly, and annual energy use.
- Must record both consumption and demand.
- Data collection system must use LAN, BAS, etc. with data remotely accessible.
- Storing data >36 mos.







LEED v4 TECHNICAL IMPROVEMENTS: INDOOR ENVIRONMENTAL QUALITY

- Pr: Minimum IAQ Performance
- Pr: Tobacco Smoke Control
- Enhanced IAQ Strategies
- Low-Emitting Materials
- Construction IAQ Mgmt Plan
- Indoor Air Quality Assessment
- Thermal Comfort
- Interior Lighting
- Daylight
- Quality Views
- Acoustic Performance



LEED v4 TECHNICAL IMPROVEMENTS: Regional Priority & Innovation



v4

Innovative Exemplary Performance Pilot Credits



LEED Accredited Professional



Possible points out of Regional Priorities





Bonus Points!

Process Timeline Energy Model In-Person Round 2 Energy Model Work Session August 2016 Round 1 Kickoff! July 2016 July 2016 May 2016 2500 Prototype 9 ¢ 9 G ration Aug . May Jun unp Buk unp E 3 (Days) -90 8 ÷ 3 Dur 8 20 24 5 88 Start End WBS Tasks 12 LEED V4 8/1/16 EVALUATE PREREQUISITES & DEVELOP RECOMMENDATIONS / SEND TD LIST OF INFORMATION NEEDED / SEND QUESTIONS TO MELISSA @ GBC "Final" 5/25/16 6/1/16 1.1 TD PROVIDES REQUESTED INFORMATION LEED 1.3 6/2/16 6/8/16 8 TD REVIEWS PREREQUISITE RECOMMENDATIONS & RESPONDS Scorecard 1.4 6/2/16 6/17/16 16 REVIEW APPENDIX G / EVALUATE BPDO & LOW-EMITTING CREDITS (MR & Oct 2016 1.6 IEQZ) / DEVELOP RECOMMENDATIONS 6/8/16 6/17/16 10 1.7 CALL WITH TD/Berg 6/8/16 6/8/16 1.8 TD REVIEWS MR & IEQ RECOMMENDATIONS & RESPONDS 6/20/16 7/6/16 17 EVALUATE CREDITS WITH IMPACT ON TD POLICY/PROCEDURES / 1.9 6/20/16 DEVELOP RECOMMENDATIONS 7/8/16 19 1.10 CALL WITH TD/Berg 6/22/16 6/22/16 1.11 DEE - VACATION 7/1/16 6/27/16 5 **Bi-Weekly Check-In Calls** 1.12 CALL WITH TD/Berg 7/6/16 7/6/16 1 TD REVIEWS POLICY/PROCEDURES RECOMMENDATIONS & RESPONDS 1.14 7/11/16 7/22/16 12 1.15 EVALUATE REMAINING CREDITS & DEVELOP MATRIX & REPORT 7/11/16 8/1/16 1.16 CALL WITH TD/Berg 7/20/16 7/20/16 1.17 CALL WITH TD/Berg 7/27/16 7/27/16 1 1.19 DELIVER FINAL REPORT 8/1/16 8/1/16 1.2 TD/BERGMEYER MEETING - MOUNT LAUREL TBD TBD 2 TLC 8/1/16 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 Baseline 2010 Model (Waltham, MA) & Daylighting Model 5/31/16 6/14/16 11 6/17/16 Review Results & Determine ECM's 6/14/16 3 Run HVAC and Envelope Options on Baseline Model 6/17/16 6/29/16 Final Decision on Waltham HVAC specific systems 6/29/16 7/8/16 Run Climate Zone Iterations & Come Up w/ Recommendations 6/30/16 8/1/16 IEQ Credit Review of Waltham, MA 6/8/16 5/31/16 6/8/16 WE Credit Review of Waltham, MA 5/31/16 EA Credit Review of Waltham, MA 5/31/16 6/8/16 2.9 Recommendations for IEQ, WE and EA Credits 6/9/16 6/20/16 6 2.10 11 Develop Matrix & Report for IEQ. WE and EA Credits 7/11/16 8/1/16 Lighting Redesign **Cx** Analysis **HVAC** August 2016 Solar Analysis August 2016 Redesign August 2016 Sept 2016

LEED v4 "Opportunities"

Location and Site

Site specific and Policy driven

Materials "Performance"

- Product Disclosure hard to come by
- > Don't qualify for any (6) points

Increased Thresholds

- Energy Performance ASHRAE 90.1 2010
- Fewer Points in Renewable Energy
- > Energy & Water Metering

It's all New!

