



House of the Future

Office Overview



-  **O**Overall planning old/new build
-  **A**Architecture + Technical planning
-  **B**Building measurement + expert advice
-  **PPH-Consulting + Certification**
-  **T**Training + Development

www.herz-lang.com



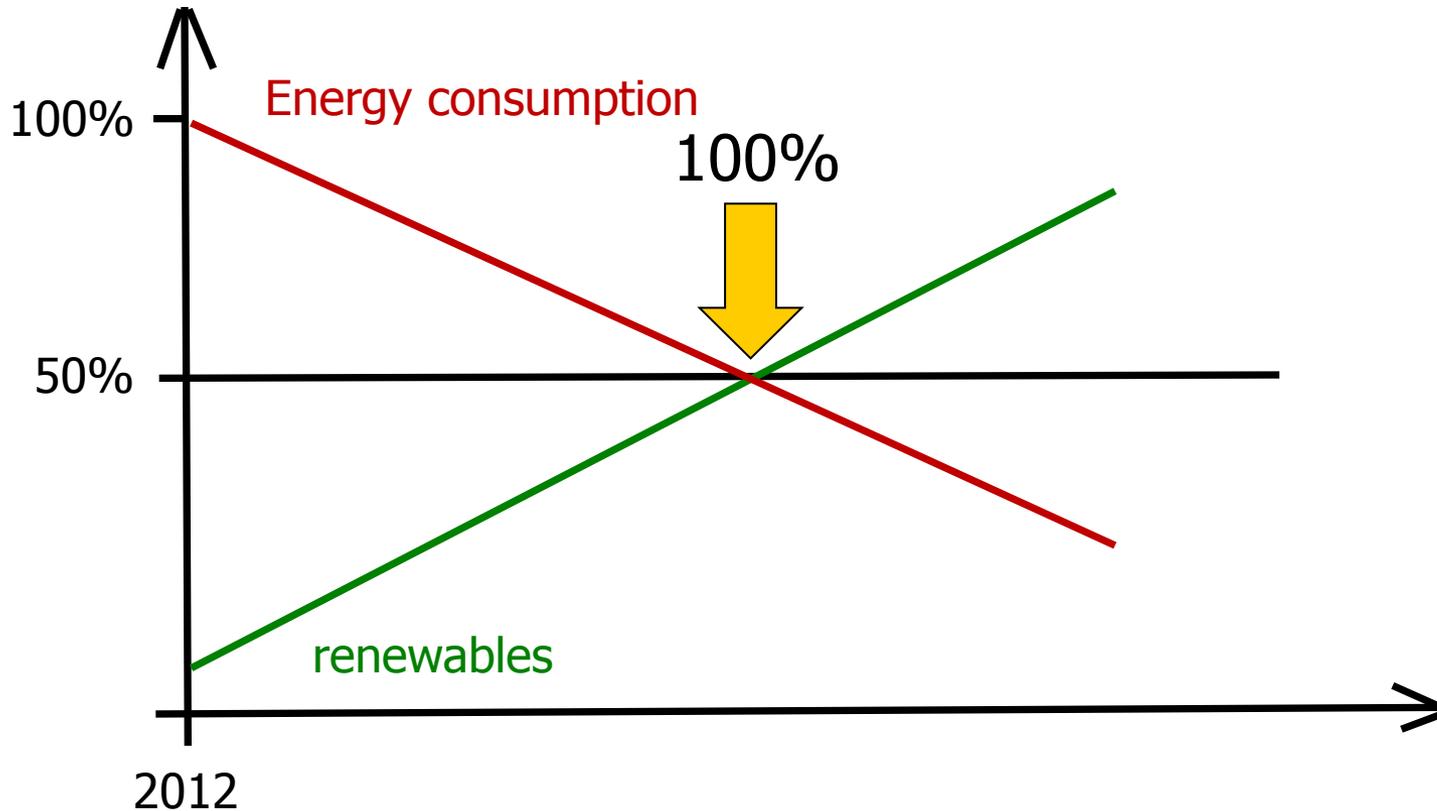
References

PH - Consulting since 2006:

- **400.Mil € building costs**
- 1.500 living quarters
- 80.000 m² treated floor area
non residential buildings



Simple formula for the energy turnaround: reduce energy and then produce remainder with renewables



Every new building and every retrofit built to the lowest standard is a missed chance for generations !

