TECHNICAL FILE

- Thermal insulation
- Benefits in buildings
- Termosoglia and Termoimbotte
- The thermal bridge
- Airtightness

M.R. vetroresina SRL®

CORRIMURO srl
PRODOTTI IN MARMORESINA E VETRORESINA CERTIFICATI CE

GRUPPO 2ESSE HOLDING s.r.l.

TERMOSOGLIA®
TERMOIMBOTTE®

Window hole thermal bridge solutions

In partnership with

CONSORZIO LEGNOLEGNO

Consorzio Nazionale Serramentisti

Certimac

CAM 6.5%

EN 14021:2016

CE

EN 15286:2013

ISTITUTO GIORDANO

People don't care about loyalty and fairness. It's all about being successful and getting away with it.

Hungry As the Sea – Wilbur Smith

We don't believe that

We believe in personal and professional commitment.

We believe that superior depth of man includes justice and fairness.

So we decided to question ourselves, to understand whether we do our job well; to share what we know and support our customers with studies and objective data that help understand what we can do for them as best as possible.

Benefits, well-being, energy and economic savings are elements we want to bring to the attention of the party we are interacting with, whether they are an individual, a public body or a professional.

This is where the desire to spread this tool stems from,

because we believe in our customers, we believe in our work and we believe in fairness and dialogue as an element of growth.

We need to persuade many people that studying is a job too, and a very tiring one... it is a process of adaptation, it is acquired with effort, boredom and even suffering.

Antonio Gramsci

Thermal checks andstudies

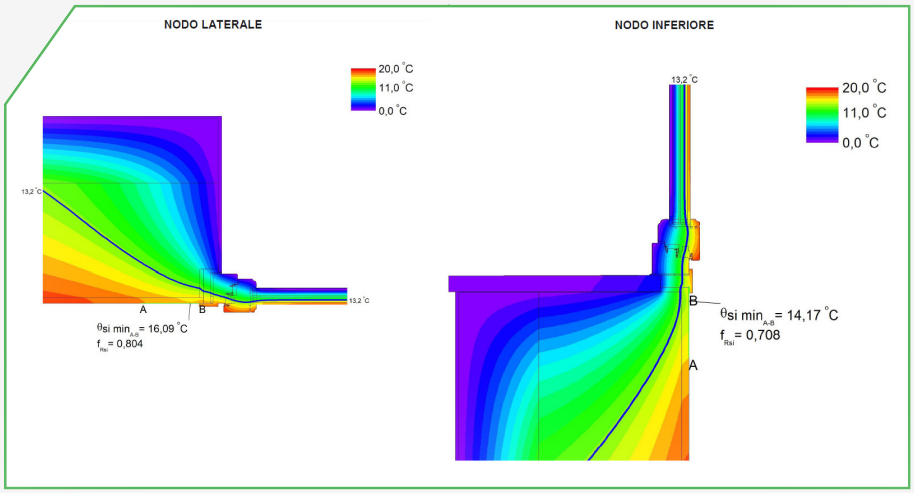
We recently invested energy and resources to meet a specific market need: making products for the purposes of replacing window frames to make works:

