

## Trans-European EnerPHit Case Studies Lead the Way

Tomás O'Leary

MosArt and Passive House Academy

[www.europhit.eu](http://www.europhit.eu)



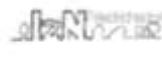
Coordinator:



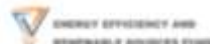
Project Partners:



Passivhus.dk



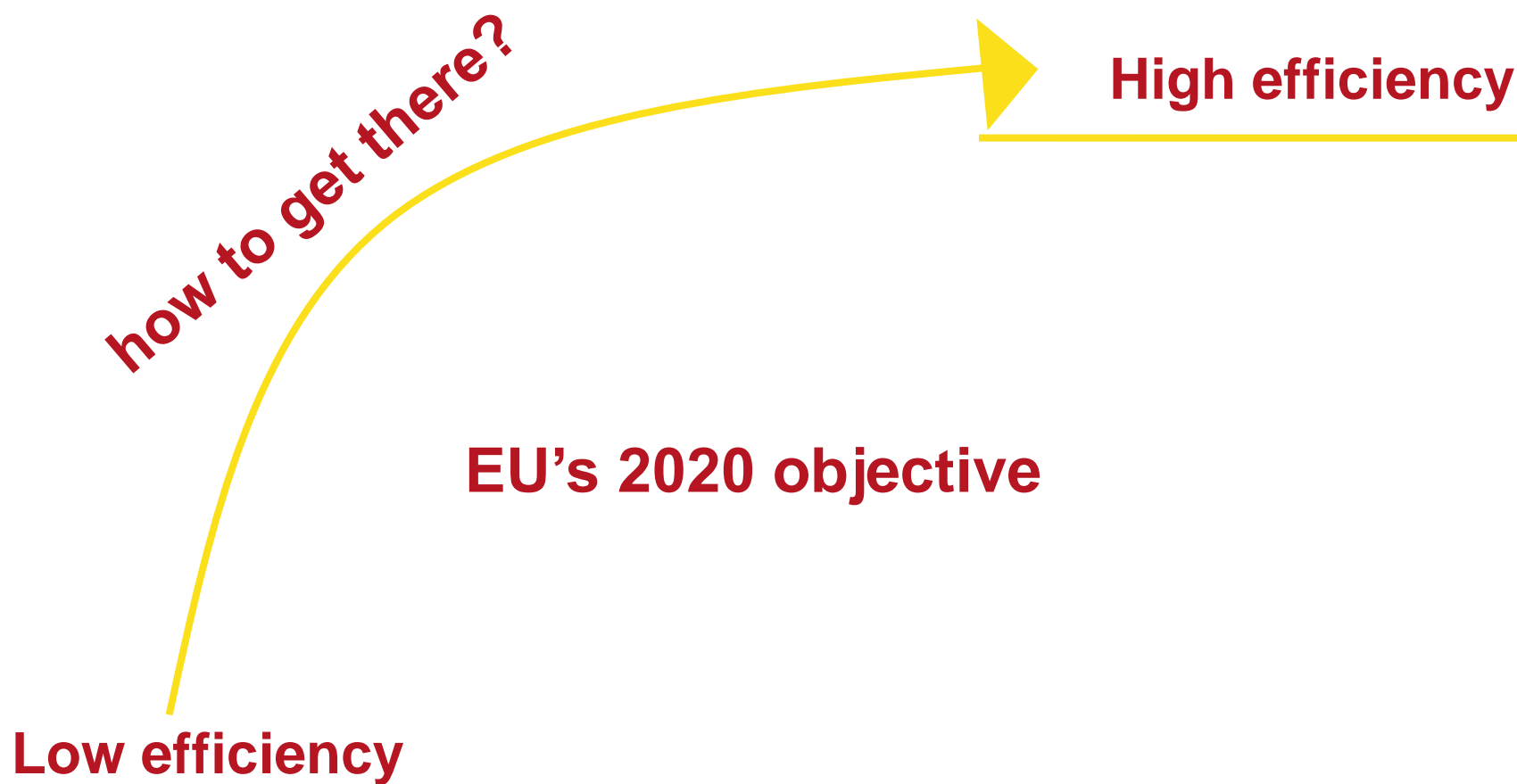
Supporters:



- Buildings consume ~ **40%** of final energy in EU
- Pre-1980 buildings = **95%** of this energy
- Just **1%** of EU building stock renovated per year
- **Deep retrofits** are the only way to reach EU's "20-20-20" targets

