

POLICY TO PROJECTS

integrating advocacy, research, & passive design

how it started: policy advocacy

**GOVERNMENT
AFFAIRS
COMMITTEE
AIA MINNESOTA**



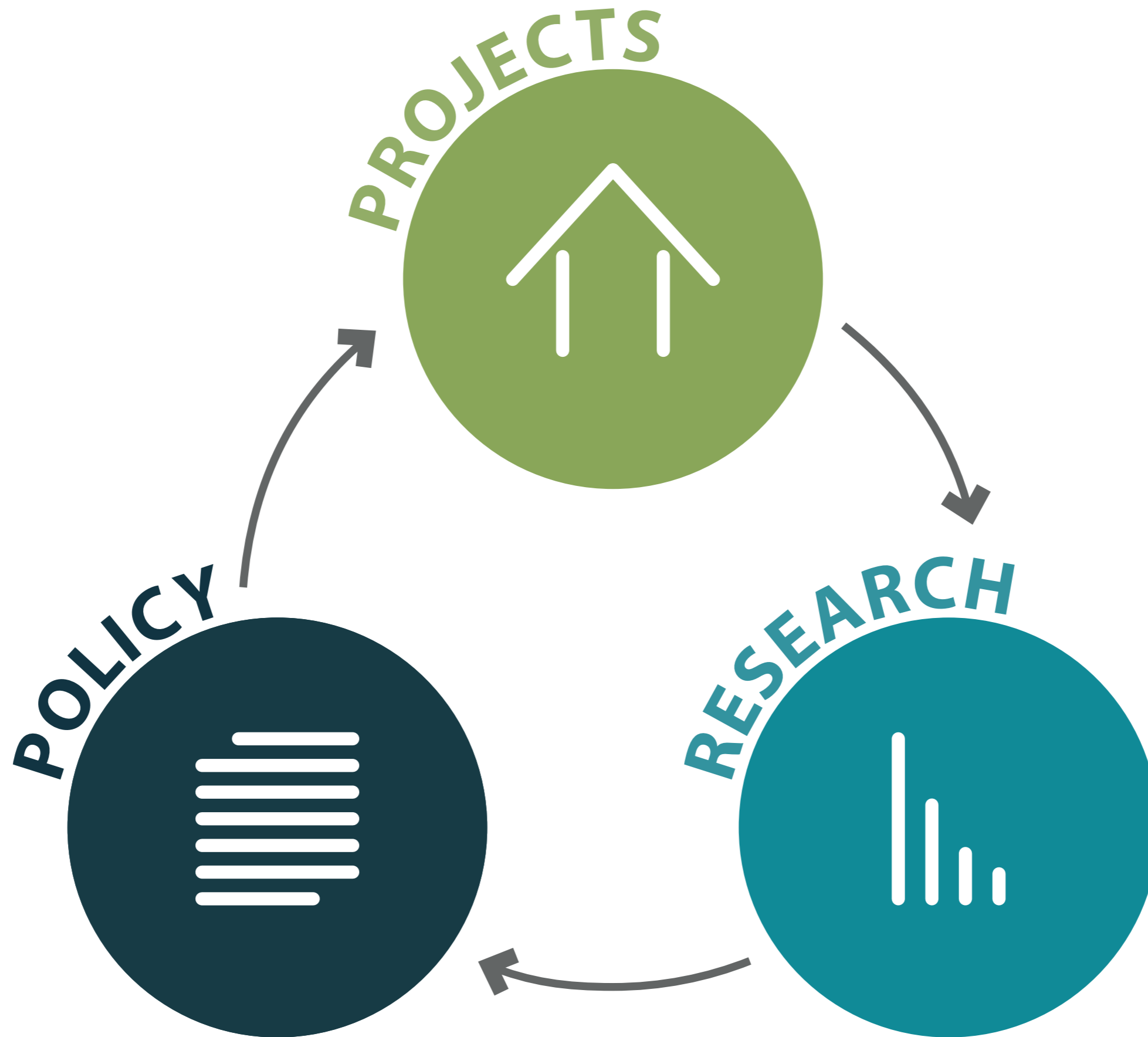
**ENERGY
VISION
ADVISORY
COMMITTEE
CITY OF MINNEAPOLIS**



**SPEAKING
EVENTS &
ORGANIZATIONS**

**TEACHING
U OF MN
SUSTAINABILITY STUDIES
NET POSITIVE STUDIO**





how it's going: growing local examples



VERDANT

Saint Paul, MN (2019) - Kaas Wilson & Sherman Associates



Image copyright Kaas Wilson Architects

HOOK & LADDER

Minneapolis, MN (2017) - LHB & Newport Midwest



Image copyright Newport Midwest

SOLSTICE APARTMENTS

Minneapolis, MN (2024) - Precipitate & Footprint Development



ART DECO OFFICE RETROFIT

Minneapolis, MN (2024) - Precipitate



NORTHSIDE PASSIVE

Minneapolis, MN (2024) - Precipitate & Urban Homeworks / PPL



HILLCREST VILLAGE

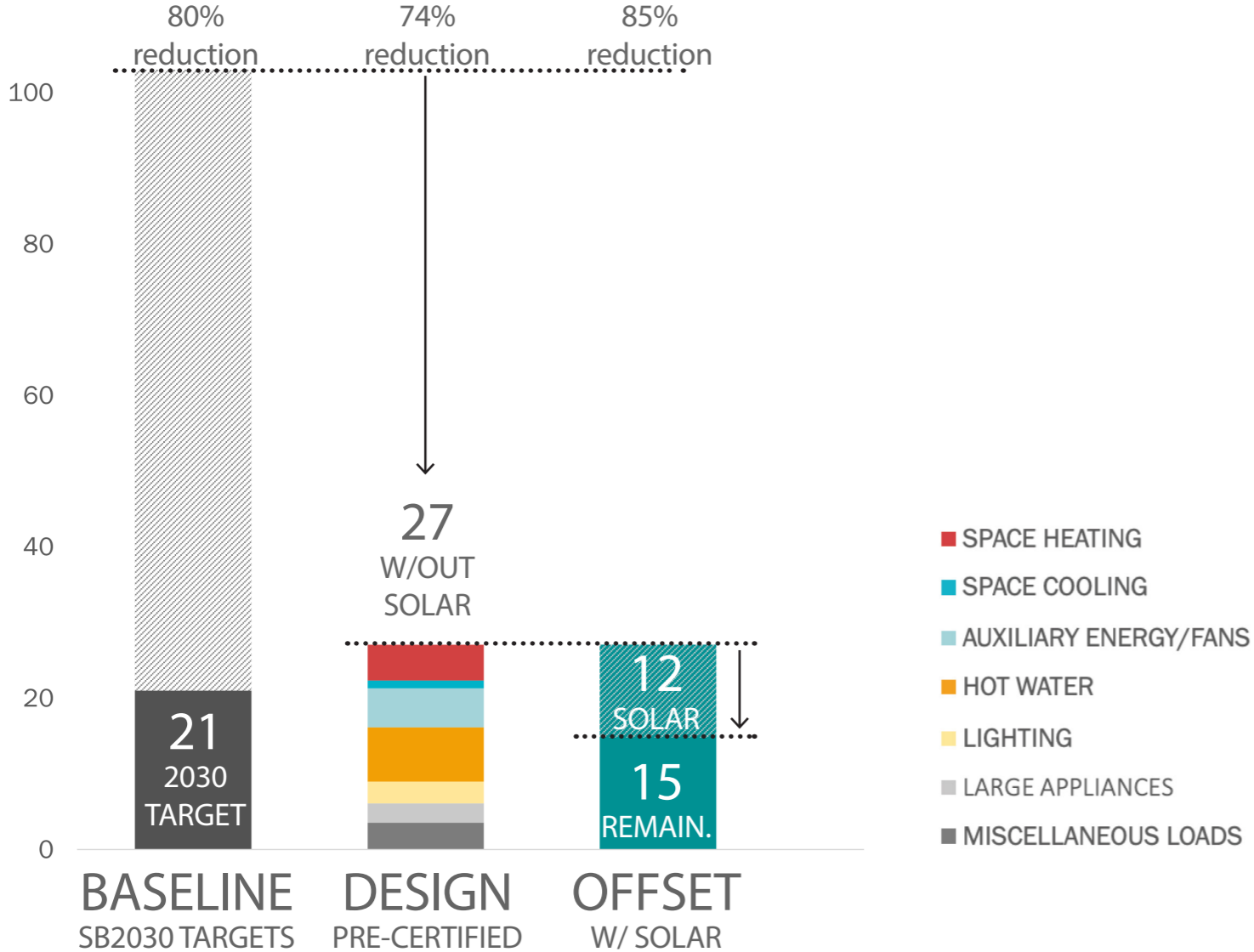
Northfield, MN (2023) - Sweetgrass Design Studio & Northfield CDC



city incentives lead to project: verdant



site | kBtu/GSF/year



education: parking



VERDANT ENCLOSED & TEMPERED



HOOK & LADDER TUCK-UNDER

policy leads to project: hillcrest village



CITY OF NORTHFIELD CLIMATE ACTION PLAN

The City of Northfield is committed to:

- 100% carbon-free electricity by 2030 and
- Being a 100% carbon-free community by 2040.