- > Preconceptions with previous v3 projects
- "How hard could it be?"
- Research







Design Solutions



It all starts with the PROTOTYPE

Key Features

- Cost effective base building, adapted to local area through a predefined kit of parts, material selections and an historic mural
- Daylighting and lighting controls yield a reduction lighting to

~1.2 watts/sf (.78 watts/sf including daylight harvesting)

- Low-e glazing, shaded windows and increased insulation help reduce total building energy consumption ~30-40% below code
- Photovoltaic panels generate 10-13% of electricity
- Efficient plumbing fixtures and drought tolerant landscaping decreased water consumption by 40% from heritage design
- Interior materials and finishes selected to maximize use of recycled content and durability



More than 80% of building components remain consistent

HVAC Design

System Design Goals

- Improve occupant comfort reduce hot/cold calls
- Ensure systems are easy to maintain by tech pool
- Energy efficient EUI target
- Easy procurement don't spec a solesource item
- Lifecycle cost savings or at worst cost neutral
- One design, if possible, Maine to Florida
- "Optimize Energy Performance" Credits
 - it is what it is...
- Involved FM team heavily in this conversation
- Balance of perspectives
 - Redundancy, Efficiency, Maintenance

"More Efficient" Constant Volume Dx System





Energy Modeling: An Opportunity

Prescriptive Requirements...

Great Place to start

Not all make sense

Restrictive

Expensive



Energy Modeling Allows...

Creative Design Solutions

Project Specific

Best solutions

Synergistic

Flexible

Types of Energy Models



Start with the Envelope

"As Designed": Previous Prototype

ricente-m					
		As Designed			
	Energy Model Inputs			Erangy Model Reputs	
Destrutions	S. of the state of the state	LWID ON ATM		5.5400	**
W p	 No Det Land, Contraction states Contractions No server in the Among states with the 	Faller & dis Satestable unde	2194	The Sector	
Per *	There is a to be will a first the data as a first second to be a first second to be a first second to be a seco	Heiling	F 75	1	- C
C BB	Construction and the second se	000 N	-1 X2	C TTON I	
		* # 10 ⁻ .44	2 (81		
HOZ.	Control of the second s	Biel 27 de-	2.21	hully and a second	
Latin M	ANTINE & TELE	MT - MMC CO	1.41		
10 /24			× .	No. of Concession, Name	
Lig the	An an grist	John C.	17,375	fare and	3
Aurente.	Series general factory control of the series for the series of the serie	Annual Crime Crime			
188. 5 4	We do not should be used on any of shifts of other spin and the Second Disk Solar second of	11. A.	0.01	Potential LGED Point	. 8
1	The state of the s	To different distance	11.731		
		INC. PRODUCT			