# Reduce Energy Consumption!

EuroPHit

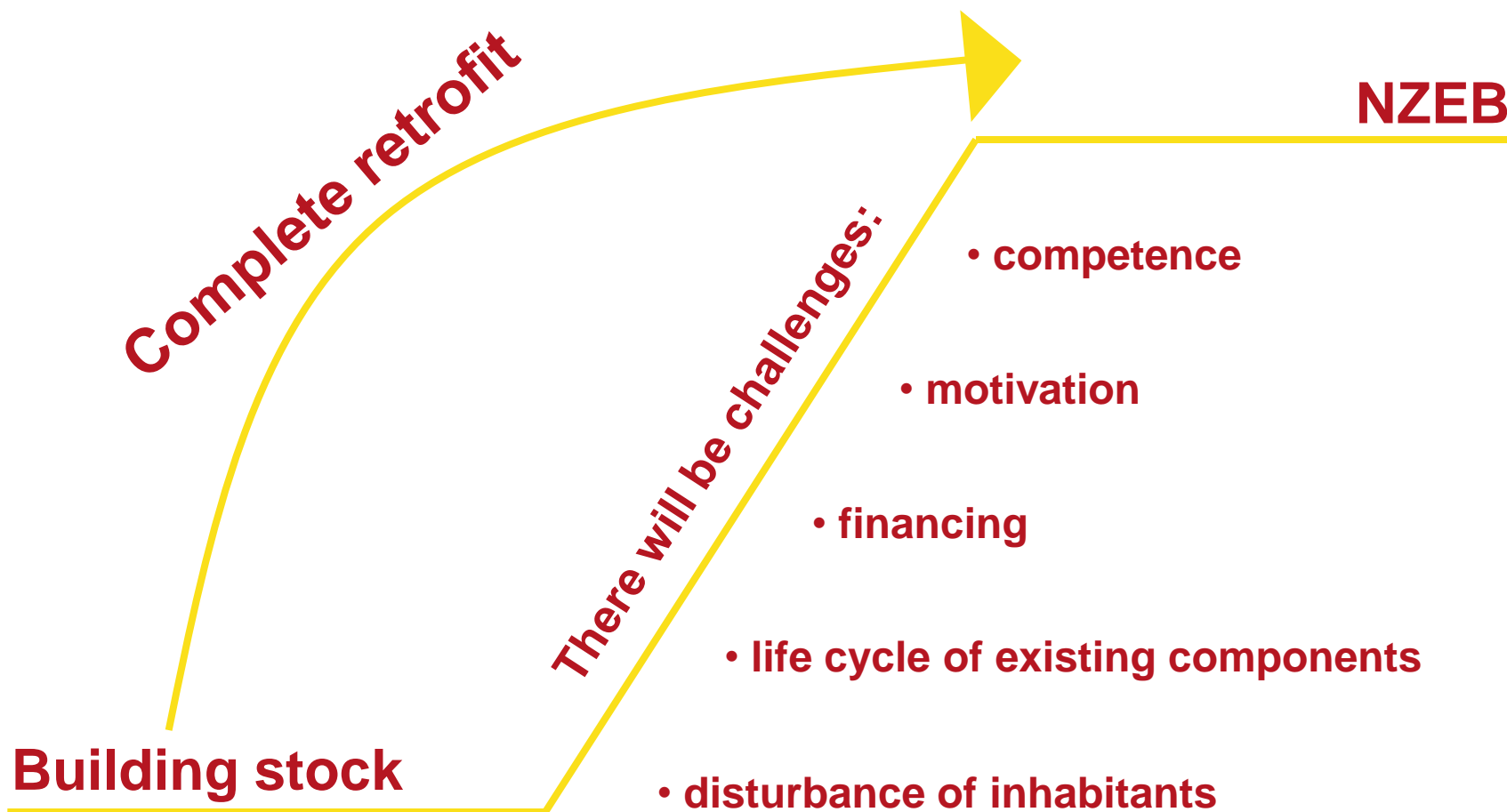


Co-funded by the Intelligent Energy Europe  
Programme of the European Union

[www.europhit.eu](http://www.europhit.eu)



# Do It All At Once?



# ...Or Step By Step

## EuroPHit

overall refurbishment plan

Building stock

step

by

step

Retrofit

EnerPHit



+  
Renewable  
energy  
systems



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

[www.europhit.eu](http://www.europhit.eu)



## Diana Ürge-Vorsatz

Lead Author, IPCC, Central European University

- ***Shallow retrofits need to be avoided***
- ***“Wait out” for deep, systemic retrofit***
- ***Need to revisit support schemes around shallow retrofits!***



***Way too thin!***

- **How far** should I go?
- What should I do **first**?
- Does it make **financial** sense?
- Where can I get expert **know-how**?
- Is there step by step **guidance**?
- Latest innovative **products**?

**EuroPHit aims to provide the answers!**



# The 9-Step EnerPHit Journey

**EuroPHit**

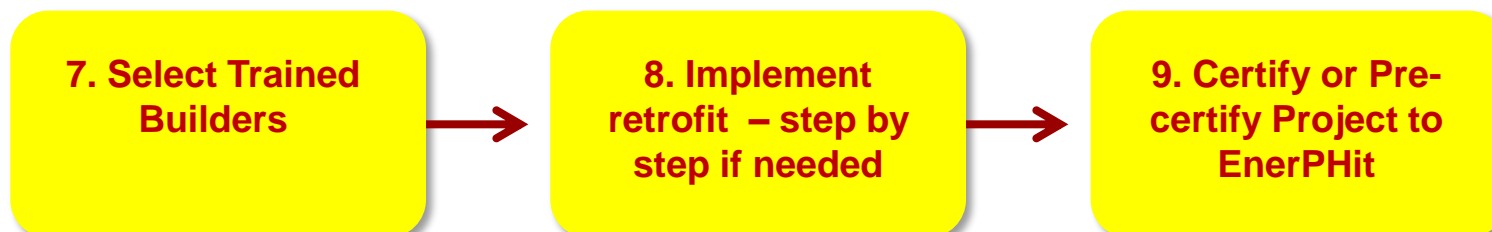
## Design



## Detail



## Deliver



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

[www.europhit.eu](http://www.europhit.eu)





# Case Study Projects

EuroPHit

- Home for the Elderly, County Dublin
- Secondary School, Galway
- Hotel, Valcanover
- Social Housing, Courcelles
- Social Housing, Liévin
- Family Home, Tournon-sur-Rhône
- Therapy Centre, Asturias
- Single Family Home, Santander
- Two Schools, Gabrovo
- Family Home, Svartbäcksvägen
- Rehab Workshop, Naestved
- Council Apart. Block, Portsmouth

Base map

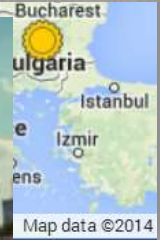
Google Maps Engine LITE

North

[www.europhit.eu/projects](http://www.europhit.eu/projects)



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



# Case Study Overview

**EuroPHit**

**Total floor area = 40,000 m<sup>2</sup>**

**Committed budget = €22 m**

## **Residential**

- Single family homes
- Multi-unit social housing

## **Non-Domestic**

- Schools
- Hotel & restaurant
- Therapy and rehab



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

[www.europhit.eu](http://www.europhit.eu)



# 1. Model Retrofit in PHPP Version 9

EuroPHit



© Passive House Academy

Test all kinds of combinations to see what works for your project

Seriously Cool Tool



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

[www.europhit.eu](http://www.europhit.eu)





# Compare Individual Retrofit Measures

EuroPHit



## CALCULATION OF VARIANTS

2013

Active

select active  
variants >>

1-1: Existant

Existing

Results	Units	1	1
Annual Heating Demand	kwh/(m²a)	92	92
Heating Load	W/m²	38.6	38.6
Overall specific space cooling demand	kwh/(m²a)		
Cooling load	W/m²		
Frequency of overheating	%	0.0	0.0
Primary energy demand	kwh/(m²a)	396	396
Certifiable as EnerPHit?	yes / no	non	no



LAMP



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

[www.europhit.eu](http://www.europhit.eu)

