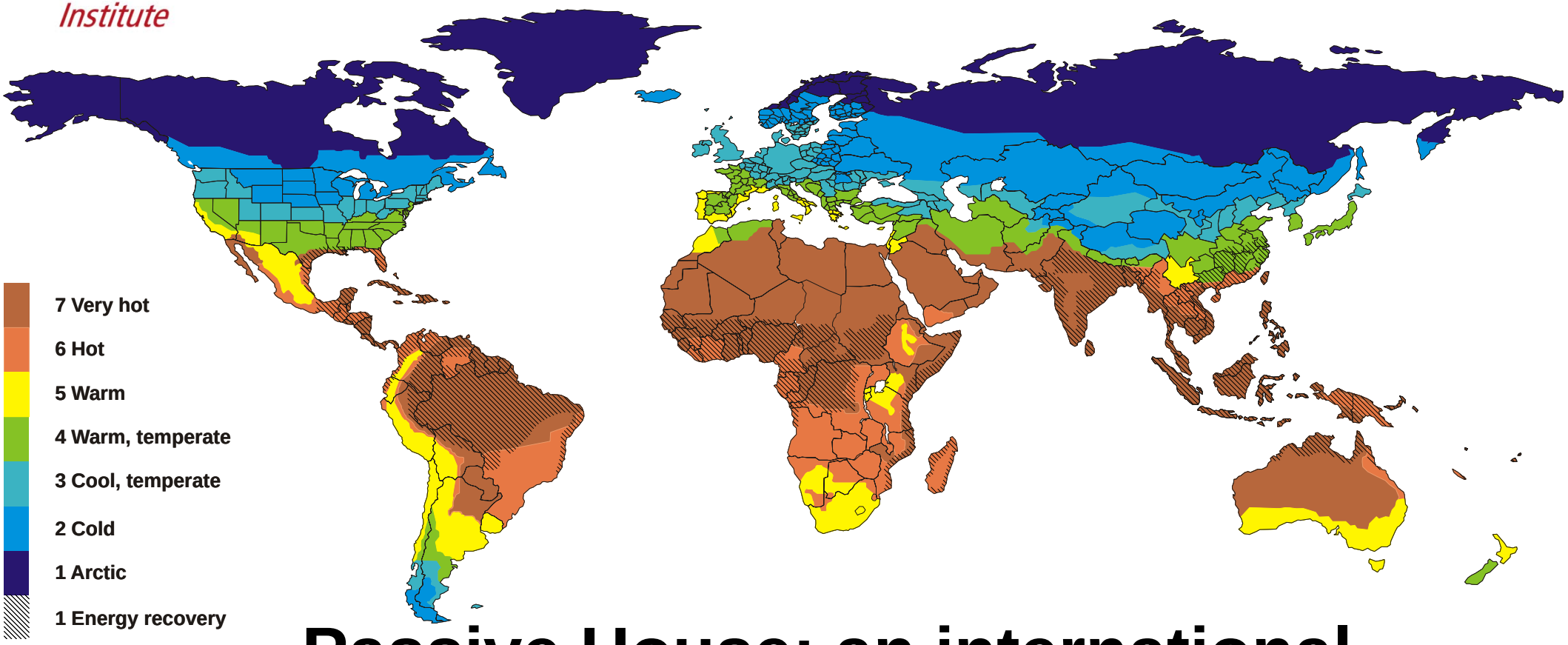
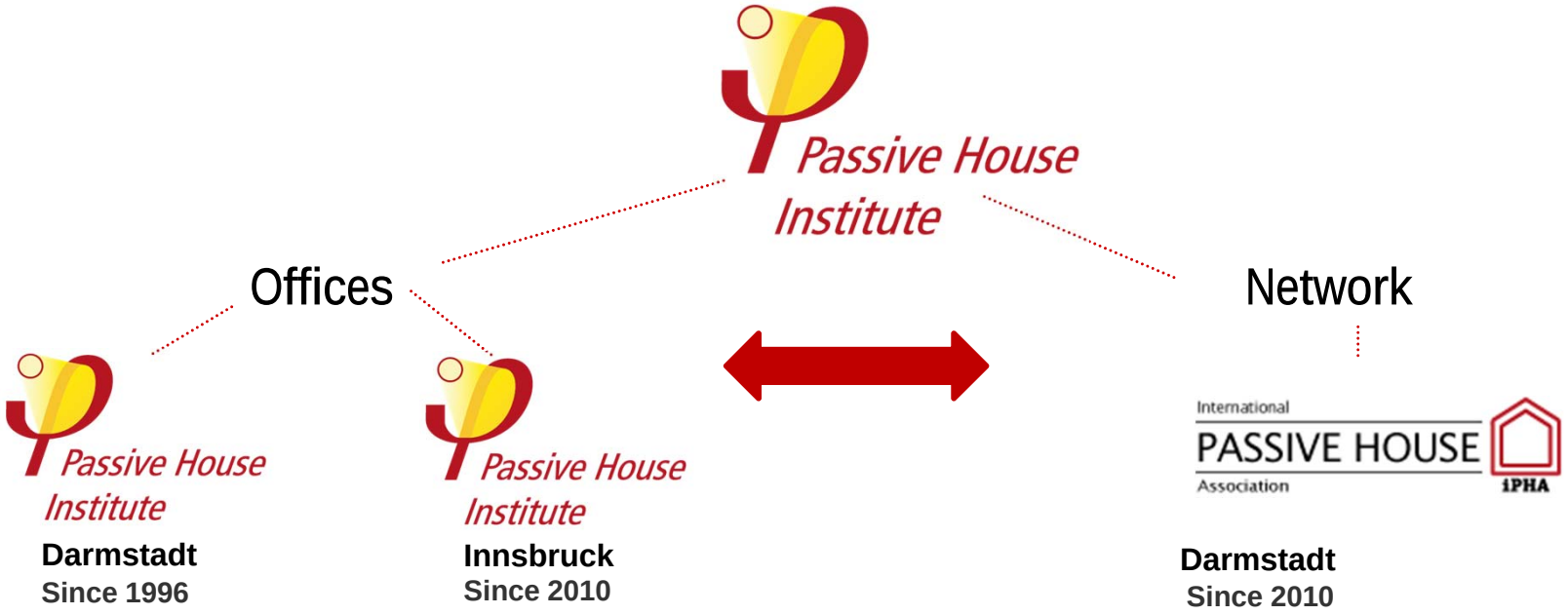