21.0% reduction **8** LEED v4 pts

Energy Cost Reduction compared to ASHRAE 90.1 2010 Appendix G Baseline

Option: Increased Roof Insulation



21.4% reduction **8** LEED v4 pts

Option: Improved Glazing

8

KI SIZAMBIAN		PreigeVials Samuely Travisional Sector and Dis	entra	N)	
		Fairmal gizzleg inpu	ered.		
	Seaver Vocal lepute			Energy Nodel Results	
Lancingeore	news cub recibe the bu	Entropy Jacobiology		d as because de	
		Science of a second	14.8	100 C 100 C	
Pa 4 1 1 Pr. 4 P	Careful and the second second second second	The second secon	10.1	Hall and a	
manine .	Filer be deal, Filer is as 14 ve also File	December we	30.416	1 17	
	REPRESENTED FOR 25 ABOUT 1				
	-41.8 V24"		10000		
••	Constant and here and 4 2 as the a loss	1 m - 1	- 9Q (B)		
	France on the march of			teacher a	
Gene	Educe, double harmoolic applic one companying darket property	001/13	186.6		
	ALL MEN AND AN ALL AND A REAL AND AN ALL AND A			any second	
			2.1	and the second sec	100 C
STREET, STREET	and the second sec			day a	
A	the second second second live is a second	0.000.00	0.0		
- and market	LINKE LASS SERVICE	Cardina de C		Problem on the second sec	
And Article	Automa a ann	AN NICES.		front a second	
	Pha Is	and the second	14.1		
	A design (81 PT	web a second	Interior
10.00				77	- Take
	And him advantage in the Annual Annual	terre ter			
	for a logic star logic logic beaution	ter teda.ent			
and other a	the second s	And there is a more	845.41	The second	
	the state is a set of anti-state of the set of a			Poly and 1997 Marche	8
	the star with statement of the statement		10.105		
	A design of the second s		100		
1000	A CAR MALINE ALLE ADDRESS CONCIONS	Con Case of Case	210	-	
		C.a.d Barrent.			

21.5% reduction

LEED pts

Option: Increased Wall Insulation

	Fi	Energy Model Summar To Barric LEED ve FROTO Consecuted) INTE DEBIC			
		Wall insolution changed	100 8-18			
	Energy Wodel Inputs			Energy Wodel Results		
Learning Source Starking Source Color Anno Anno Anno Anno Anno Anno Anno An	 Here a surface and an annual surface and an annunder an annunder an annual surface and an annual	e Hojo Lei Maria India Anti Maria yak Teorana Kata Teorana Tang Tang Tang Tang Tang Tang Tang T	1214 1214 100 100 100 100 100 100 100 100	Rock John J		
Citer 1977 1977 1970 1970 1970 1970 1970	 A contract (Provide the End and End of End of The Article State (End of End of E	Ten Burg Cole Call Cole Sec Call Cole Sec Decod Sector Ten Burg Sector	63.58 63.58 83.457 81.457	Pisers are percent	8	ha m Ngan

21.3% reduction **8** LEED v4 pts

Option: Reduce Lighting Power

			For gy Horlel Sciencery TO BRIEK (SED-VALEROTOT) ARXIV 201	TELESO	n	
а: 20—			Improved lighting lists		N.	
		Paura Makilanda			Barragy Vorsel Results	
	5 44 1	5. * * * N/* HE	Pargy the parks	UM I		-
1	ta di sylandışır. Mili	2. So these firsts of the same the second	Balance of A Starg Sec. To the	31.4 31.4	ta Best	
	**	" Description of sub-of- "R-C such as a final synamic round with ref 2015	14 Arry	.1) .4	14 A	10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -
	Gåren:	USANG COMPARISATION SHOP SHOP SHOP SHOP SHOP SHOP SHOP SHOP	Cesine	XX	LANC	
1	112 A 11 A 11		* # m	22.00		
	and when			1000	- me -	
	-100	the second second second second second	102 1.00	~~~	bunden last	and the second se
	5 cm +15 d	Carl a de a mais		2.4		
	of Caler	7. w	and the second	1	care and	
	JPR:	SHE SPATION \$2.5 CHORN /7 LL1	Inet	100.007		1.5.5
	-	Provide State Day State State State			nige	a contra
	COUPWOR	ATTRALIPTION AND AND AND ADDRESS AND A DEPONIS	WHEN PROVIDENT			
	100.5-	They do not not relatively the set for the set of the s	Old South - Bally at	perie.	Poserial . SED Points	9
			Proved & Bry	10.0		10000
		128.00 de les mile mileite min gefint et m	To d Tong, Poling a	1.0.0		
			New Recovery	45.115		
			110000000000000000000000000000000000000	1000		

23% reduction9 LEED pts

HVAC Option: Original Prototype / Constant Volume Dx



HVAC Option: Constant Volume w Increase Efficiency



HVAC Option: Central VAV



HVAC Option: VRF



HVAC Design Options Summary

HVAC: Options	Annual Electric Use (kBtu)	Annual Gas Use (kBtu)	Total annual utility cost	% Savings over LEED Baseline	Potential LEED points
Original Prototype, Constant Volume DX, with Gas-Fired Furnace	134,786	33,080	\$ 6,496	21.1%	8
Option : Central VAV	97,686	59,748	\$ 5,154	37.3%	14
Option : Constant Volume DX with Improved Efficiency	133,536	33,074	\$ 6,440	21.7%	8
Option: VRF	100,705	0	\$ 4,545	26.6%	11

Smart Retail Control

LEED Metering Credits

Performance Monitoring "Needs"

+

Successful Piloting on existing Banks

Smart Retail Control





Commissioning



Energy Code Adoption by State



^{*} Adopted new Code to be effective at a later date

Code Required Cx Process

Code Required Commissioning Process IECC C408



LEED v4 What's New?

