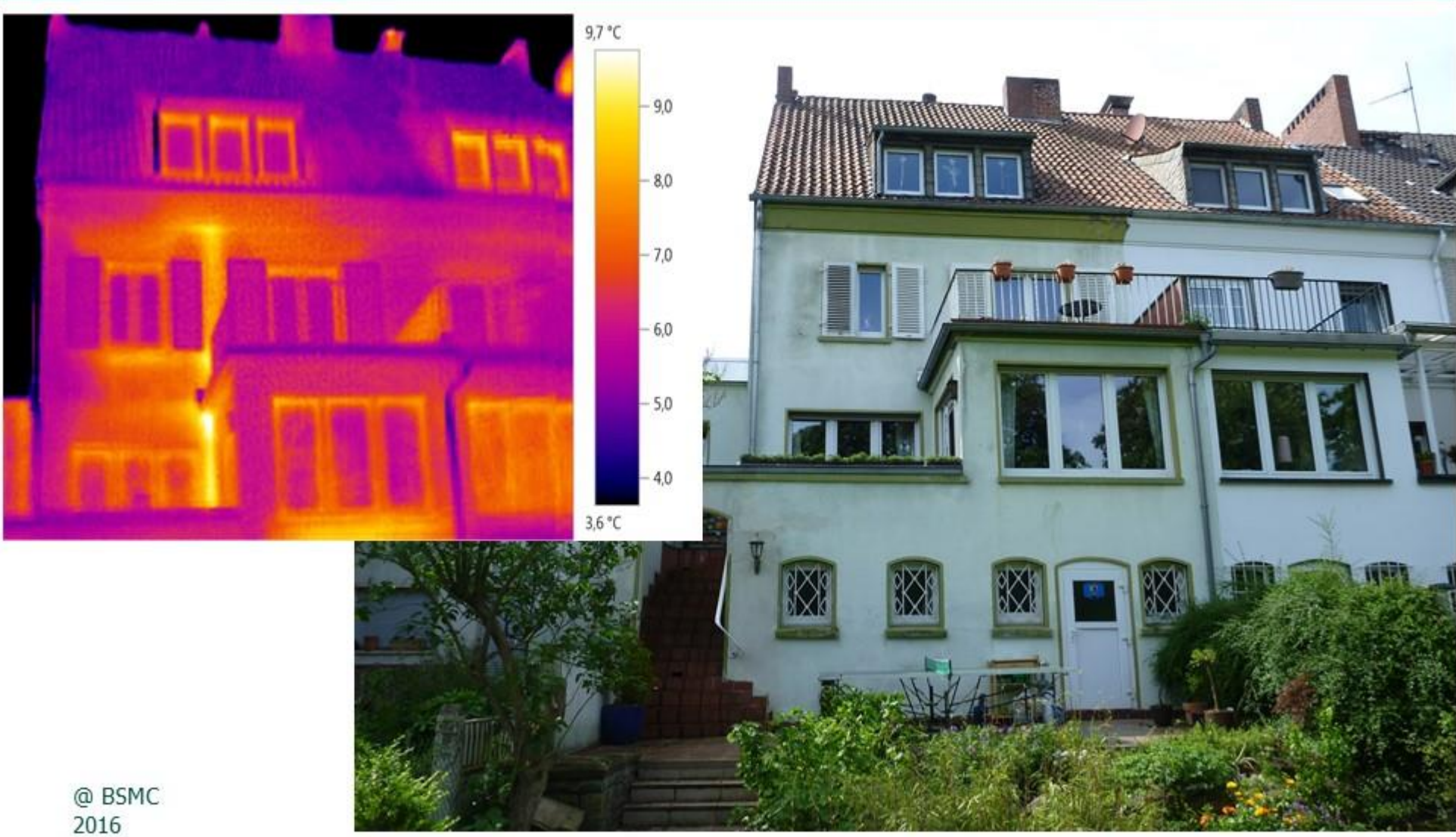


Retire at 65?