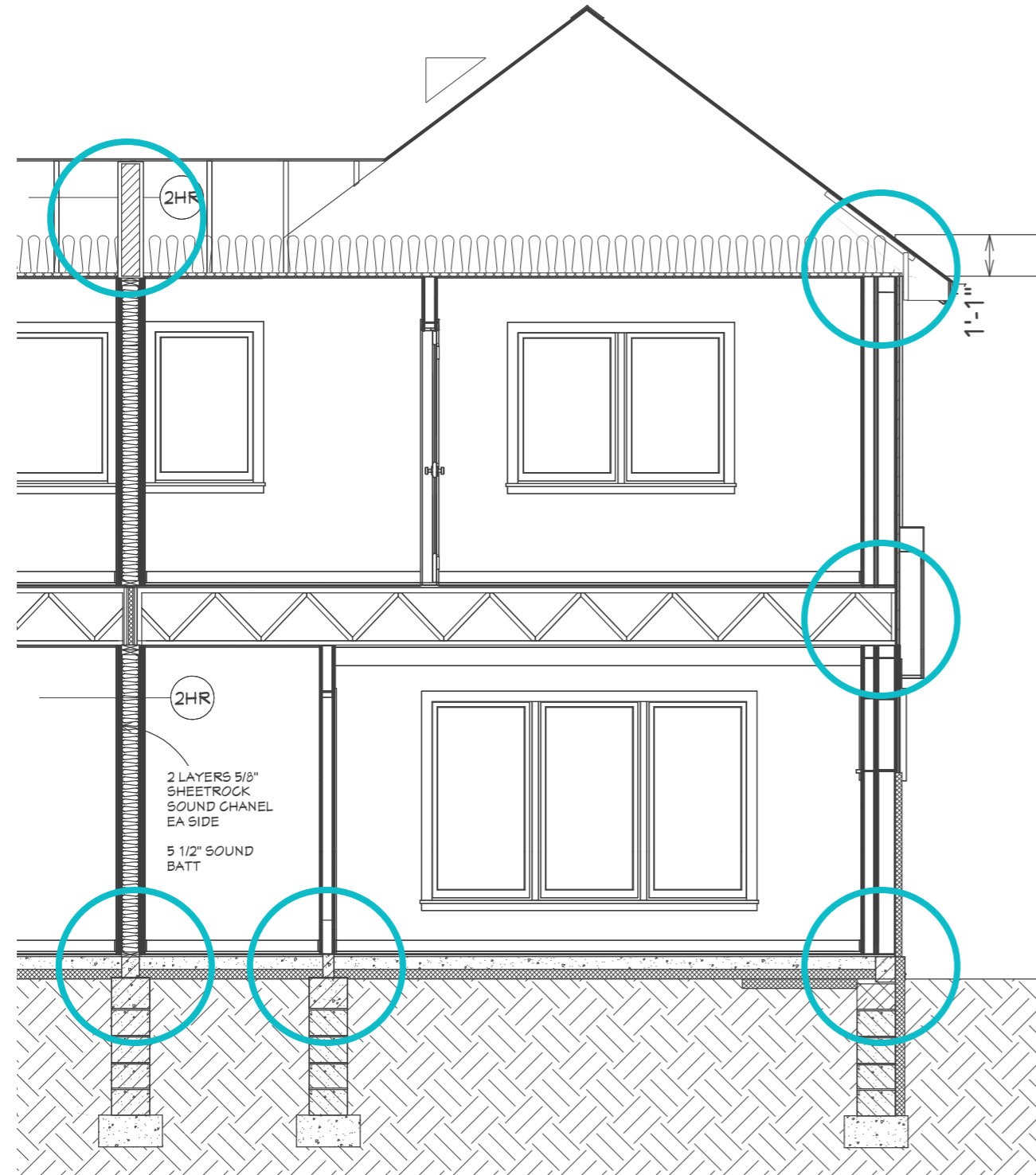
The plan includes strategies to enhance the resilience of the community as it adapts to the impacts of a changing climate.

Plan called for a net-zero demonstration project.



ci.northfield.mn.us/Sustainability

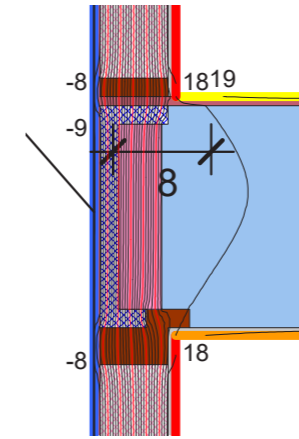
project details: thermal bridging



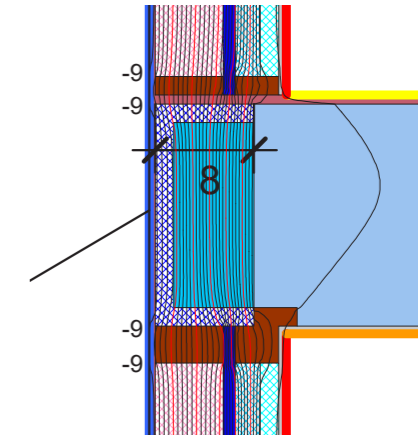
Drawings copyright SWEETGRASS DESIGN STUDIO

6091 KBTU/YEAR VS 468 KBTU/YEAR

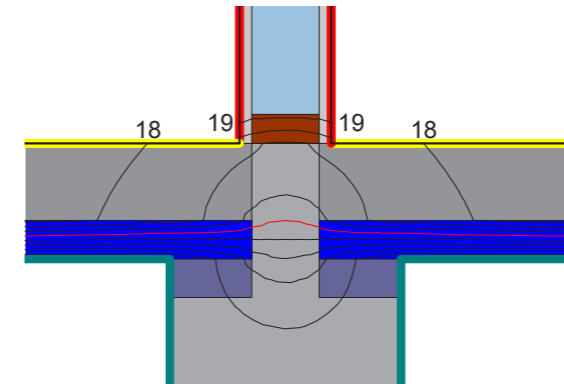
EXAMPLE RIM JOIST DETAIL
 TB (>0.006) 0.018 BTU/hr-ft-F



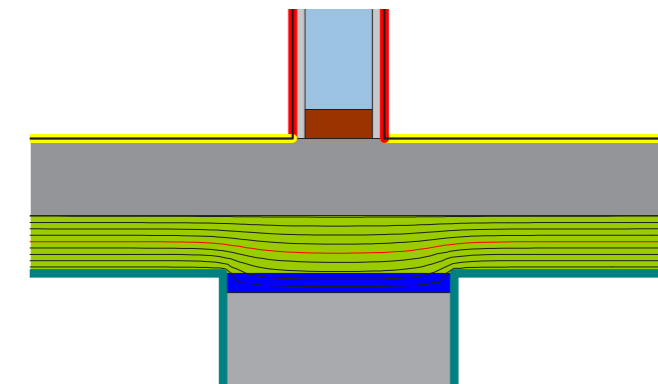
TB-FREE (<0.006) 0.003 BTU/hr-ft-F



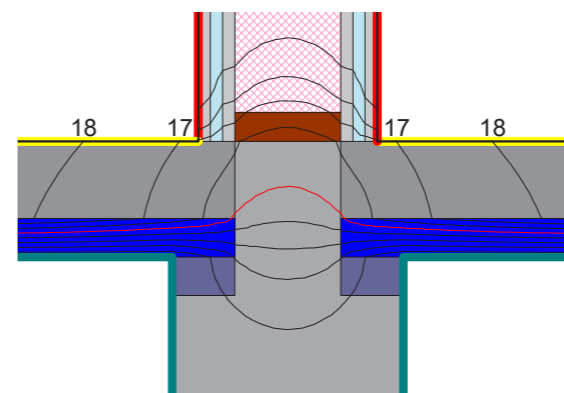
EXAMPLE BEARING WALL DETAIL
 TB 0.0341 BTU/hr-ft-F