We need new recipes!

Overall concept fundamentals

- 1. Energy Saving: Factor 5-10**
- 2. Generate renewable, efficient energy**
- 3. Distribute and use energy efficiently**
- 4. Ensure energy efficiency:**
 - Quality Management Planning/Construction/Maintenance**
- 5. Passive House Plus**

Office buildings of Herz & Lang = energy⁺

Weitnau, Schongau, Kaufbeuren (PH)



Residential / office building

Built 1987

Redeveloped 2007

CO₂ Reduction : **Factor 30** (heating)

Consumption reduction: **Factor 5**

Description	b [cm]	TC
Roof: blown-in insulation	22	040
Wall: blown-in insulation with timber construction	22	040
District heating from biomass for heating + DHW		
Ventilation system with heat recovery		
17.6 kWp photovoltaic		
Green power (KOR-Air)		



CO₂ = 0



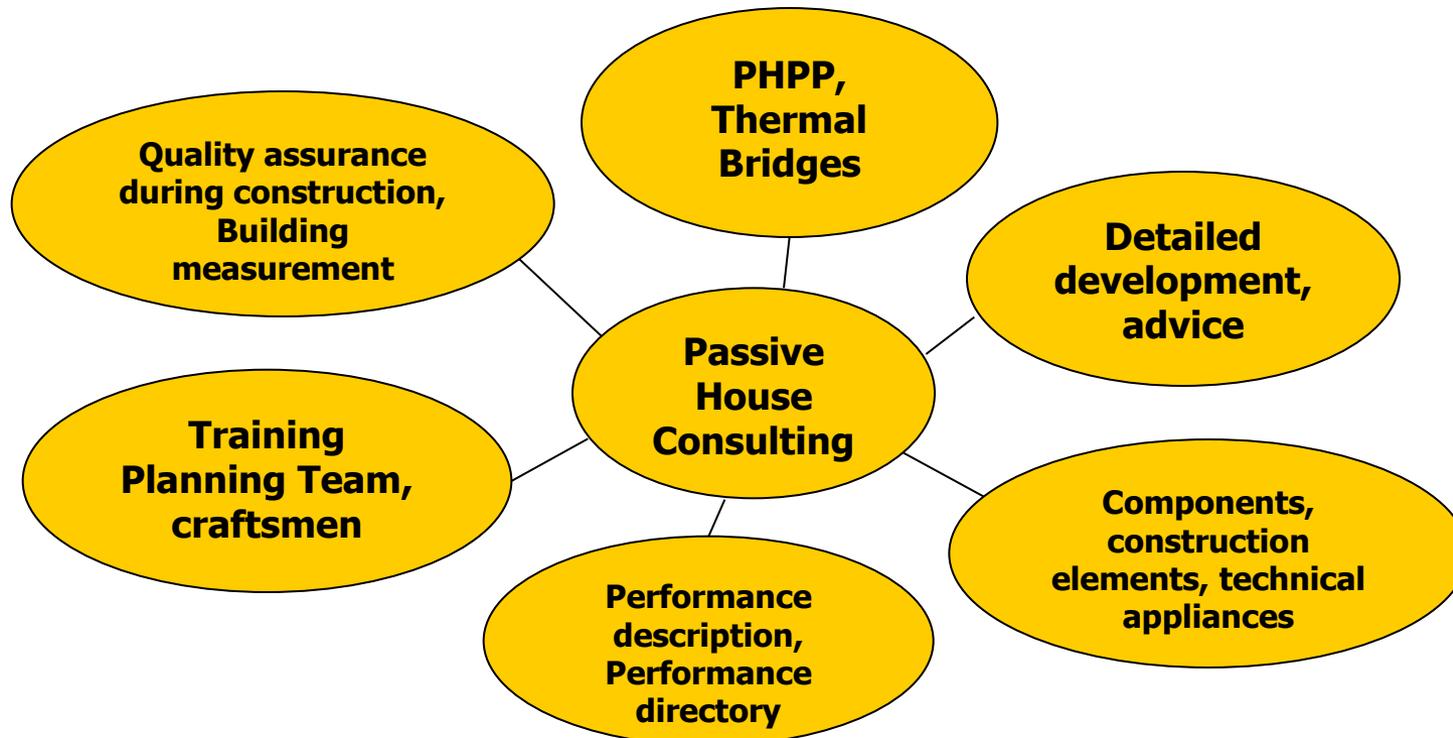
Building of the Future / PH-Consulting

Definition Consulting:

The aim of Passive House Consulting is to introduce special knowhow in existing planning and construction teams to achieve the high building standards securely and to finish with the Passive House certificate .

Guideline : The consuler is to be charged for the service by the client !

Spectrum : Residential and non residential, new and old buildings



Project Lodenaareal

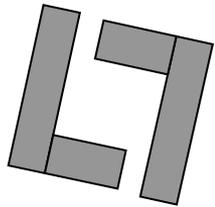
Project Lodenaareal Innsbruck / Austria