„Old“ East View



Revive as Passive House Plus!

at Medieval City Wall



Titel

Retire at 65?
Revive as Passive-House-Plus!

Index

SRWXOL

City, Country
Climate zone
Year of completion

Hamm, NRW, Germany
Cool, temperate
2016/17

Certified as

Passive House Plus

Object type

Two Family House

Treated floor area [m²]

217

Construction

Roof: Post world war wooden beams, fungus infected. Renewed in 2016: 45cm insulated double T-beam construction. Including new studio, new balcony, new dormers & new PV

Walls: Post world war masonry construction erected in 1951 from old brick remnants of destroyed predecessor. Refurbished in 2016 with 24cm ETICS

Basement: Ceiling: 12cm concrete, retrofitted with 22cm EPS. In 2016/17. Walls: 30 - 60cm old brick work. Door lintels and upper flanks insulated. Accessible External walls insulated, 8 - 24cm EPS/XPS.

U-values [W/(m²K)]

Exterior wall	0,12
Roof	0,09
Ground floor	0,15
Windows	0,72
Glazing	0,52
g-value of glazing [%]	53%

Airtightness concept

Airtightness layer in lower floors: exterior plaster, in roof floors: interior and exterior plaster. Connection to windows and to roof is via plaster able tapes

n₅₀-value [1/h]

0,55

Ventilation system

Cascaded comfort ventilation with a highly efficient central heat recovery unit (Maico, WS 320, 92%) using existing shafts, stairs for minimizing duct work, cost, distribution effort

Heating/cooling/dehumidification/domestic hot water

Small residual heat demand < 3 kW: covered by smallest cellar-based micro-heat pump available, which draws its heat from 3 small vertical plate collectors in garden. Distribution: via existing old radiator system (designed for 70/90C used at 30/35C). Hot water: provided by 170l storage integrated in heat pump system. Distribution: via existing pipe system cut down to short lead lines and supplemented by new short lines to attic (behind external insulation)

Renewable energies

10 kWp PV array on east- and west-facing roof sides. Environmental heat collected via heat pump & ground collectors.

Other Ecological aspects

Reuse of existing construction and heat supply structures drastically cuts down grey energy, emissions, material expenditure. Additional high quality living space in attic as "renovation-by-product" at low expense on energy, materials, emissions.

