INAUGURAZIONE DELLA TEST CELL UNIFI

# ANALISI DELLE PERFORMANCE ENERGETICHE DI COMPONENTI DI INVOLUCRO MEDIANTE OUTDOOR TEST: EGUZKI E ILARGI PASLINK TEST CELLS

**EGUZKI and ILARGI PASLINK TEST CELLS LCCE**
**Vitoria-Gasteiz**


**Ing. Carlos García-Gáfaro**
***Thermal Area***
*Laboratorio LCCE del Governo Basco*


UNIVERSITÀ DEGLI STUDI FIRENZE
DIDA DIPARTIMENTO DI ARCHITETTURA
DIEF DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

ABITA

Laboratorio Tecnologie per l'Abitare Mediterraneo

abitare mediterraneo

Regione Toscana

***Scuola di Ingegneria***
***Università di Firenze***
***7 aprile 2016***

enedi

EUSKO JAURLARITZA GOBIERNO VASCO
ENPLEGU ETA GIZARTE POLITIKETAKO SAILA
Etxegintzaren Kalitatea Kontrolatzeko Laborategia
DEPARTAMENTO DE EMPLEO Y POLÍTICAS SOCIALES
Laboratorio de Control de Calidad en la Edificación

Universidad del País Vasco Euskal Herriko Unibertsitatea

# The Laboratory:

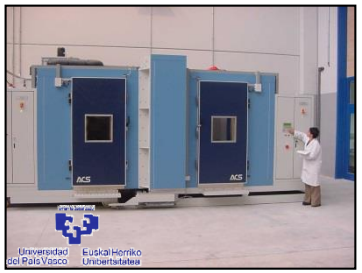
**Laboratory for the Quality Control in Buildings of the Basque Government LCCE**



*Physical-mechanical Area*


*Acoustic Area*

*Thermal Area*




LABORATORIO DE CONTROL DE CALIDAD EN LA EDIFICACION DEL GOBIERNO VASCO

EUSKO JAURLARITZAREN ETXEGINTZAREN KALITATEA KONTROLATZERAKO LABORATEGIA

# The Thermal Area: LCCE

## Laboratory for the Quality Control in Buildings of the Basque Government LCCE

About us: We are a specialized team of researchers, engineers, architects and lectures of the University of the Basque Country **UPV/EHU (ENEDI Research Group)**, promoting building energy efficiency by the Thermal Area of the Laboratory for the Quality Control in Buildings of the **Basque Government** LCCE.

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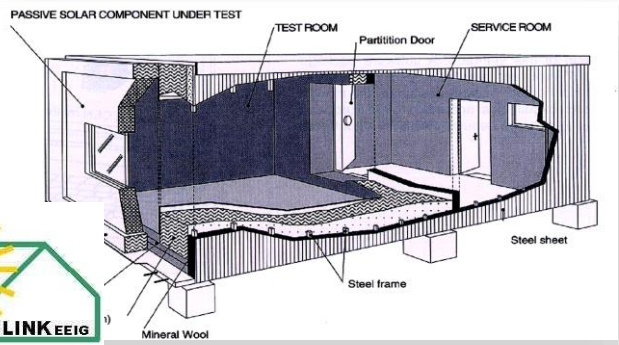
## Reasons for using PASLINK Test

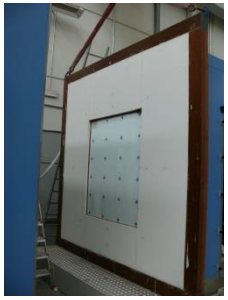
Dynamic Thermal Response?
Solar gains?




PASLINK EEIG

Normalized Thermal Characterization of opaque and semi transparent solutions

ISO 8990



ISO 12567-1

Normalized Thermal Characterization of materials

EN 12667 / EN 12669

ASTM C-1114-06

# HISTORY

**1985** PASSYS I — *Belgium, Denmark, France, Germany, Italy, Netherlands, UK, JRC*

**1990** PASSYS II — *Greece, Portugal, Spain*

**1992** COMPASS, PASLINK

**1994** European Economic Interest Grouping of Outdoor Test Centres — *Finland*

**1996** PV-HYBRID-PAS

**2000** IQ-TEST — *Switzerland,...*

**2002** DAME-BC — *New member states*

*New sites in Spain, France, ...*

**2005** DYNASTEE *Network*

**2010**

**DYN**amic **A**nalysis. **S**imulation and **T**esting applied to the **E**nergy and **E**nvironmental performance of buildings

INIVE

International Network for Information on Ventilation and Energy Performance

## FULL MEMBERS:

BBRI
*Belgian Building Research Institute*
*Sint-Stevens-Woluwe, BELGIUM*

BRE, Scotland
*Building Research Establishment Scottish Laboratory*
*East Kilbride, SCOTLAND, UK*

CRES
*Centre for Renewable Energy Sources*
*Pikermi, GREECE*

CIEMAT
*Plataforma Solar de Almeria (PSA)*
*Almeria, SPAIN*

VTT
*VTT Building & Transport*
*Espoo, FINLAND*

## EXTERNAL MEMBERS/ASSOCIATED:

BTU
*Brandenburg Technical University of Cottbus*
*Cottbus, GERMANY*

TNO
*TNO Building & Construction Research*
*Delft, The NETHERLANDS*

ESRU
*University of Strathclyde*
*Glasgow, SCOTLAND, UK*

EC-JRC
*European Commission –*
*Joint Research Centre*
*Ispra, ITALY*

DTU-BMM
*Technical University of Denmark*
*Lyngby, DENMARK*

EMPA
*Swiss Federal Laboratories for*
*Materials Testing and Research*
*Zurich, SWITZERLAND*

FGT
*University of Porto*
*Porto, PORTUGAL*

NKUA
*University of Athens*
*Athens, GREECE*

DYNASTEE

**SUMMER SCHOOL 2016**
**19 – 24 JUNE 2016, Granada, Spain**
**Dynamic Methods for whole Building Energy Assessment**
ugr Universidad de Granada
ETS
**Deadline for submission is 15th May 2016**