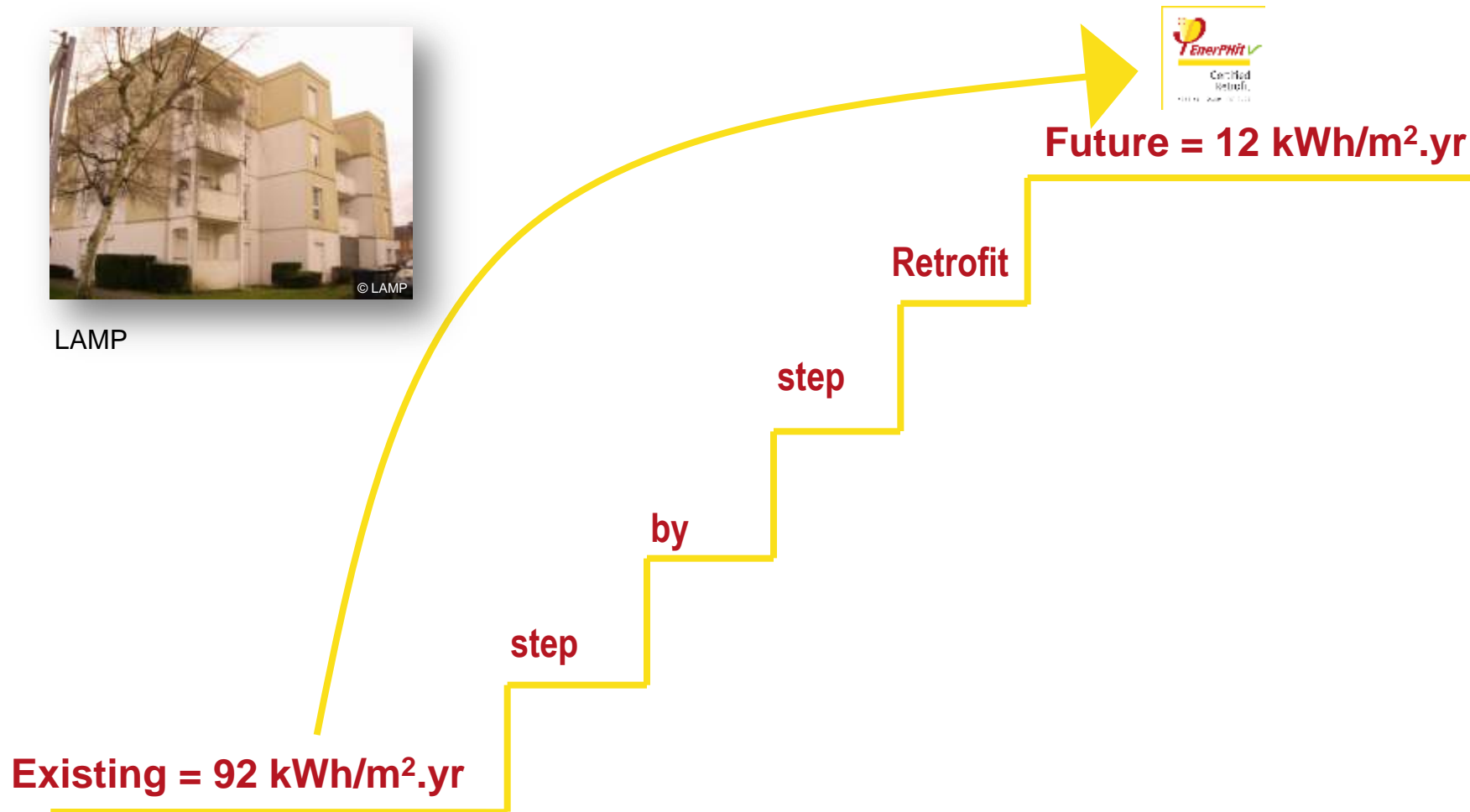


# Step by Step towards EnerPHit

EuroPHit



LAMP



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

[www.europhit.eu](http://www.europhit.eu)



## 2. Determine Economic Feasibility

**Option A:**

**Cost to Save 1 kWh  
of Energy**

**Option B:**

**Cost to Buy 1 kWh  
of Energy**

**If  $A < B$ , A is a 'No Brainer'**

**Typically people still chose B ('No-Brain')**



# Calculating Cost to Save 1 kWh of Energy EuroPHit

## Calculation Factors:

- Retrofit cost for individual measures
- Annual maintenance cost
- Subsidies and supports (if any)
- Product life
- Energy saved
- Interest rate, inflation rate
- Duration of borrowing
- Energy Price

Calculation of selected configuration

	Lower Efficiency	Higher Efficiency	Difference / Savings / Profit
Design according to variant	1-Existing	2-2: 1 + n50 1h1 + MVER 80%	
Annual heating demand	91.617	63.757	KWh(m²a)
Minimal interior surface temperature	-	-	°C

Investment	Per m² of TFA	Entire building	Per m² of TFA	Entire building	Per m² of TFA	Entire building
Treated Floor Area (TFA)	1.00	1203	1.00	1203	1.00	1203
Investment costs less sum of financial support	0.00	0	199.49	240000	199.49	240000
Annuity (capital costs)	0.00	0	12.75	15342	12.75	15342

Energy (Space heating + cooling + mech. ventilation)	Per m² of TFA	Entire building	Per m² of TFA	Entire building	Per m² of TFA	Entire building
Area	1	1203	1	1203	1	1203
Annual heating demand	91.62	110223	63.76	76705	27.86	33518
Cooling + dehumidification demand						
Final energy demand	209.56	252112	139.36	167660	70.20	84452
CO <sub>2</sub> -Emissions	71.25	85718	47.38	57005	23.87	28714
Primary energy demand	272.42	327746	181.17	217958	91.26	109788
Total cost space conditioning	26.19	31514	18.25	21958	7.94	9557

Economic viability	Per m² of TFA	Entire building	Per m² of TFA	Entire building
Total annual costs			-4.81	-5785
			111.26	133856
			18.2	

Approximate estimate of cost effectiveness (all components with lifetime)

Boundary conditions	Energy price (cent/kWh)	Period of use
Nominal interest rate	4.00%	Build. assemblies
Inflation	1.50%	Gas/Oil Vent. system
Period under consideration [a]	20	Logg Thermal bridges
		Pellet Complete building
		District heating Windows
		Others

**Revolutionary and Highly practical tool:**  
**Enables real-time comparison of cost efficiency**



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

[www.europhit.eu](http://www.europhit.eu)