Passive House: an international solution for a sustainable energy future

Amina Lang
International Passive House Association

iPHA – network of the Passive House Institute



Research and development | Quality assurance
Building certification | Component certification
Expert Training
International Passive House Conference

www.passivehouse.com

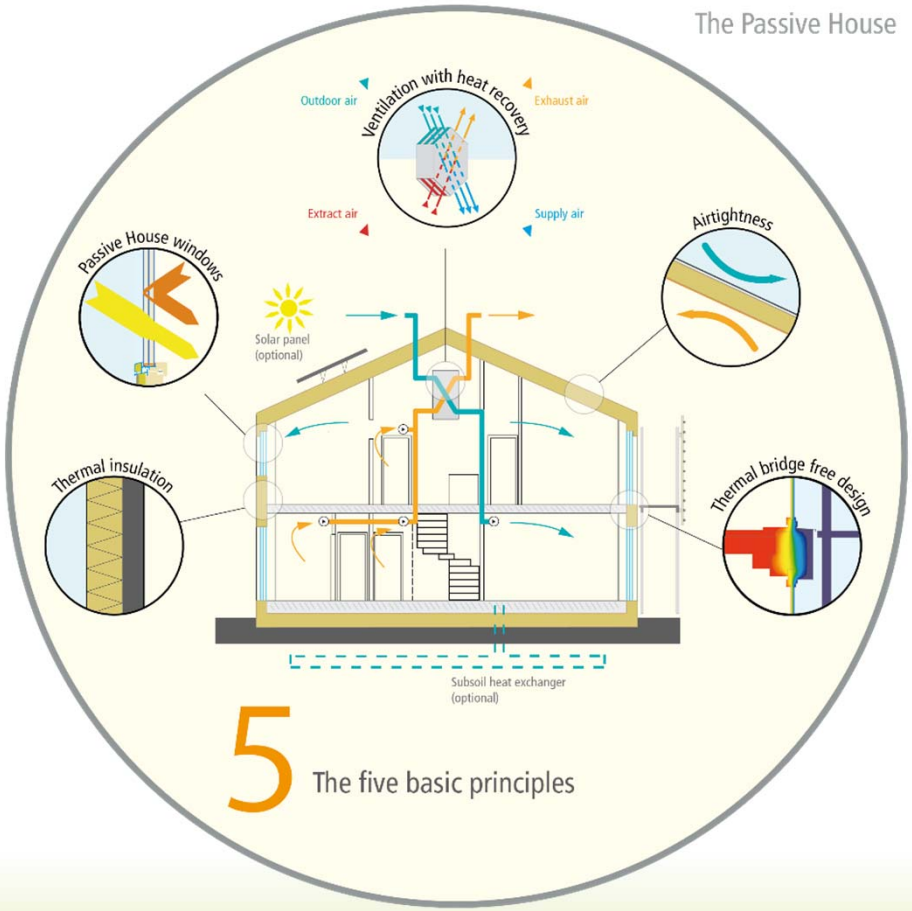
Passive House Networks

Passipedia | Passive House promotion
International Passive House Days
www.passivehouse-international.org

www.passipedia.org

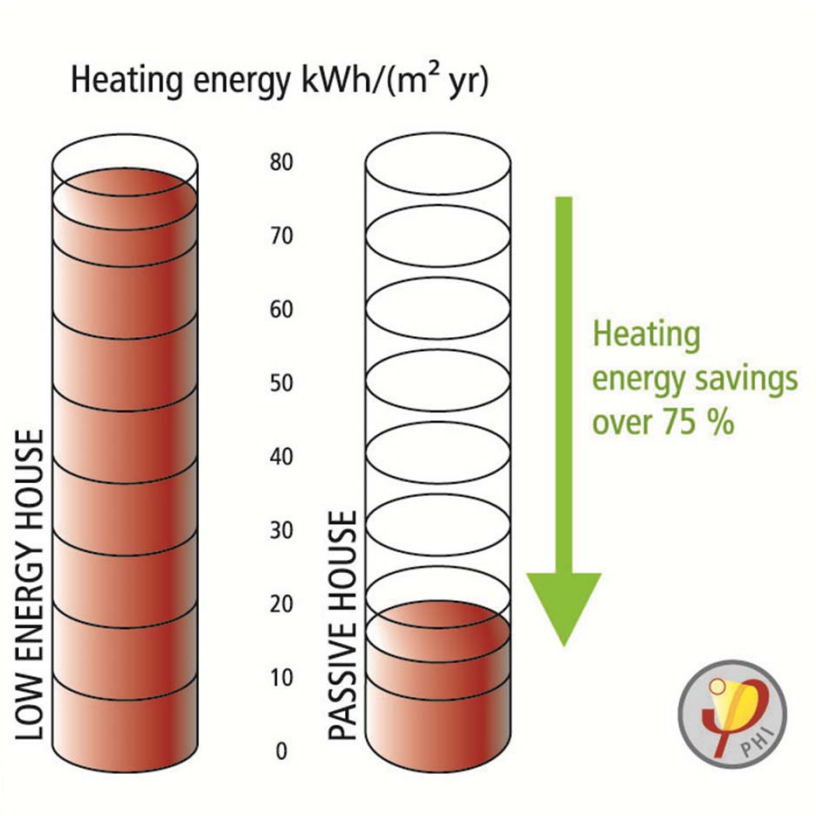
Passive House Principles

- Thermal insulation
- Thermal bridge free design
- Proper ventilation
- Airtight building envelope
- Passive House windows

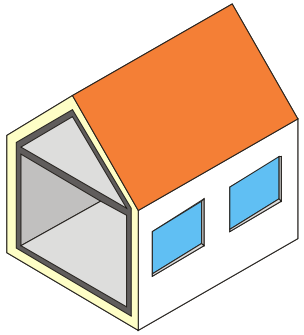


Passive House Benefits

1. High levels of comfort
2. Consistent fresh air all throughout the building
3. Structural longevity: mould-free buildings with a highly reduced risk of moisture related damages
4. Extremely low heating and cooling costs; despite rising energy costs
5. A radically improved indoor environment