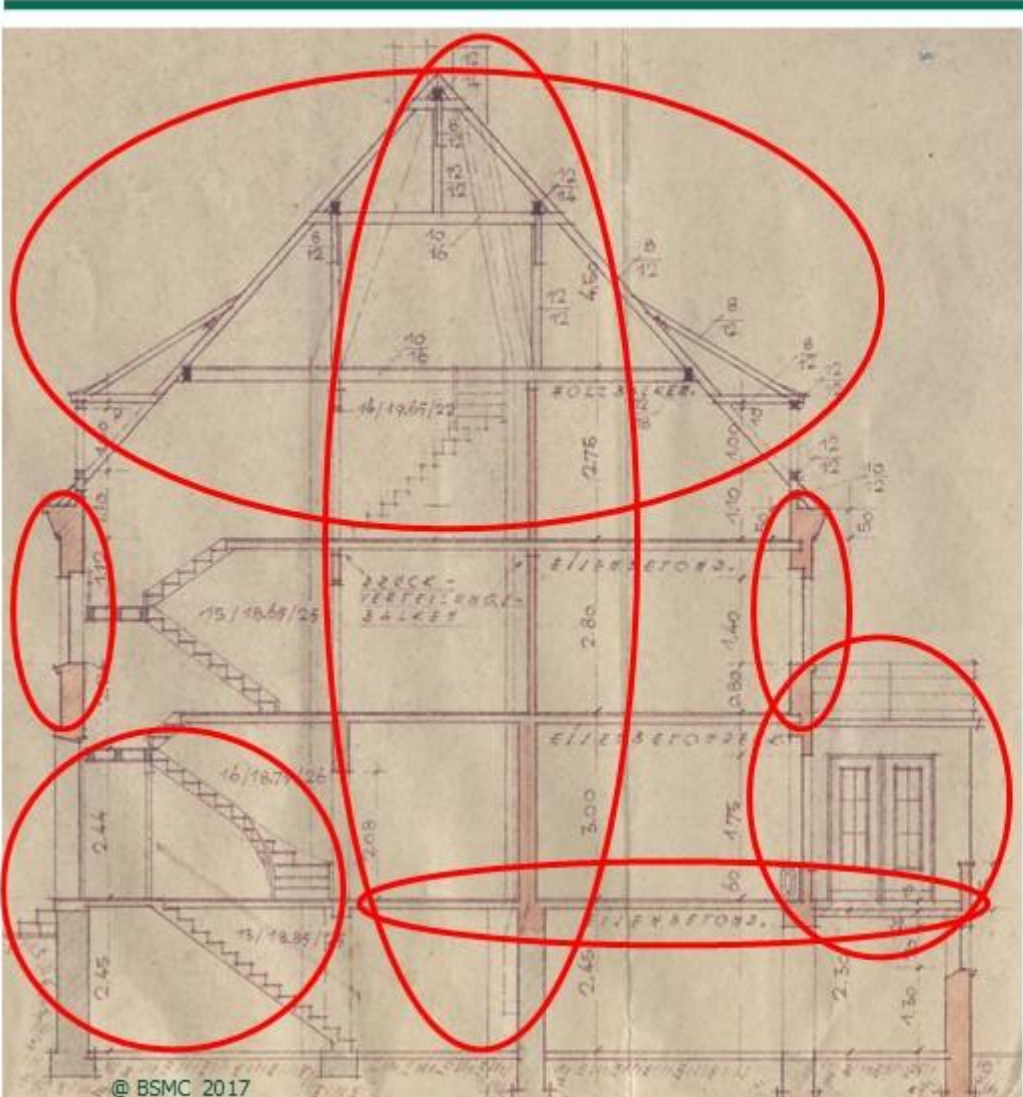
According to PHPP

PHPP-version	9.6
Heating demand	15 [kWh/(m ² a)]
Heat load	12 [W/m ²]
Cooling demand	0 [kWh/(m ² a)]
Cooling load	0 [W/m ²]
Overheating	0 [%]
PER demand	29 [kWh/(m ² a _{TFA})]
PER production	53 [kWh/(m ² a)]
PE demand	42 [kWh/(m ² a)]