LAMP

# Determine Economic Feasibility

EuroPHit



**Option A:**

**Cost to Save 1 kWh  
of Energy  
= €0.18**

**Option B:**

**Cost to Buy 1 kWh  
of Energy  
= €0.25**

**Choose Option A, it's a 'No Brainer'**



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

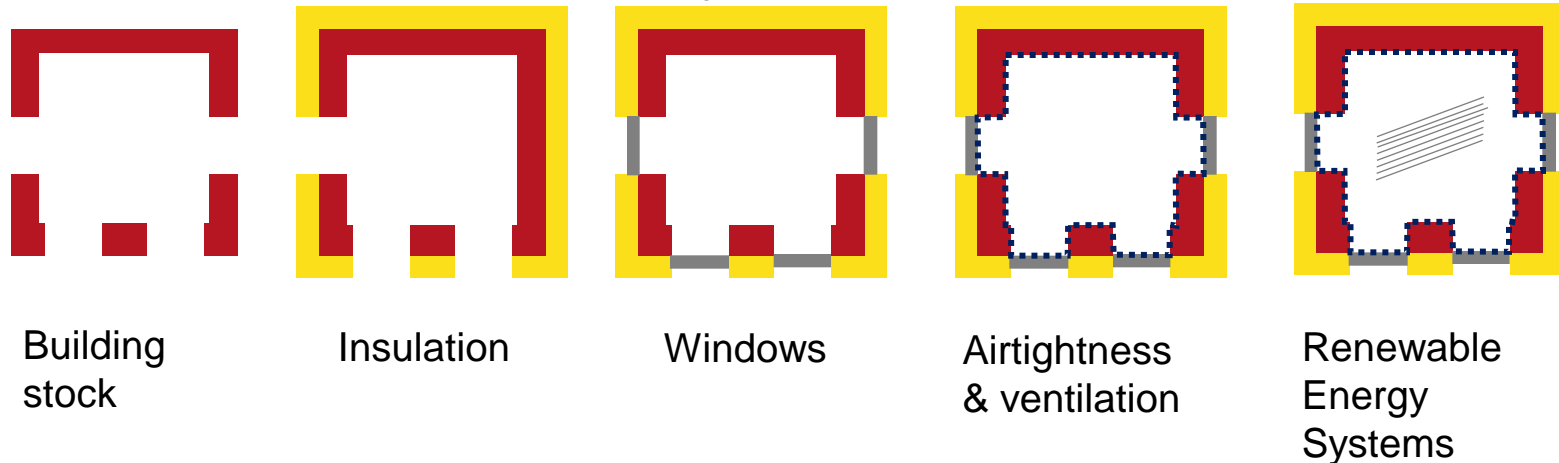
[www.europhit.eu](http://www.europhit.eu)





### 3. Prepare A Refurbishment Plan

#### Example - Components step-by-step



# What To Tackle First...

EuroPHit

Windows?

Airtightness  
and  
ventilation?

External  
insulation?



Beijing



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

[www.europhit.eu](http://www.europhit.eu)



# Scale of Refurbishment Plans

Part or whole  
facade?

Part or whole  
building?

Part or whole  
block?



© Passive House Academy

# Step By Step Façade Insulation

EuroPHit



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

[www.europhit.eu](http://www.europhit.eu)





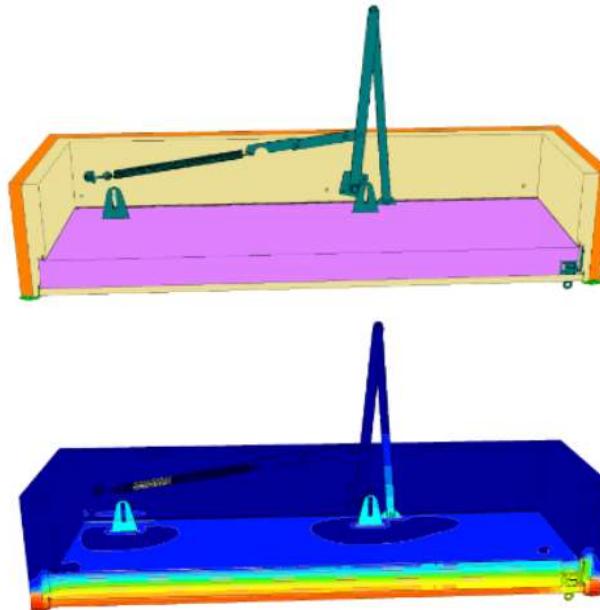
## 4. Select New Products for Old Buildings EuroPHit

**Façade Integrated  
MVHR with flow rates  
50 - 100m<sup>3</sup>/h**



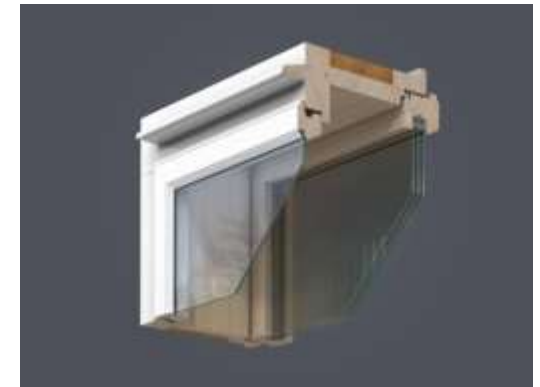
Example, © BluMartin  
87% efficient!

**Insulated & airtight  
attic hatch**



© PHI

**High performance  
windows for  
historical retrofits**



Example, © SmartWin

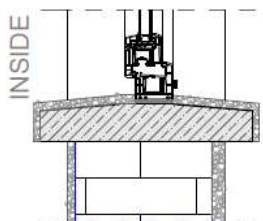
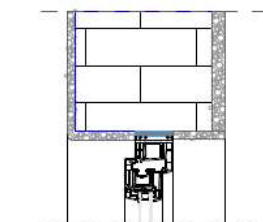


Co-funded by the Intelligent Energy Europe  
Programme of the European Union

[www.europhit.eu](http://www.europhit.eu)