Passive House = High Energy Performance

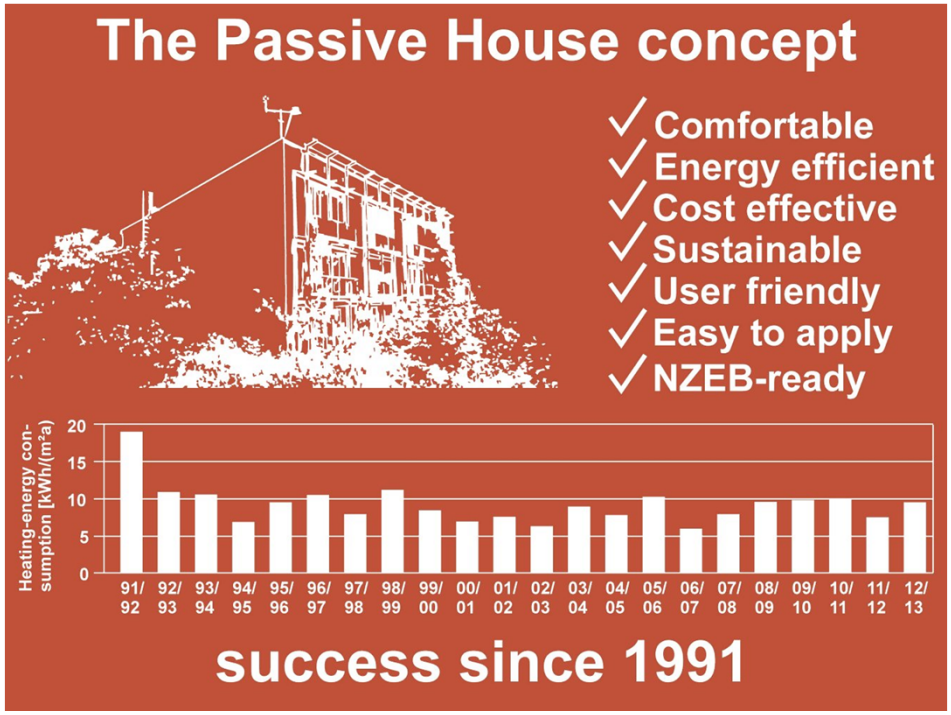


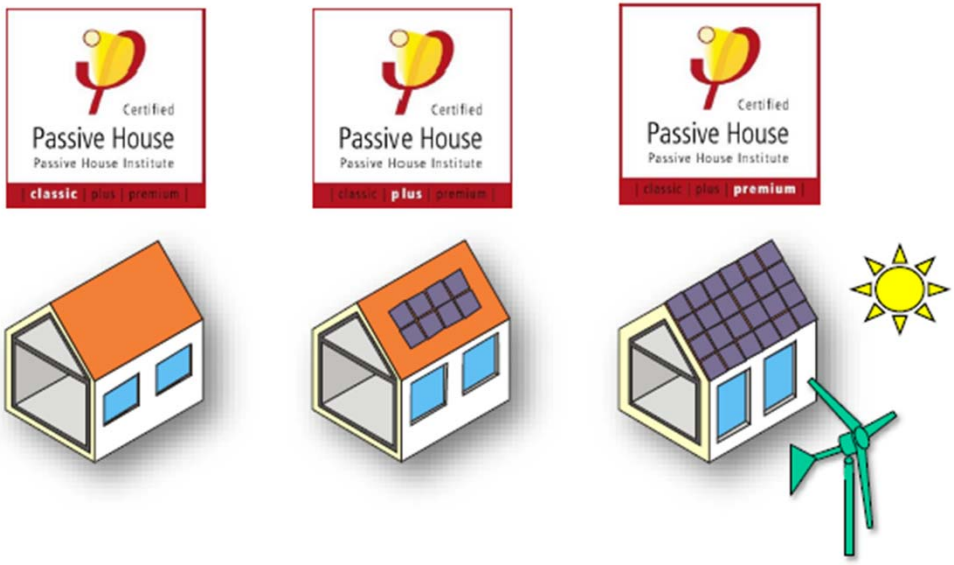
Heating demand:
≤ 15 kWh/(m²a)
or heating load ≤ 10 W/m²

Primary energy demand:
≤ 120 kWh/(m²a)
or
Renewable Primary Energy demand:
≤ 60 kWh/(m²a)

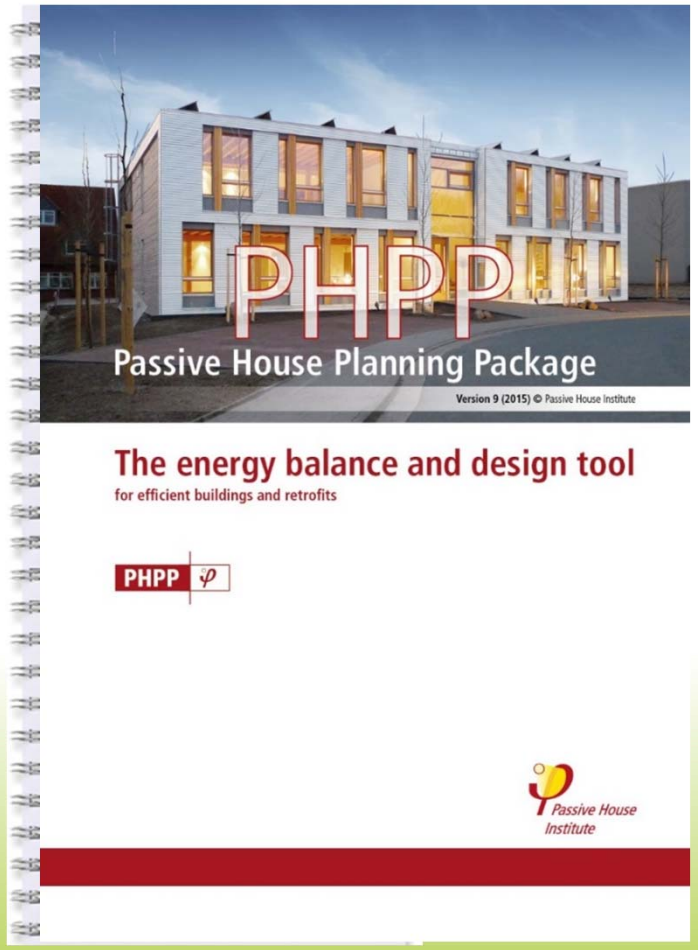
Airtightness:
0.6 ACH (50pa)

Passive House: Quality Assured!





PHPP – the global high performance building tool



© Passive House Institute

- **The energy balance and planning tool for efficient buildings and retrofits such as Passive House buildings and low energy buildings**

PHPP sold in 20 languages in 31 countries

Passive House buildings worldwide: numbers

November 2014

- Number of certified Passive House sqare metres reaches one million mark
- 10 000 units certified