354 living quarters

Neue Heimat Tirol

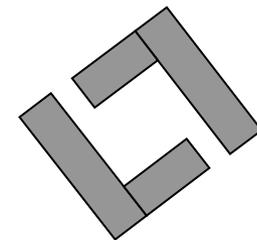
(public housing association)

One competition – two appartement blocks – two architects



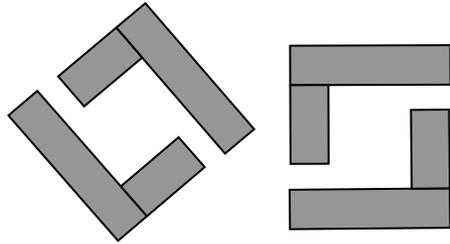
team k2
165 living quarters

din a4
189 living quarters

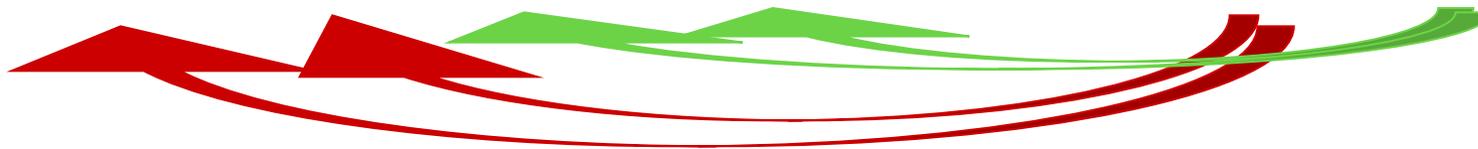


Project LodenaREAL

Team layout



Architecture	Statics	HVAC	Electro-planning	building physics	PH-CONSULTING SHELL and QUALITY MANAGEMENT HERZ & LANG	PH-CONSULTING HVAC AIROPTIMA
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PH Consulting: Shell

PH Consulting: HVAC



Quality Management - QM

QM are all **organised measures** to improve the quality:

1. Quality planning:

- aim definition
- integral planning
- team communication



2. Quality leading:

- tendering
- training
- site management

3. Quality assurance:

Measurements:

- airtightness
- thermography

4. Quality improvement:

- checklists
- monitoring



Passive House Calculation PHPP

Central calculation tool for Passive Houses

Kennwerte mit Bezug auf Energiebezugsfläche

Bauteil:	A	B	C	D	E	Summe
General-Eccher-Straße Nr.:	15	17	19	21	23	
Energiebezugsfläche:	1386,03	1384,18	1954,81	1385,37	1382,83	7493,2 m ²
Raumluftvolumen:	3465,08	3460,44	4887,02	3463,42	3457,07	18733,0 m ³
Zahl WE:	18	18	24	18	18	96
Personenzahl:	39,6	39,5	55,9	39,6	39,5	214,1