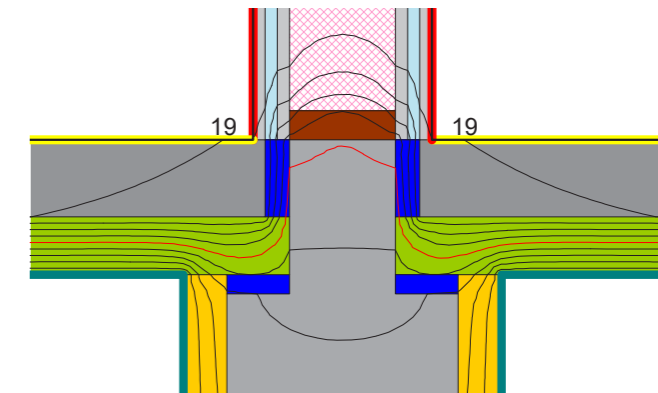
TB-FREE -0.018 BTU/hr-ft-F



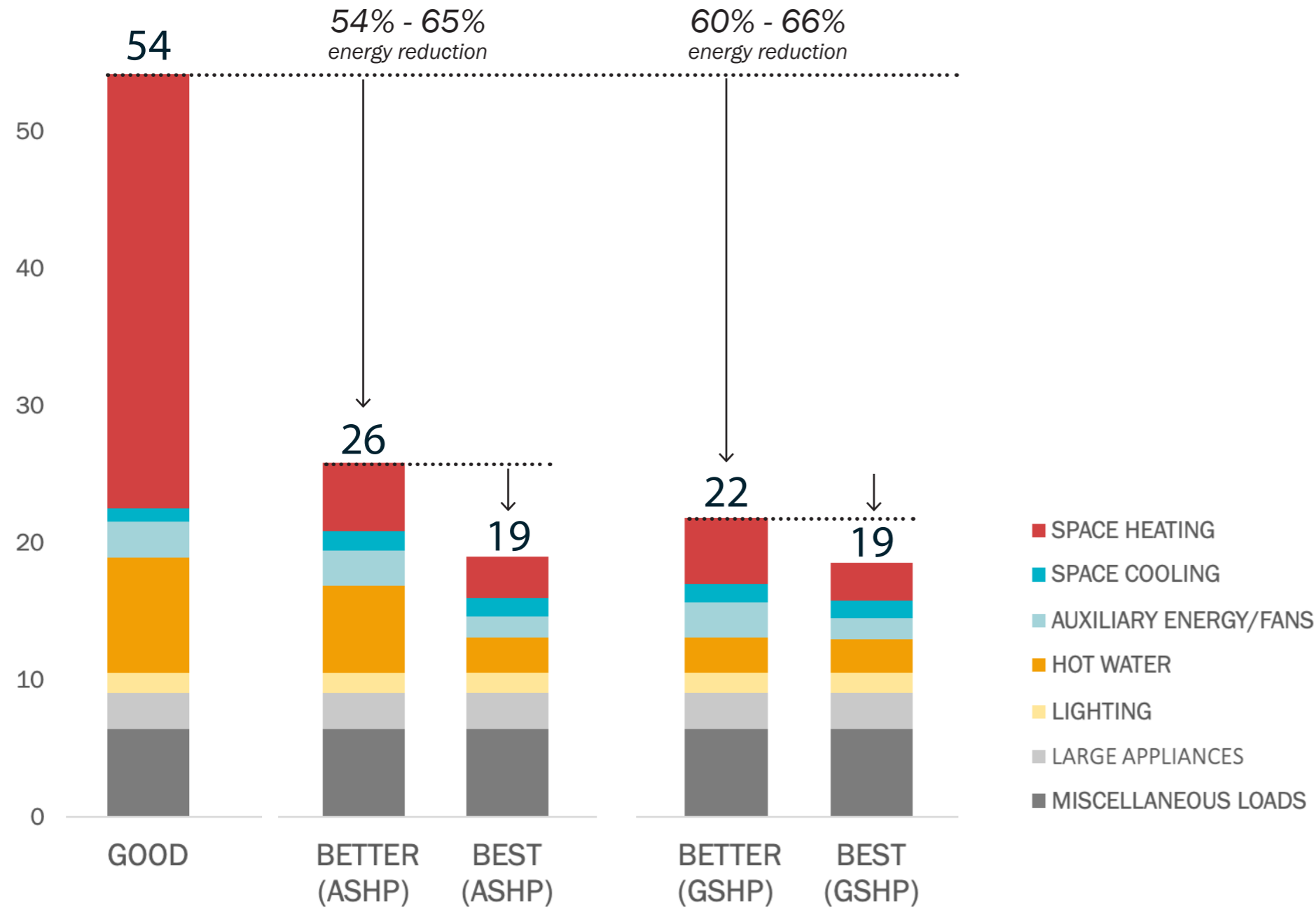
EXAMPLE DEMISING WALL DETAIL
 TB 0.380 BTU/hr-ft-F



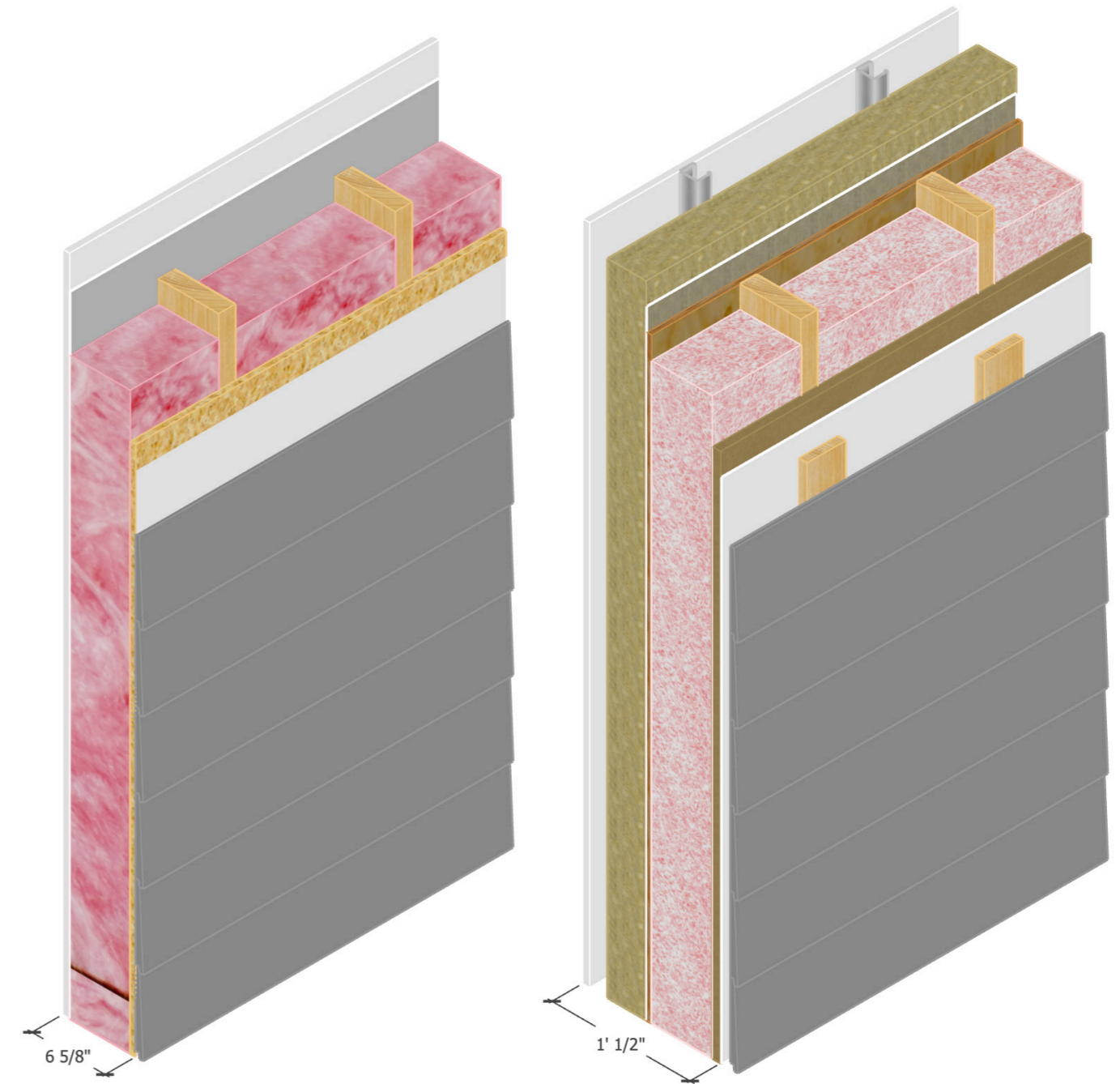
ADEQUATE 0.062 BTU/hr-ft-F



net zero study: good-better-best



Annual Energy Use Comparison (kBtu/sf-yr)



project leads to research



“Living here was my dream, but I need more support from management to make sure my house functions like any other house. The people who installed my heat pump didn’t know what they were doing and neither do the people who come to fix it”

“I know my house is different, but I need more information on how”

“I hope to be a part of this work moving forward”



MAIN TAKEAWAYS

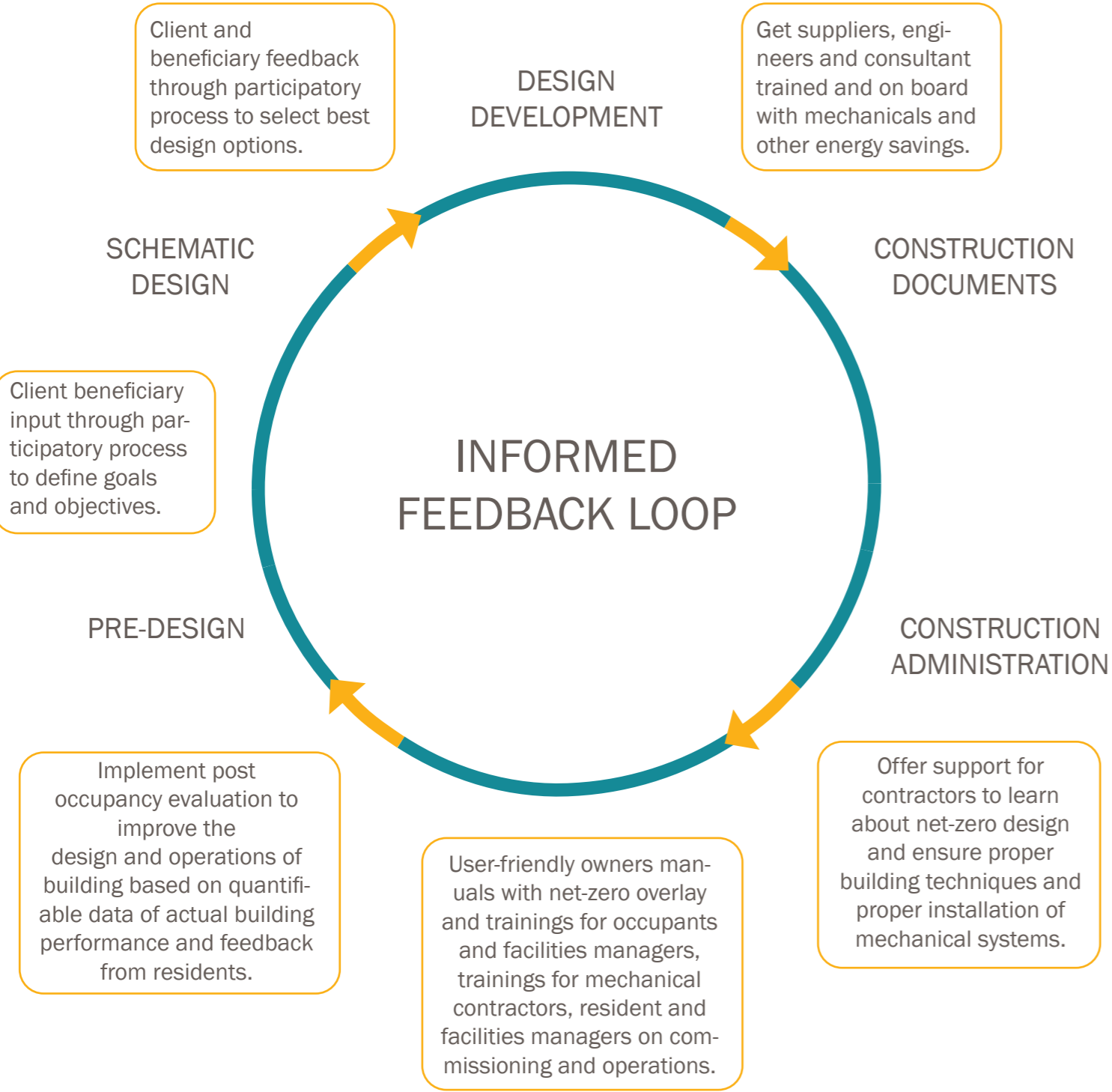
Residents and property managers need formal training/orientation that highlights the unique features of living in a net-zero home.

