		:				:
2 12 Lo	cation and Transportation	16	8 0 5	Materials and Resources		13
Crea	iit LEED for Neighborhood Development Location	N/A	~	rered Storage and Collection of Recyclables		Required
1 Crea	iit Sensitive Land Protection	-	- -	rereq Construction and Demolition Waste Management Plannin	bu	Required
1 Crea	iit High Priority Site	2	3	redit Building Life-Cycle Impact Reduction		5
5 Cred	it Surrounding Density and Diverse Uses	5	-	redit Building Product Disclosure and Optimization - Environme	nental Product Declarations	2
5 Cred	iii Access to Quality Transit	5	-	redit Building Product Disclosure and Optimization - Sourcing c	of Raw Materials	7
1 Cred	iit Bicycle Facilities	-	-	redit Building Product Disclosure and Optimization - Material Ir	Ingredients	2
1 Cred	iit Reduced Parking Footprint	-	5	redit Construction and Demolition Waste Management		2
Crea	it Green Vehicles	- L				:
			9 1 6	ndoor Environmental Quality		16
4 2 Su	stainable Sites	10	-	rereq Minimum Indoor Air Quality Performance		Required
Pren	eq Construction Activity Pollution Prevention	Required	<u>→</u>	rereq Environmental Tobacco Smoke Control		Required
Cred	it Site Assessment	-	2	redit Enhanced Indoor Air Quality Strategies		2
2 Cred	ii Site Development - Protect or Restore Habitat	7	en	redit Low-Emitting Materials		с
1 Cred	iit Open Space	-	~	redit Construction Indoor Air Quality Management Plan		-
3 Cred	iit Rainwater Management	e	-	redit Indoor Air Quality Assessment		2
Cred	iit Heat Island Reduction	2		redit Thermal Comfort		-
Cred	it Light Pollution Reduction	÷	-	redit Interior Lighting		2
			<b>m</b>	redit Daylight		с
4 2 W	ater Efficiency	11	-	redit Quality Views		-
Pren	eq Outdoor Water Use Reduction	Required	-	redit Acoustic Performance		-
Prer	eq Indoor Water Use Reduction	Required				
Prer	ed Building-Level Water Metering	Required	5 0 1	nnovation		9
Cred	iit Outdoor Water Use Reduction	2	~	redit Innovation: O+M Starter Kit		-
2 2 Cred	iit Indoor Water Use Reduction	9	-	redit Innovation: Safety First Pilot Credit		~
2 Cred	iit Cooling Tower Water Use	7	~	redit Innovation: Low-Mercury Lamps		-
0 Cred	iit Water Metering	-	~	redit Innovation: Occupant Comfort Survey		~
			-	redit Innovation: TBD		~
6 14 En	ergy and Atmosphere	33		redit LEED Accredited Professional		-
Pren	eq Fundamental Commissioning and Verification	Required				
Pren	eq Minimum Energy Performance	Required	3 1 0	Regional Priority		4
Preru	eq Building-Level Energy Metering	Required	~	redit Advanced Energy Metering - 1pt threshold		-
Pren	eq Fundamental Refrigerant Management	Required		redit Enhanced IAQ Strategies - 2pt threshold		-
Cred	it Enhanced Commissioning	9		redit Building Life-Cycle Impact Reduction - 3pt threshold		-
3 9 Cred	it Optimize Energy Performance	18		redit Rainwater Management - 3pt threshold		~
Cred	iit Advanced Energy Metering	-				
2 Cred	iit Demand Response	7	50 18 42	<b>TOTALS</b>		110
3 Cred	iit Renewable Energy Production	• •	CA BULONS	ertified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points,	Platinum: 80 to 110	
1 Cred	iit Enhanced Refrigerant Management	-	OUNCIDE OF STR	.EED v4 for BD+C		

#### V

Bridging Documents – Final Report CDB Project Number - 630-442-057

			LEED Produ	ict Data Submittal For
Project Name:				
Fill out the follo	wing inform	ation for EACH	l compliant	product:
Subcontractor				
Product Name				
Manufacturer				
Manufacturer Location				
Extraction/Harvest Locat	ion			
Materials Cost (all costs as material and getting materia installation costs )	sociated with l to site. Exclud	le		
Product (select and enter name below). □Paint and Coating	Interior/ Exterior?	Wet-Applied on-site (y/n)?	VOC Content (g/L)	General Emissions Evaluation
Adhesive and Sealant				provided?
	Choose an item.	Choose an item.		Choose an item.
		1		
Wet-Applied Product Volu	me Used (L)			
Wet-Applied Product Volu	me Used (L)			
Wet-Applied Product Volu	me Used (L) e)	General Emi	issions Evalua	tion Provided (y/n)
Wet-Applied Product Volu Flooring Product (Enter Nam Ceilings (Enter Name)	e)	General Emi	issions Evalua	ition Provided (y/n) ition Provided (y/n)
Wet-Applied Product Volu Flooring Product (Enter Name) Ceilings (Enter Name) Insulation (Enter Name)	me Used (L)	General Em General Em General Em	issions Evalua issions Evalua issions Evalua	ition Provided (y/n) ition Provided (y/n) ition Provided (y/n)