	Verwendet:	Nachweis:	Monatsverfahren	Mittelwerte gewichtet	PH-Zertifikat:	Erfüllt?
Energiekennwert Heizwärme:	13,91	12,50	14,23	14,32 kWh/(m ² a)	15 kWh/(m ² a)	✓
Drucktest-Ergebnis:	0,22	0,21	0,24	0,22 h ⁻¹	0,6 h ⁻¹	✓
Primärenergie-Kennwert (WW, Heizung, Hilfs- u. Haushalts-Strom):	117,30	116,69	115,51	117 kWh/(m ² a)	120 kWh/(m ² a)	✓
Primärenergie-Kennwert (WW, Heizung und Hilfsstrom):	33,70	33,06	33,07	34 kWh/(m ² a)		
Primärenergie-Kennwert Einsparung durch solar erzeugten Strom:				kWh/(m ² a)		
Heizlast:	9,45	8,94	8,98	9,2 W/m ²		

Innentemperatur: 20,0 °C
Interne Wärmequellen: 2,1 W/m²

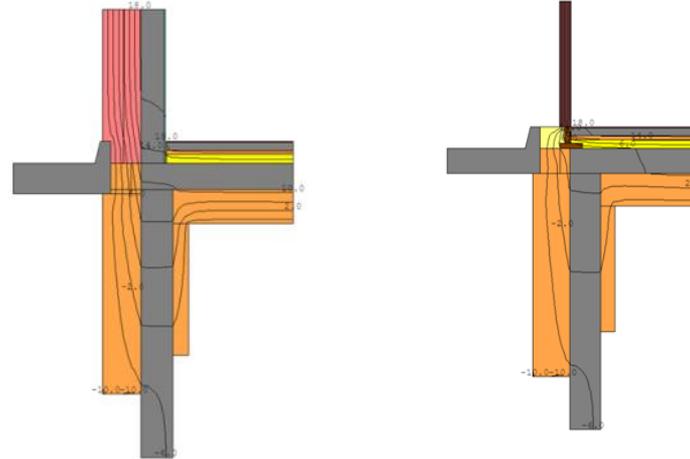
Übertemperaturhäufigkeit: 7,4% 8,5% 6,0% 2,5% 1,4% **5%** über 25 °C



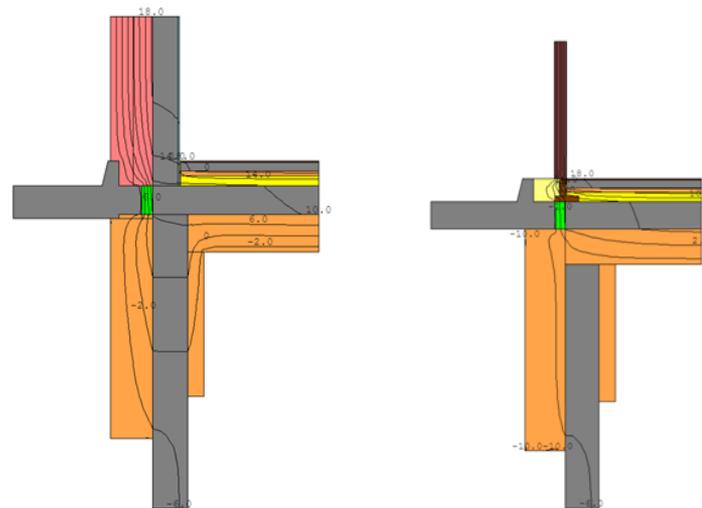
**Training, accuracy and experience is necessary !
Constant verification in the planning and
construction stage
Result: PH-Certification**