## 5. Step By Step Construction Details



EXISTING  
SITUATION

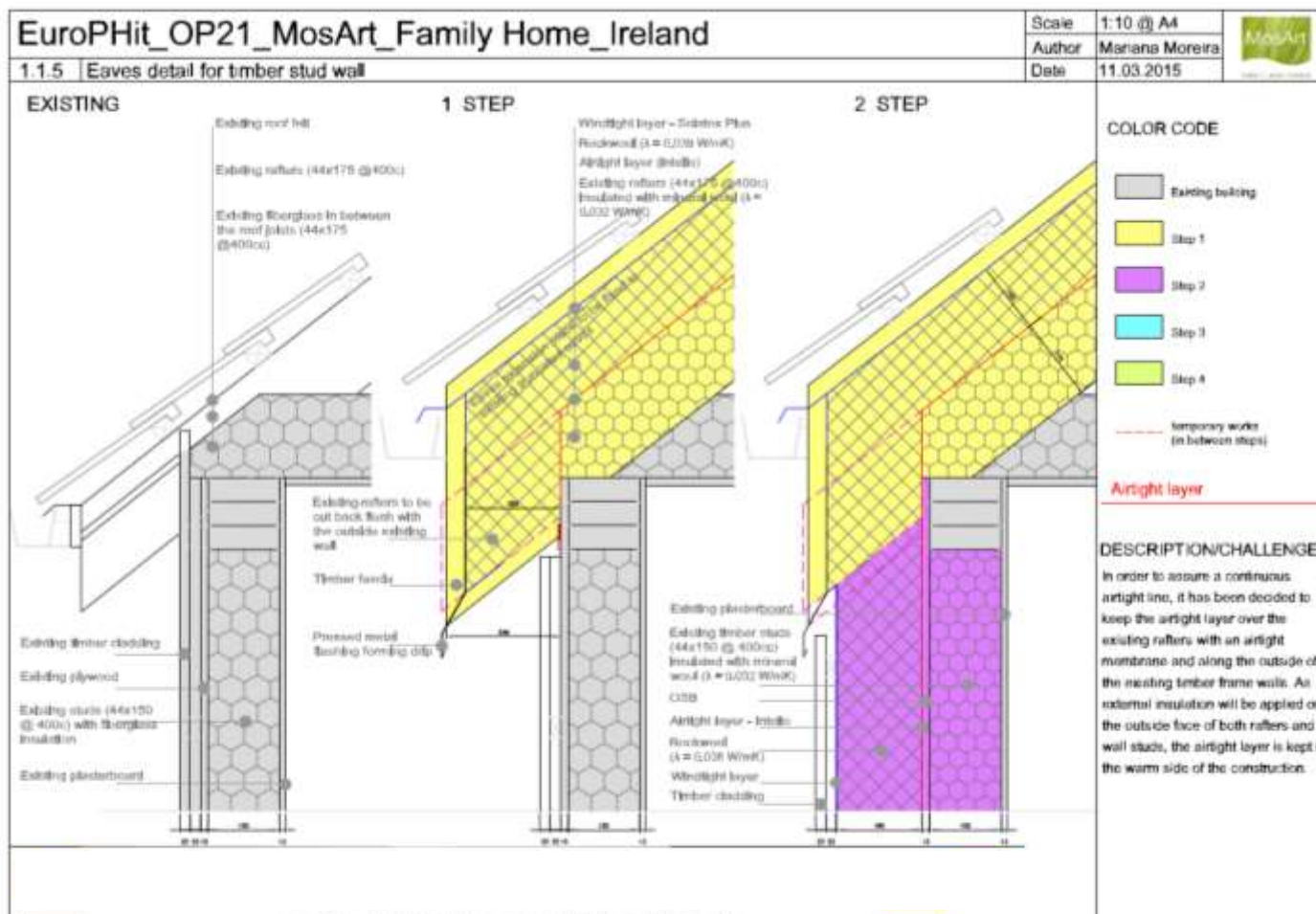
School retrofit project in Bulgaria

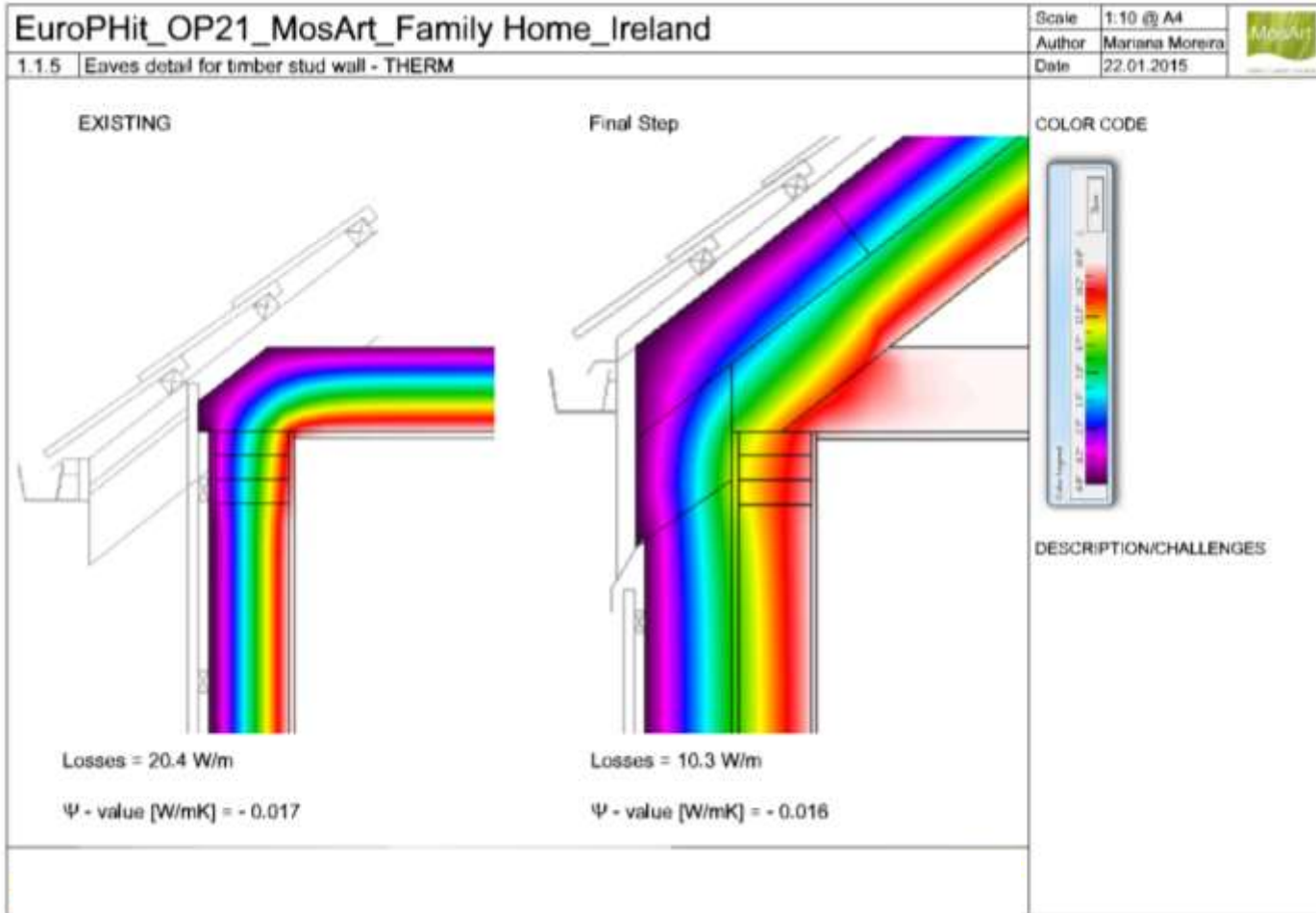


Co-funded by the Intelligent Energy Europe  
Programme of the European Union

[www.europhit.eu](http://www.europhit.eu)









## 6. Prepare Tendering Documents



ArchitectureMNP

**Avoid Costly Unforeseen Extras**



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

[www.europhit.eu](http://www.europhit.eu)



# Pre-Tendering Training Requirement

EuroPHit



© Passive House Academy



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

[www.europhit.eu](http://www.europhit.eu)



## 7. Select Trained Builders

**EuroPHit**

### Three EuroPHit Training Programmes

#### **Project Design Team:**

**Certified Passive House Designer:**

7 days, 80 trainees

#### **Project Contractor:**

**Certified Passive House Tradesperson:**

3 days, 224 trainees

#### **Airtightness, Installation and Measurement:**

3 days, 224 trainees



© Passive House Academy



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

[www.europhit.eu](http://www.europhit.eu)