Residents need more information on heat pumps and ERVs.

Residents need an easy to understand operations manual

Residents want more opportunities to **build community** with neighbors.

continued research: full circle

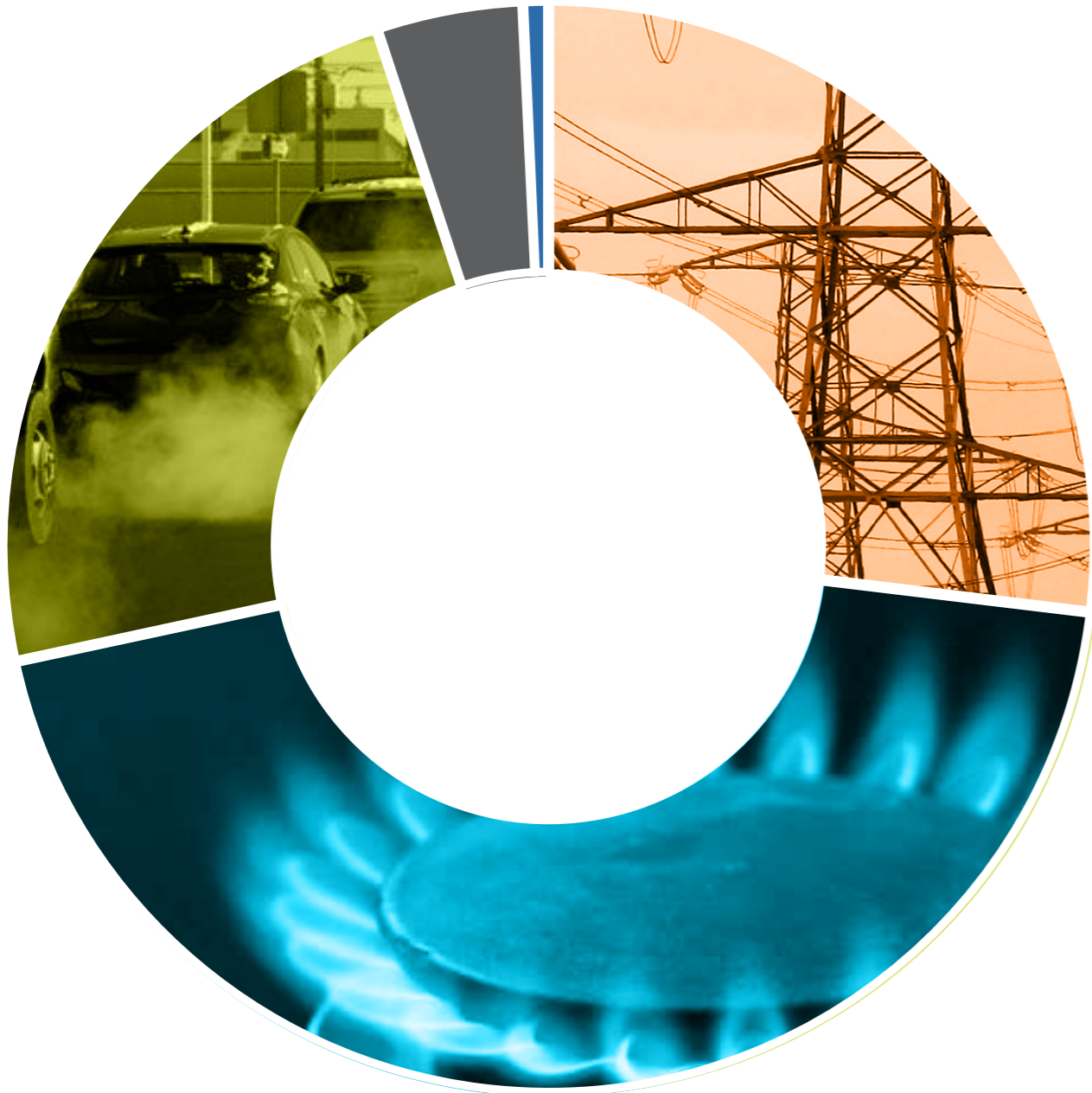


research > project > policy: legislative tour



photos from CEE twitter

creating policy: minneapolis climate equity plan



■	Fossil (Natural) Gas (45%)
■	Electricity (28%)
■	On-Road Transportation (24%)
■	Solid Waste (5%)
■	Wastewater (1%)



mn housing gap: building partnerships



Enhanced Sustainability















C. Enhanced Sustainability (1 to ~~65~~ points)

The project will incorporate additional sustainability criteria into its design. The applicant must complete the “How Will Criteria Be Implemented” column within the applicable year’s Multifamily Intended Methods Worksheet and clearly explain how each selected Optional Criteria point and alternative building performance pathway (Tier 3 and Tier 4) will be implemented. The selected Optional Criteria point total on the Multifamily Intended Methods Worksheet must reconcile with the minimum number of Optional Criteria points required for the applicable tier, if claiming Tier 1 or Tier 2 points.

Applicants can select Tier 1, Tier 2, Tier 3, Tier 4; or a combination of Tiers 1 and 3, ~~or~~ Tiers 2 and 3, Tiers 1 and 4, or Tiers 2 and 4; for a maximum of ~~65~~ points. Please note: All buildings in the project with residential units, regardless, if claiming or not claiming point(s) for enhanced sustainability, must be certified through the ENERGY STAR Residential New Construction Program using ENERGY STAR Multifamily New Construction (MFNC), ENERGY STAR Manufactured Homes and/or ENERGY STAR Certified Homes as relevant. Refer to applicable MN Overlay for additional information regarding baseline requirements. Actual enrollment of project with Enterprise Green Communities Criteria (EGCC) is not required for any selected Tier or combination of Tiers.

4. Tier 4: The project will be certified by one of the following alternative building performance pathways as claimed in the Multifamily Intended Methods Worksheet (4 points):

- a. Passive House Institute (PHI) Classic
- b. Passive House Institute United States (PHIUS)
- c. One of the following 2020 Enterprise Green Communities Criteria, Criterion 5.4 Achieving Zero Energy, Option 2 programs:
 - i. PHIUS + Source Zero
 - ii. PHI Plus
 - iii. PHI Premium
 - iv. International Living Future Institute’s Zero Energy Petal
 - v. Zero Carbon Petal
 - vi. Living Building Challenge

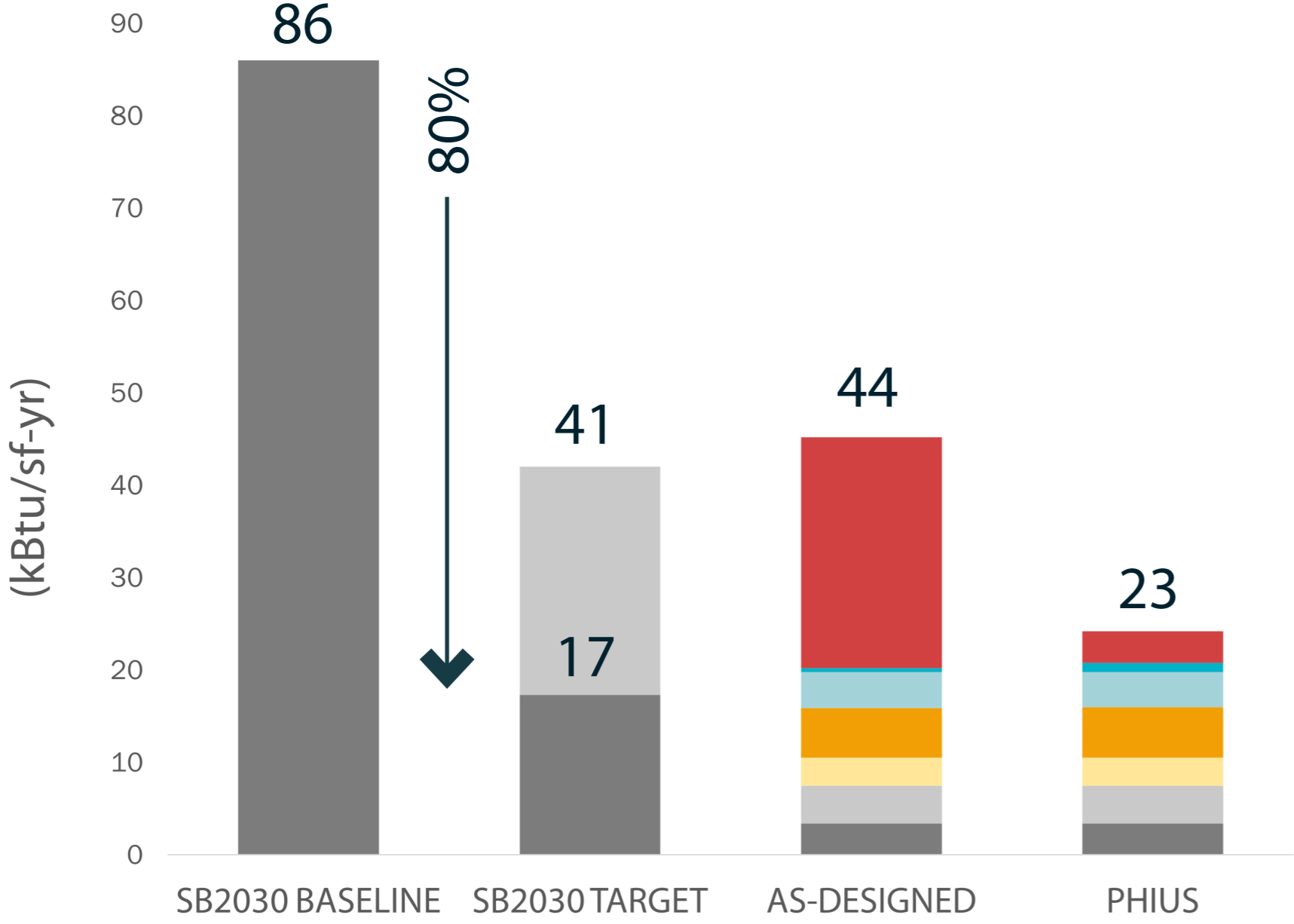
 Phius Katrin Klingenberg, Executive Director https://www.phius.org/	 Passive House Network Ken Levenson, Executive Director https://naphnetwork.org/
 Center for Energy and Environment Rebecca Olson, Sr. Director of Residential and Community Energy www.mncee.org	 Precipitate Elizabeth Turner, CPHC www.precipitatearch.com
 Alchemy Architecture Marcy Conrad Nutt AIA CPHD www.alchemy-architects.com	 LHB Architects Maureen Colburn, AIA https://lhbcorp.com/
 475 Supply Floris Kevelring Buisman, CEO https://foursevenfive.com/	 Frerichs Construction Dave Einck Senior Project Manager www.frerichsconstruction.com
 SIGA 1966 Etienne Gubler CEO SIDA Americas https://www.siga.swiss/us_en	 Owens Corning Jay Murdoch Director, Industry Affairs https://www.owenscorning.com/en-us
 MSR Design Simona Fischer, AIA, CPHC Director of Sustainable Practice https://msrdesign.com	 Meteeek Supply Ben Grams c https://meteeeksupply.com/
 Meteeek & Co. Ben Grams General Counsel for Meteeek and Co. https://meteeek.com/	 te Studio Tim Dehlhey Eian CPHD/C Principal Testudio.com

