BIPV
IN STEP BY STEP RETROFITTING PROJECTS

Isabel Sánchez – R&D Technical Manager

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1. WHAT IS BUILDING INTEGRATED PHOTOVOLTAICS (BIPV)?
2. BIPV SOLUTIONS
3. BIPV TECHNOLOGIES
4. PHOTOVOLTAIC VENTILATED FAÇADES
5. PHOTOVOLTAIC GLAZING AREAS
6. CONCLUSIONS

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WHAT IS BUILDING INTEGRATED PHOTOVOLTAICS (BIPV)?


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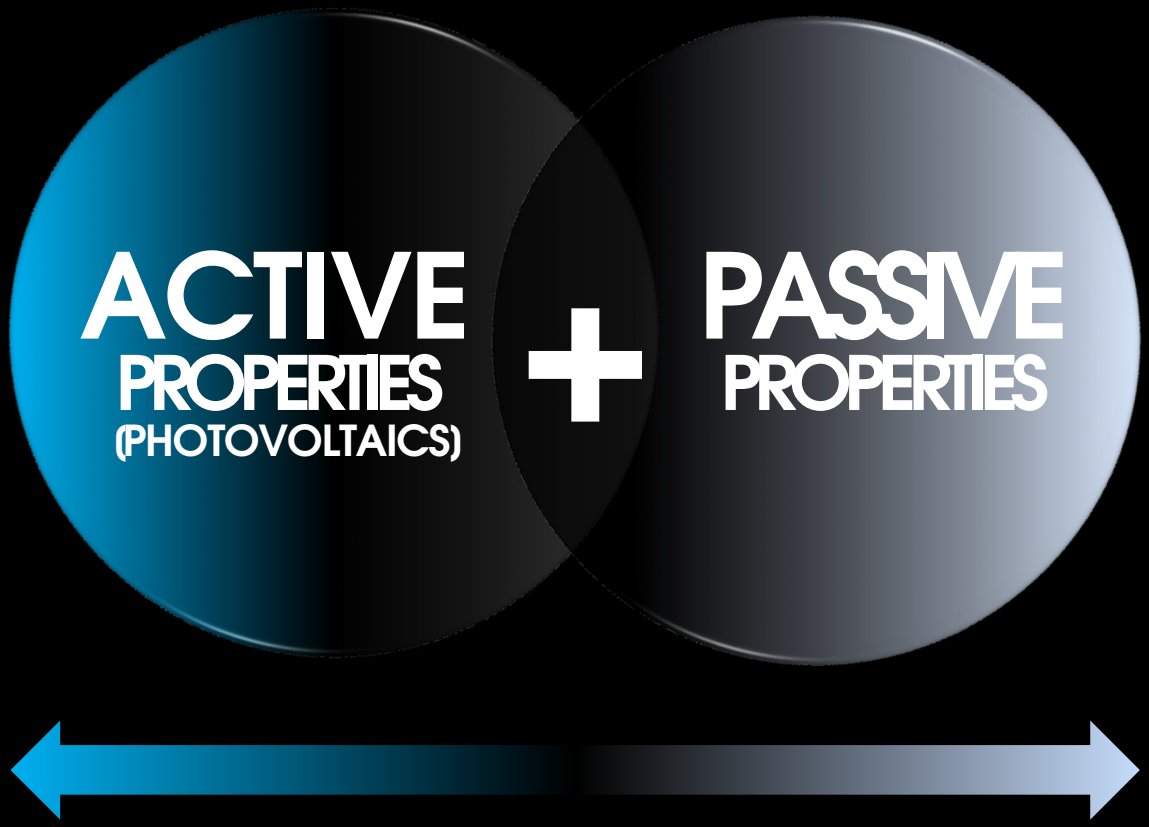

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Certified Passive House
Passive House Institute

EnerPHit
Certified Retrofit
Passive House Institute

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BIPV SOLUTIONS

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CURTAIN WALL

BRISE SOLEIL

WALKABLE FLOOR

SKYLIGHT

VENTILATED FAÇADE

PARKING LOT

CANOPY

URBAN FURNITURE

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Photovoltaic skylight

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Photovoltaic skylight

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Photovoltaic brise-soleil

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Photovoltaic double skin

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Photovoltaic ventilated facade

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Photovoltaic walkable floor

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Photovoltaic balcony railings