Fundamental Commissioning & Verification

- ✓ Review the OPR, BOD, and project design
- ✓ Develop/implement a Cx Plan
- Develop construction checklists and system test procedures
- ✓ Verify system test execution
- ✓ Maintain an issues/benefits log
- ✓ Prepare a final Cx process report
- Document all findings, recommendations & report directly to the owner
- ✓ Exterior enclosures inclusion in OPR, BOD, review of project design.
- Create a current facilities requirements & O&M plan covering (including plan for periodic commissioning requirements)



Enhanced Commissioning

Option 1. Enhanced Systems Commissioning

Path 1 Enhanced Cx- Complete Cx process activities for MEP and renewable Energy systems according to ASHRAE guidelines

CxA must: review contractor submittals, verify systems manual and training requirements

Path 2 Performance Verification – Achieve Path 1 and monitor points to assess performance of energy

Options 2. Envelope Commissioning (2pts)

Include the building's thermal envelope in Cx and perform enhanced Cx on the envelope.







Renewable Energy



Optimize PV



Net Zero Energy Branch, Ft Lauderdale, FL



108 3 NEW LOCATION 100.00 O ROOF PLAY

New Prototype: Max Roof Layout

Passaic County, NJ Branch

PV Options Summary

Option	Baseline Building Energy Use (kWh/yr)	PV Nominal Size	No. of Panels	Previous Prototype PV kWh/yr	% PV	LEED v4 Renewable Energy Credit	LEED v4 Optimize Energy Credit
HVAC Option 1: Current Prototype	78,836	9 kW (Previous Prototype)		9,900	12%	3 pts + 0 ID pt	Increase from 16% to 24% cost savings 11 pts
HVAC Option 2: Centralized VAV	78,836	9 kW (Previous Prototype)		9,900	12%	3 pts + 0 ID pt	Increase from 25% to 34% cost savings 15 pts
HVAC Option 3: HVAC VRF	58,614	9 kW (Previous Prototype)		9,900	16%	3 pts + 1 ID pt	Est Increase from 25%+ to 35%+ cost savings** 15+ pts
PV Option: Maximize Energy Points	58,614	24 kW		27,000	40%	3 pts + 1 ID pt	54% Energy Cost Reduction 18 pts + 1 ID pt
PV Option: Maximize Production	58,614	13 kW	50	17,000			





Conclusions: Is this Scalable?



LEED v4 Scorecards

Pilot Location #1 (FL)

LEED[®] for New Construction

Total Possible Points**	110*
Location & Transportation	4
Sustainable Sites	3
Water Efficiency	6
Energy & Atmosphere	22
Materials & Resources	2
Indoor Environmental Quality	4
Innovation	3
Regional Priority	1
	46

Pilot Location #2 (MA)

LEED[®] for New Construction

Total Possible Points** 110*

	Location & Transportation	7
Y	Sustainable Sites	1
	Water Efficiency	6
	Energy & Atmosphere	20
	Materials & Resources	2
	Indoor Environmental Quality	4
Ø)	Innovation	3
Z	Regional Priority	2
		45

*projects are still under USGBC review – points not final

Next Steps:

- Document & track all costs associated with the new design & LEED specs (bids due back mid May)
- Monitor USGBC LEED v4 review process, finalize our LEED Scorecard
- Analyze the data utilizing the Smart Retail Controls dashboard & compare to energy modeling; make adjustments as needed
- Develop business case & decide whether to scale

High Performing Buildings are about

Teamwork



<u>Christina.Sprows@td.com</u> <u>Mark.Gelfo@tlc-eng.com</u> <u>Justin.Mulhollan@tlc-eng.com</u>