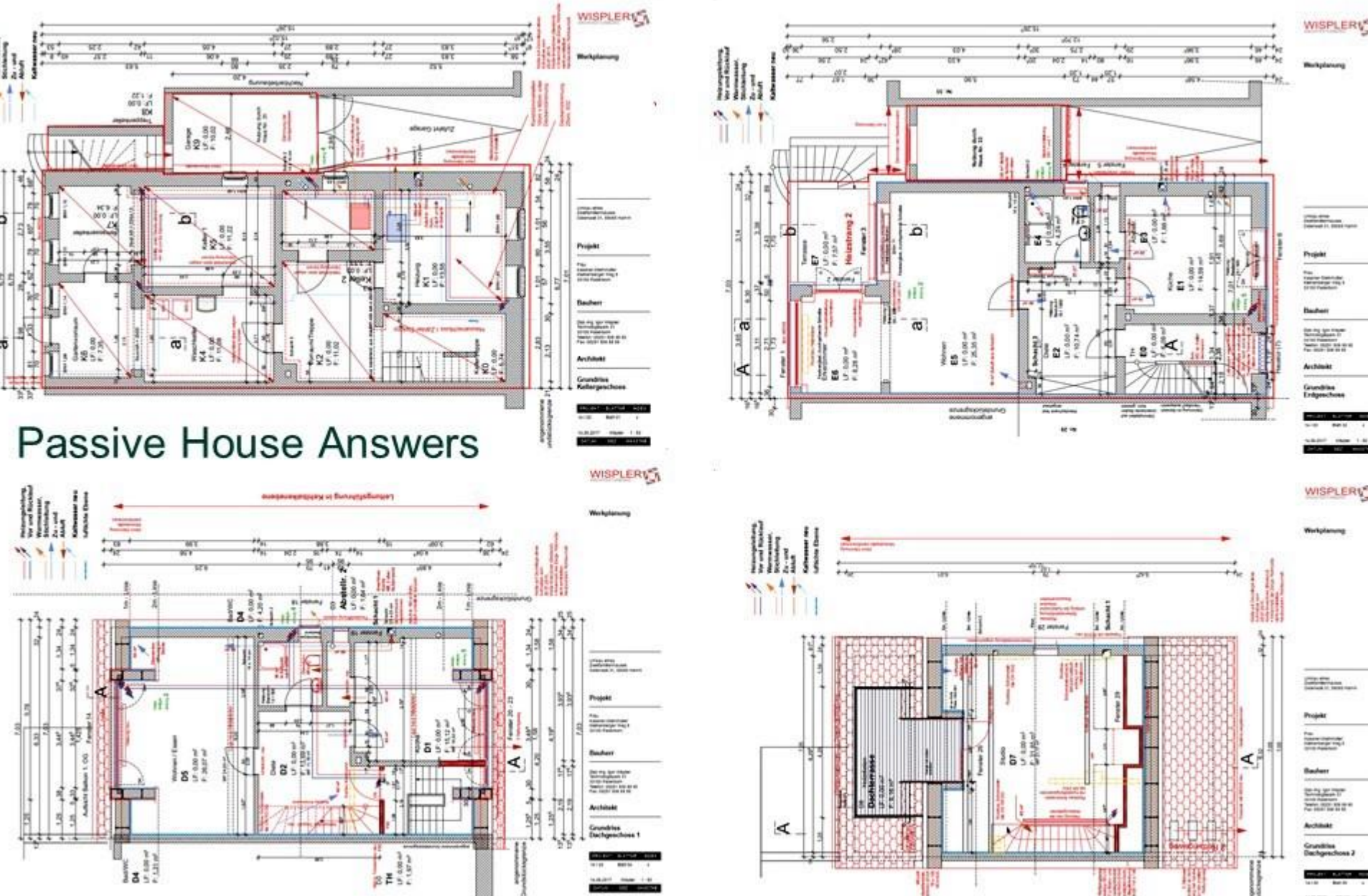
Further notes (e.g. comments on hydrothermal and acoustic comfort)

It is one of the world's first projects showing - that even under "difficult" conditions (O/W oriented old 2-family house, mediocre A/V ratio, rebuilt after WW2 with old material on a city wall) the Passive House Plus Standard can be achieved in a very sustainable way thereby creating high quality living space with high thermal, acoustic and environmental comfort.

Refurbishment Challenges



- Post 2nd World War Building 1951
- Reconstructed with old materials
- Built on thick heat-bridging cellar walls
- Mediocre A/V ratio, East-West orientation
- Roof, walls, floors uninsulated
- Many thermal bridges – also towards neighbour
- Rotten roof truss, with penetrating chimneys, air leakages, fungus/mould – needs urgent renewal
- Outdated windows & window ventilation
- Front door & stairwell windows single-paneled
- Bay Window room/oriel with mould problems
- Heating and Hot Water Circulation lossy
- Served by inefficient gas-boiler (formerly coal)
- Heating Demand > 200 kWh/m²a
- PER-Demand ~ roughly 500 kWh/m²a
- 1st and 2nd floor inhabited,
- 3rd and 4th floor empty