# Hands-on Training in Tradesperson Labs EuroPHit



**Certified Passive House Tradesperson Training Lab in Dublin**

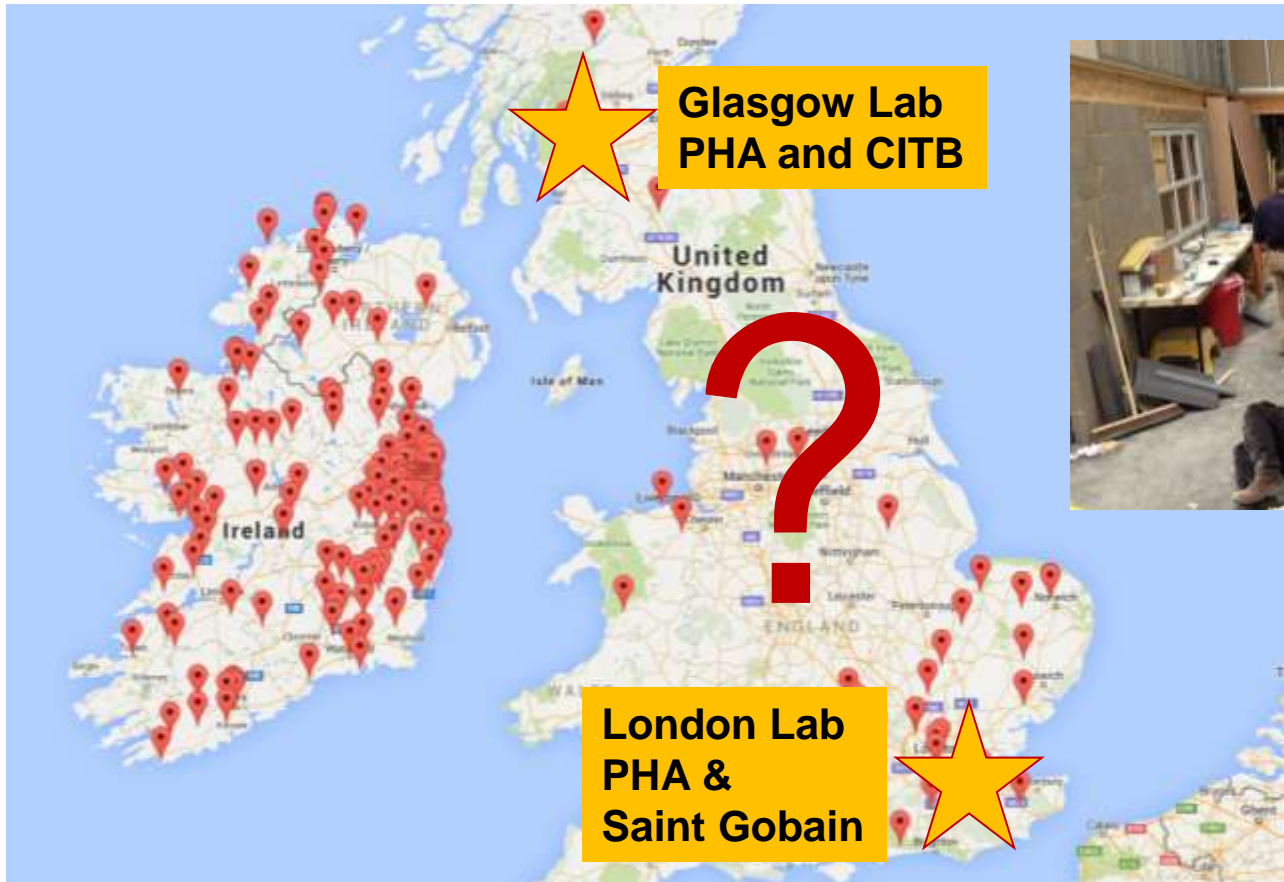


Co-funded by the Intelligent Energy Europe  
Programme of the European Union

[www.europhit.eu](http://www.europhit.eu)



# Hands-on Training in Tradesperson Labs EuroPHit



Erith, London Lab

  
**SAINT-GOBAIN**

**Next Course:  
Tomorrow! 21<sup>st</sup> October**

**Certified Passive House Tradesperson**



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

[www.europhit.eu](http://www.europhit.eu)