COMMERCIAL ENERGY CODE
ADVOCATING FOR NET ZERO BY 2036

RESIDENTIAL ENERGY CODE UPDATES
MEMBERS ON TECH. ADVISORY GROUP

AFFORDABLE HOUSING
ADVOCATING FOR ENERGY EFFICIENCY IN HOUSING

building developer relationships: edge apartments



- SPACE HEATING
- SPACE COOLING
- AUXILIARY ENERGY/FANS
- HOT WATER
- LIGHTING
- LARGE APPLIANCES
- MISCELLANEOUS LOADS

comparison to energy star & sb2030 requirements



	ENERGY STAR ENTERPRISE GREEN COMMUNITIES	PASSIVE HOUSE
	AS-DESIGNED	PHIUS+ 2021
Roof	R49	R49
(whole wall) Wall	R19 + 6.6 ci	R19 + 12.6 ci
Slab	R0.42 (slab on grade)	R14.8 (slab + 4" EPS)
Windows	U-0.27, SHGC .392 no interior blinds	U-0.16 (operable), U-0.14(fixed) no interior blinds
Doors	R8.7	R8.7
Air Sealing	0.13 cfm/SF @50 Pa	.06 cfm/SF @50 Pa
Heating	95 AFUE Gas Furnace 20 - 31 kBTU/h	Water Source Heat Pump (Gas Heated Water Loop) Combined COP 5.09
Cooling	Electric AC 13 SEER / 11.38 EER 12 - 17 kBTU/h	Water Source Heat Pump (Chilled Water Loop) Combined COP 5.69
Ventilation	Dryers, Range Hood, Bathrooms No Recovery 1 W/cfm Fan Efficiency	Energy Recovery Ventilator Swegon Gold SRE 0.79 / LRE 0.4 / 1.08 W/cfm
DHW	Natural Gas 92% efficient no vertical recirculation	Natural Gas 98% efficient vertical recirculation
Lighting & Power	100% LED, Median Energy Star Apps.	100% LED, Median Energy Star Apps.
Thermal Bridging	Attic Access, Foundation, Rims, Balconies, Canopies	Attic Access, Foundation

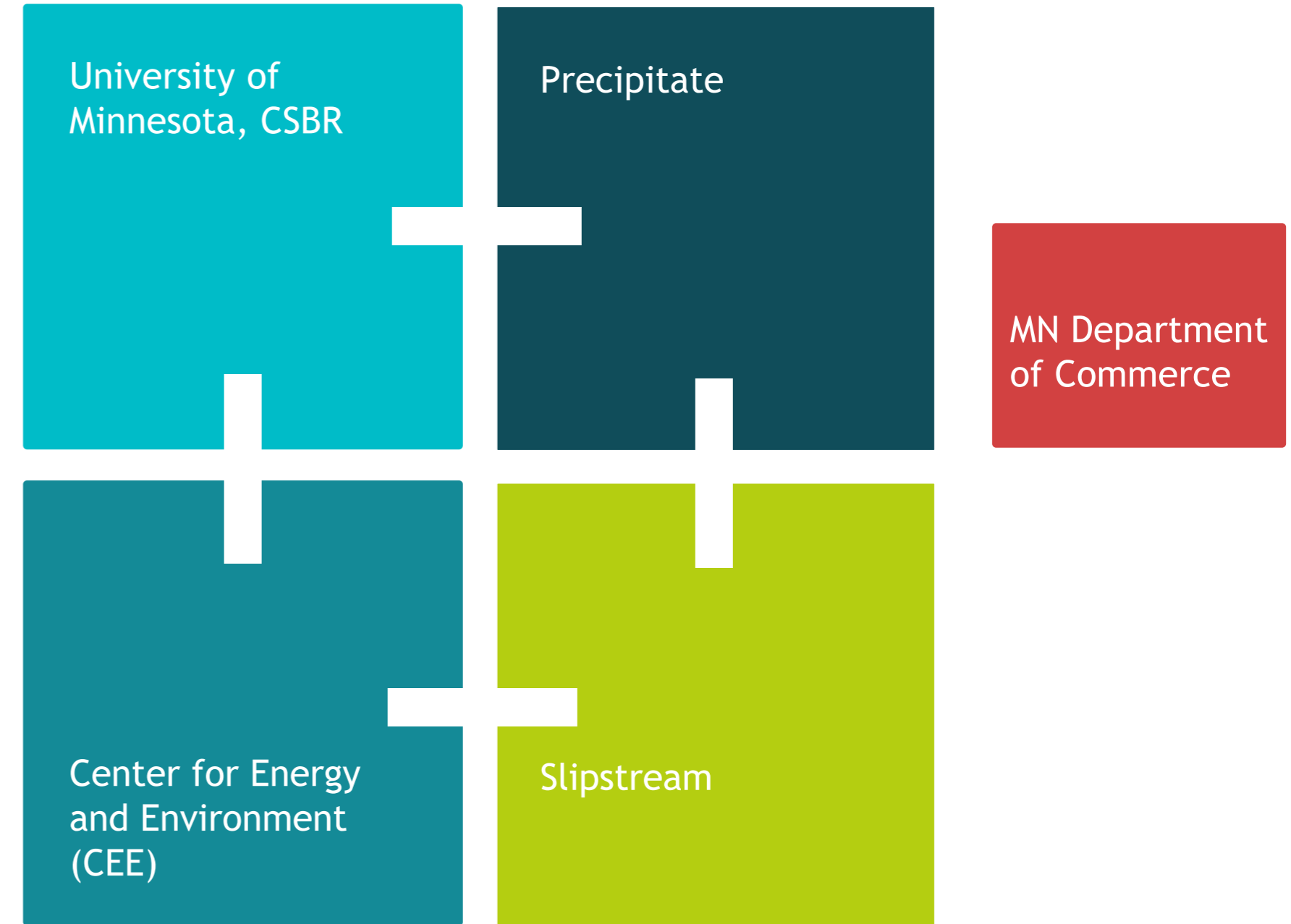
policy > project success!



exploring incentives: card grant

\$258,441 GRANT AWARDED
& ADMINISTERED BY THE **MN**
DEPARTMENT OF COMMERCE DIV.
OF ENERGY RESOURCES & FUNDED BY
INVESTMENT FROM MN **UTILITIES**.

CONSERVATION APPLIED RESEARCH
AND DEVELOPMENT (**CARD**) **GRANTS**
ARE RESEARCH-FOCUSED GRANTS
DESIGNED TO IMPROVE AND EXPAND
THE REACH AND ENERGY SAVINGS OF
UTILITY ECO PROGRAMS (ENERGY
CONSERVATION AND OPTIMIZATION
PROGRAMS)