# *Paslink Test Cells in LCCE – Vitoria Gasteiz*


EUSKO JAURLARITZA
GOBIERNO VASCO

## Outdoor Thermal Characterization using Paslink Test

# WHY

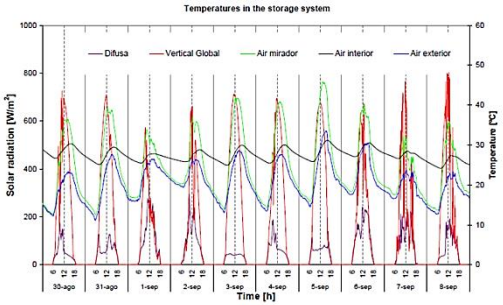
# HOW

# WHAT

# **WHY** a Paslink Test Cell Thermal Characterization?

The most similar methodology to a normalized test with clearly defined and proven equipment and procedures

**POWERFUL** and **RELIABLE** tool




**Outdoor Testing**

**Data Analysis**

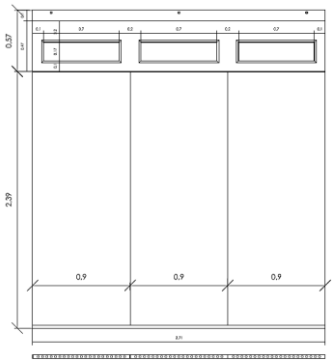
**Quality control**

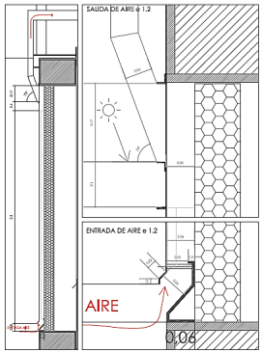
**Modelling**

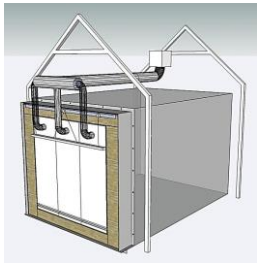
# HOW Is a Paslink Test made?

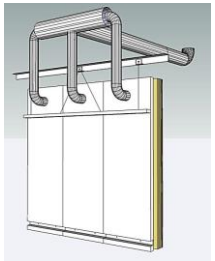
Making the sample.

Example Test:
Ventilated Façade with a glazed PV elements





1. Design of the sample.

# HOW Is a Paslink Test made?

Making the sample.

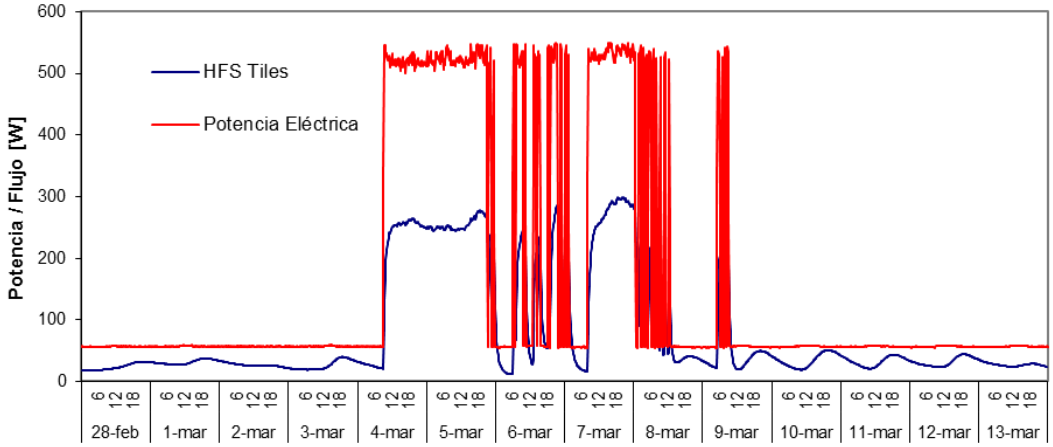
2. Zone construction for Wet or Heavy sample layers

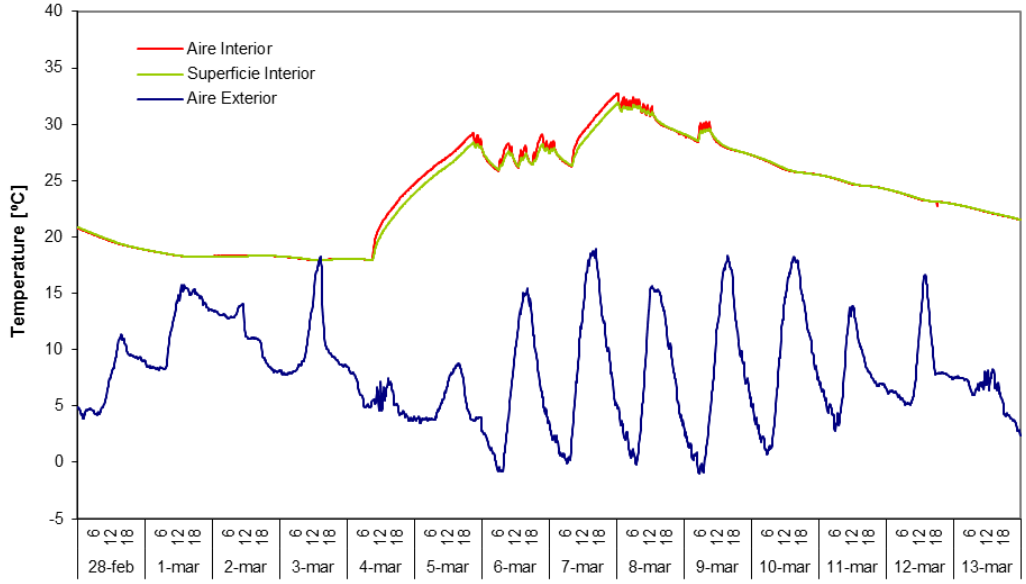
3. Movement of the sample

4. Ending, sealing and connection of the sample. Check of airtightness (<0.5 $h^{-1}$.)

# HOW Is a Paslink Test made?

Test execution.