## 8. Start On-Site – Reality Bites



© ALAMY

Retrofit in theory



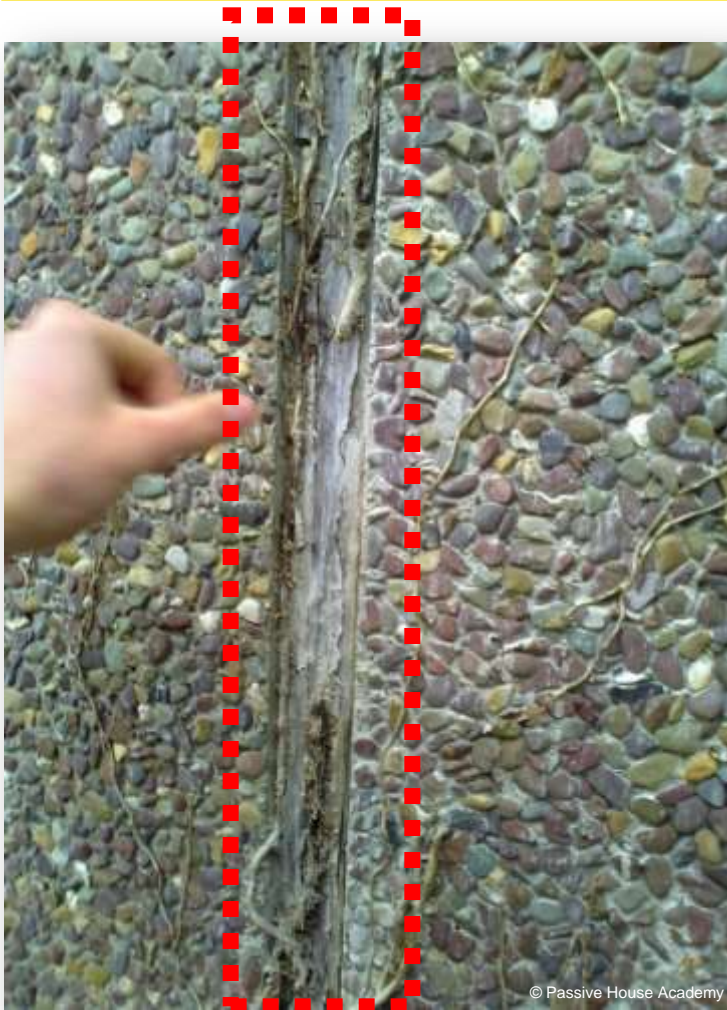
© The Wave Home Cat Sanctuary

Retrofit in practice



**“remove vegetation before applying tape”**

**EuroPHit**



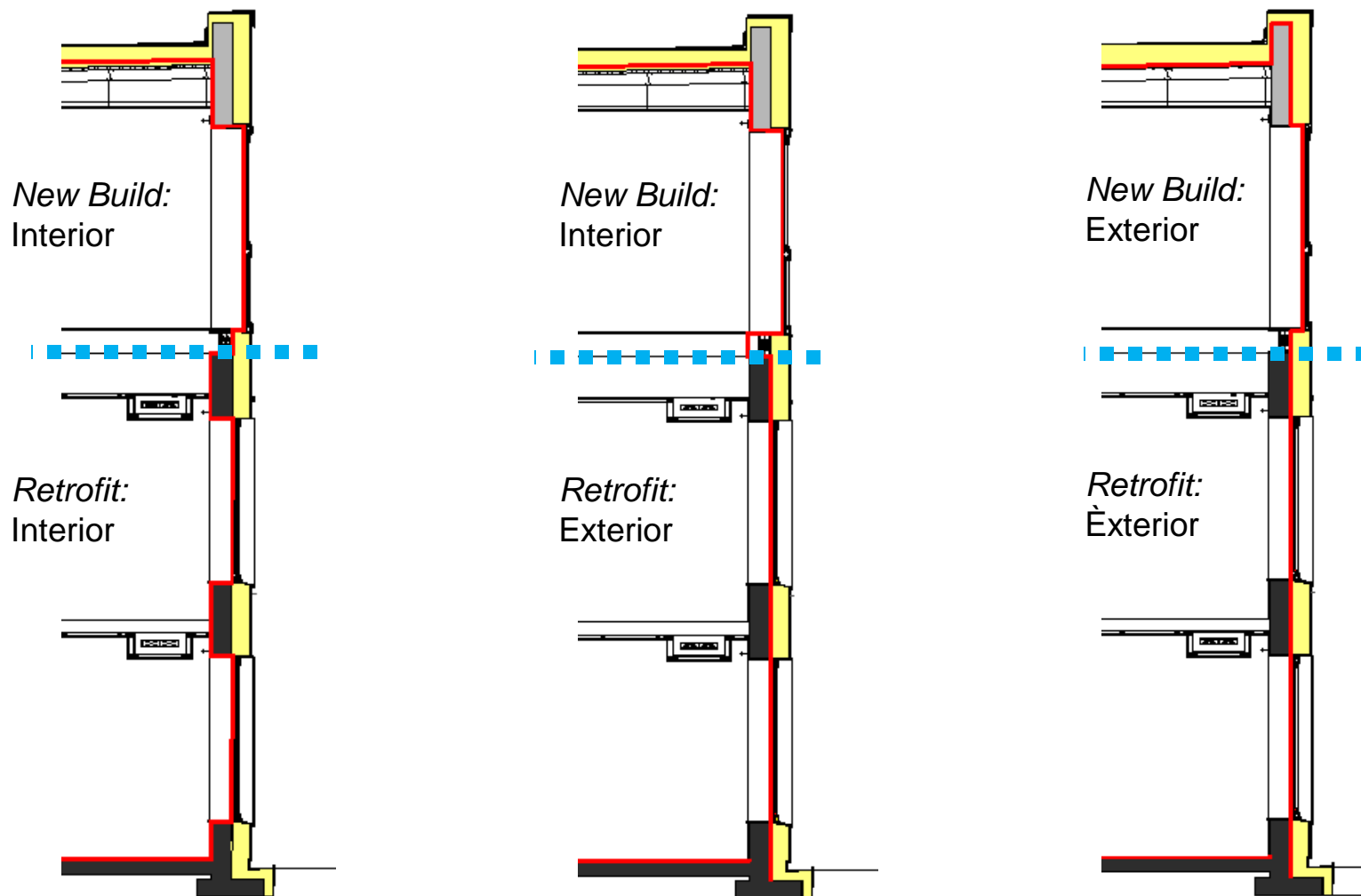
Co-funded by the Intelligent Energy Europe  
Programme of the European Union

[www.europhit.eu](http://www.europhit.eu)



# EnerPHit Proposal – Airtight Line Journey

EuroPHit



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

[www.europhit.eu](http://www.europhit.eu)





# Dublin: Exterior Placement of Windows

EuroPHit



© Passive House Academy



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

[www.europhit.eu](http://www.europhit.eu)



# Dublin: Airtightness Taping of Frame

EuroPHit



© Passive House Academy



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

[www.europhit.eu](http://www.europhit.eu)





# Dublin: External Insulation

EuroPHit



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

[www.europhit.eu](http://www.europhit.eu)



# Dublin: Apply Base Coat Render

EuroPHit



© Passive House Academy



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

[www.europhit.eu](http://www.europhit.eu)





