Good Energy Haus

First Climate-neutral certified Passive House Plus in Minneapolis.
Modern ultra-sustainable design.

The 'Good Energy Haus' is a truly carbon-neutral, urban certified Passive House Plus in Minneapolis, Minnesota. Designed by Tim Delhey Eian, principal of TE Studio, the home was built in 2019-20 by Tanner Construction and serves as a beacon for sustainability, as well as a demonstration showcase for the design firm and its partners.
‘Good Energy Haus’ is a case study for modern, sustainable urban living. It is a Certified Passive House Plus in US Climate Zone 6, and an insulated wood-frame construction with upcycled dense-pack cellulose insulation. It is powered by a photovoltaic system with 100% wind-electricity backup.

See more details about this project

[https://www.slideshare.net/timeian/good-energy-haus](https://www.slideshare.net/timeian/good-energy-haus)

Photo credit

Corey Gaffer Photography

Stakeholders

Contractor

Name: Tanner Construction
Contact: Seth Tanner, seth@tannerconstructionllc.com, Watertown, MN, USA
[http://www.tannerconstructionllc.com](http://www.tannerconstructionllc.com)

Construction Manager

Name: TE Studio, Ltd.
Contact: Tim Eian, tim@testudio.com, Minneapolis, MN, USA
[http://www.testudio.com](http://www.testudio.com)

Stakeholders

Function: Structures calculist
Align Structural
Rick Johnson
[http://www.alignstructural.com](http://www.alignstructural.com)

Function: Manufacturer
Tanner Windows
Stephan Tanner, stephan@tannerwindows.com, Watertown, MN, USA
[http://tannerwindows.com](http://tannerwindows.com)

Function: Environmental consultancy
Herz & Lang
Raphaël Vibert, raphael.vibert@herz-lang.de, Weitnau, Germany
[https://www.herz-lang.de](https://www.herz-lang.de)

Contracting method

General Contractor

Type of market

Realization

If you had to do it again?

Slab on grade concrete pour was too uneven for polishing. Ended up having to pour self leveler and install cork flooring. Would use a specialized concrete contractor in future and/or set slab at lower elevation and utilize self-leveling overpour as standard. Open living area sound is lively. Would utilize more sound-absorbing materials in future.
Building users opinion

Comfort is tremendous on sunny, cold days. Like a higher set point on cloudy, cold days. Air quality is stellar (is monitored 24/7). Illumination is wonderful (lots of daylight = need very little artificial light).

Energy

Energy consumption

Primary energy need: 15.79 kWh/m².year
Primary energy need for standard building: 47.34 kWh/m².year
Calculation method: Other
CEEB: 0.0001

Breakdown for energy consumption:
- Heating: 8.3 kWh/m² a
- Cooling: 3.5 kWh/m² a
- Hot water: 10.2 kWh/m² a
- Household electricity: 8.8 kWh/m² a

Envelope performance

Envelope U-Value: 0.19 W·m⁻²·K⁻¹

More information:

WOOD WALL
5/8” (16mm) drywall
7-1/4” (184mm) dense-pack cellulose insulation and 2x8 framing [0.039]
1/2” (13mm) OSB sheathing
9-1/2” (241mm) dense-pack cellulose insulation and I-Joists [0.039]
1/2” (13mm) wood fiberboard sheathing [0.055]

VENTILATED SIDING
U = 0.101
U-Wert = 0.095 W/(m²K)

SLAB
4” (102mm) polished concrete slab
8” (153mm) EPS [0.039]
U-Wert = 0.184 W/(m²K)

ROOF
Low sloped hot roof
5/8” (16 mm) drywall
5-1/2” (140mm) 457 service cavity
18” (457mm) dense-pack cellulose and trusses [0.040]
3/4” (19mm) plywood
average 2-1/2” (64mm) polyisocyanurate tapered insulation [0.035]
U-Wert = 0.079 W/(m²K)

WINDOW FRAMES
Tanner Windows, Lauda Premium
Wood frame exterior aluminum cladding
Tanner Lauda Premium frame: Uf = 0.81
U w-Wert = 0.68 W/(m²K)

GLAZING
Saint Gobin glazing: Ug = 0.53, g = 0.545
Swiss Spacer
U g-Wert = 0.53 W/(m²K)
g -Wert = 545 %

SHADING
Hella Raffstores, Loxone MiniServer automation
ENTRY DOOR Tanner Windows Entry Door (= Tanner window)
Local fire-protection door: U d-Wert = 0.8 W/(m²K)

Building Compactness Coefficient: 0.34
Indicator: n50
Air Tightness Value: 0.22

Users' control system opinion:

Shades are automated with an interior temperature sensor and a roof mounted weather station. They can be manually overridden by occupants with an app.
More information

Energy monitoring started 12/ 2020 and is in process.

Real final energy consumption

Final Energy : -7.87 kWh/m².year

Renewables & systems

Systems

Heating system :
  - Heat pump

Hot water system :
  - Heat pump

Cooling system :
  - VRV Syst. (Variable refrigerant Volume)

Ventilation system :
  - Double flow heat exchanger

Renewable systems :
  - Solar photovoltaic

Renewable energy production : 100.00%

Solutions enhancing nature free gains :
Wastewater heat recovery unit

Smart Building

BMS :
Automated exterior shades

Environment

Urban environment

Infill lot in Minneapolis, MN
Land plot area : 1 000.00 m²
Built-up area : 27.00 %

Costs

Health and comfort

Indoor Air quality

Monitoring with AirThings system.

Comfort

Measured indoor CO2 concentration :
628 ppm
GHG emissions

GHG in use: -12.00 KgCO₂/m²/year
Methodology used: PHPP

Contest

Reasons for participating in the competition(s)

- Insulated wood-frame construction with upcycled dense-pack cellulose insulation.
- Powered by photovoltaic system with 100% wind-electricity backup.

Building candidate in the category