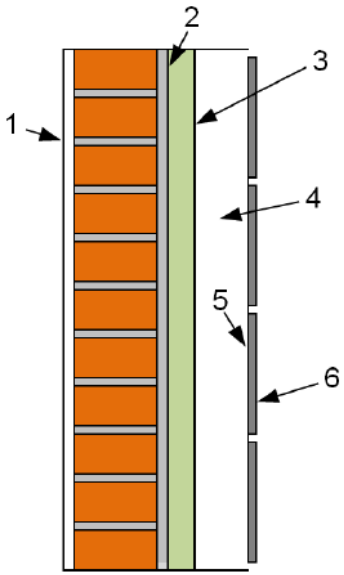


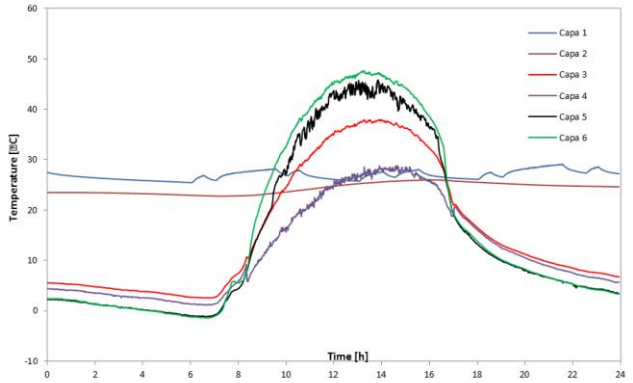



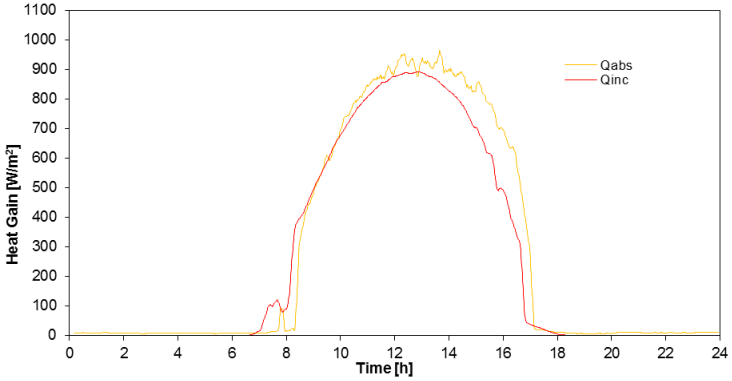

- PRBS (Pseudo Random Binary Sequence) or ROLBS (Randomly Ordered Logarithmically Binary Sequence) type heating signals are used during test to avoid correlated response in function of the exterior temperature.
- Reduction of the test duration
- Typical duration of the test: 2-3 weeks.

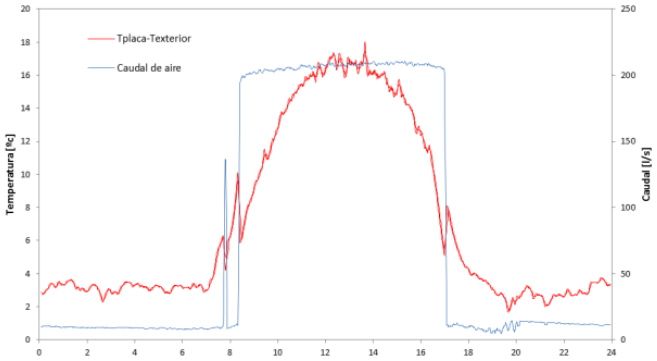
# HOW Is made a Paslink Test Cell Thermal Characterization?

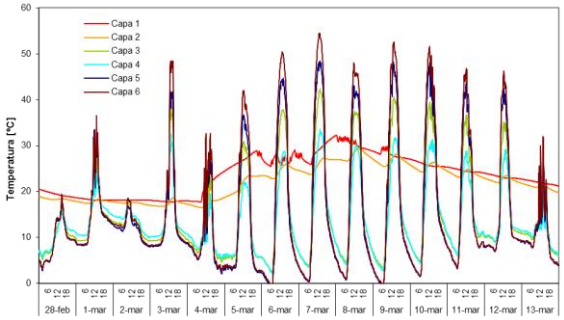
Test execution.