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Photovoltaic canopy

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Photovoltaic gallery

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BIPV TECHNOLOGIES

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crystalline

amorphous sillicon

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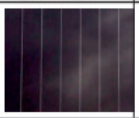
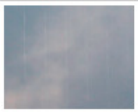
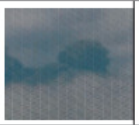
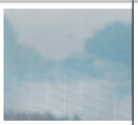
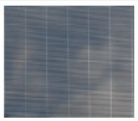
A-si technology

- Best results in terms of kWh/kWp under diffuse irradiation conditions
- Absorption of infrared and UV-radiation
- Best aesthetic solutions when combining with other cladding materials.
- Different see-through degrees

LIGHT TRANSMISSION	OUTSIDE OF THE BUILDING	INSIDE OF THE BUILDING	PEAK POWER
DARK-0%			62 WP/m² 5.754 W/ft²
S CLEAR-10%			44 Wp/m² 4.087 W/ft²
M CLEAR-20%			38 Wp/m² 3.530 W/ft²
L CLEAR-30%			32 Wp/m² 2.972 W/ft²

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PHOTOVOLTAIC VENTILATED FAÇADES

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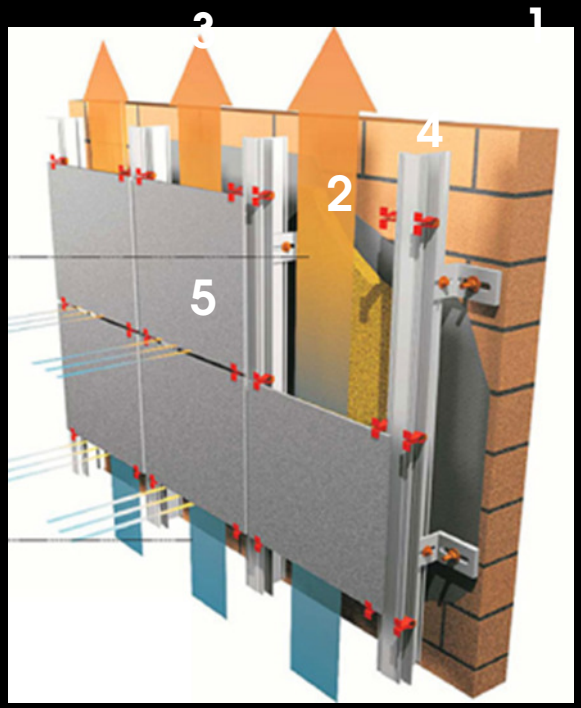
PV ventilated façade system



1. Wall or support
2. Thermal insulation
3. Air chamber
4. Substructure
5. PV Cladding

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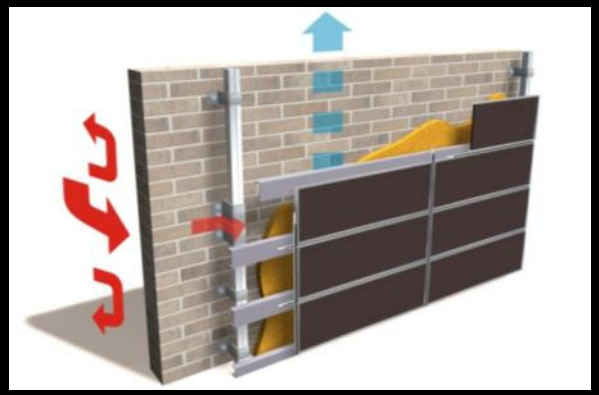
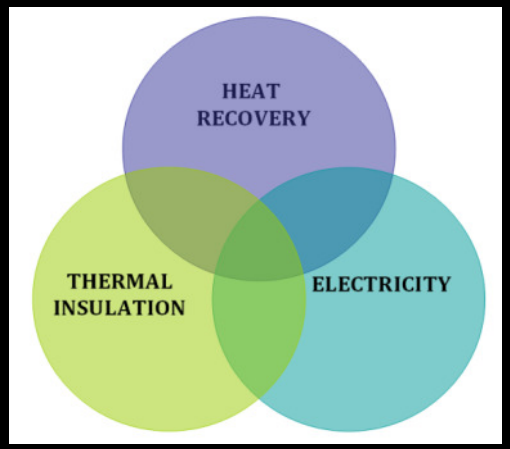
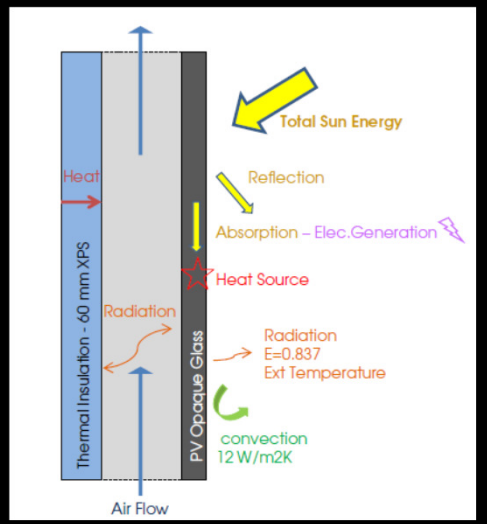
PV ventilated façade system







