We love how comfortable our school is!

Passive House Primary school Marigrün Graz
Architekturwerk Berktold Kalb
GBG Gebäude und Baumanagement Graz GMBH
Treated floor area: 2,015 m² = 21,700 ft²
Heating demand: 11 kWh/m²a = 3.47 kBTU/ft²a
Photo credits: Kurt Hörbst
55,000 Passive Houses exist in 28 European member countries

Energy efficient building worldwide – Passive House Standard as one proven solution!

COP21 Paris, Dec 2nd 2015

Günter Lang, Passivhaus Austria
2nd Largest Passive House worldwide
Lodenareal / Innsbruck
Developer: Neue Heimat Tirol
361 flats/ 27,800 m² = 299,300 ft²
Primary energy consumption 117kWh/m²a = 37.1kBTU/ft²yr

Developer NEUE HEIMAT TIROL builds only in Passive House Standard.
Over 2,800 apartments finished, 700 more each year.

Pellets consumption 246m³/a = 8,690 ft³/yr, same consumption as 6 single family houses.
Inhabitant satisfaction result: 95%
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Sustainability evaluation of Viennese housing estates in the passive house standard – A post occupancy evaluation of selected criteria

BOKU 2009  Roman Smutny, Christoph Neururer & Martin Treberspurg

PopUp dorms – GreenFlexStudios 2015
Tennis hall Stefan Edberg in Växjö / Sweden
Architecture Kent Pedersen Arkitektfirma Aps
Building physics Tyréns / IG Passivhus Sverige

Exterior wall U-value: 0.094 W/m²K
Floor slab U-value: 0.125 W/m²K
Roof U-value: 0.068 W/m²K
Primary energy demand: 118 kWh/m²a
Treated Floor Area: 3,589 m²
Mixed construction

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New Plus Energi Headquarters for Syd Energi

Esbjerg / Denmark

Architecture GPP Arkitekter A/S
Building physics Esbensen A/S

Treated Floor Area 10,952 m² = 117,900 ft²
Year of construction 2013

Annual heating demand: 8 kWh /m²a = 2.53 BTU/ft²a
Primary energy demand: 217 kWh /m²a = 68.8 BTU/ft²a
Curtain wall U-value: 0.188 W/m²K = R 30
Roof U-value: 0.065 W/m²K = R 87

Heat pump using both heat recovery from the server room and a geothermal system.
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RHW.2 Tower Raiffeisen-Holding NÖ-Vienna office
World’s first Passive high-rise office building
Architects DI Dieter Hayde and DI Ernst Maurer

High-rise benchmarks energy consumption in kWh/m²a

- Conventional US skyscraper: 140 kWh/m²a = 570 kWh/m²a
- Conventional AT skyscraper: 125 kWh/m²a = 312 kWh/m²a
- RHW.2 skyscraper: 140 kWh/m²a = 117 kWh/m²a

- Renewable energy: bio gas + geothermie
- User: 135 kWh/m²a = 570 kWh/m²a
- Building equipment: 125 kWh/m²a = 312 kWh/m²a
- Cooling: 170 kWh/m²a = 742 kWh/m²a
- Heating: 95 kWh/m²a = 396 kWh/m²a

- Bio gas: 14 kWh/m²a = 57 kWh/m²a
- Geothermie: 82 kWh/m²a = 315 kWh/m²a

- 80% reduction compared to conventional skyscrapers

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Cornell University Residences
World’s Tallest Passive House High-Rise
New York City / US

26-story residential tower for Cornell University’s new Roosevelt Island Campus
350 residences for students
save 882 tons of CO₂ per year
Passive House office in China, Zhuozhou, Hebei (Beijing)
Passive House consulting Schöberl & Pöll GmbH
Treated Floor Area 2868 m²

Exterior wall U-value 0.095 W/(m²K)
Basement floor U-value 0.085 W/(m²K)
Roof U-value 0.069 W/(m²K)

Heating energy demand 2 kWh/(m²a)
Primary energy 100 kWh/(m²a)
Emission CO₂-equivalent 26.3 kg/(m²a)
Belgian & Netherland embassy (currently under construction)
Client: Foreign affairs ministry of Belgium
Kinshasa / République Démocratique du Congo
Architecte + physique du bâtiment: A2M

The most important impact in design is: sunshade and airtightness!
Insulation 5cm PIR wall and roof

Surface 5 769 m²
Cooling, dehumidification

Primary Energy kWh/(m²a)

- 72%

Conventional building: 420
Passive House embassy: 119
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4.47 kBTU/ft²a

38.9 kBTU/ft²a

25.4 kBTU/ft²a

BABY IT’S COLD INSIDE – LET’S CHANGE TO PASSIVE Passive House makes resilient

What a blackout?