August 2015

- 1.2 million square meters
- 11 700 units

1 millionth square meter:
Passive House renovation in Santa Cruz, California

Passive House buildings worldwide: numbers

International PASSIVE HOUSE Association iPHA

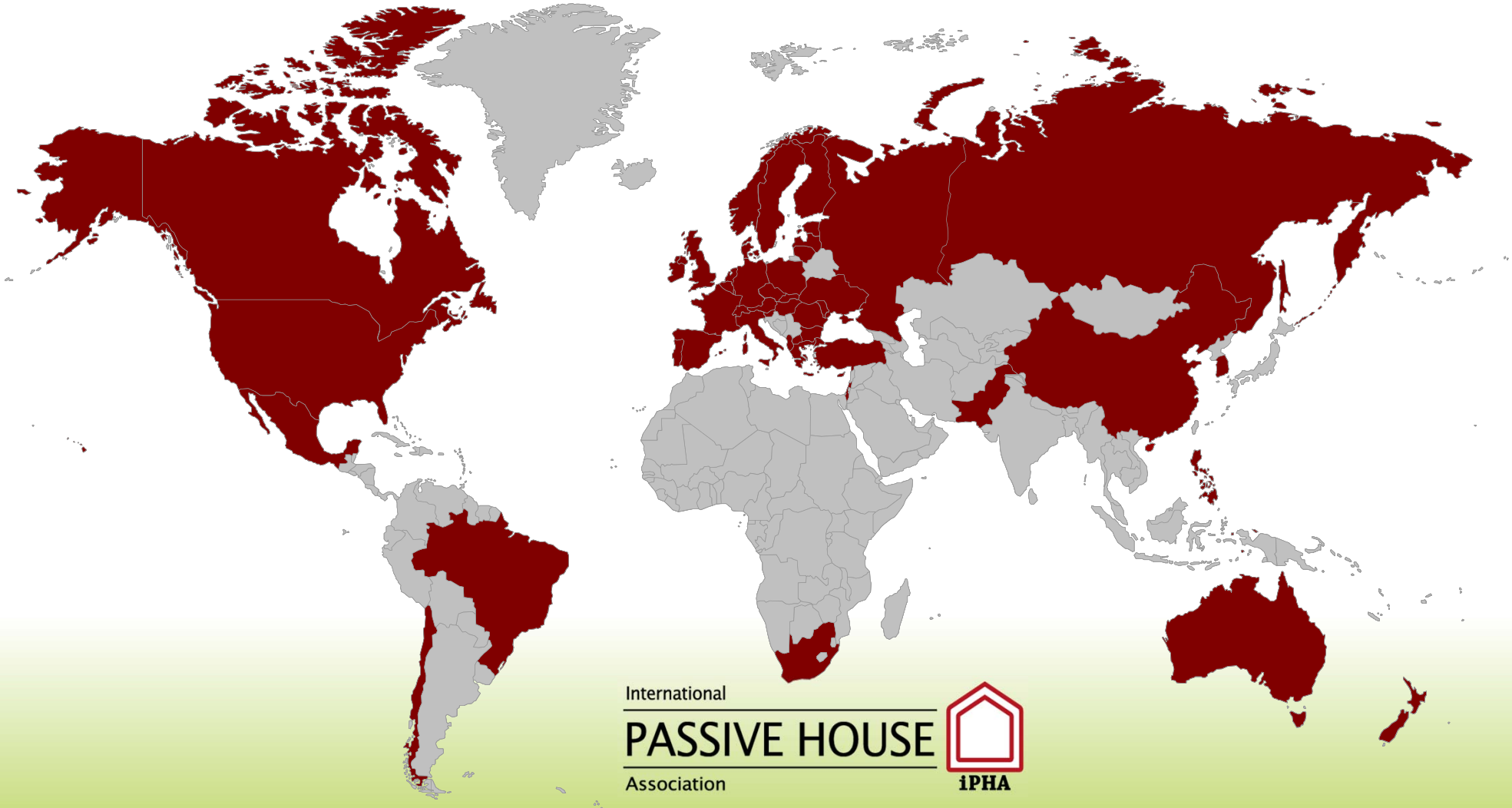
Passive House Network

- **Over 4,500 Certified Passive House Designers/Consultants** in 53 countries
- **Almost 1500 Certified Passive House Tradespeople in** 20 countries
- **Over 30 Building Certifiers certifying across the world**
- **Over 600 Certified Components**

© Passive House Institute

International Passive House Association, iPHA

Since 2010 | some 2750 members | 60+ countries | 19 Affiliate Partners



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Albania | Australia | Austria | Belgium | Brazil | Bulgaria | Canada | Chile | China | Cyprus | Czech Republic | Denmark | Estonia | Finland | France | Germany | Greece | Hong Kong | Hungary | Isle of Man | Ireland | Israel | Italy | Latvia | Lithuania | Luxembourg | Macedonia | Mexico | Moldova | Montenegro | Netherlands | New Zealand | Norway | Pakistan | Philippines | Poland | Portugal | Romania | Russia | Slovakia | Slovenia | South Africa | South Korea | Spain | Sweden | Switzerland | Ukraine | United Kingdom | United States ...

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

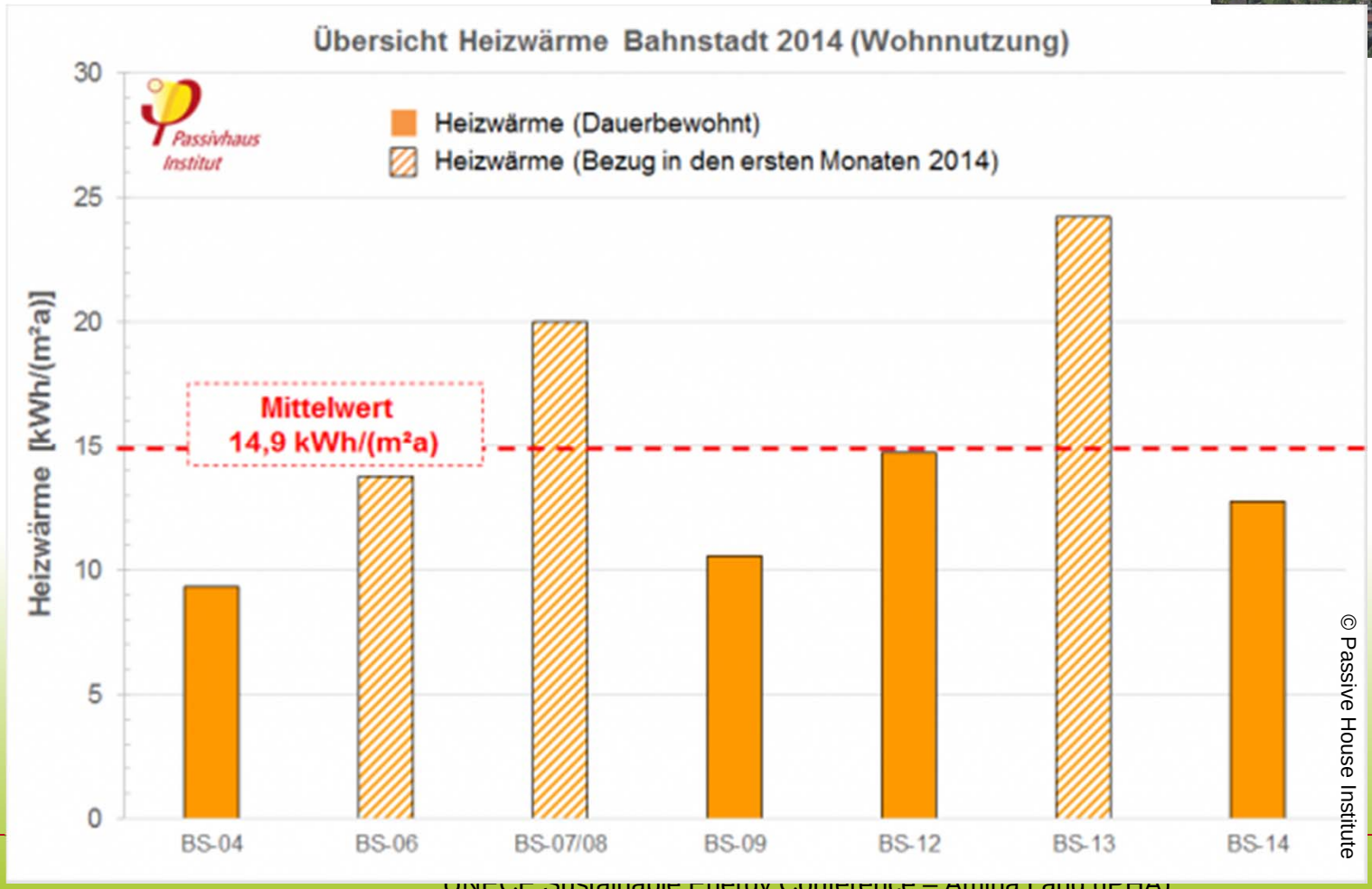
www.heidelberg-bahnstadt.de

Germany: Bahnstadt Heidelberg

- conversion of a former railway freight area
- completely new city quarter
- up to **12 000 residents** on 116 hectares
- **Passive House Standard (PHPP) obligatory for all buildings**
- support and quality assurance by city of Heidelberg for successfully reaching Passive House Standard
- mixed use quarter (residential and non-residential)
- non-residential Passive House buildings:
  - Offices
  - institutes (also with laboratory)
  - school and child care
  - retail stores
  - community center
  - cinema