1. As discreet as possible for the occupiers;
2. Able to considerably improve comfort levels.

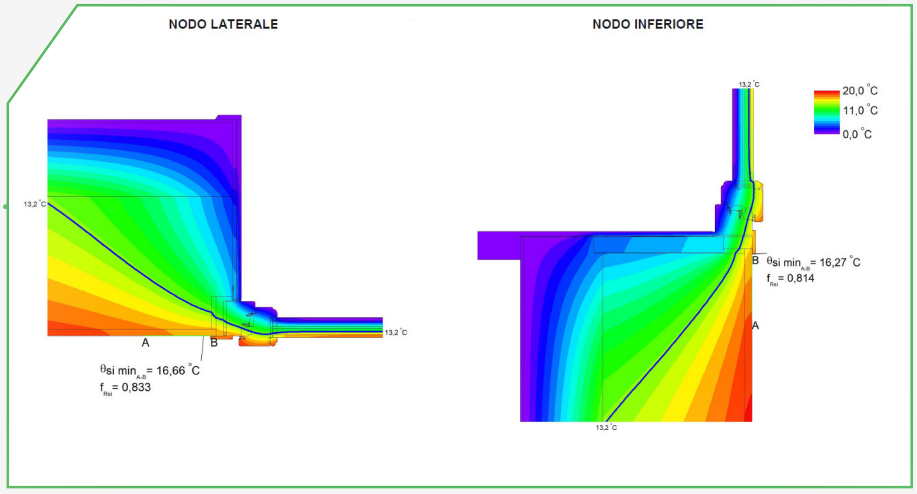
So we asked ourselves a very simple question, which is however very hard to answer: how and to what extent does the use of Termosoglia and Termoimbotte improve the settings where they are applied?

Termosoglia and Termoimbotte on masonry with cladding

A thermal analysis draws a link between the same situation (masonry with cladding) with and without using Termosoglia and Termoimbotte. The idea was to effectively define the change entirely brought by our and your work.



Installation of a new window frame on masonry with cladding during the building's requalification.



Installation of a new window frame on masonry with cladding during the building's requalification by using Termosoglia and Termoimbotte.

The table below compares data on masonry with a cladding.

	WINDOW FRAME REPLACEMENT ON MASONRY WITH CLADDING			
	TRADITIONAL INSTALLATION		TERMOSOGLIA/ TERMOIMBOTTE INSTALLATION	
	Side node	Bottom node	Side node	Bottom node
Critical isotherms	No	No	No	No
Minimum surface temperature near the installation joint	16.09°C	14.17°C	16.66°C	16.27°C
Thermal bridge value Ψ	0.216 (W/mK)	0.324 (W/mK)	0.164 (W/mK)	0.204 (W/mK)
Minimum external temperature to avoid mould	3.06°C	8.64°C	0.27°C	2.25°C

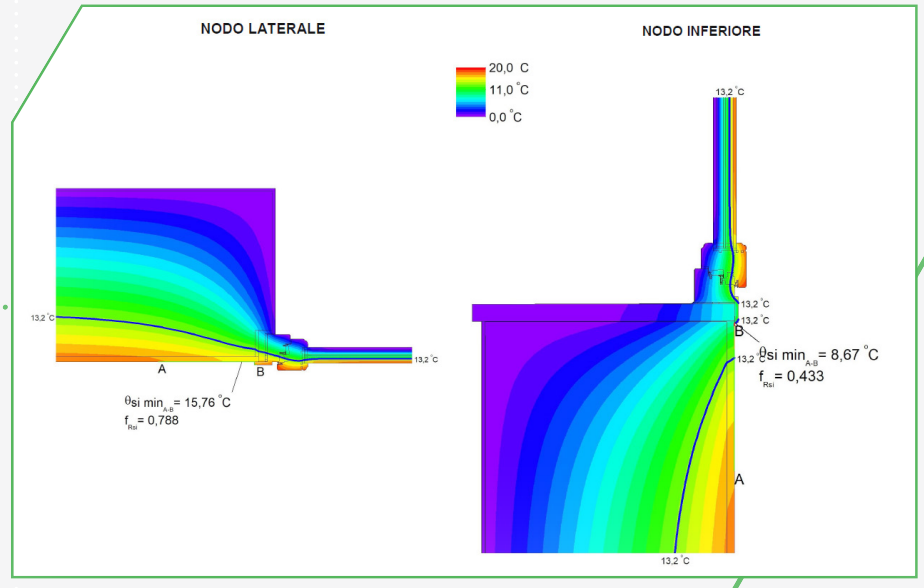
There is a clear improvement and benefit for customers.