# The Project Architect's Perspective

EuroPHit



© Passive House Academy



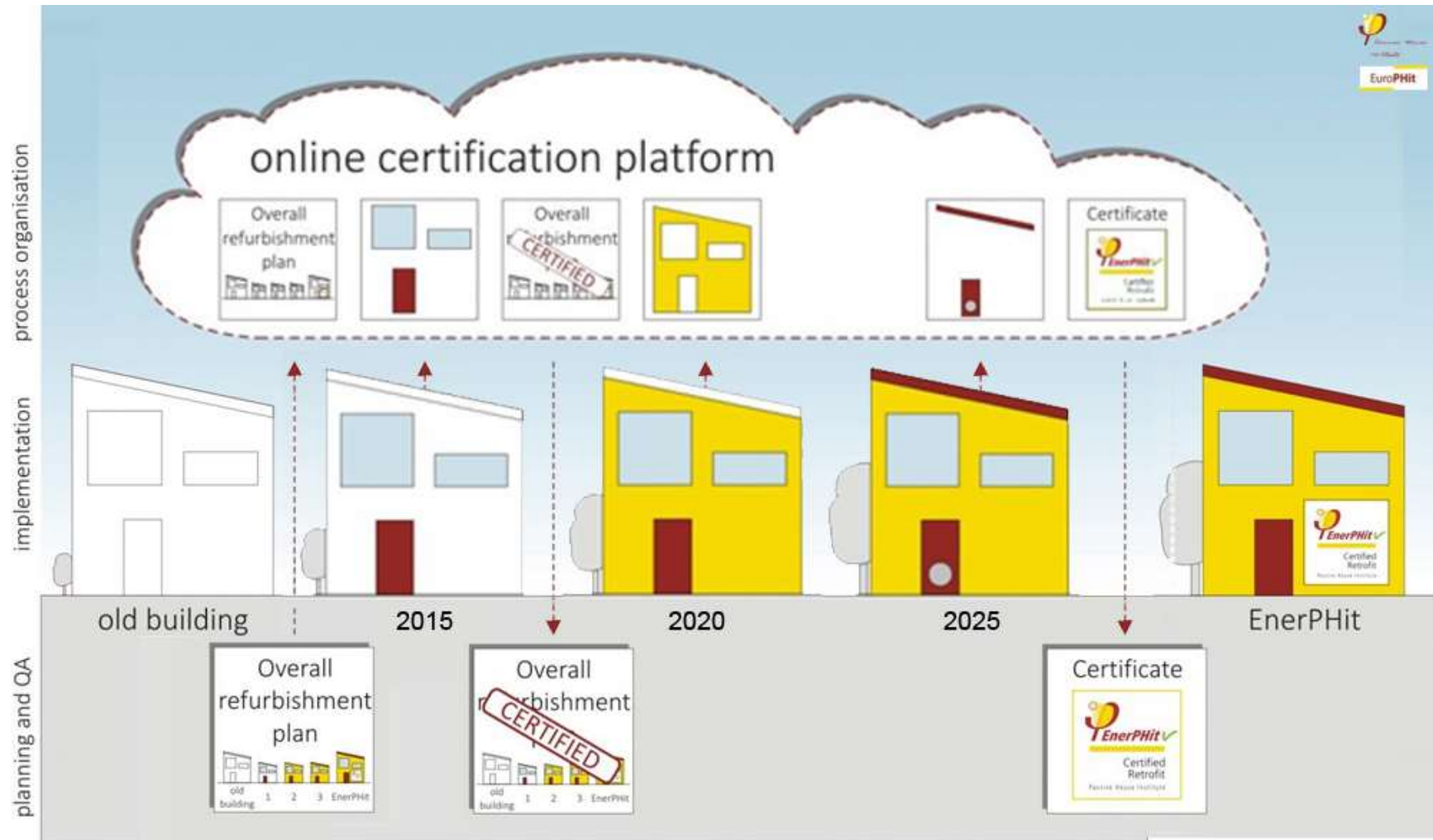
Co-funded by the Intelligent Energy Europe  
Programme of the European Union

[www.europhit.eu](http://www.europhit.eu)



# 9. Certification: criteria and scheme

EuroPHit



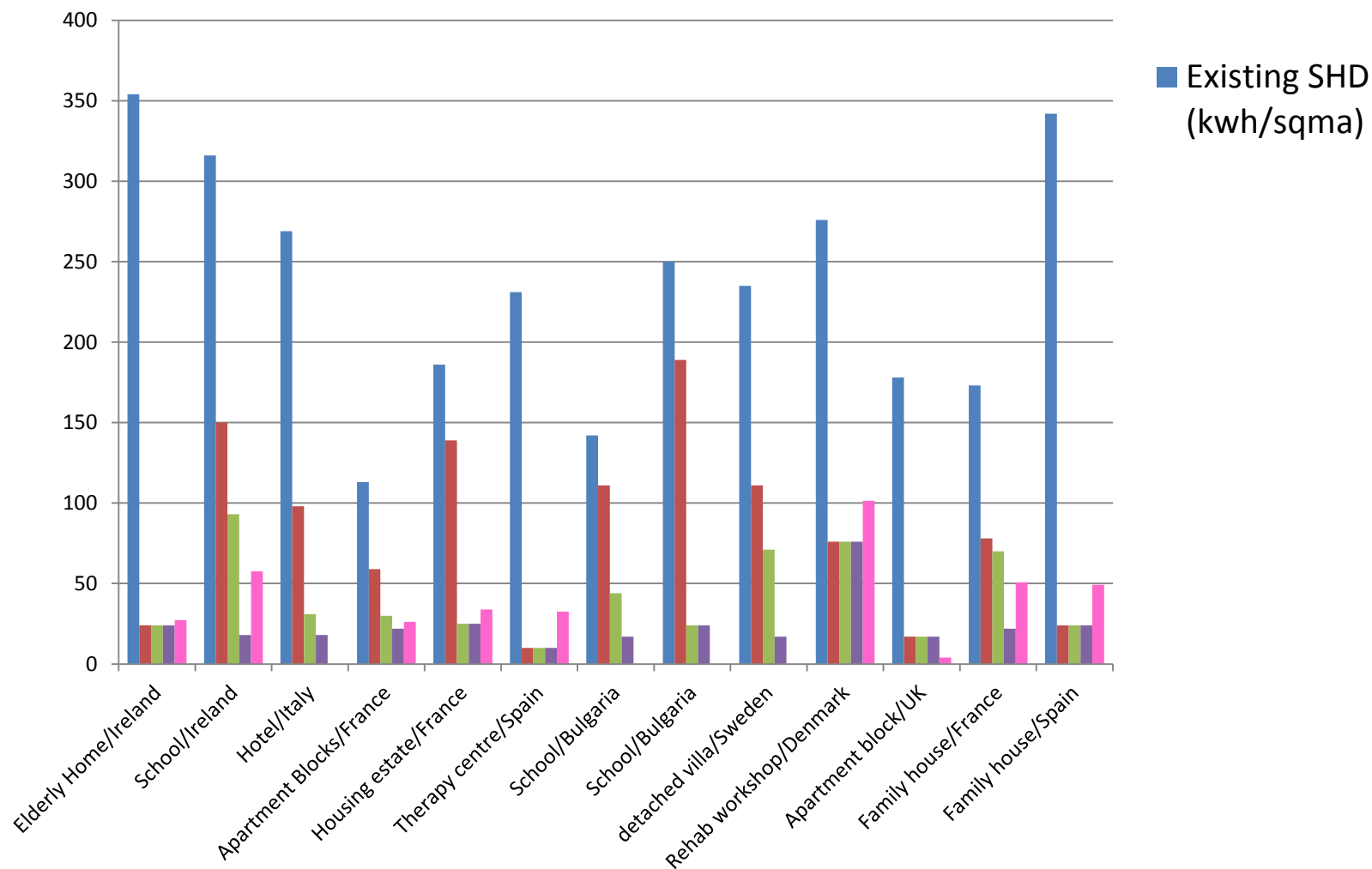
Co-funded by the Intelligent Energy Europe  
Programme of the European Union

[www.europhit.eu](http://www.europhit.eu)



# EuroPHit case study performance

EuroPHit



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

[www.europhit.eu](http://www.europhit.eu)



# If you do it, do it RIGHT!

**EuroPHit**

Thank you for your attention

*Please join the EuroPHit Network*

**tomas@passivehouseacademy.com**



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

**[www.europhit.eu](http://www.europhit.eu)**