Thermal bridges

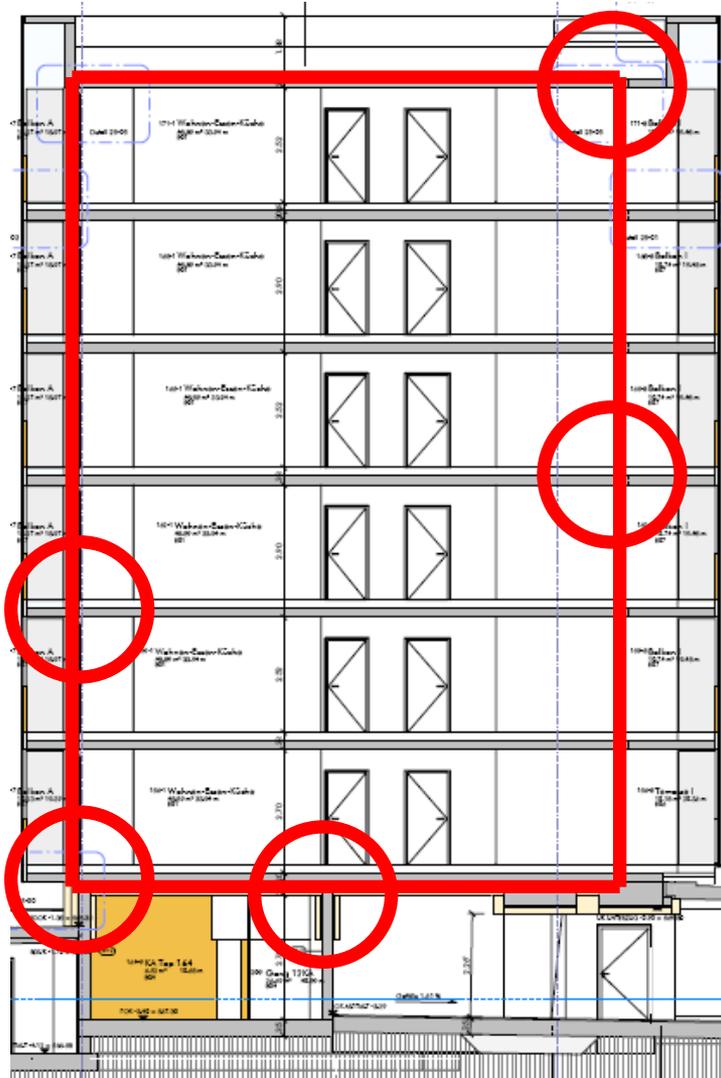


- Overall calculation
- Constant verification with the PHPP



Training planer and contractors

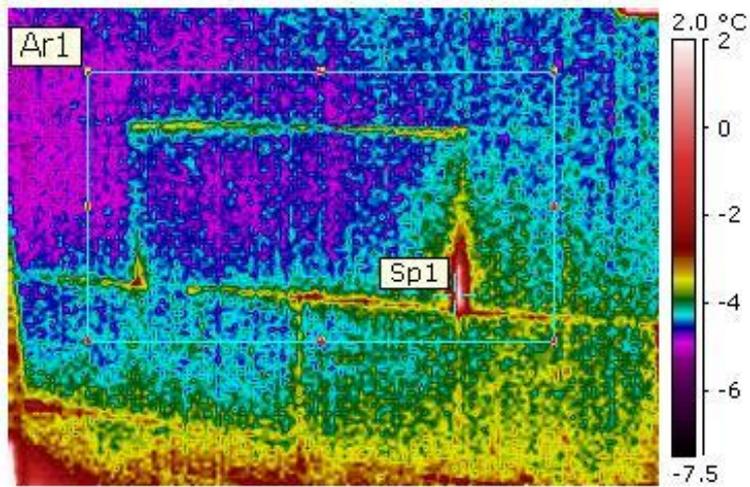