Termosoglia and Termoimbotte on traditional masonry

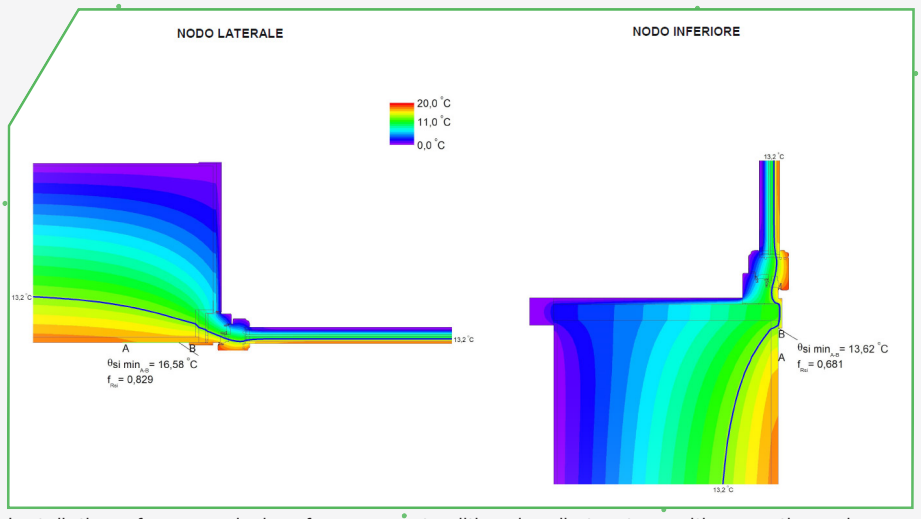
Replacing window frames in occupied buildings is an extremely common and highly critical situation if, for various reasons, you do not want the works to extend to the masonry around the window frames.

This is a highly critical setting, even in the case of a high-performance window frame. Mould, condensation and energy losses associated with the presence of the marble windowsill or the uninsulated parapet are among the main issues that individuals:

- Do not consider when the works are carried out, often because they are not aware of the consequences in future;
- Have to face soon after the window frame has been replaced and often attribute the issue to the window frame.



Installation of a new window frame on a traditional wall structure with pass-through windowsill.



Installation of a new window frame on a traditional wall structure with pass-through windowsill, plus the installation of Termosoglia and Termoimbotte.

The comparison of data on traditional masonry involves truly significant difference in terms of liveability and well-being.

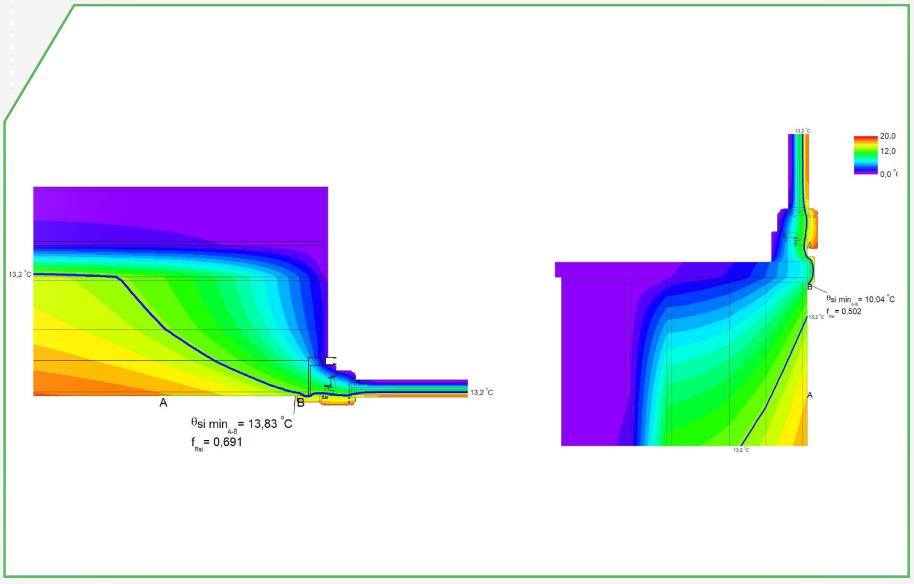
	WINDOW FRAME REPLACEMENT ON TRADITIONAL MASONRY			
	TRADITIONAL INSTALLATION		TERMOSOGLIA/ TERMOIMBOTTE INSTALLATION	
	Side node	Bottom node	Side node	Bottom node
Critical isotherms	No	Yes	No	No
Minimum surface temperature near the installation joint	15.76°C	8.67°C	16.58°C	13.62°C
Thermal bridge value Ψ	0.126 (W/mK)	0.423 (W/mK)	0.073 (W/mK)	0.209 (W/mK)
Minimum external temperature to avoid mould	4.38°C	14.16°C	0.64°C	9.62°C