„New Passive Plus“ East View



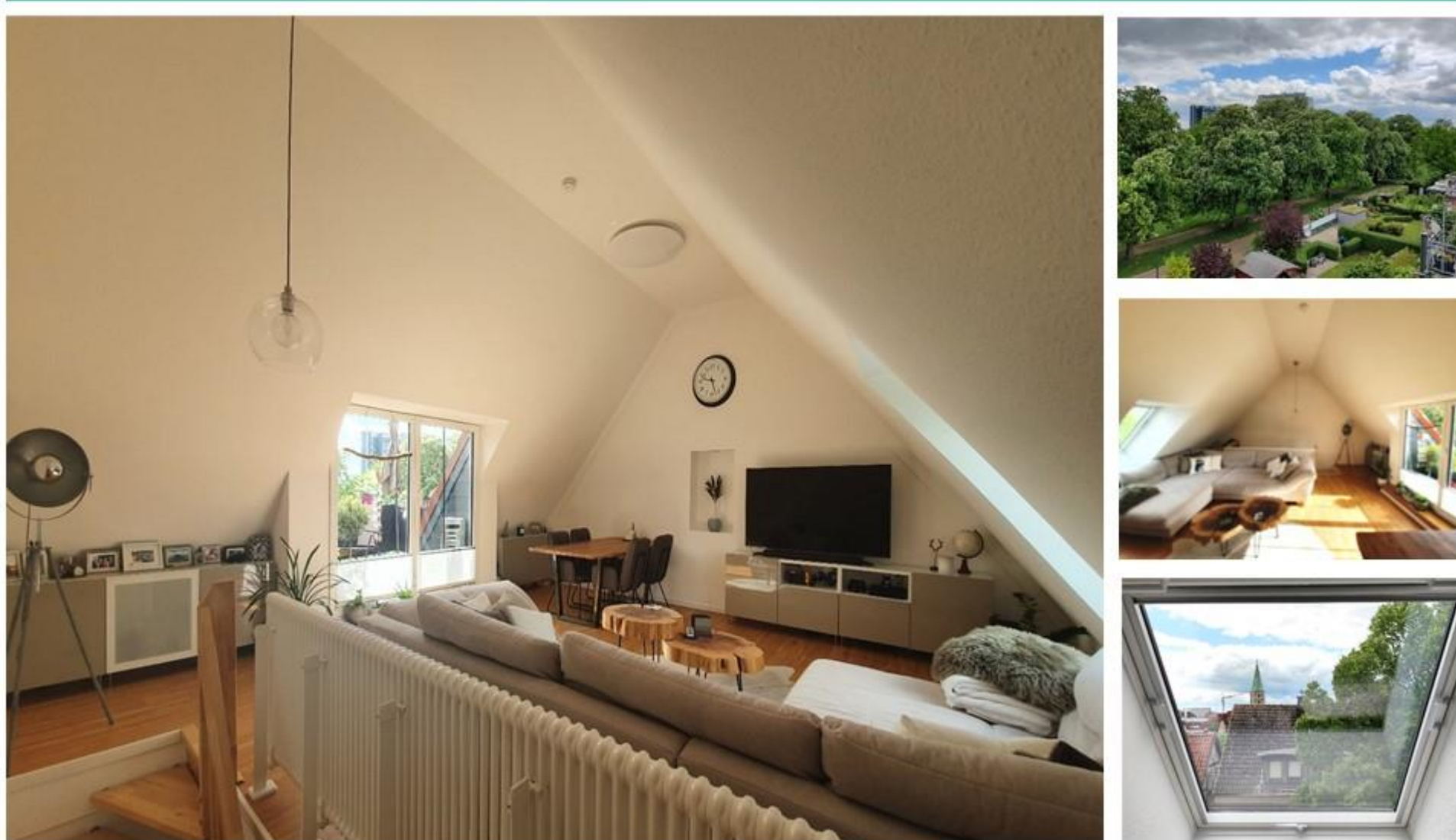
Dr. Bernd Steinmüller
Sustainability Management Consulting



From „Old“ Draughty Loft Space with Chimneys, Fungus-Infected Roof Truss



To „New“ Spacious Studio with Roof Balcony & Church View & Open Stairway



Cascaded Air Flow → Use of Stairs & Old Chimneys & Wide Openings & Heat Recovery → Cost-Effective Ventilation