Influence thermal bridges



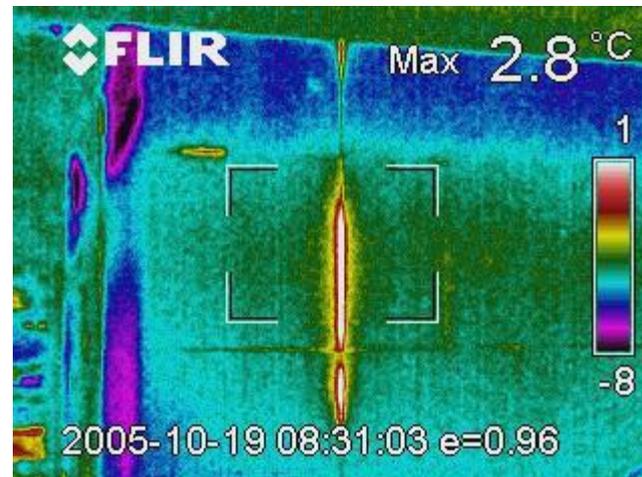
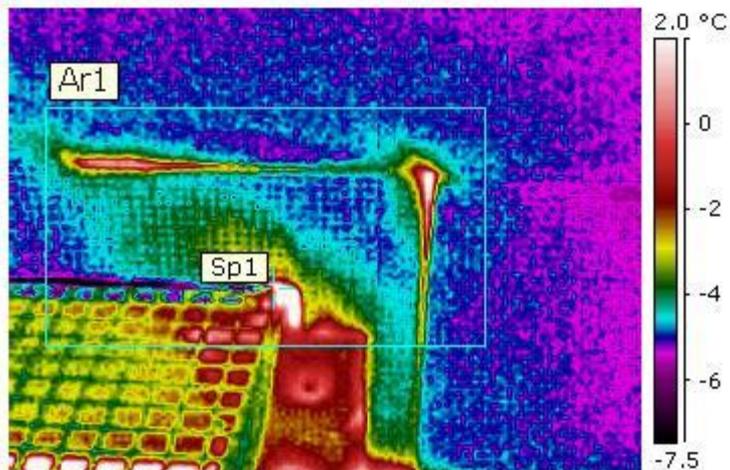
Requirement for Passive House:
 $U_{WB} < 0,01 \text{ W}/(\text{m}^2\text{K})$