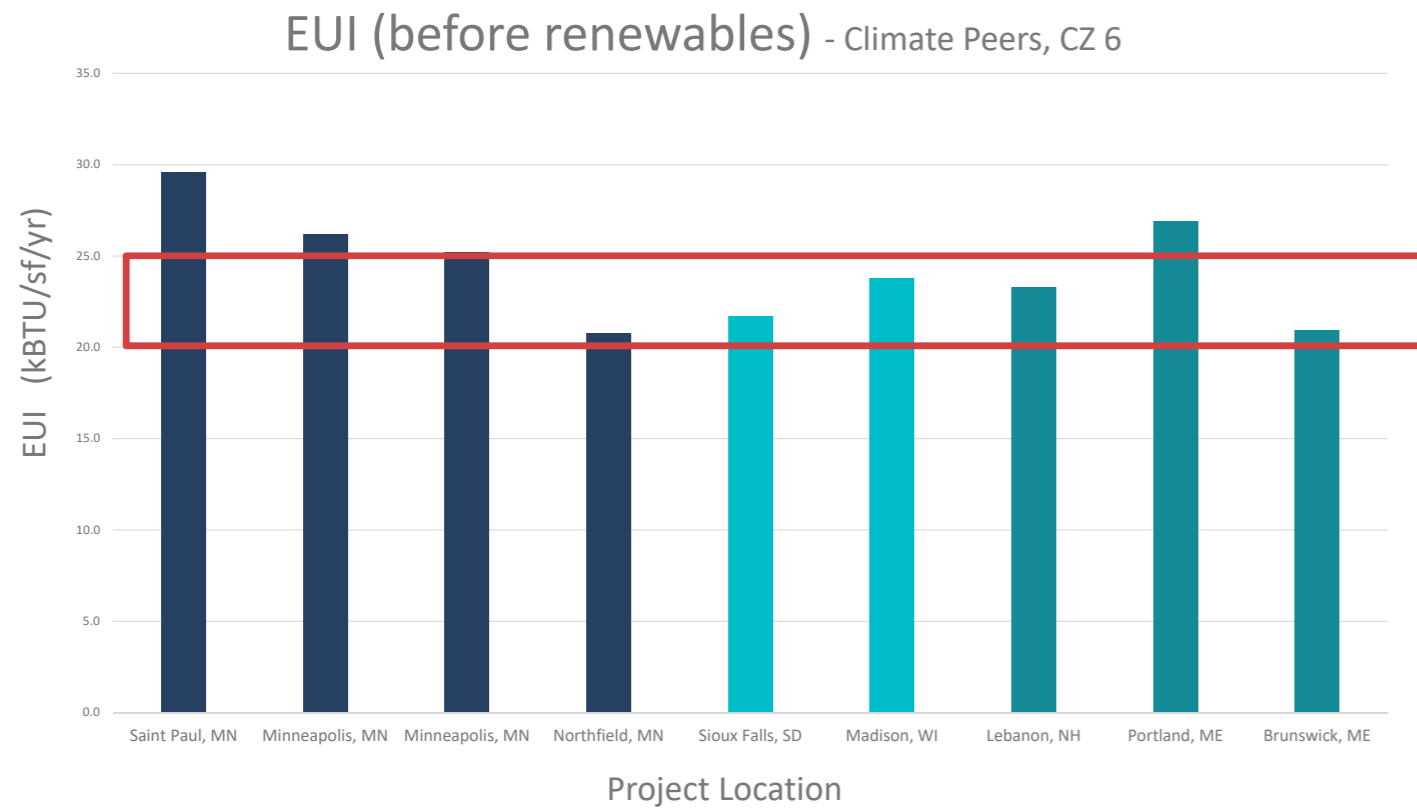


Note: results are still in draft form and might change based on the study's final analysis and recommendations that will be included in the CARD final report and webinar

study of existing projects



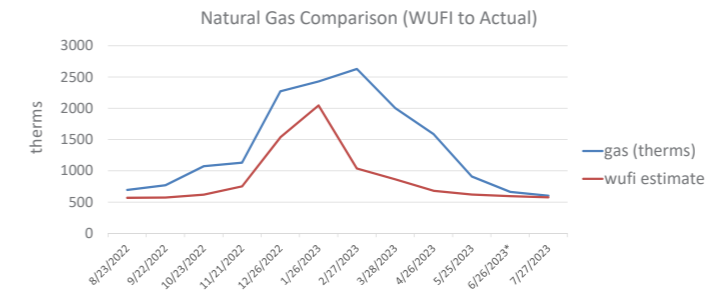
current multifamily phius in minnesota



Typical EUI:
20-25 kBTU/sf/yr

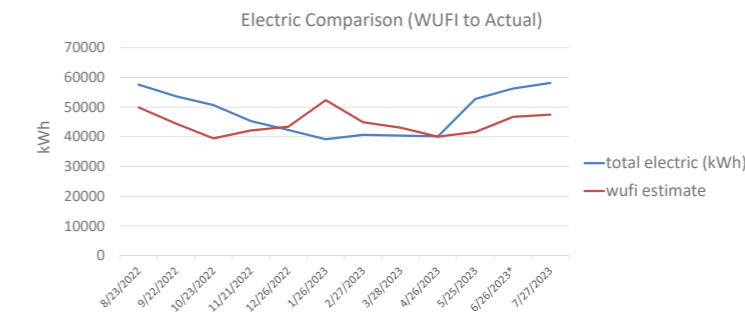
Site energy savings:
40 - 60% **modeled**
savings compared to
typical affordable
multifamily construction
in MN

modeled to actual consumption - verdant



WUFI EUI (with parking garage):
23.5 kBTU/sf/yr

Measured EUI (with parking garage):
29.6 kBTU/sf/yr



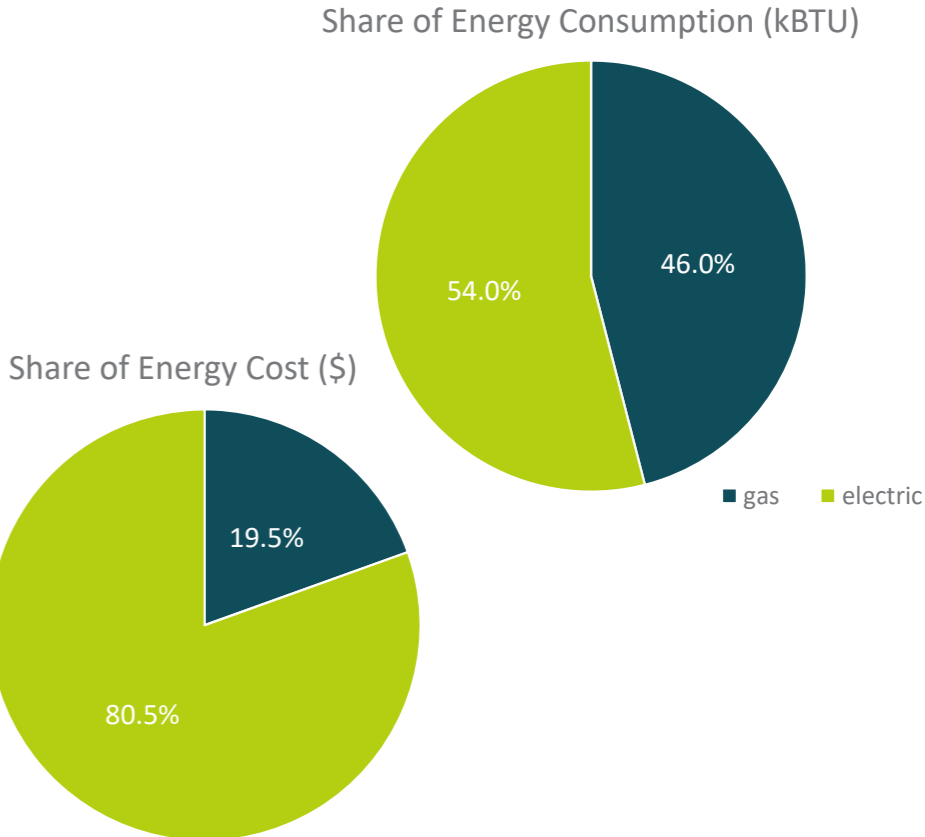
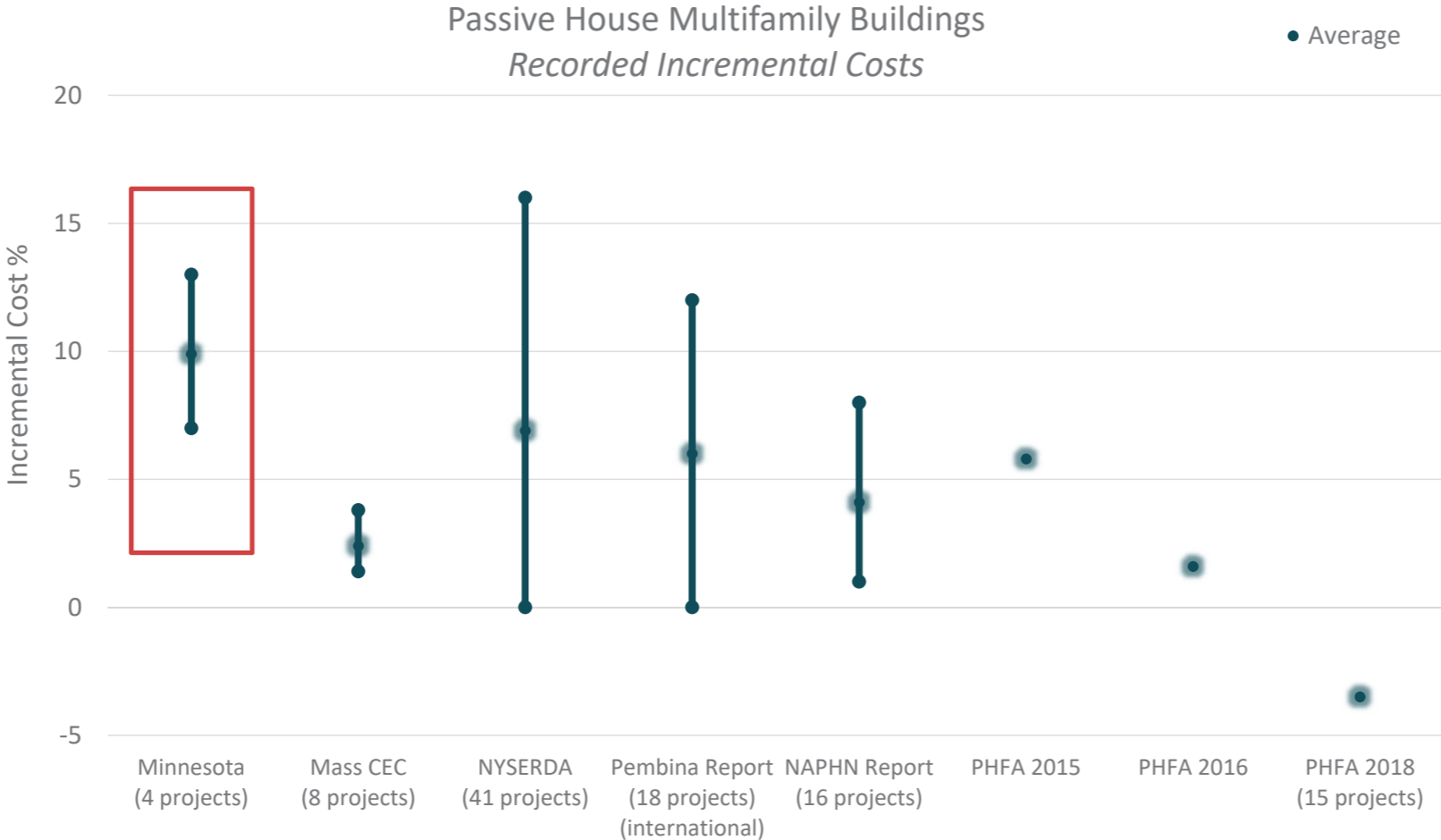
80% Modeled vs. Actual
(Measured data is most recent 12 months, but has not been weather-normalized yet)

how much does it cost? how much can we save?