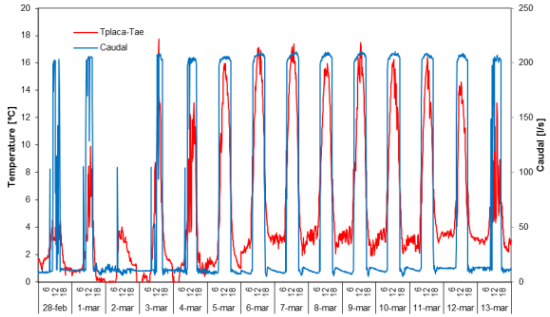


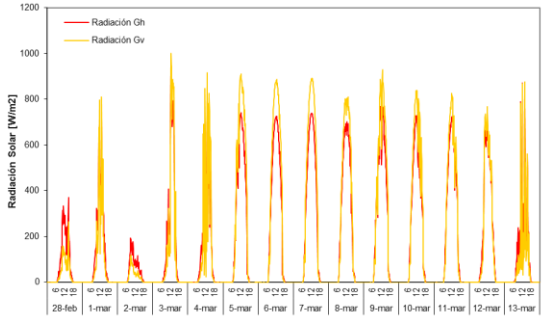



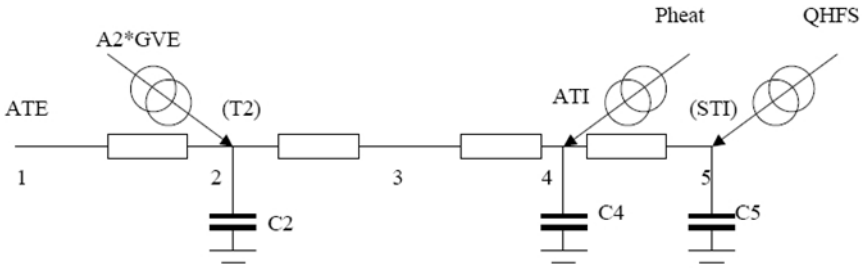



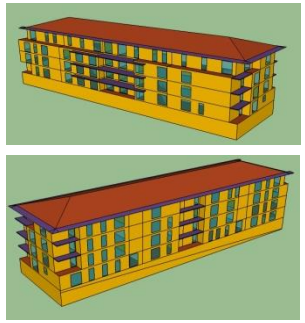



# HOW Is made a Paslink Test Cell Thermal Characterization?

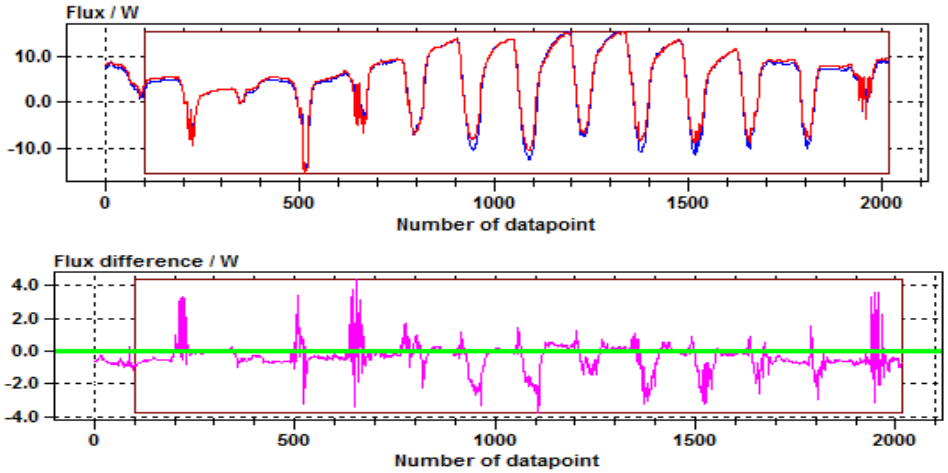
Modelling.

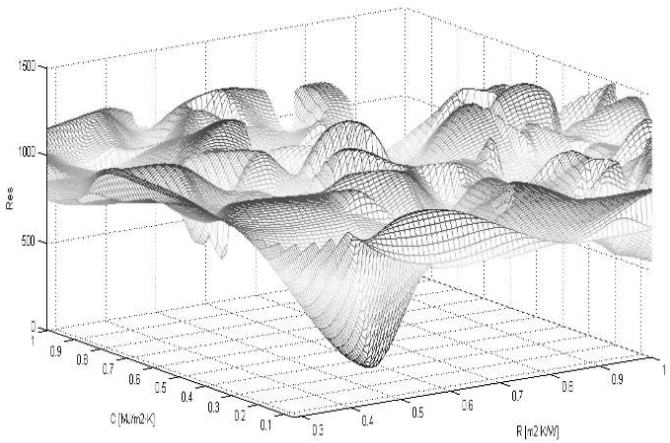


Thermal model of the component

Extrapolation to simulation tools



Iterative process adjusting real and modelled values

# WHAT Elements can be characterized in a Paslink Test Cell ?

Examples.

ETICS solutions

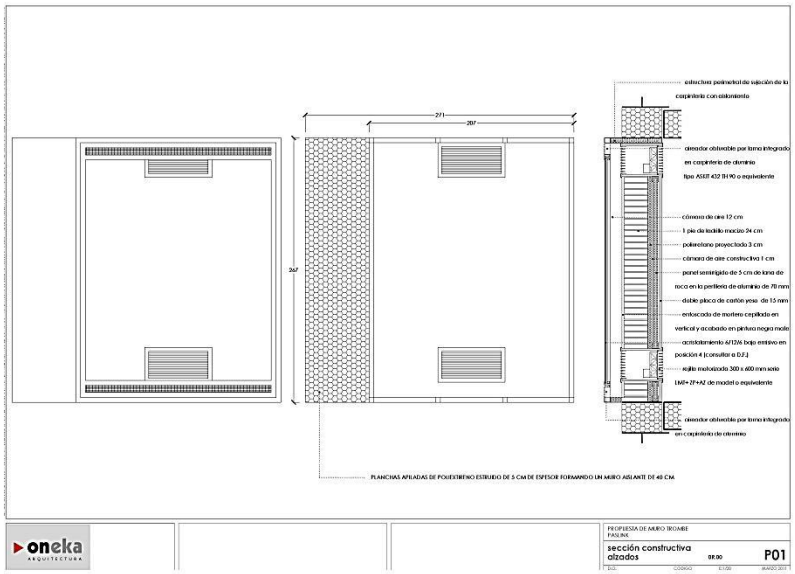
Garden façade and roof

Façade with Phase Change Materials

Active greenhouse window

Ventilated Façades, light or heavy exterior layer

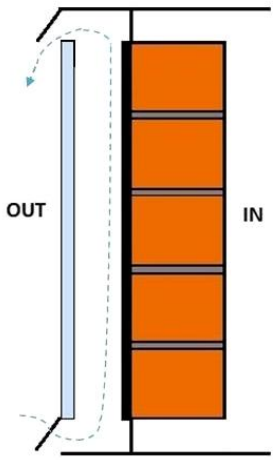
# WHAT **Elements can be characterized in a Paslink Test Cell ?**
Examples.