Training planer and contractors

Influence thermal bridges



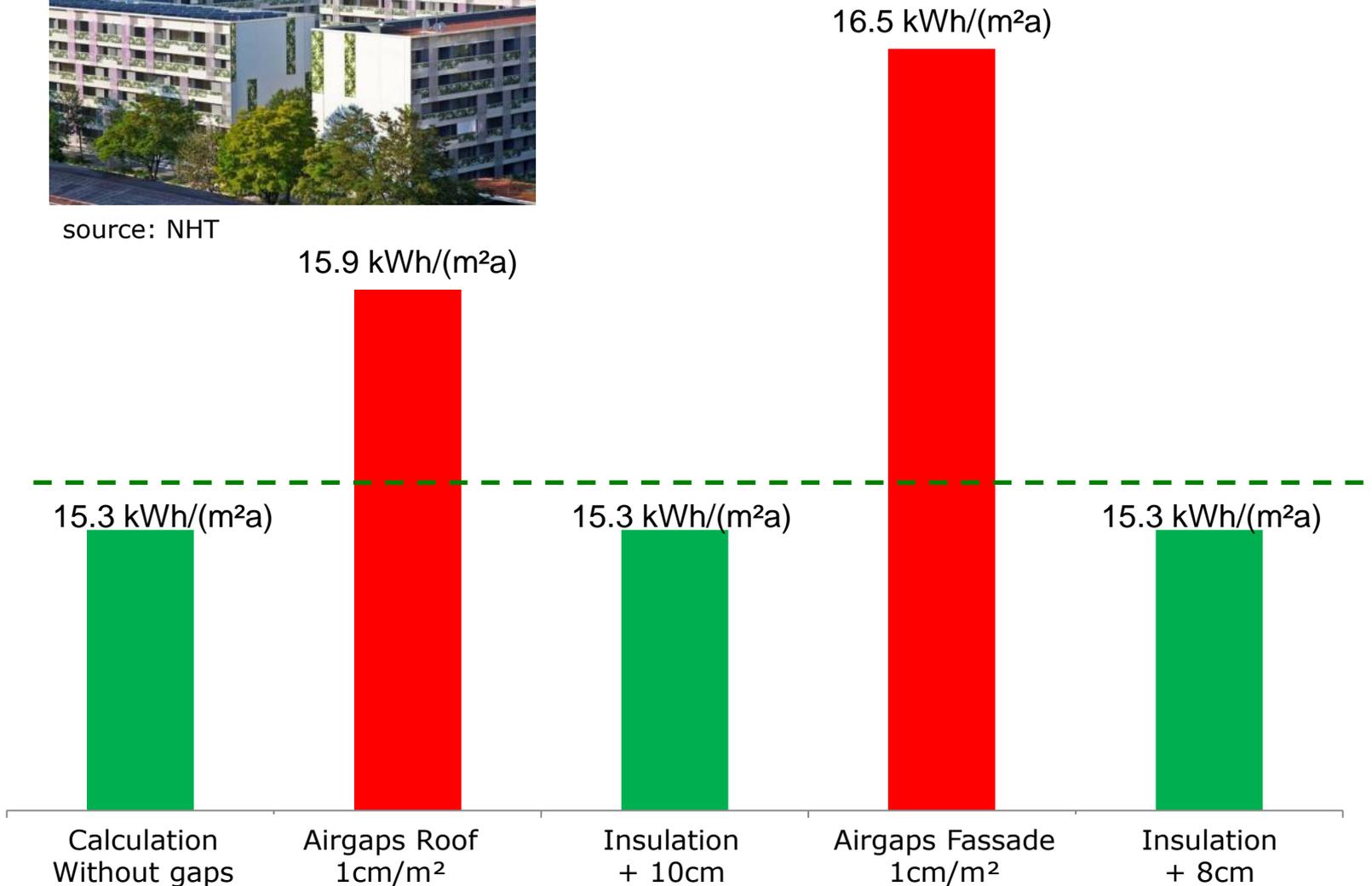
Airgaps EIFS



Influence Airgaps

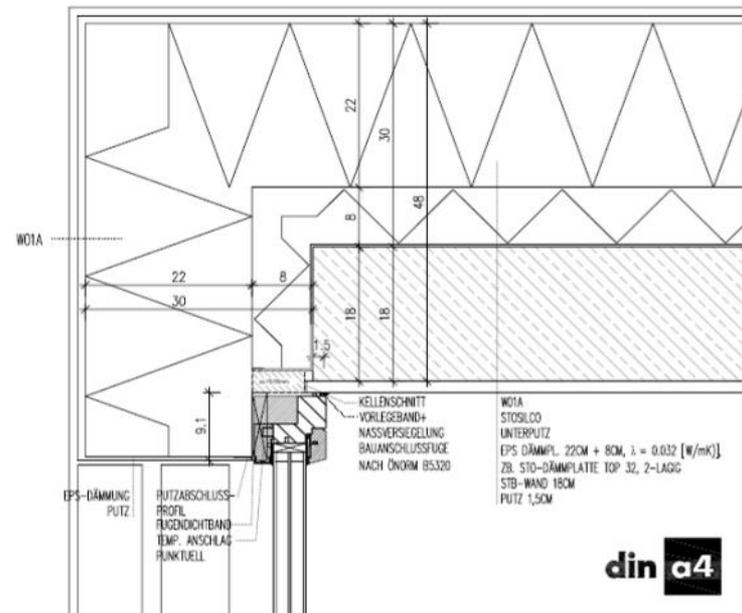


source: NHT



Model flat

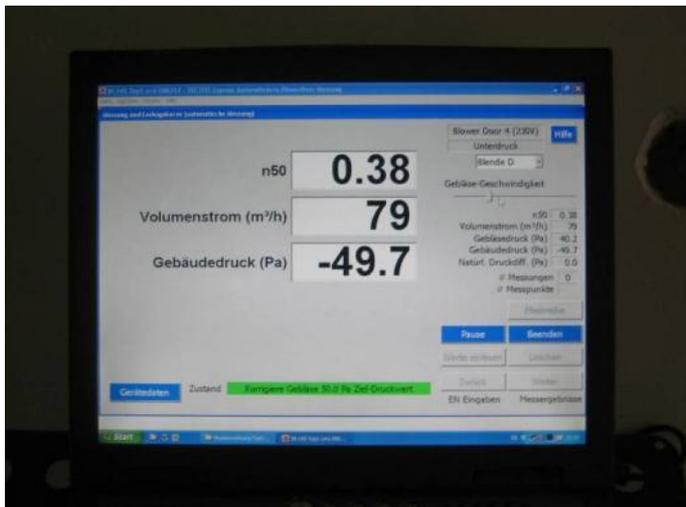
Installation Circumstances Window



Measurement of a model flat



Quality assurance



Measurement apartment blocks

IN144 + IN145

IN 144 (teamk2) $\leq 0,40$ 1/h

Haus A	n50	= 0,16 1/h
Haus B	n50	= 0,17 1/h
Haus C	n50	= 0,18 1/h
Haus D	n50	= 0,16 1/h
Haus E	n50	= 0,17 1/h
Haus F	n50	= 0,14 1/h
Haus G	n50	= 0,19 1/h
Haus H	n50	= 0,14 1/h

IN 145 (dina4) $\leq 0,35$ 1/h

Haus A	n50	= 0,22 1/h
Haus B	n50	= 0,21 1/h
Haus C	n50	= 0,24 1/h
Haus D	n50	= 0,25 1/h
Haus E	n50	= 0,17 1/h
Haus F	n50	= 0,18 1/h
Haus G	n50	= 0,23 1/h
Haus H	n50	= 0,19 1/h
Haus I	n50	= 0,18 1/h
Haus J	n50	= 0,14 1/h



Certification - Benefits

- Clear objective definition of targets
- Discipline in the planning team
- Planning and execution in "Four-eyes principle"
- Avoid errors
- Optimization Ensuring the concept (Client / user ...)
- Economics
- Increase in value



Passive Buildings NHT Lodenareal

Best performing Passive House in Austria



Pilot project in Tirol, 354 apt.
Construction cost 54 Mil euro
> 400 Excursions since 2009

Neue Heimat Tirol has built
over 1000 flats with our
PH Consulting since 2007

**“The Lodenareal is the
key project for the future