Comparison of data involving the presence or absence of Termosoglia and Termoimbotte on traditional masonry.

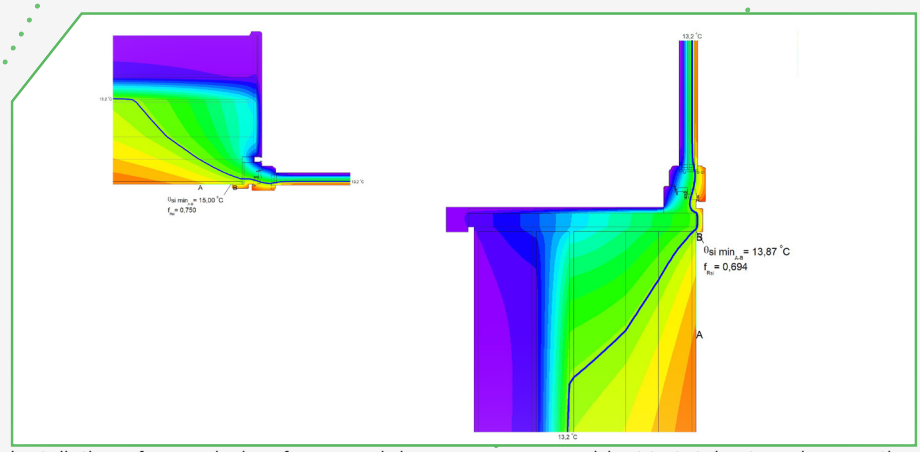
Termosoglia and Termoimbotte on masonry for full external renovation and metal subframe

More ‘extensive’ works involve considerable changes to the external masonry package, whilst conditions on the inside are basically maintained. This context is associated with existing occupied buildings where works inside the dwellings is to be avoided as much as possible.

An issue that cannot be overlooked in this situation is the presence of the metal subframe and the through windowsill.



Installation of new window frame and door on masonry subject to total external renovation and metal subframe with pass-through windowsill.



Installation of new window frame and door on masonry subject to total external renovation and the installation of Termosoglia and Termoimbotte.

A thermal analysis draws a link between the same situation (masonry with cladding) with and without using Termosoglia and Termoimbotte. The idea was to effectively define the change entirely brought by our and your work.

	RENOVATED MASONRY ON EXTERNAL SIDE			
	INSTALLATION WITH METAL SUBFRAME		INSTALLATION WITH METAL SUBFRAME, TERMOSOGLIA/ TERMOIMBOTTE	
	Side node	Bottom node	Side node	Bottom node
Critical isotherms	No	Yes	No	No
Minimum surface temperature near the installation joint	13.83	10.04	15.00	13.87
Thermal bridge value Ψ	0.363 (W/mK)	0.611 (W/mK)	0.271 (W/mK)	0.318 (W/mK)
Minimum external temperature to avoid mould	9.27	13.35	6.76	9.20

Comparison of data involving the presence or absence of Termosoglia and Termoimbotte on masonry undergoing total external renovation.

What we have to learn to do,
we learn by doing it
Aristotle

Facts on-site analysis

The world of design often needs to find a compromise with the real world. It is not always possible to accurately reproduce what has defined in the project without any modifications.