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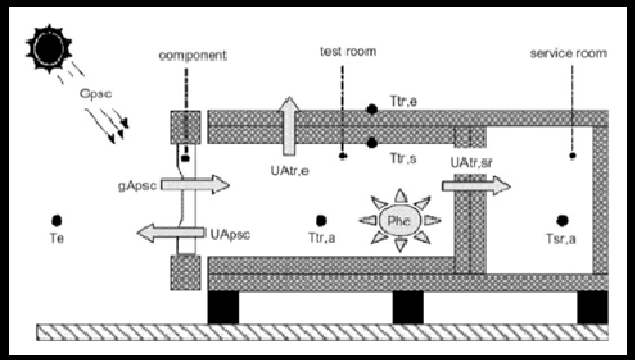
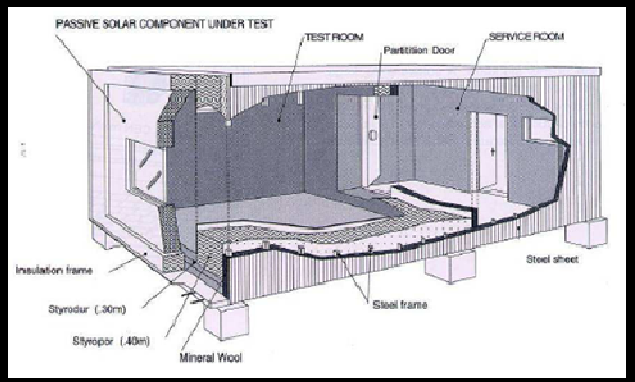
Paslink test





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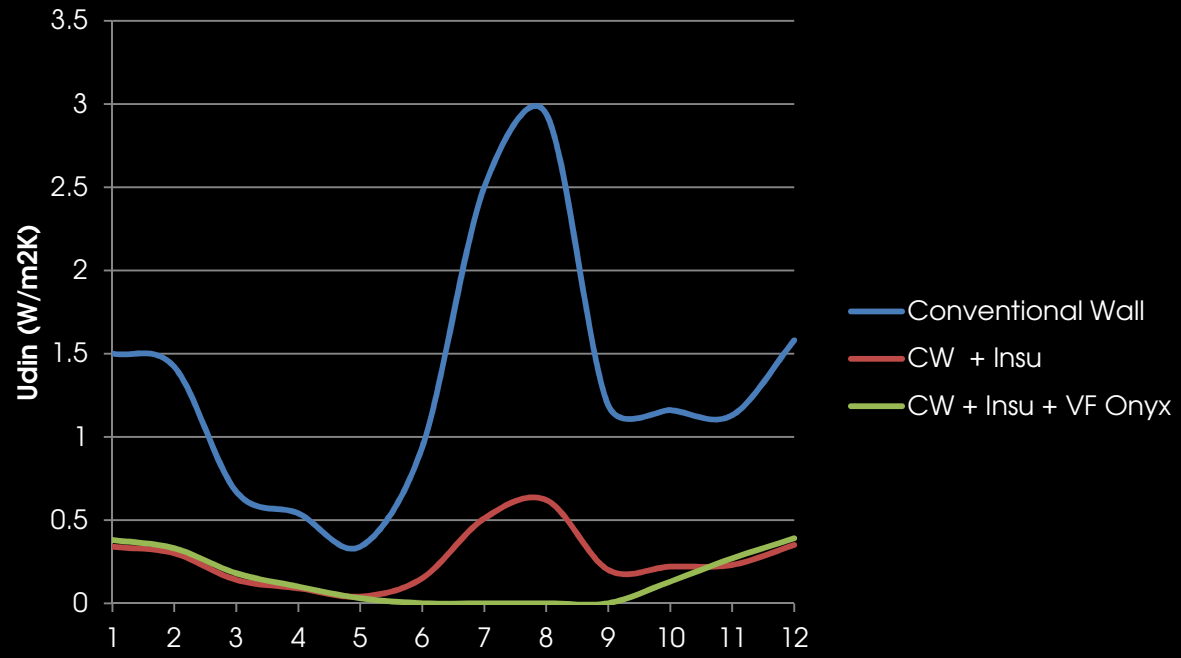
Paslink test results. Madrid