	LEED Product Data Submittal Form
Wall Panels (Enter Name)	General Emissions Evaluation Provided (y/n)
Composite Wood (Enter Name)	Composite Wood Evaluation Provided (y/n)
Furniture (Enter Name)	Furniture Evaluation Provided (y/n)
By submitting this cover sheet, the provided is accurate and represent: rating system. Any changes or alternatives must fi	submitting party attests that the material information s the material qualifications required per the applicable LEED rst be approved by the project architect.
Signatura	Data

# **Preliminary Energy Model** | Hanley Materials Lab

5a-Cold And Humid, Heating

Dominant, Hot Summer

\$0.0965/kWh

\$0.91/Therm

#### Context

The model was developed based on available preliminary drawings and design specifications. It should serve as a preliminary high level evaluation of the building performance and assessment of LEED points. The final model could be different based on the actual design details.

Location:	Springfield, IL	Climate Zone:
Area:	75,986 Conditioned Floor Area (CFA)	
Program:	Mixed Use, Multifamily	<b>Electricity Cost:</b>
LEED:	11-16 Optimize Energy Performance Points	Gas Cost:

#### **South East Perspective**

#### North West Perspective





#### **Executive Summary**

Description	Unit	Baseline (LEED V4.0)	Proposed
Annual Site Energy Summary			
Electricity	kWh	2,236,418	1,468,005
Natural Gas	Therms	117,341	46,729
Total Site Energy Use	kBtu/sf-year	254.8	127.4
Site Energy Use Savings	-		50%
Annual Energy Cost Summary			
Electricity	\$/year	215,814	141,662
Natural Gas	\$/year	106,780	42,523
Total Energy Cost	\$/year	322,594	184,186
Site Energy Cost Savings	•		43%
Annual Carbon Emission Summary			
Electricity	Metric Tons/year	1,005	660
Natural Gas	Metric Tons/year	623	248
Total Carbon Emissions	Metric Tons/year	1,628	908
Carbon Emission Reductions			44%

#### **Process Loads**

Process load is a major model variable that influences project performance + level of cost savings for LEED points. Frequency and duration of use also play a role. This analysis assumes VFD and energy recovery are implemented.



### **Energy Conservation Measures**

These charts demonstrate the relative impact of various energy conservation measures. The cumulative benefits take the project from the LEED V4.0 baseline to the proposed design.





### **Sensitivity Study**

Since VFD and Energy Recovery (ER) have such significant impacts on energy usage, carbon emissions, and cost, we examined ramifications of various possible combinations of their inclusion and exclusion here.