Cellar Ecology: New Heat Pump

Garden Heat: New Ditch Collectors



„New Passive Plus“ West View

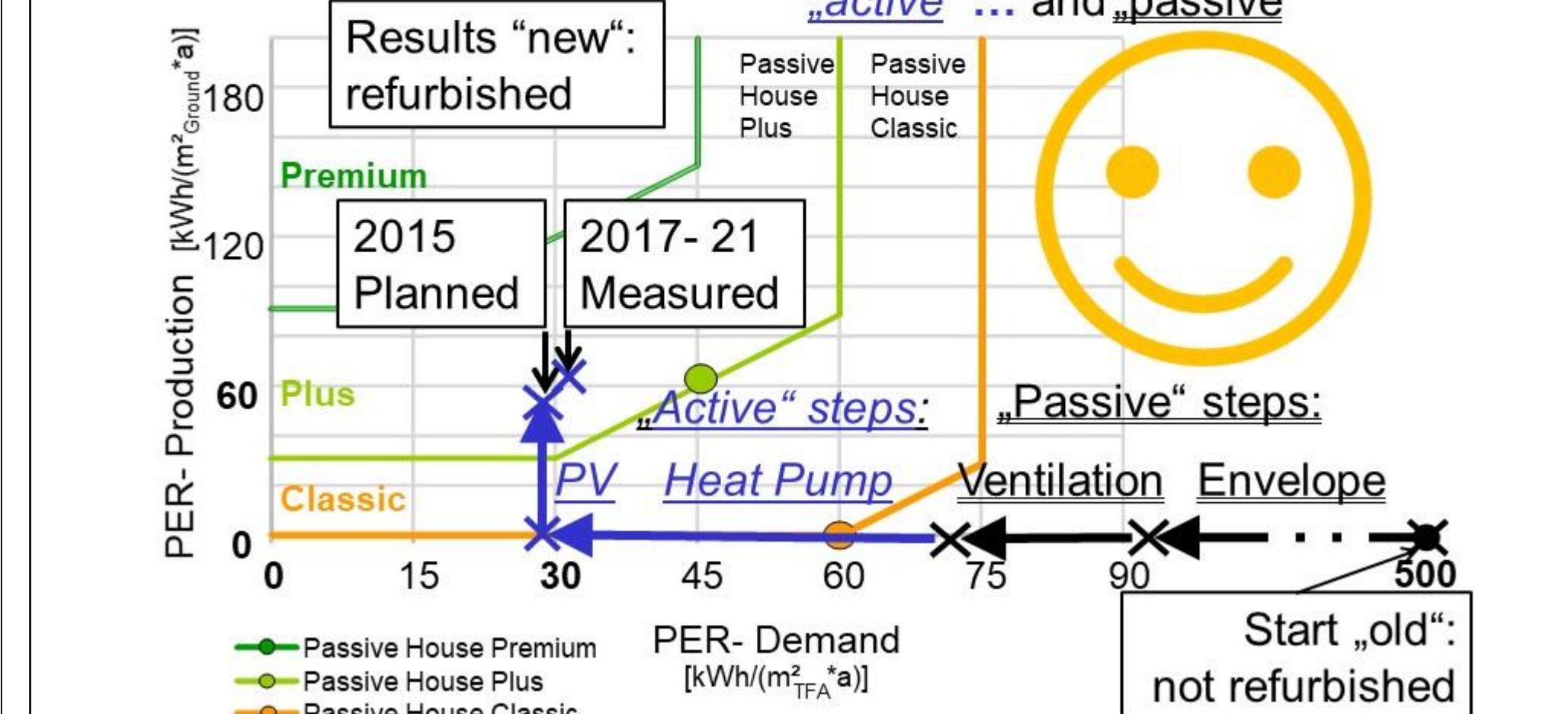


Spot Landing

Old → 2015 Planned New → 2017 – 21 Measured



Effects on Primary Energy Renewable PER-Demand & Production:



2021

Passive House Award



IG PASSIVHAUS

Informations-Gemeinschaft Passivhaus Deutschland



International PASSIVE HOUSE Association