Germany: Bahnstadt Heidelberg – simplified monitoring

- simplified heating consumption measurement
- in 1260 apartments with more than 75 000 m² of floor area
- savings compared to a average German buildings: 77 %



average heating consumption

Germany and Austria: Passive House Supermarkets

Austrian company „MPREIS“

- 2 certified Passive House supermarkets completed
- Passive House building envelope + efficient refrigeration, ventilation and lighting
- 2 more PH supermarkets by MPREIS under construction

„REWE“ in Hanover

- first certified PH supermarket in Germany
- combining of building and refrigeration technology

Passive House Classes

World‘s first Passive House Plus

- single family home in Ötigheim, Germany
- PER demand: 28 kWh/(m^2_{TFA}a)
- RES production 76 kWh/($m^2_{projected}$a)

First Passive House Plus

apartment building

- project “Vögelebichl”, Innsbruck, Austria
- built by Innsbruck municipal housing society
- 16 apartments
- PV and solar thermal + heatpump

Spotlight New York City

Mayor Bill de Blasio announced a policy **One City: Built to Last** in September 2014, to dramatically reduce greenhouse gas emissions from buildings city-wide by 2050. The policy states that New York City will look to *"**Passive House**, carbon neutral, or `zero net energy' strategies to inform the standards."*
In fact, Passive House is the only building energy efficiency standard noted in the plan.

Spotlight New York City

International PASSIVE HOUSE Association iPHA

SECTIONS HOME SEARCH The New York Times SUBSCRIBE NOW LOG IN

REAL ESTATE

World's Tallest Passive House Breaks Ground on Roosevelt Island

By ALISON GREGOR JUNE 12, 2015

In a rendering showing Phase 1 of construction, the apartment house is the tallest structure, and the first academic building is in the foreground.

Kilograph, Weiss/Manfredi and Handel Architects

ON LOCATION
A Greenwich Village Loft for a Family of Four

2 of 2

Spotlight China

First certified office building in China

- building owner is manufacturer of PH windows
- built with local materials
- chosen by the Chinese government as national pilot project

'ZhuoZhou' Hebei Central China
Contractor: Hebei Xinhua Curtain Wall Co. Ltd.
building physics: Dawid Michulec
www.schoeberlpoell.at and PHI

Certified Passive House
Passive House Institute

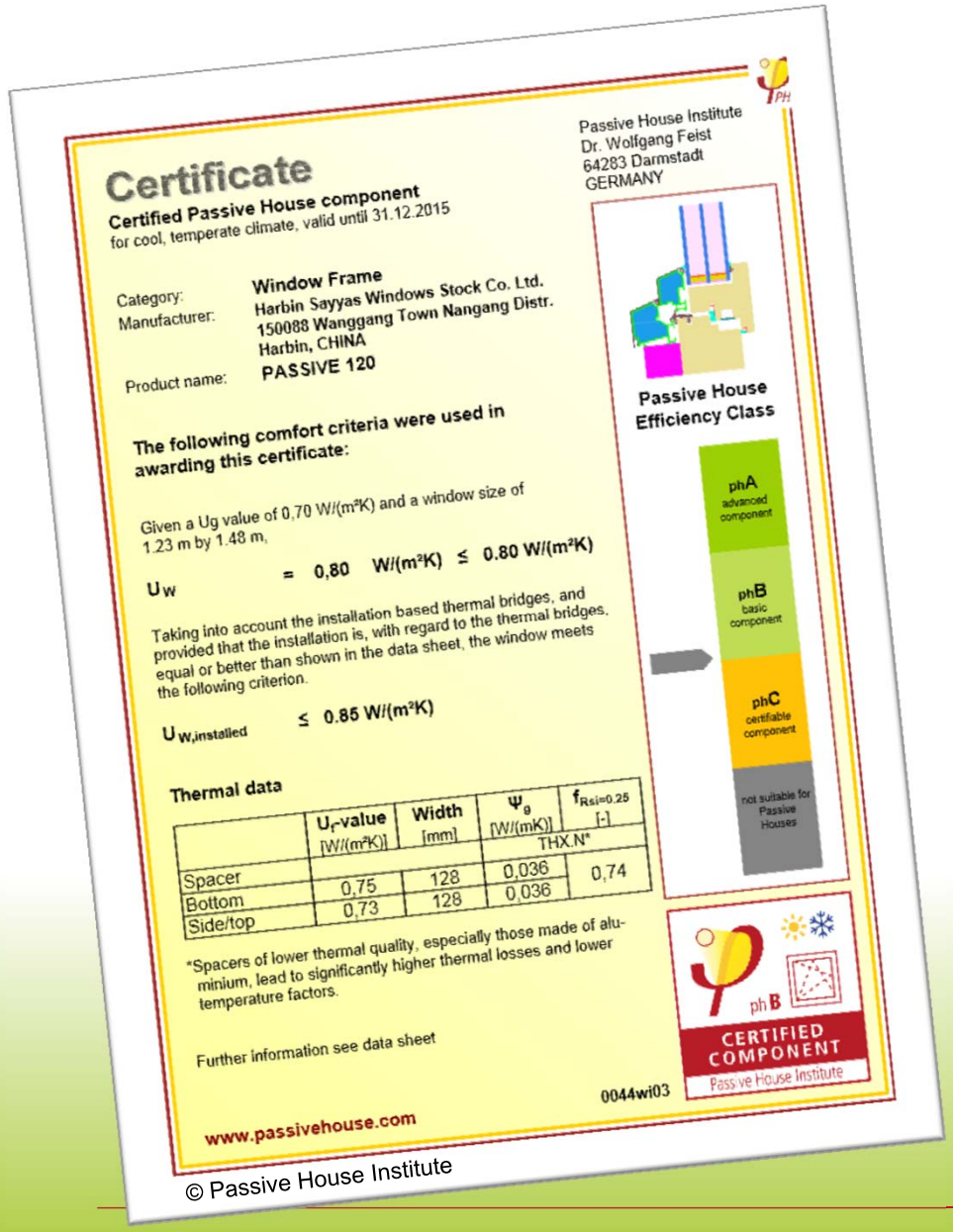
First certified Passive House hotel in China

- 95 % lower energy demand compared to standard Chinese hotels

'Bruck' PH building, Changxing, south China
contractor: Landsea, Architect: Ruge
building physics: PHI

Spotlight China

International PASSIVE HOUSE Association iPHA



Certificate

Certified Passive House component
for cool, temperate climate, valid until 31.12.2015

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
GERMANY

Category: Window Frame
Manufacturer: Harbin Sayyas Windows Stock Co. Ltd.
150088 Wanggang Town Nangang Distr.
Harbin, CHINA
Product name: PASSIVE 120

The following comfort criteria were used in awarding this certificate:

Given a Ug value of 0,70 W/(m²K) and a window size of 1.23 m by 1.48 m,

U_W = 0,80 W/(m²K) ≤ 0.80 W/(m²K)

Taking into account the installation based thermal bridges, and provided that the installation is, with regard to the thermal bridges, equal or better than shown in the data sheet, the window meets the following criterion.