1,956,000 ft³ Gas

55,400 m³ Gas

1,660 ft³ Wood pellet
Historic building Eberlgasse
Retrofit to Passive House
Net floor area 668.3 m²
Wall U-value 0.089 W/m²K

Heating demand from 178 kWh/m²a to 15 kWh/m²a
Primary energy demand: 108 kWh/m²a
for heating, hot water, household electricity

Owner: Andreas Kronberger Unternehmensberatung
Building physics: Schöberl & Pöll GmbH
First retrofit to Passive House Plus

Office building Technical University Vienna

Architect: Arch. DI Gerhard Kratochwil
Building physics: Schöberl & Pöll GmbH
Owner: BIG Bundesimmobilien gesmbH

Treated floor area: 7,322 m² = 80,000 ft²
Heating demand: 14 kWh/m²a = 4.4 kBTU/ft²a
Heat load: 9 W/m² = 2.85 BTU/ft²
Primary energy: 56 kWh/m²a = 17.75 kBTU/ft²a

Energy efficient building worldwide – Passive House Standard as one proven solution!
Retrofit from old beer factory to Meininger Hotel
Molenbeek-Saint-Jean / Brussles / Belgium
Architect A2M
Surface 8 714 m² with 150 rooms
Reduction of 520 tons of CO₂-Emissions per anno
Building costs 872 €/m²

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Pilot City Innsbruck

66,000 m² refurbished area
40,000 citizens living in refurbished area

Source: Andreas Friedl

Pilot City Innsbruck: 36 buildings
12.5 GWh Energy saving per anno
0.6 GWh Renewable energy production

Before refurbishment
After refurbishment

Heating demand [kWh/m².a]

- 89 %

9,0 kWh/m².a

Energy saving at 12.5 GWh

Renewable energy production at 0.6 GWh
International Passive House Database
3,500 Passive Houses documented
2,173,196 m² sum of floor area
700 to visit during Passive House Days
www.passivehouse-database.org

Energy efficient building worldwide –
Passive House Standard as one proven solution!

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Passive House front-runner regions
Today Europe has 40 Passive House front-runner regions with more than 43 Million inhabitants.

- Germany
- Austria
- Belgium
- Luxembourg
- UK
- Ireland
- Poland
- Portugal
- Spain
- Italy
- Norway, …
Vienna 3., EUROGATE – Aspanggründe
Multi family houses areal with 1,900 flats
around 156,000 m² = 1,679,000 ft²
Masterplan Project: Albert Wimmer ZT-GmbH
Visualisierung: beyer.co.at

Part of big city in Passive House Standard
World’s largest Passive House city district
Zero-Emission-City areal Heidelberg-Bahnstadt
116 ha for 5,000 new job places + 1,700 flats
Passive House as Standard for urban development

www.heidelberg-bahnstadt.de
On 19 July 2011, the council of ministers of the State of Bavaria passed legislation regarding energy standards for public buildings stipulating that all new build administrative buildings be constructed to the Passive House Standard. In special cases, such buildings will be chosen as pilot Passive House projects.

Bavarian Parliament
Bayerischer Landtag in München
Maximilianum

Architect:
Léon Wohlhage Wernik Architekten

Construction: Massive 2012

Heating demand
5 kWh/m²a = 4,75 kBtU/ft²yr

Primary energy demand:
116 kWh/m²a = 34 kBtU/ft²yr
Belgian Energy provider Elia
Brussels mandated Passive House in January 2015

High rise renovation to full PH

Brussels Environnement Ministry
Passive House performs!
Energy consumption & Greenhouse gas evolution in Brussels
(with climate correction)

- Energy consumption
  - 1990 - 2011: +1 %
  - 1990 - 2004: +16 %
  - 2004 - 2011: -15 %

- Population
  - 1990 - 2011: +16 %
  - 1990 - 2004: +4 %
  - 2004 - 2011: +12 %

- Greenhouse Gas (GHG)
  - 1990 - 2011: -11 %
  - 1990 - 2004: +5 %
  - 2004 - 2011: -16 % -20 %...

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New York City goes Passive!

A Roadmap for New York City’s Buildings:

“The City Government will implement leading edge performance standards for new construction that cost effective achieve highly efficient buildings, looking to Passive House to inform the standards”
No Performance Gap with Passive House - Measured by over 2,100 apartments

Energy efficient building worldwide – Passive House Standard as one proven solution!

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World Energy Efficiency Revolution

Master Plan 2016 - 2036

€ 100.- /m² = 13.- $/ft² subsidy for retrofits with 85% Energy Efficiency to EnerPHit-Standard for all buildings from 1930 to 1980

One planet energy efficiency revolution
€ 5,000 ($ 6,900) billion subsidy until 2036
= € 250 billion per year
€ 7,000 ($ 9,500) billion taxes + VAT
€ 2,000 ($ 2,600) billion benefits for finance gouvernants

€ 36,000 ($ 49,000) billion invest volumina
€ 46,000 ($ 62,000) billion energy savings
€ 10,000 ($ 13,000) billion benefit for humans on planet

• 60.0 billion m² living area
• 12,000 TWh in energy savings per yr
• 6,620 million tons CO₂ reduction per yr
• 39 million additional green jobs per yr

Win – Win – Win strategy against economic crises!

Before retrofit
After retrofit
Renewable Energy

End Energy Demand TWh/(a)

© OMNIA
More than 65,000 Passive House buildings and counting in all climate zones!

Energy efficient building worldwide – Passive House Standard as one proven solution!

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Good envelope → low heating load

High quality – good results!

Thank you for your attention!

www.passivehouse.com
www.langconsulting.at
www.better-bee.com
www.passivhaus-austria.org
www.passivehouse-international.org