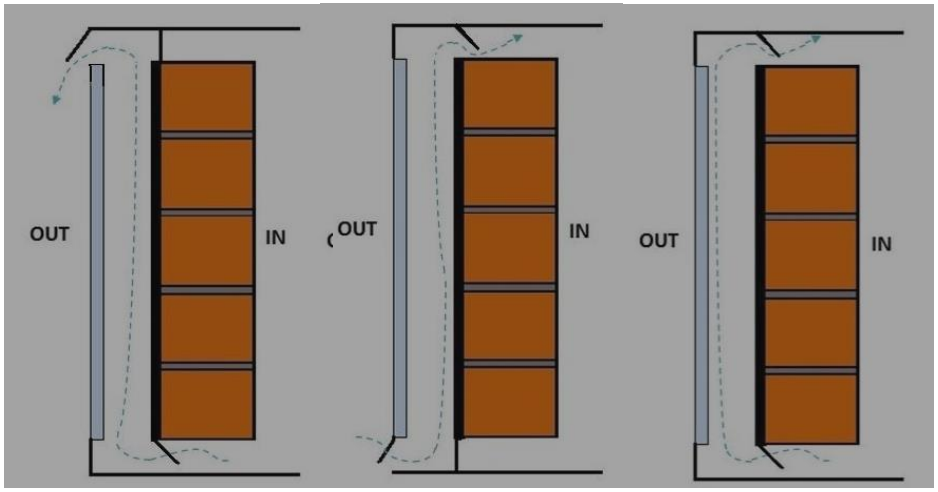


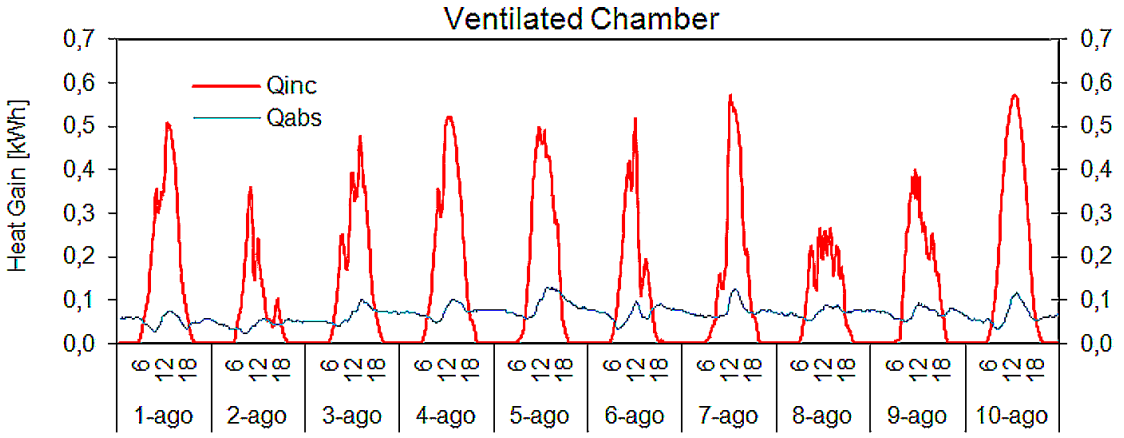

Social Housing Building with a type of  Trombe Wall Solution in the Basque Country