of housing in Europe”**

Wolfgang Feist 2009



Source: NHT, din a4, team k2

Passive Buildings NHT Lodenareal

Best performing Passive House in Austria

space heat demand [kWh/(m ² a)] calculated	space heat demand [kWh/(m ² a)] Monitoring	Difference Calculation - Monitoring	domestic hot water without losses [kWh/(m ² a)] Monitoring	domestic hot water with losses [kWh/(m ² a)] Monitoring	Difference without and with losses	electricity consumption ventilation system [kWh/(m ² a)] Monitoring	Percent of maximum	
15,0	15,5	103%	23,4	36,2	155%	7,8	100%	Utendorfasse
11,0	15,2	138%	-	-	-	6,0	77%	Dreherstaße
13,1	14,4	110%	16,2	27,1	167%	5,3	68%	Mühlweg
8,6	17,4	202%	-	-	-	7,5	96%	Molkereistraße
13,0	16,8	129%	18,2	24,6	135%	3,7	47%	Roschégasse
14,5	12,2	84%	8,5	10,6	125%	1,7	21%	Lodenareal

Passive Olympic Village Innsbruck 2011

First Youth Olympics 2012 / Neue Heimat Tirol



440 Apartments

30.000 m² Floorspace

13 Buildings (6x Hybrid Timber/RC)

Construction Cost 65 Mil. Euro



Passive House Housing Ulm



8 storey Passive House project
Result of an architectural competition, currently in planning stage

Source: UWS / Ulm



House of the Future = Zero Carbon Building

Basic : Passive House PHI



Herz & Lang
Your Specialists
in Sustainable Building

PH-Consulting

Ensures energy efficiency in design, construction, usage, maintenance and makes PH-Certification easy