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# Appendix

2	42	Proposed (Design)	Baseline (LEED v4)	Notes	Impact
	Energy Use Intensity (EUI) kBtu/SF-year	127.4	254.8	50.00% Energy Savings	NA
	Electricity Consumption kWh	1,468,005	2,236,418	34.36% Eletricity Savings	NA
	Gas Consumption Therms	46,729	117,341	60.18% Gas Savings	NA
2	Electricity Cost \$ @0.0965/kWh	141,662	215,814	34.36% Eletricity Cost Savings	NA
bm	Gas Cost \$ @ 0.91/Therm	42,523	106,780	60.18% Gas Cost Savings	NA
Ę	Total Cost \$	184,186	322,594	42.91% Energy Cost Savings, equivalent to 16 Energy Performance Points	NA
SI	Electricity CO2e Metric Tons @ 131.71kg/MBtu	660	1,005	34.36% Less Carbon Emissions From Electricity	NA
	Gas CO2e Metric Tons @ 53.11 kg/MBtu	248	623	60.18% Less Carbon Emissions From Gas	NA
	Total CO2e Metric Tons	908	1,628	44.23% Overall Less Carbon Emissions	NA
	1	Proposed has VFD on MAU	and exhaust fans		High
9 5	2	Proposed has run around loo	p energy recovery		High
t Gu	3	Proposed has lower lighting	g power densities	NA	Medium
E A	4	Proposed has magnetic t	pearing chillers		Medium
N N	5	Proposed has better	envelopes		Medium
	6	Proposed has condensing boilers			Medium
(					
	Location	Springfield, 1	IL		
	Climae Zone	5A		HDD65: 5284; CDD65: 1208	High
-	Weather	Cold and humid, heating don	ninant, hot summer		
Dia	Local Energy Code	IECC 2018		Significantly more stringent than the energy code LEED v4 references	Medium
ene	Purpose of this Study	LEED v4 Energy Per	formance	LEED awards energy performance points based on energy cost savings	NA
5	Energy Code Used	ASHRAE 90.1 2	2010		Medium
	Model Methodology	Appendix G Performance	Rating Method	AppG PRM baseline is based on building size, type, and fuel type.	Medium
	Size sqft	75,986			NA
1	Building Usage	37,901 sqft of labs, 3,417 sqft of storage, o	and 34,578 sqft of office spaces	Mainly for lab and office uses	NA
ule +	Office Spaces	M-F 8-5, 70F Heating,	75F Cooling	Expected	Medium
Sched	Lab Spaces	HVAC 24/7, 70F Heating	g, 75F Cooling	Expected	Low
	28 22 22 22 22 22 22 22 22 22 22 22 22 2				
100	Roof	R-30; U-0.032	R-20; U-0.048		Medium
be	Extrior Wall	Opaque Wall: Precast R-12; U-0.0725	R-13+R-7.5c.i.; U-0.064	Proposed Assumed; Baseline Per ASHRAE 90.1 2010	Medium
elo	Slab on grade	R-10 at primeter only, F-0.54	R-0; F-0.73		Low
N	Glazing-Assembly	Double Pane Air filled Assembly U-0.36; SHGC-0.35	U-0.50; SHGC-0.40		Low
-	Window Wall Ratio	16%	16%	Low Window Wall Ratio Building	Low
3	Infiltration	0.03 CFM/sqft on concrete panels, 0.06 CFM/sc	qft on windows, 1 CFM/sqft on doors	Typical values based on construction types	Low

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# Appendix

S		Proposed (Design)	Baseline (LEED v4)	Notes	Impact
	Offices	0.5 W/SF	1.11 W/SF	55% lower	Medium
0	Lobby	0.7 W/SF	0.9 W/SF	22% lower	Low
ţ	Storage	0.25 W/SF	0.63 W/SF	60% lower	Low
hg	Corridor	0.35 W/SF	0.66 W/SF	47% lower	Low
2	Labs	0.8 W/SF	1.81 W/SF	56% lower	Medium
	Exterior Lighting	Not Modeled	Not Modeled	Need site plan to estimate	Low
(c)	12 1500 - No. 30			8 D.	
ocess	Office Spaces	0.75 W/SF	0.75 W/SF	Enderstand and an annual second	11 at
Reception and Pr	Lab Spaces	5 W/SF	5 W/SF	Estimated based on space usage	High
	Offices	AHU + VAV boxes, chilled water, hot water, VFD fan	System 5: Packaged VAV with Reheat, Air cooled DX @ COP 3.37, fossil fuel boiler, non condensing @ 80%		Medium
HVAC	Labs	MAU + Exhaust to meet ACH requirements, chilled water, hot water, VFD fans, run around loop recovery 40% effectiveness	System 5: Packaged VAV with Reheat, Air cooled DX @ COP 3.37, fossil fuel boiler, non condensing @ 80% efficiency for lab spaces with more than 5000CFM OA; System 3 Packaged Rooftop Air conditioner for lab spaces with less than 5000 CFM OA	Proposed assumed; Baseline per ASHRAE 90.1 2010 AppG; https://www.usgbc.org/leedaddenda/10453	High
	Chiller	Mag Bearing Chiller COP 5.5	NA		Medium
	Boiler	Condensing boilers @ 95% efficiency	Non-condensing, 80% efficiency		Medium
	Cooling Tower	VFD Fan	NA		Medium
	PV Panel				
ple	Efficiency				
D .	Number of panels				

	PV Panel			
ble	Efficiency			
DM	Number of panels	NA	NA	NA
a	DC Size kW	110		196
Re	Annual Generation kWh			
	CO2e Offset Metric Tons			

Domestic	Usage	2 Gallon/Person-day	2.5 Gallon/Person-day	Proposed is assumed to have low flow fixtures	Low
Hot Water	Water Heater	Electric Resistance Water Heater @ 97% efficiency	Electric Resistance Water Heater @ 97% efficiency	Proposed assumed; Baseline per ASHRAE 90.1 2010 AppG	Low

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	Medium
seline per ASHRAE 90.1 2010 AppG; /leedaddenda/10453	High
	Medium
	Medium
	Medium