# WHAT Elements can be characterized in a Paslink Test Cell ?
Examples.

- **Trombe wall**



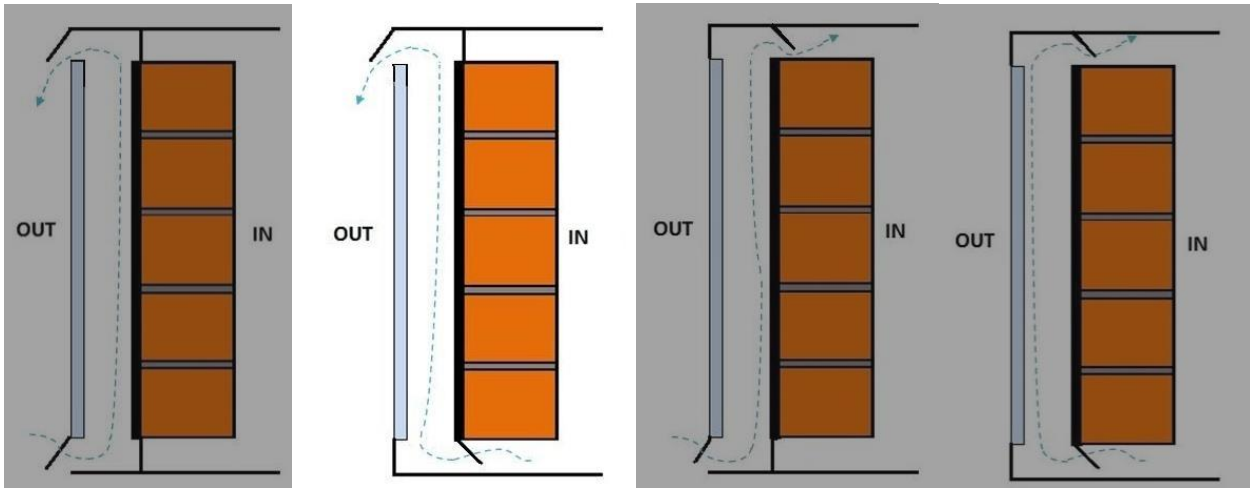



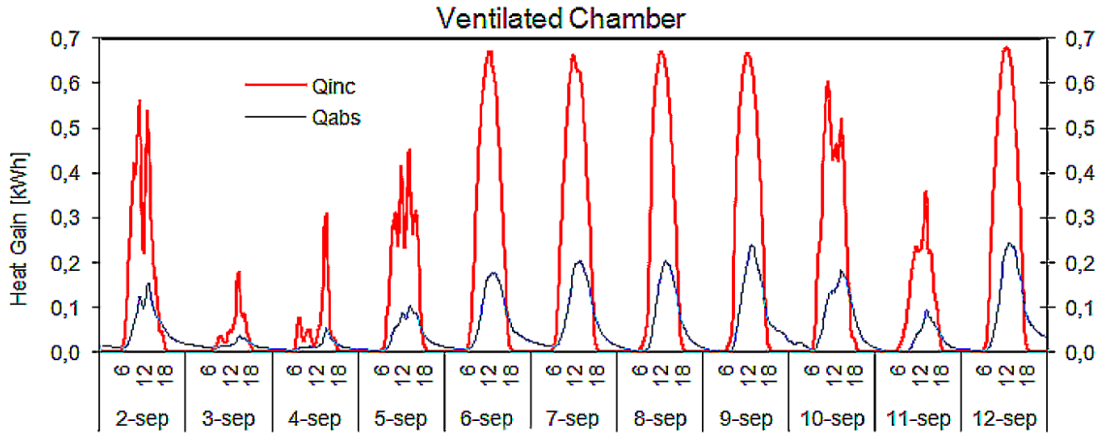

$\eta \approx 57\%$

$\Phi \approx 1{,}8\ kWh/m^2$

# WHAT Elements can be characterized in a Paslink Test Cell ?
Examples.

- **Trombe wall**



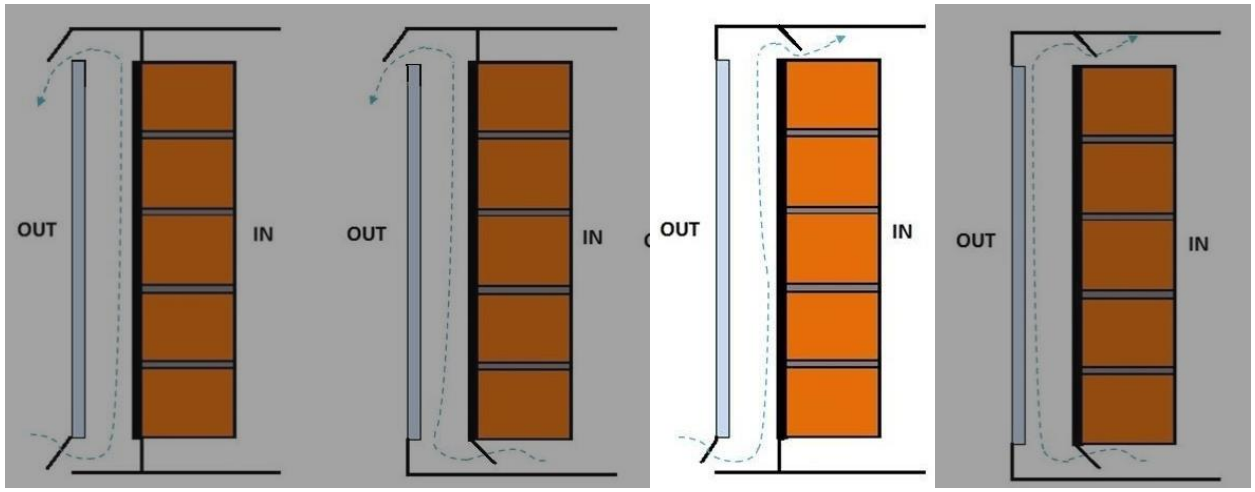



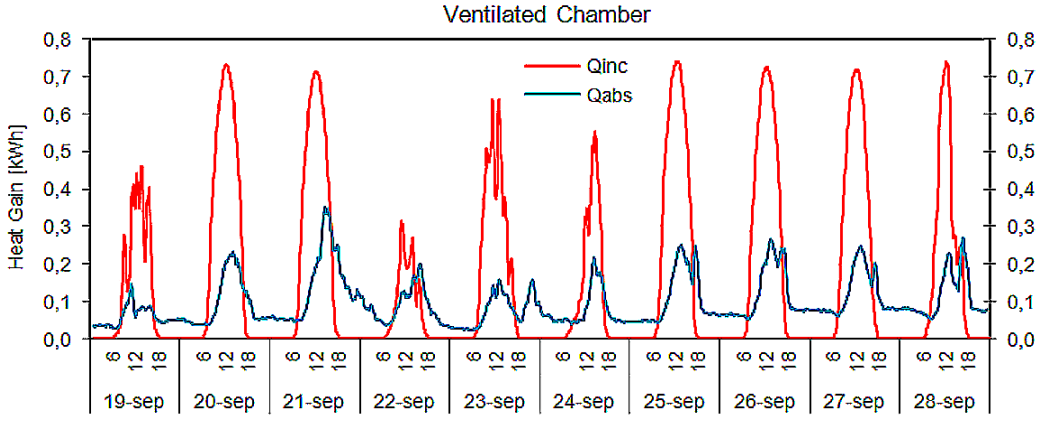

$\eta \approx 36\%$

$\Phi \approx 1{,}4\ kWh/m^2$

# WHAT Elements can be characterized in a Paslink Test Cell ?
Examples.

- **Trombe wall**



