BEYOND ENERGY
Justifying PHIUS for Affordable Housing
PHIUS CONFERENCE / SEPTEMBER 21, 2018 / BOSTON

Lindsey Kieffaber, Architect
Elizabeth Turner, Architect and CPHC

Image credit: LHB

precipitate
ARCHITECTURE, PLANNING, RESEARCH
LHBcorp.com
BEYOND ENERGY: Justifying PHIUS for Affordable Housing
Data that city staff members presented to the council Thursday show that barriers to housing access have been in place for decades and that the disparities are stark. 

Most Minneapolis residents of color are renters, while most white residents own homes. Of cost-burdened households in the city — those that pay 30 percent of their income or more for housing — about 75 percent are renters."

Minneapolis leaders look to tackle affordable housing ‘crisis,’ Emma Nelson, Star Tribune, August 3, 2017

Gov. Mark Dayton proposes about $100 million for affordable housing as part of his 2018 bonding proposal. Such contributions, while well-intended and valuable to the beneficiaries, result in too few affordable-housing units to make a real difference, often at a disproportionate cost to taxpayers.

Affordable housing unchained: We don’t need more subsidies in Minnesota. We need fewer rules and fees., Peter Coyle, Star Tribune, April 6, 2018
BEST USE OF PUBLIC FUNDING?

Why should we spend public money on PHIUS for Affordable Housing...

...rather than spending public money on more units of Affordable Housing?
BEYOND ENERGY: Justifying PHIUS for Affordable Housing

PHIUS+ 2015 REQUIREMENTS
- High-performance building envelope
  - Thermal comfort
  - Moisture control
  - Durability
- Fresh air requirements
  - Direct bedroom supply
  - MERV 8 (MERV 12)
  - Limited exposure to combustion gas
- DHW design

OCCUPANT BENEFITS
- Resilience
  - extreme weather
  - power outages
  - housing cost uncertainty
- Remediation of environmental pollution
- Increased occupant comfort
- Increased occupant health
  - reduction in mold, bacteria, dust, pests
  - cardiovascular
  - stress

COMMUNITY BENEFITS
- Lower turnover = connection to community
- Resilience
- Proactive care for vulnerable populations
- Economics
- Emissions
- Prototype

OWNER BENEFITS
- Funding opportunities
- Reduced maintenance/operation costs
  - utilities
  - envelope durability (3rd party verified)
  - lower turnover

PHIUS BUILDING PROJECT METRICS

- Climate Zone 6A
- Floor Area 53,167 SF
- Units 59
- Occupants 156
- Density 341 SF/Occupant
- Envelope 56,200 SF
- Envelope/iCFA 1.06

image credit: LHB
TIMELINE

- **SPRING 2016**
  Schematic Design PHI Feasibility Study
  Targeted PHI due to neighborhood demand and developer interest

- **SPRING-SUMMER 2017**
  Design Development
  PHIUS+ 2015 chosen as rating system, iterative WUFI Passive models

- **FALL 2017**
  PHIUS Review Begins
  Three rounds of submissions

- **APRIL 2018**
  Achieved PHIUS+ 2015 Pre-Certification

- **AUGUST 2018**
  Construction Start
  PHIUS Verifier engaged throughout construction process
HOOK & LADDER

STANDARD

PHIUS

Image credit: LHB
TEAM RELATIONSHIPS

**CONTRACTOR**
Frerichs

**ELEC. SUB**
J Becher & Assoc.

**MECH. SUB**
Associated Mechanical Contractors

**COMMUNITY**

**DEVELOPER**
Newport Partners

**ARCHITECT**
LHB

**LANDSCAPE ARCHITECT**

**STRUCTURAL ENGINEER**

**MEP ENGINEERS**
Steen

**FINANCING**

**CPHC**
Precipitate

**PHIUS**

**PHIUS VERIFIER**
EcoAchievers
DEVELOPMENT FUNDING SOURCES

PHIUS BUILDING
TOTAL COST
Excluding site
$10,020,951

STANDARD BUILDING
TOTAL COST
Excluding site
$9,547,675
AFFORDABLE HOUSING IN TWIN CITIES
CONTINUOUS FRESH AIR SUPPLY - DIRECT TO BEDROOMS

STANDARD

PHIUS

image credit: LHB
HIGH-PERFORMING ENVELOPE & MECHANICAL SYSTEM

ENVELOPE
Roof Insulation    R-55
Wall Insulation    R-19 + R-9.6 CI (R-29.7 total wall assembly)
Above Parking     R-50 CI
Slab Insulation    R-20 CI
Awning Window      U-0.17, SHGC 0.2
Fixed Window       U-0.15, SHGC 0.27