incremental construction costs

Typical incremental cost in MN: 7-13%, MN average 10%



modeling energy savings

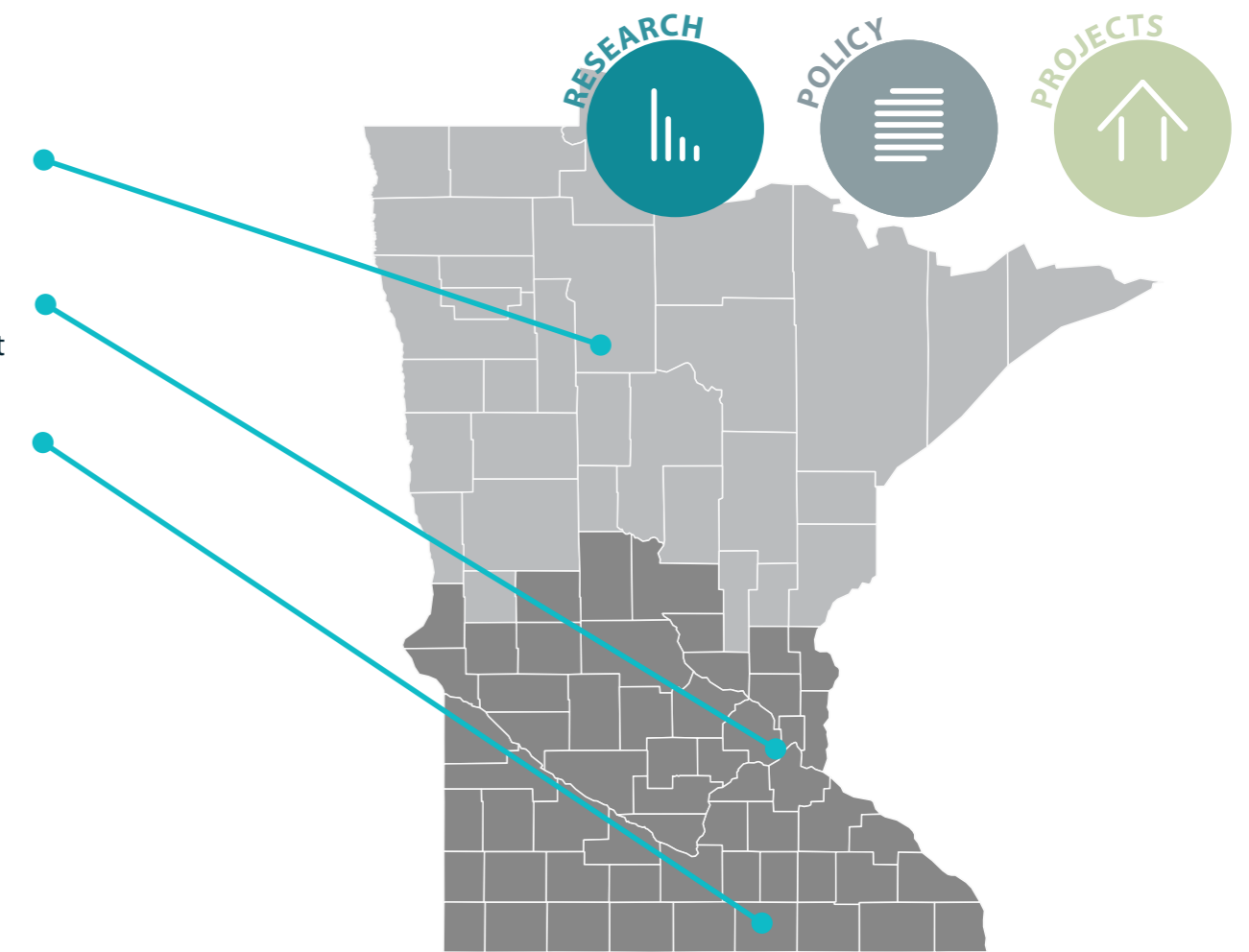
UNDERSTAND THE POTENTIAL ENERGY SAVINGS FOR MULTIFAMILY BUILDINGS ACROSS THE STATE

BY COMPARING A **CODE BASELINE BUILDING** TO A **PHIUS CERTIFIABLE BUILDING** FOR **THREE SCALES** OF MULTIFAMILY BUILDINGS IN **THREE MN CLIMATES**

7 NORTH
BEMIDJI MUNICIPAL AIRPORT

6A CENTRAL
Minneapolis - St. Paul Intl Airport

6A SOUTH
Albert Lea (AWOS)



3 CLIMATES 3 SCALES



A. SMALL MULTIFAMILY

TIERRA LINDA

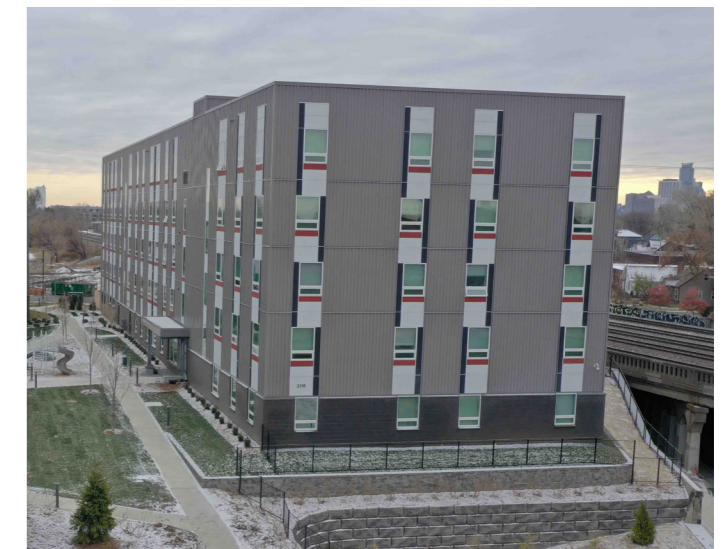
Envelope Area	14,107
iCFA	8,596
Dwelling Units	6
Bedrooms	18



B. MEDIUM MULTIFAMILY

VAN BUREN CARBON SMART APARTMENTS

Envelope Area	21,103
iCFA	17,880
Dwelling Units	23
Bedrooms	23



C. LARGE MULTIFAMILY

HOOK & LADDER

Envelope Area	56,200
iCFA	53,167
Dwelling Units	59
Bedrooms	97

model assumptions for large multifamily



	BASELINE COMMERCIAL CODE ASHRAE 90.1 2019 W/MN AMENDMENTS			PASSIVE HOUSE
	GAS	ELECTRIC RESISTANCE	ELECTRIC ASHP	PHIUS+ 2021
Roof	R30 Zone6, R35 Zone7			PERFORMANCE BASED (VARIES)
(whole wall) Wall	R20 + 3.8ci (R21 effective)			
Slab	R7.9 (slab on grade)			
Windows	U-0.42/0.36 (operable), U-0.34/0.29 (fixed) site & summer shading .75, no interior blinds			
Doors	Uw-0.63 (entrance) Uw-0.37 (opaque)			
Air Sealing	0.31 cfm/SF @50 Pa			.06 cfm/SF @50 Pa
Heating	80 AFUE Gas Furnace	All-in-One Elec Heating & AC	Air Source Heat Pump COP 3.2 @ 47F / 2.05 @ 17F	VRF SYSTEM 20,000 BTU/h Heat.COP 3.87 @ 47F / 2.41@ -12.6F
Cooling	Electric AC 13 SEER / 11.38 EER		Air Source Heat Pump 13 SEER / 11.38 EER	Air to Air Heat Pump 641,000 BTU/h 25 SEER
Ventilation	Balanced, No Recovery 1 W/cfm Fan Efficiency			Energy Recovery Ventilator SRE 0.79 / LRE 0.694 / .79 W/cfm
DHW	Standard Natural Gas 0.8 EF R3.3 Pipe Insulation			Natural Gas 96% efficient 72 ga. tank
Lighting & Power	75% LED, Utility Baseline Appliances			100% LED, Median Energy Star Apps.
Thermal Bridging	Not Included in Baseline Models			