This is something we know well, which is why we were not satisfied with in-depth analytical checks. We also wanted to examine situations on site, in real contexts, which differences and which benefits there are in using Coprimuro products.

Energy savings and benefits

What determines, or rather, which performance associated with window frames and components influence energy savings? Almost all the people interviewed say it's "thermal transmittance". Very true, but it is not the only performance to consider. Equally if not more important is air permeability, intended as the ability of the building envelope (and therefore of the window frames and installation joints treated with Coprisoglia and Termoimbotte) to limit air infiltration.

Qt + Qv = TotQ

Qt – The amount of energy dispersed through transmission (therefore linked to the heat flow tests we have seen)
Qv – The amount of energy dispersed through ventilation (and therefore linked to draughts).

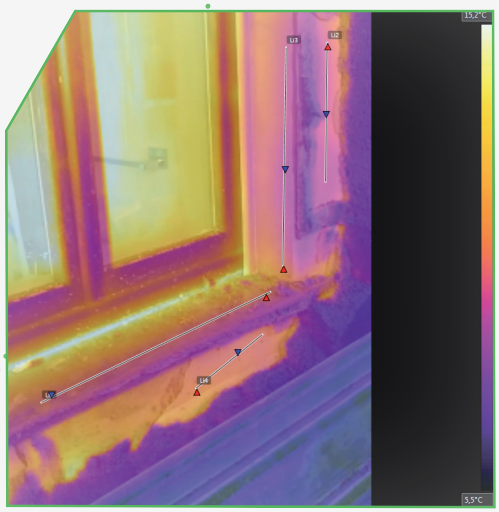
What happens in the customer's home if the Coprimuro system is not present.
Is there really a tangible difference in the improvement of conditions by using Termosoglia and Termoimbotte?

Energy savings with transmission

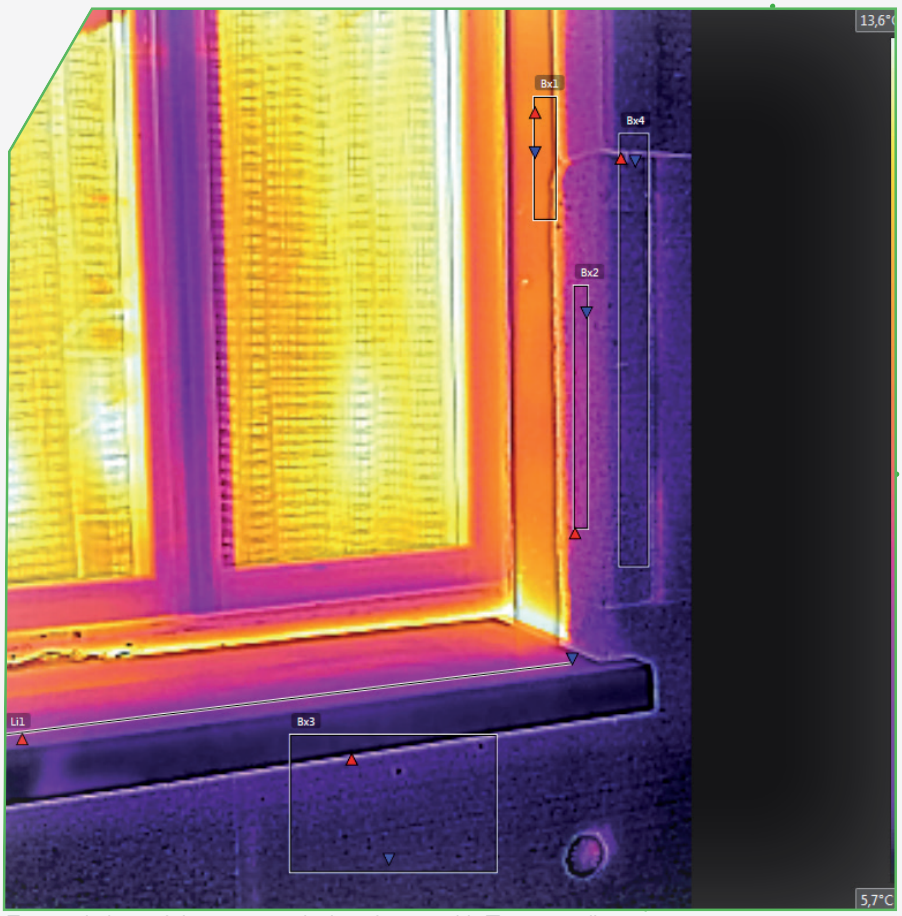
The site taken into consideration had window frames that needed to be replaced, with the installation joint which had not undergone any maintenance since the installation of the window frames.