	Base wall	Base wall + ETICS	Base wall + PV vent facade
U value (W/m²K)*	2,21	0,52	0,51

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PV ventilated façade system

- Continuous insulation layer
- Removal of humidity
- Reduction of thermal transmittance
- Acoustic insulation
- Available space for hidden drainage systems, pipes or wiring
- Easy installation - Simple maintenance works
- Retrofitting: works do not disturb building´s users
- Aesthetic value

+ ENERGY PRODUCTION ON-SITE

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PHOTOVOLTAIC GLAZING AREAS

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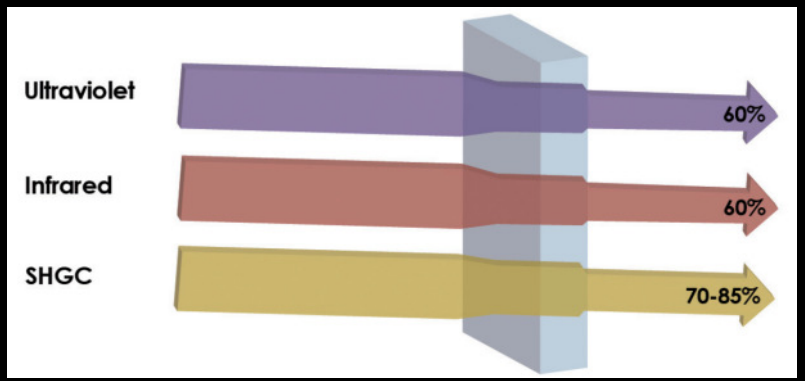
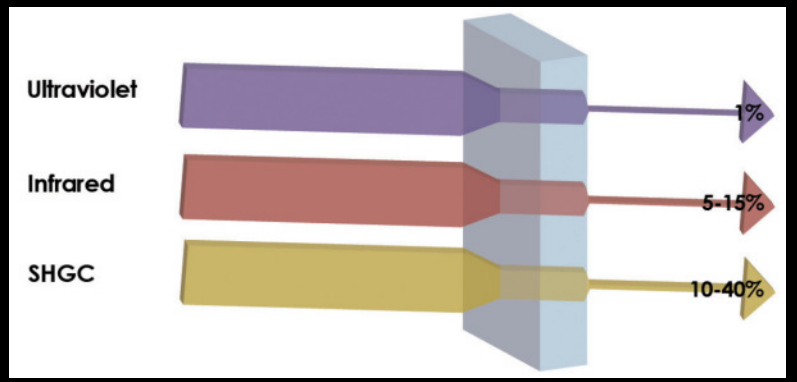
PV glazing areas

- Natural illumination
- Absorption of the infrared and UV-radiation
- Reduction of heat gains in warm climate conditions
- Different see-through degrees
- Visual relation between inner and outer space of buildings
- Free energy production