$U_{W,installed}$ ≤ 0.85 W/(m²K)

Thermal data

	U_f-value [W/(m²K)]	Width [mm]	Ψ_g [W/(mK)]	$f_{Rsi=0.25}$ [-]
			THX.N*	
Spacer			0,036	0,74
Bottom	0,75	128	0,036	
Side/top	0,73	128		

*Spacers of lower thermal quality, especially those made of aluminium, lead to significantly higher thermal losses and lower temperature factors.

Further information see data sheet

www.passivehouse.com

0044wi03

Passive House Efficiency Class

phA advanced component
phB basic component
phC certifiable component
not suitable for Passive Houses

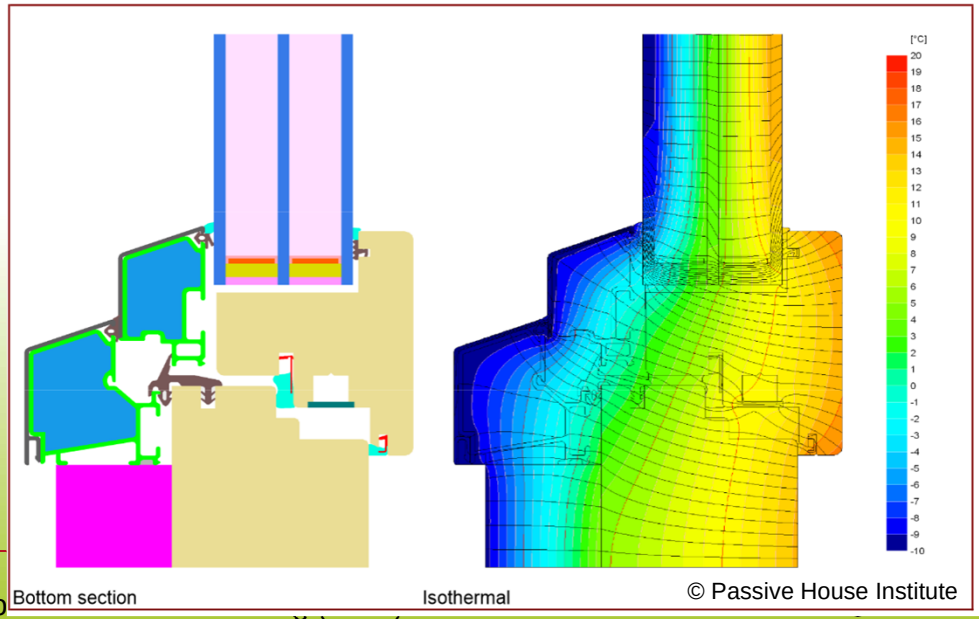
phB CERTIFIED COMPONENT Passive House Institute

© Passive House Institute

Chinese manufacturers of certified PH windows

- Harbin Sayyas Windows Stock Co. Ltd.
- Hebei Orient Sundar Window Co.. Ltd.
- Jiangsu Top Composite Technology Co..Ltd
- Qingdao Anrida Door & Window Co.. Ltd

Manufacturer Harbin Sayyas Windows Stock Co. Ltd.
No. 9 Xinnong Road, 150088 Wanggang Town Nangang Distr. Harbin, CHINA
Tel.: +86 451 86700111 / 13796653469
Email: sayyas_zb@163.com, www.sayyas.net



Bottom section Isothermal © Passive House Institute

Competition
Ventilation for residential buildings

Entry deadline is 31 December 2015

© Passive House Institute

COMPONENT AWARD 2016
Passive House Institute

Cost-efficient ventilation for refurbischments of residential buildings

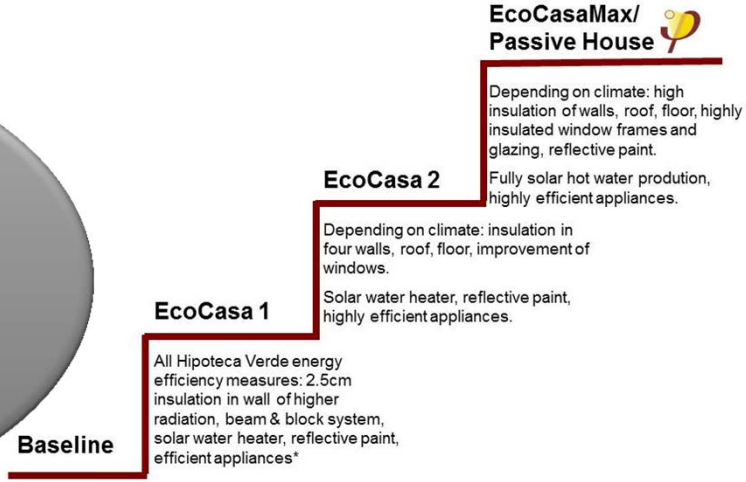
Component Award 2016

© Passive House Institute

Spotlight Mexico: NAMA for new housing

3 building types

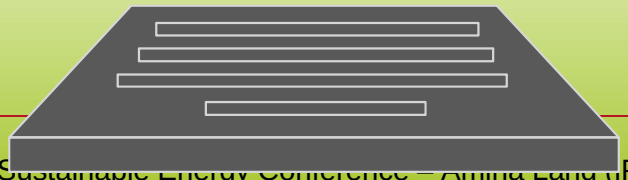
NAMA for new housing in Mexico (2011)

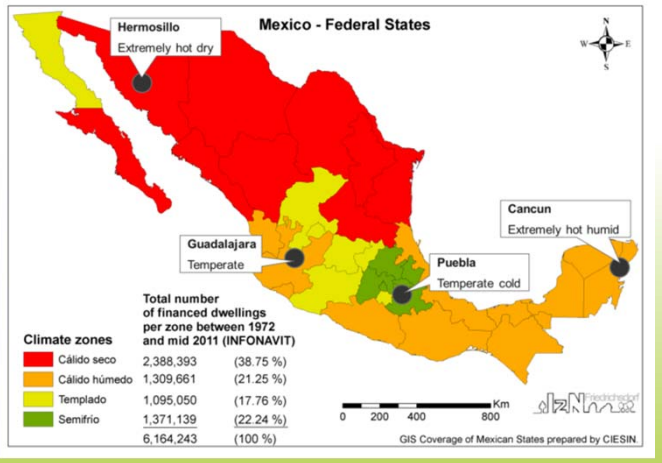


*In the current Hipoteca Verde scheme only some measures can be chosen by the project developers for additional credit. For the NAMA all the energy efficiency measures available for Hipoteca Verde were chosen as an optimisation of the programme.