In this case we carried out a thermographic investigation that considered:

- Window frame installed on traditional masonry, without any improvement intervention;
- Window frame installed on masonry with cladding;
- Window frame installed on masonry with cladding and use of Termosoglia and Termoimbotte.



External view of the 1970s window frame resting on the wall where the cladding has been removed



External view of the 1970s window frame with Termosoglia.

The on-site checks, although associated with the criticality of an old window frame, showed a gradual improvement of the context.

Not just calculations, but also real checks in the contexts of use

EXTERNAL VIEW			
Areas analysed	**Temperatures (°C)**		
	1970s window frame on traditional wall.	1970s window frame and door on masonry with unturned cladding.	1970s window frame and door on masonry with unturned cladding and Termosoglia – Termoimbotte.
Side masonry	9.4	7.0	7.2
Parapet	9.9	9.1	8.4
Lower window wall	10.5	6.9	7.0
Windowsill	11.1	11.0	8.7
Installation joint	14.4	14.4	12.9

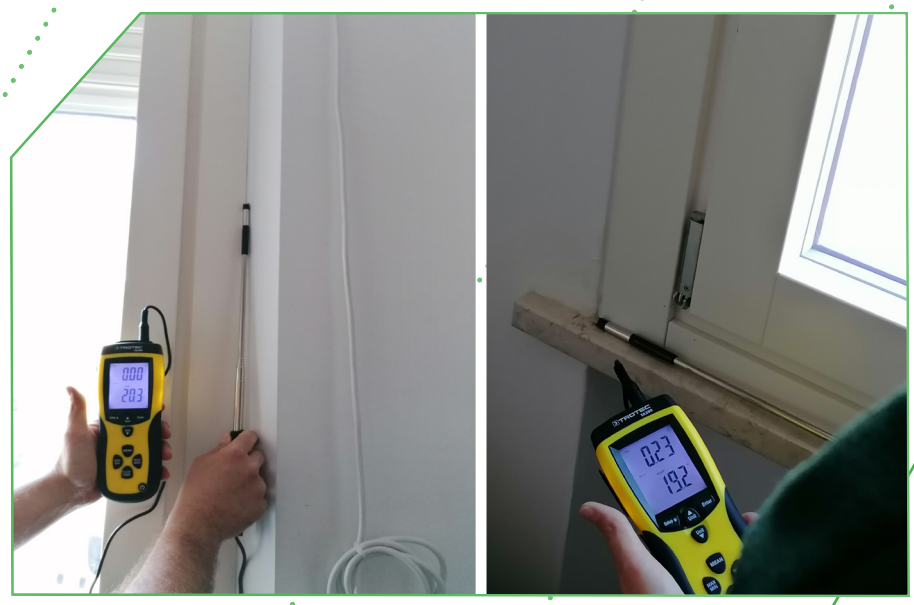
INTERNAL VIEW			
Areas analysed	**Temperatures (°C)**		
	1970s window frame on traditional wall.	1970s window frame and door on masonry with unturned cladding.	1970s window frame and door on masonry with unturned cladding and Termosoglia – Termoimbotte.
Windowsill corners	19.7	Not present	21.6
Side parapet	21.2	Not present	23.3

Energy savings with ventilation

We carefully analysed air infiltrations, by also testing the impact of the air tightness of the installation joint managed with Coprisoglia and Termoimbotte on a site undergoing major renovation of the masonry package.