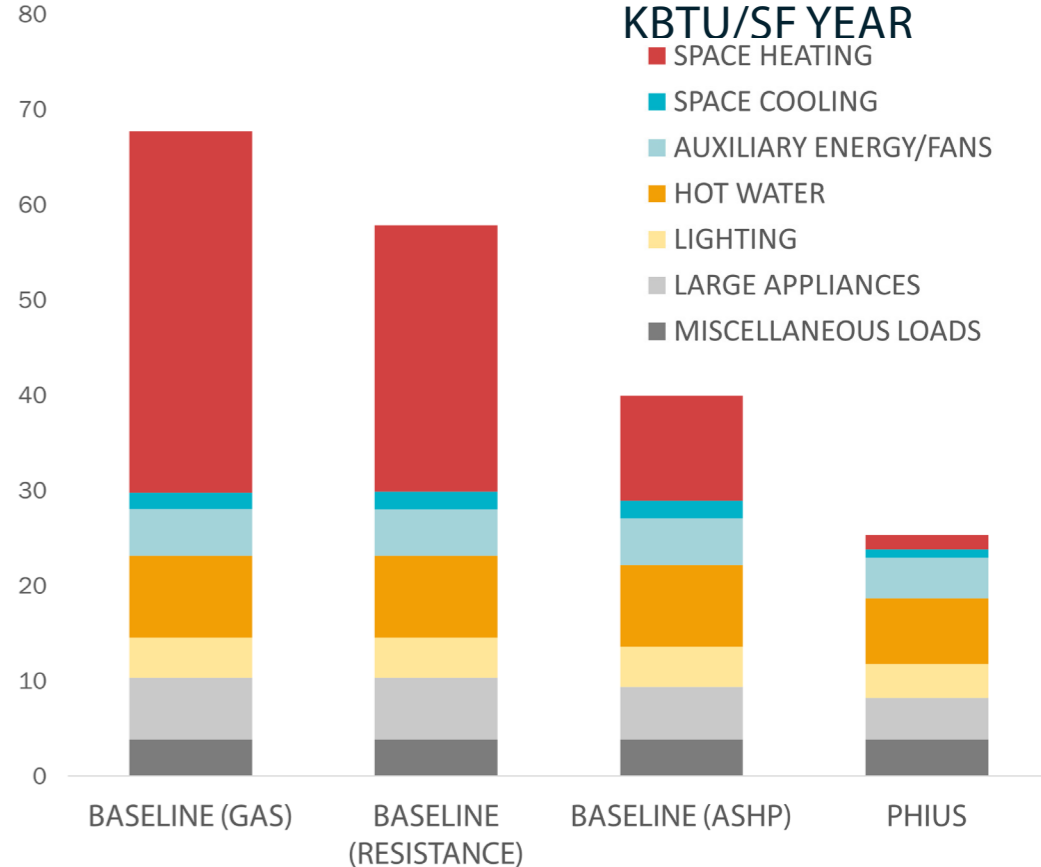
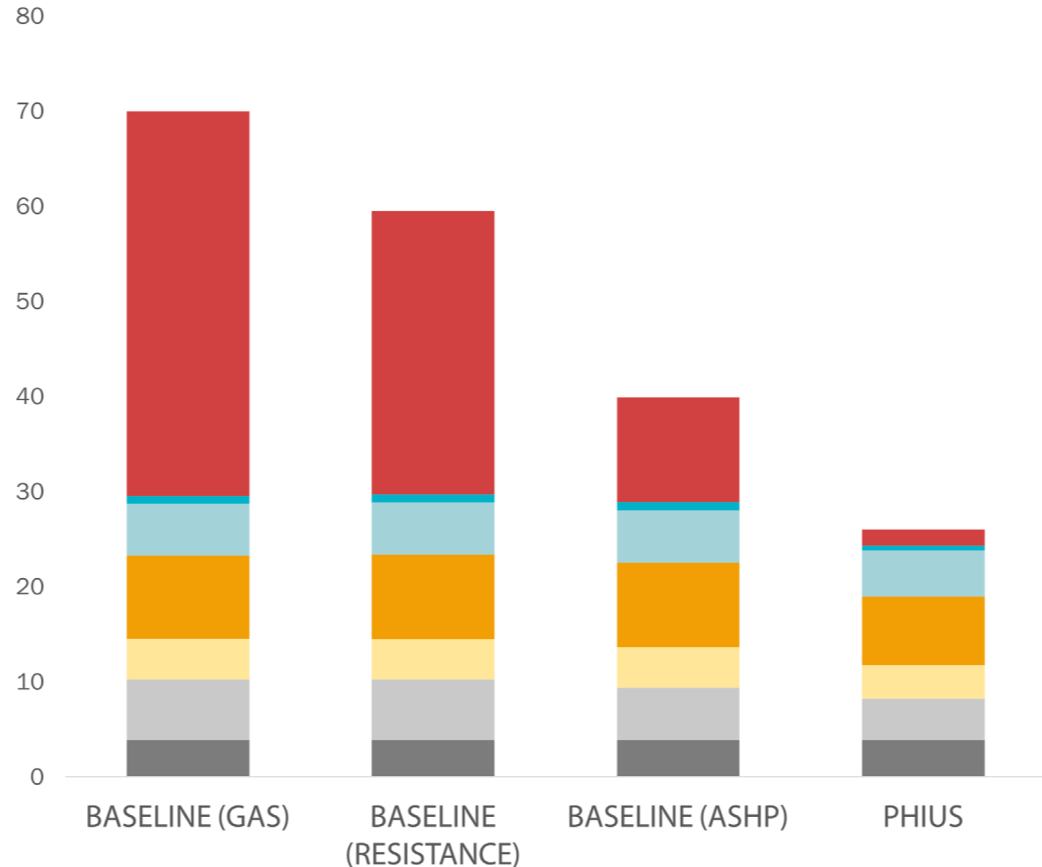
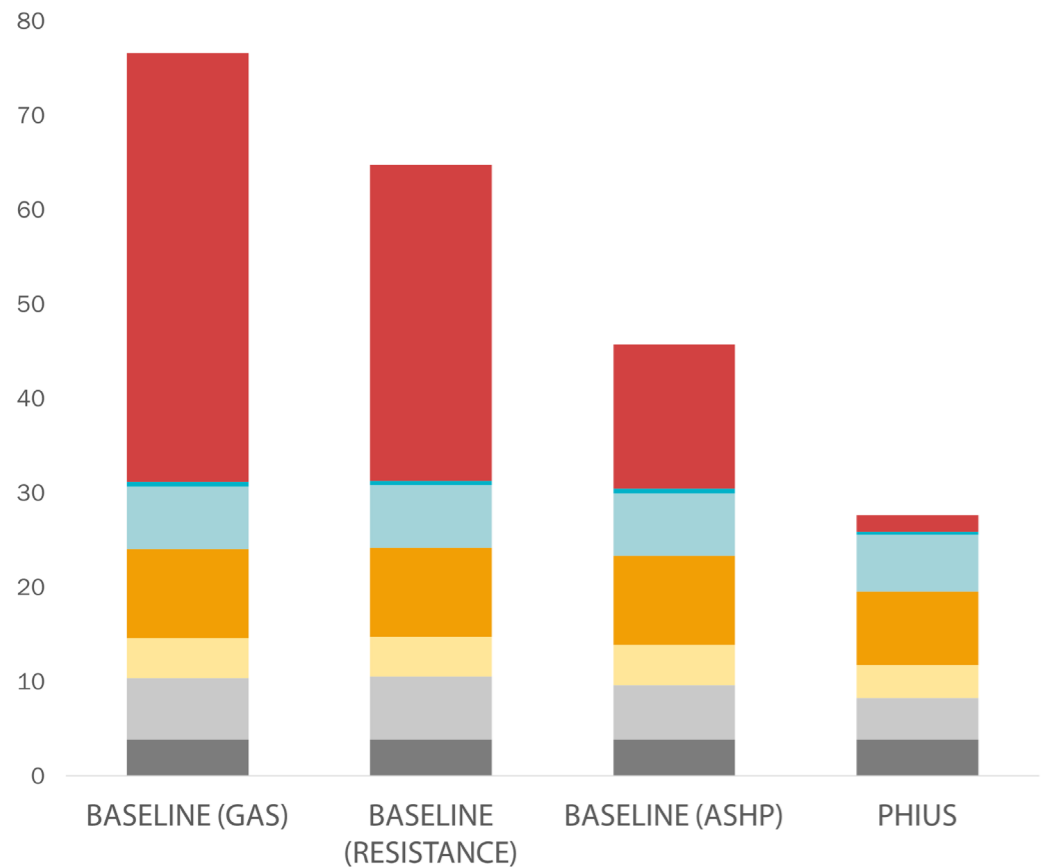
annual site energy use comparison | large multifamily



BEMIDJI (7A)
64% - 40% reduction

MINNEAPOLIS ST PAUL (6A)
65% - 35% reduction

ALBERT LEA (6A)
63% - 37% reduction



KBTU/SF YEAR
 ■ SPACE HEATING
 ■ SPACE COOLING
 ■ AUXILIARY ENERGY/FANS
 ■ HOT WATER
 ■ LIGHTING
 ■ LARGE APPLIANCES
 ■ MISCELLANEOUS LOADS

Wall	R21	R44
Roof	R35	R63
Slab	R7.9	R20
Wdws	U-0.36(operable)/0.29(fixed)	U0.19
Doors	U0.63(entry)/0.37(opaque)	U0.43
Solar		none

Wall	R21	R28
Roof	R30	R53
Slab	R7.9	R20
Wdws	U-0.42(operable)/0.34(fixed)	U0.19
Doors	U0.63(entry)/0.37(opaque)	U0.43
Solar		none

Wall	R21	R28
Roof	R30	R53
Slab	R7.9	R20
Wdws	U-0.42(operable)/0.34(fixed)	U0.19
Doors	U0.63(entry)/0.37(opaque)	U0.43
Solar		none

projects > research > policy > projects



VERDANT

Saint Paul, MN (2019) - Kaas Wilson & Sherman Associates



Image copyright Kaas Wilson Architects

HOOK & LADDER

Minneapolis, MN (2017) - LHB & Newport Midwest



Image copyright Newport Midwest

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Minneapolis, MN (2024) - Precipitate & Footprint Development



ART DECO OFFICE RETROFIT

Minneapolis, MN (2024) - Precipitate



NORTHSIDE PASSIVE

Minneapolis, MN (2024) - Precipitate & Urban Homeworks / PPL



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