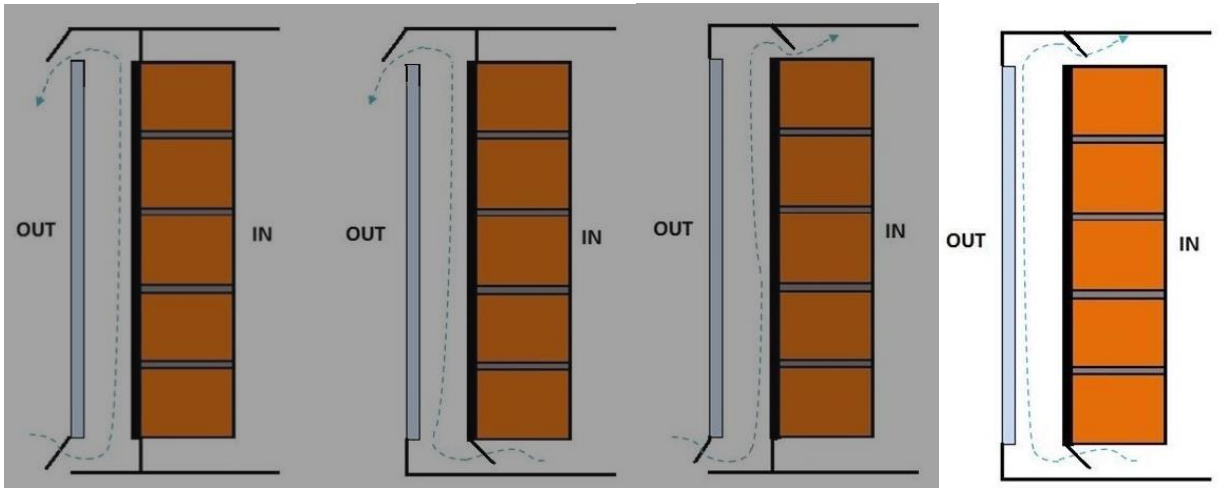



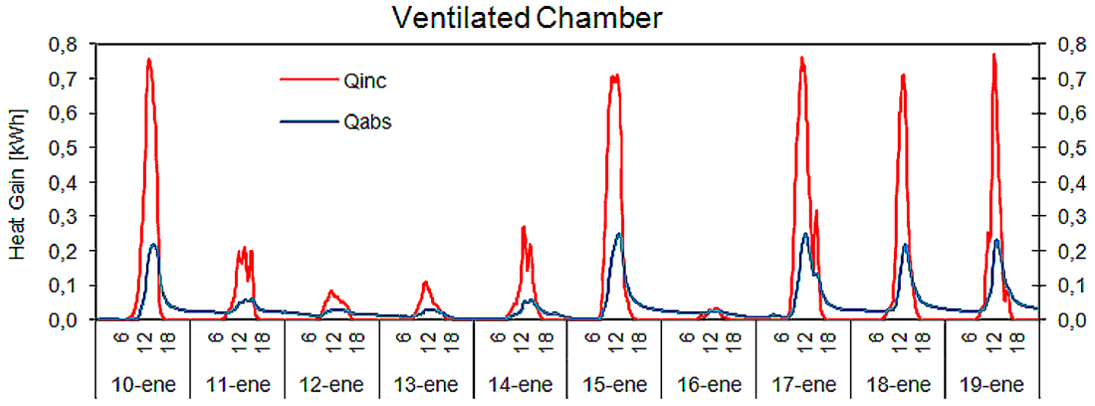

$\eta \approx 61\%$

$\Phi \approx 2{,}6\ kWh/m^2$

# WHAT Elements can be characterized in a Paslink Test Cell ?
Examples.

- **Trombe wall**



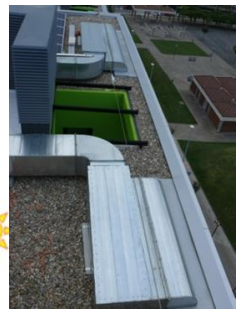

$\eta \approx 58\%$

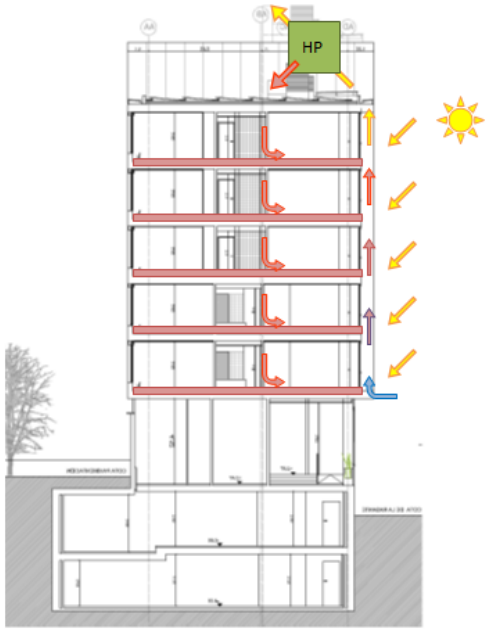
$\Phi \approx 1\ kWh/m^2$

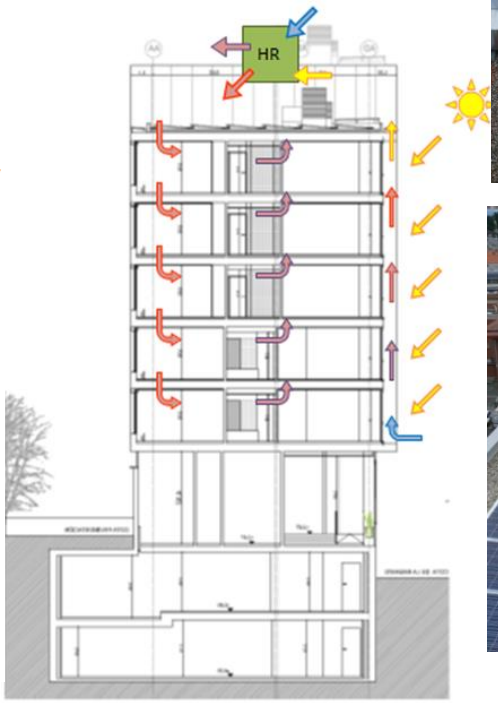
# BUILDING SCALE

## Application of Paslink Test Cell Results in a nZEB Building

Social Housing Building of the Basque Government with “Free Heating”.