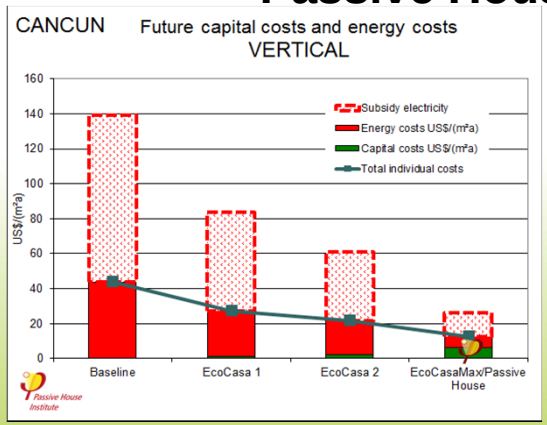
4 energy efficiency levels (from baseline to Passive House)

Calculations with PHPP





4 different climate zones



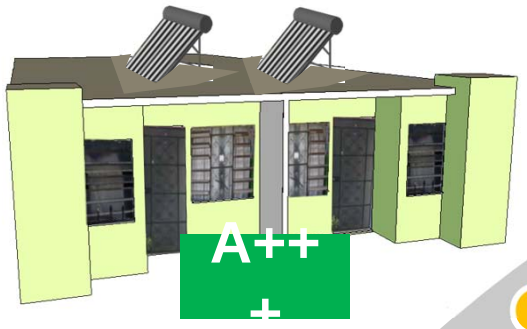
Calculation of life cycle costs

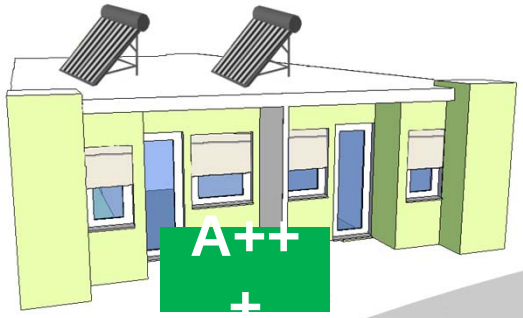
© Passive House Institute

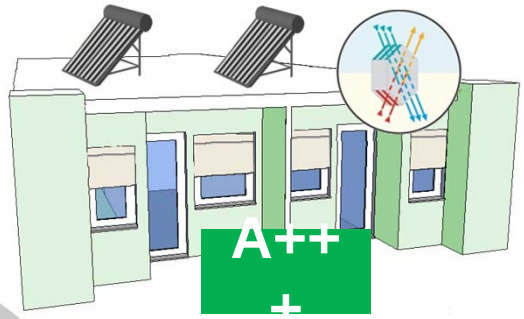
Spotlight Mexico:
Technical Design for the NAMA Existing Housing in Mexico

International PASSIVE HOUSE Association iPHA

Overall refurbishment plan according to consultancy







Step 3

Step 2

Step 1

Baseline

A

B

C

D

E

F

From step 1: Improved comfort in the buildings.
Sustainable and cost-efficient in the short-/ longterm.

© Passivhaus Institut

KfW LAIF – Passive House pilot projects

Consortium:

- Financing from the European Union LAIF “Latin American Investment Facility“
- Financing for additional costs of 500 Passive House dwelling units in Mexico (hot-dry and hot-humid climates)
- Training, consultation and support of local project developers through PHI

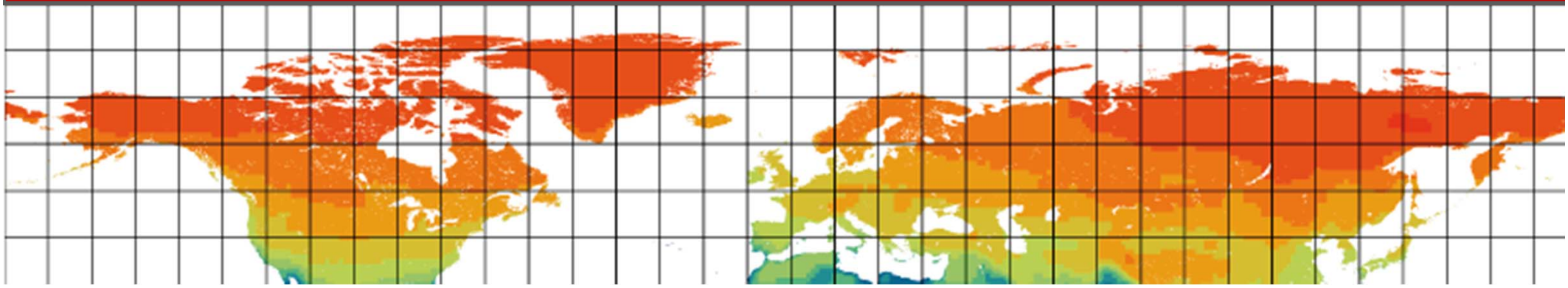
© Passive House Institute

With support of:

Upcoming events: International Passive House Days

Passive House Globally: Climate

Energy efficiency first!



The only „unlimited“ energy source is energy efficiency !

- Energy efficiency never stops and future supply is 100 % sure
- Energy efficiency does not get more expensive (like fossil fuels)
- Energy efficiency is good for the environment and health
- Energy efficiency makes you independent

We need to use enormous amounts of Energy Efficiency !