conventional glass



a-si PV glass

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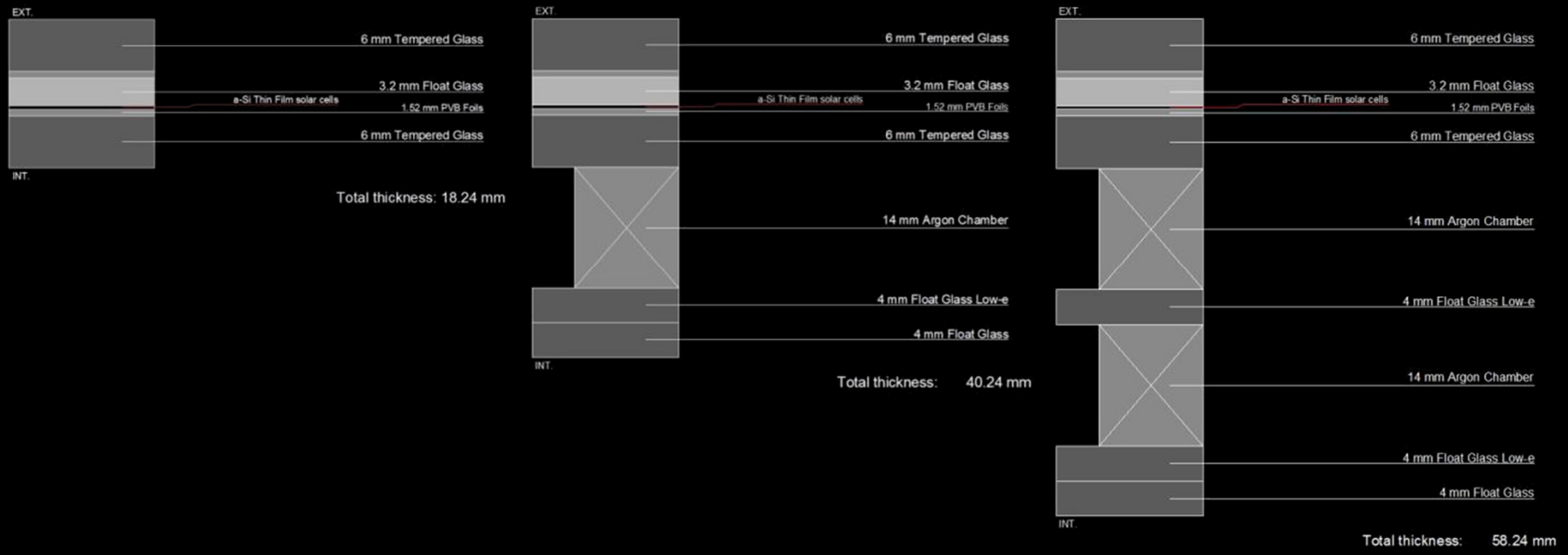
PV glazing areas



Sections of different glass configurations

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PV glazing areas

		Opaque		10% transp.		20% transp.		30% transp.	
	U_{value}	g_{value}	Power	g_{value}	Power	g_{value}	Power	g_{value}	Power
	$W/m^2 K$	%	W_p/m^2	%	W_p/m^2	%	W_p/m^2	%	W_p/m^2
Single (6+3.6+6)	5,2	23	62	29	44	32	39	37	33
IGU (6+3.6+6/12 air/4+4)	2,7	6	62	11	44	14	39	19	33
Low-E IGU (6+3.6+6/12 air /LowE4+4)	1,6	5	62	10	44	12	39	17	33

Properties of a-si technology glazing areas

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CONCLUSIONS

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- BIPV solutions replace conventional construction materials
- Active and passive properties contribute to Passive House certifications
- EnerPhit step by step projects should consider the implementation of BIPV systems as a decision to be evaluated in the first steps of the plan

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THANK YOU

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Thank you for your attention

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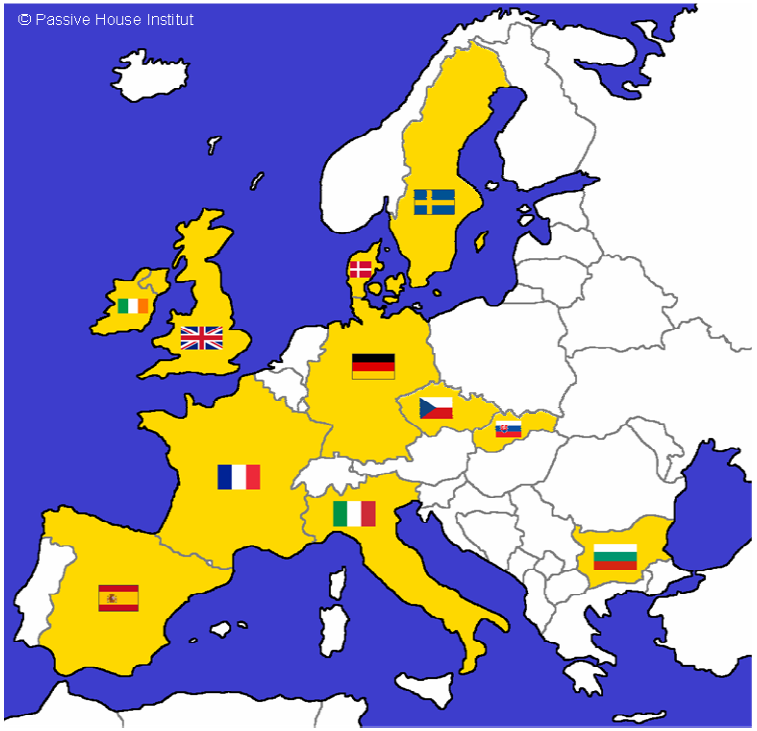

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