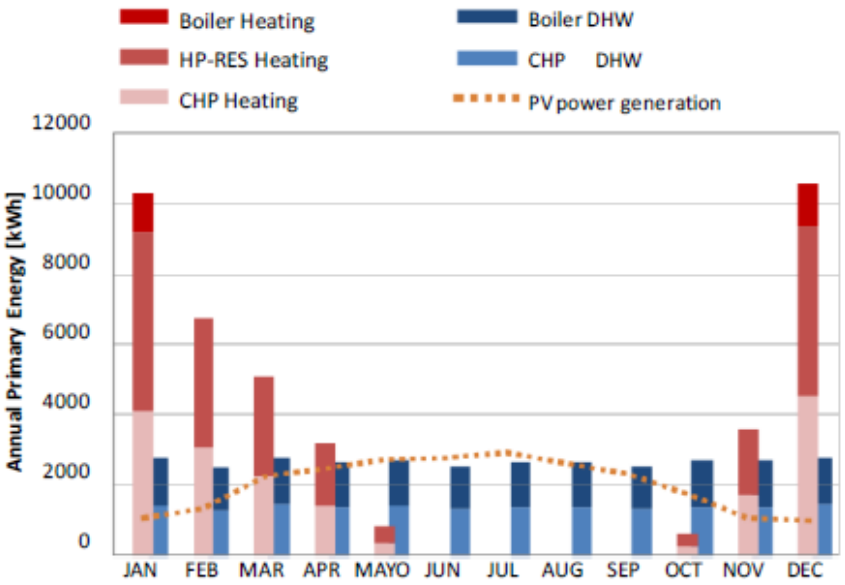


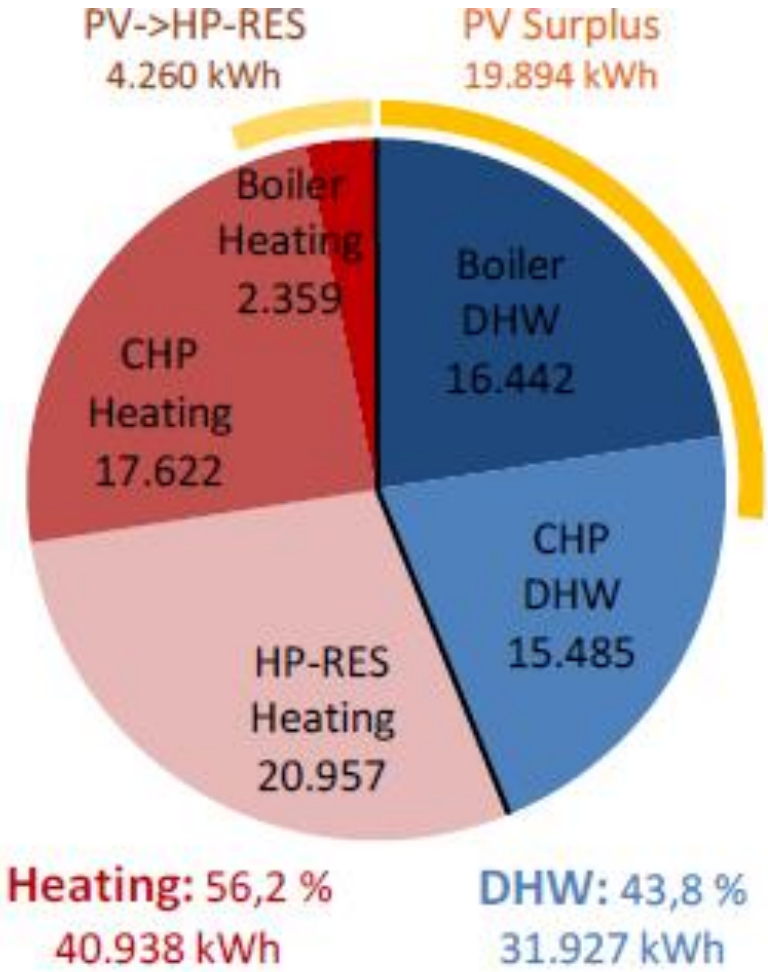




# BUILDING SCALE

**Application of Paslink Test Cell Results in a nZEB Building**

Social Housing Building of the Basque Government with “Free Heating”.



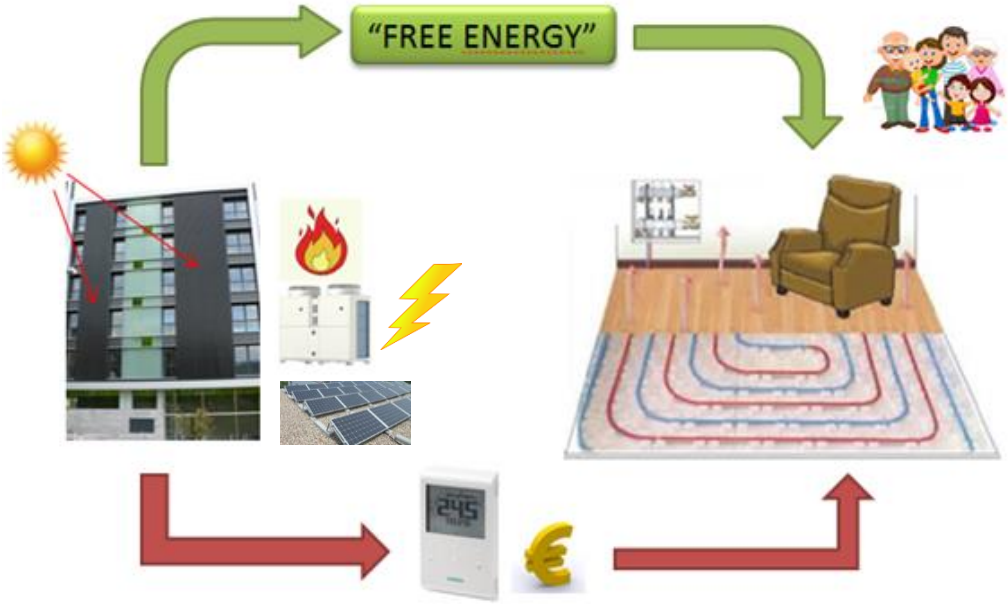



# BUILDING SCALE

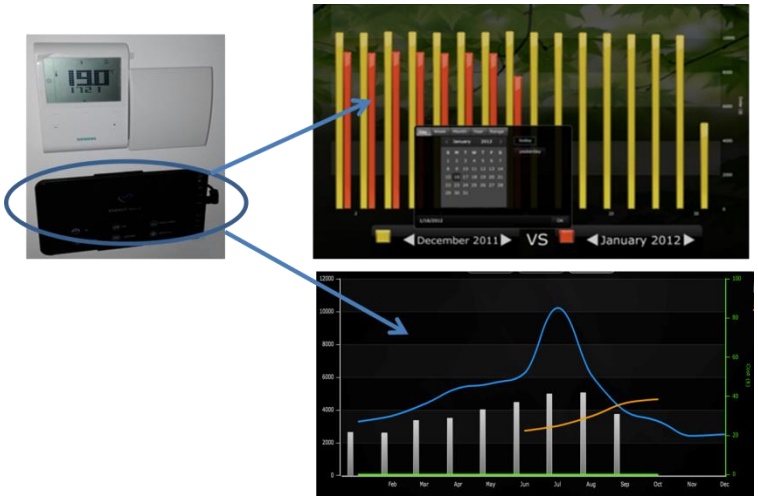
**Application of Paslink Test Cell Results in a nZEB Building**
Social Housing Building of the Basque Government with “Free Heating”.

## “*FREE HEATING*” CONCEPT

**Provide heating without any charge to the users**




## INFORMATION TO THE USER



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***Thank you very much for your attention***

**termica@euskadi.eus**

**www.euskadi.net/LCCE**

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