SYSTEMS
HVAC System        VRF with Centralized ERV
Lighting           LED
Dryers             Heat Pump mixed with Standard
DHW                Gas with VRF Preheat
Solar              40 kW Rooftop
DOMESTIC HOT WATER
CONSTRUCTION SAVINGS - PARKING

STANDARD

PHIUS

UNENCLOSED PARKING

8'-0" CLEAR

FIBER CEMENT SOFFIT PANEL ON METAL STUD FRAMING

BITUMINOUS PAVING SLOPE TO DRAIN, SEE PLAN

PRECAST BEAM DASHED BEYOND

PRECAST COLUMN WITH THERMAL BREAK AT TOP

INSULATED FLOOR/CEILING

image credit: LHB
To calculate the utility allowance chart simply, start with the Payment Standard amount and then subtract the amounts listed below for all the utilities which the participant (tenant) pays. This equals the Net Rent. If the Owner’s proposed rent is greater than the Net Rent (payment standard minus the utilities), this unit may be considered NOT affordable for the Housing Choice Voucher Program. Be sure to use the proper column for the bedroom size and the proper unit type. The Range and Refrigerator amounts are for participant owned appliances, so do not add them if they are provided by the owner.

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Rent</th>
<th>Utilities</th>
<th>Utilities Actual</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 BR</td>
<td>$835</td>
<td>$835</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 BR PHIOUS</td>
<td>$1,174</td>
<td>$1,174</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 BR</td>
<td>$1,552</td>
<td>$1,552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 BR PHIOUS</td>
<td>$1,552</td>
<td>$1,552</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PATH B:**
$13,000 ANNUAL SAVINGS
**Utility Supplied Metering (Original Design)**

- 120 Electric meters each with monthly individual service charges
- 61 Gas meters each with monthly individual service charges

Required permissions through utility and tenant agreements to obtain unit energy data. Math required after receiving utility information to compare Standard to PHIUS building.

**Annual Utility Service Charges (118 units):** $27,289

---

**Wireless Monitors (Proposal Request)**

- 2 Electric meters
  - Install wireless sub-meters, individual service charge savings
- 2 Gas meters
  - Install wireless sub-meters, individual service charge savings

Commercial energy rate*

Rate change savings

Easy access to unit energy data. 3rd party provides energy data formatted to compare Standard to PHIUS building. 3rd party provides: high usage alerts, online access to data, original utility bills, and data formatted to upload to Energy Star and B3 Benchmarking.

**Cost Changes:**
- One time install - Electrical cost: $60,000 (Maximum)
- One time install - Mechanical cost: $0
- One time - 3rd party database set up fee: $5,500
- One time - design additional services**: $5,000
- **TOTAL upfront cost:** $70,500

**Annual Energy Services cost:** $1,920
**Annual Utility Service Charges:** $0
**Annual Utility Savings***: ($32,580)

**Payback period: 2.3 years**

---

*In addition to the commercial rate being lower than the residential rate. In 2017, MN utility regulators approved Xcel Energy rates to increase 10.6% for residential and 6.9% for commercial over 4 years. Further widening the gap between commercial and residential rates, allowing the project to see additional savings annually for changing over to the commercial rate.

**Design Additional Services include:** LHB coordination, STEEN redrawing distribution panels, resizing electrical loads, voltage drop, and riser locations and distribution plans.

**Annual Utility Savings include** money saved on individual utility supplied meter service charges, and energy cost savings from changing over to the commercial rate, based on Xcel Energy Design Assistance (EDA) calculated Energy Use Intensity (EUI) projections for both buildings.
# Beyond Energy: Justifying PHIUS for Affordable Housing

## PHIUS+ 2015 Requirements
- High-performance building envelope
  - Thermal comfort
  - Moisture control
  - Durability
- Fresh air requirements
  - Direct bedroom supply
  - MERV 8 (MERV 12)
  - Limited exposure to combustion gas
- DHW design

## Occupant Benefits
- Resilience
  - Extreme weather
  - Power outages
  - Housing cost uncertainty
- Remediation of environmental pollution
- Increased occupant comfort
- Increased occupant health
  - Reduction in mold, bacteria, dust, pests
  - Cardiovascular
  - Stress

## Community Benefits
- Lower turnover = connection to community
- Resilience
- Proactive care for vulnerable populations
- Economics
- Emissions
- Prototype

## Owner Benefits
- Funding opportunities
- Reduced maintenance/operation costs
  - Utilities
  - Envelope durability (3rd party verified)
  - Lower turnover
BEYOND ENERGY: Justifying PHIUS for Affordable Housing

WHAT WILL BE IMPACT OF PHIUS+ 2018?