Connections to special networks and expertise in Europe

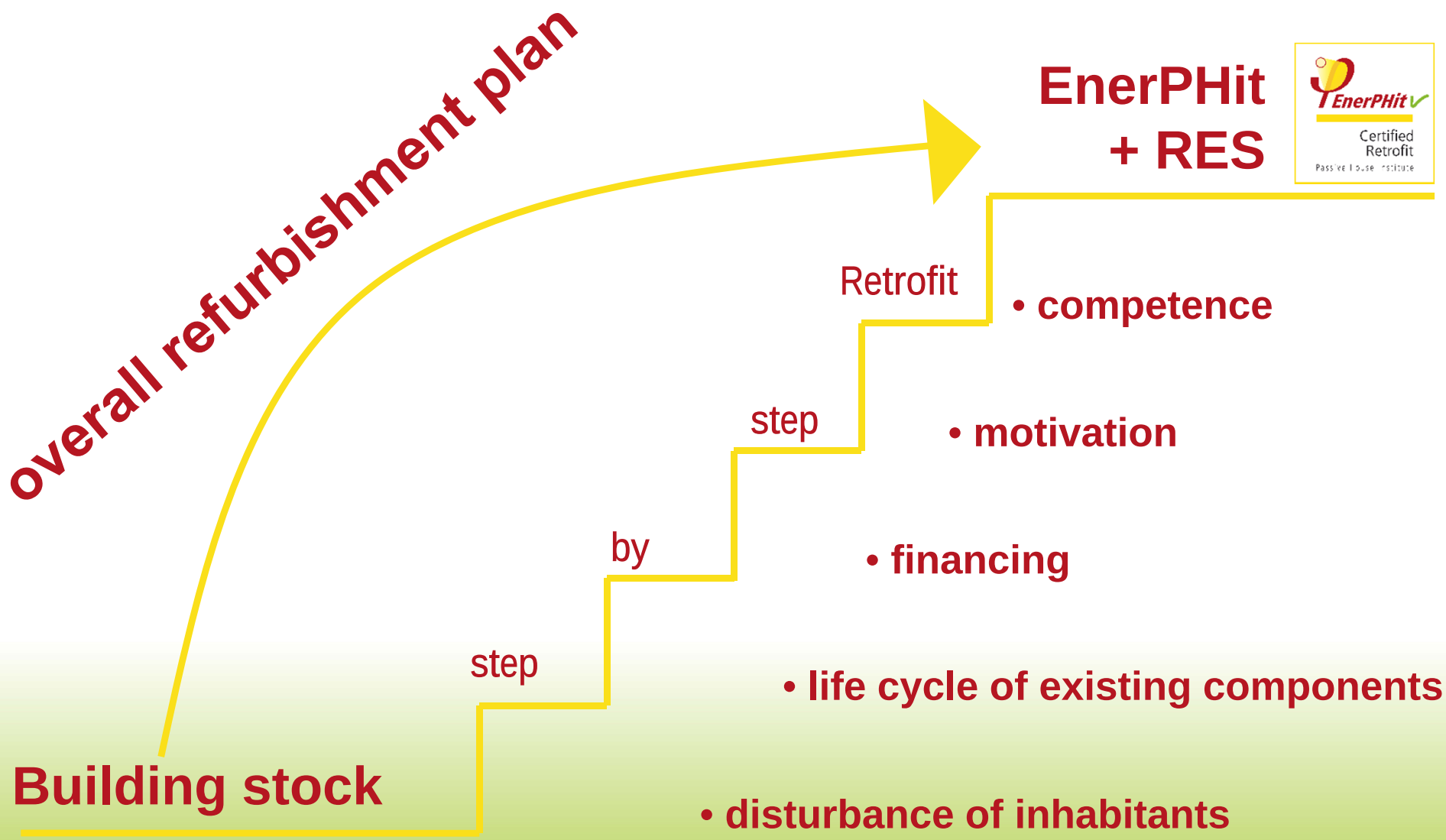
Co-funded by the Intelligent Energy Europe Programme of the European Union

Sinfonia

PassREg

EuroPHit

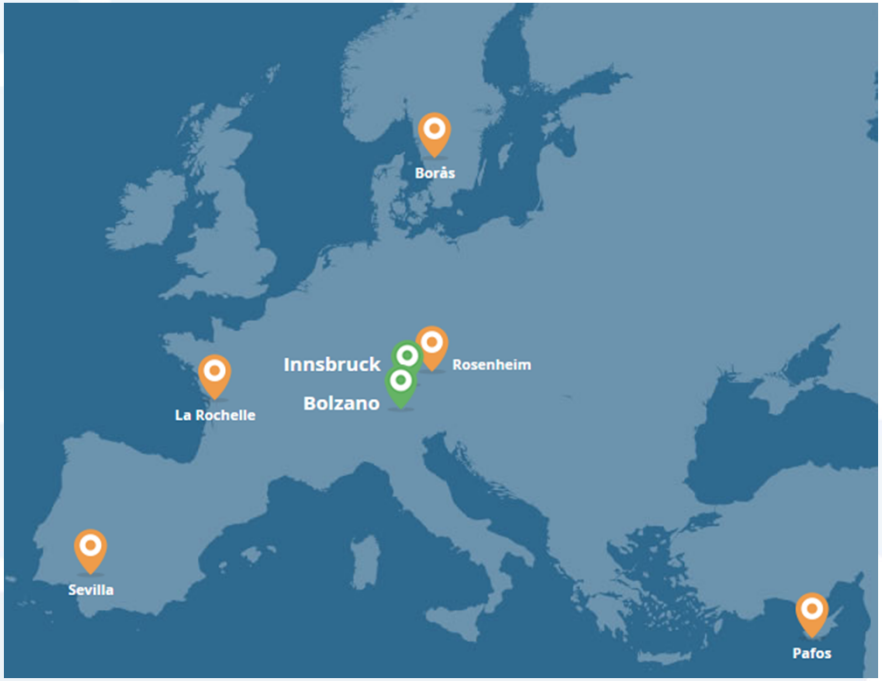
Step by step retrofits



Low carbon cities for better living

Smart city project in Innsbruck (Austria), Bolzano (Italy) and other European cities.

Sinfonia



Demonstrating the deployment of large-scale, integrated and scalable energy solutions in mid-sized European cities.

More information:

www.sinfonia-smartcities.eu

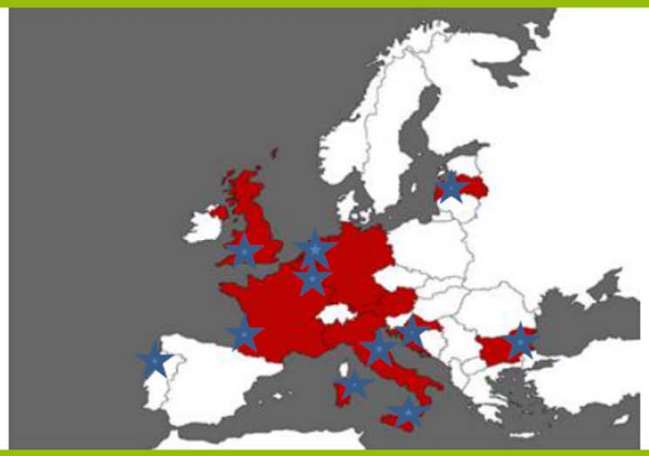
This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 609019

Passive House + renewables

Passive House Institute

In 2012 8 regions took on the challenge creating new frameworks to promote…..

In 2015



8 regions have found and initiated their individual ways to promote …….

….Passive House + renewables as solution for NZEBs.

Co-funded by the Intelligent Energy Europe Programme of the European Union

20TH INTERNATIONAL PASSIVE HOUSE CONFERENCE 2016

Darmstadt | Germany

22 - 23 April 2016

with exhibition and framework programme

Darmstadt Kranichstein © Passive House Institute

Under the patronage of:

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Wissenschaftsstadt Darmstadt

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www.passivehouseconference.org

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Thank you!

www.passivehouse-international.org

Amina Lang
International Communications
International Passive House Association