Images of the tests carried out to verify air infiltration.

Air infiltrations (not from the window but from the installation joint) are not very significant and in some cases close to zero.



Accurate analysis with thermo-anemometer on the lateral and lower installation joint.

The Coprisoglia and Termoimbotte system can also be used for air infiltration with the top performance window frames; the system confirmed reduced losses that can be compared with class 4 according to UNI EN 12207.

Perfect communication exists.
It's an argument.
Stefano Benni

What advantages and what benefits

A comparison is often the only way to truly meet to the market's questions, needs and sometimes objections.
The thermal and air permeability values reported can therefore be defined as performance, numerical and technical elements. At the same time, however, they can be interpreted and communicated as a benefit, as well as a way of improving and meeting very specific needs.

The quality of a product or a quality product must be able to meet customers' implicit and explicit needs.

Coprimuro system® applied to masonry with cladding

BENEFITS FROM REPLACING A 1970S WINDOW FRAME WITH A 1.3 FRAME W/m²K		
	INSTALLATION WITHOUT TERMOSOGLIA AND TERMOIMBOTTE	INSTALLATION WITH TERMOSOGLIA AND TERMOIMBOTTE
Critical isotherms	No	No
THAT IS TO SAY		
Potential condensation near the window frame under 'normal' conditions	No	No
Minimum surface temperature near the installation joint	Minimum 14.17°C	Minimum 16.27°C
THAT IS TO SAY		
Moisture content which may lead to condensation	About 70%	About 80%
Minimum external temperature to avoid mould	8.64°C	2.25°C
THAT IS TO SAY		
Provinces where mould should not occur (ref. 10349-1 January)	Benevento, Genoa, Lecce, Imperia, etc.	Udine, Bergamo, Trieste, Verona, Monza Brianza, etc.
Thermal bridge value Ψ	0.216 (W/mK) 0.324 (W/mK)	0.164 (W/mK) 0.204 (W/mK)

TO RECAP

OVERALL ENERGY SAVINGS WITH THE COPRIMURO SYSTEM in MILAN
about 260 kWh/a per m²

OVERALL ENERGY SAVINGS WITH THE COPRIMURO SYSTEM in BOZEN
about 570 kWh/a per m²

Coprimuro system® applied to traditional masonry

BENEFITS FROM REPLACING A 1970S WINDOW FRAME WITH A 1.3 FRAME W/m²K		
	INSTALLATION WITHOUT TERMOSOGLIA AND TERMOIMBOTTE	INSTALLATION WITH TERMOSOGLIA AND TERMOIMBOTTE
Critical isotherms	Yes	No
THAT IS TO SAY		
Potential condensation near the window frame under 'normal' conditions	Yes	No
Minimum surface temperature near the installation joint	Minimum 8.67°C	Minimum 13.62°C
THAT IS TO SAY		
Moisture content which may lead to condensation	About 48%	About 67%
Minimum external temperature to avoid mould	14.16°C	9.62°C
THAT IS TO SAY		
Provinces where mould should not occur (ref. 10349-1 January)	No municipality	Cosenza, Catanzaro, Lecce, Salerno, Caserta, etc.
Thermal bridge value Ψ	0.126 (W/mK) 0.423 (W/mK)	0.073 (W/mK) 0.209 (W/mK)

TO RECAP

OVERALL ENERGY SAVINGS WITH THE COPRIMURO SYSTEM in MILAN
about 260 kWh/a per m²

OVERALL ENERGY SAVINGS WITH THE COPRIMURO SYSTEM in BOZEN
about 570 kWh/a per m²

Coprimuro system® applied to masonry with metal subframe for total external redevelopment

BENEFITS FROM REPLACING A 1970S WINDOW FRAME WITH A 1.3 FRAME W/m²K		
	INSTALLATION WITHOUT TERMOSOGLIA AND TERMOIMBOTTE	INSTALLATION WITH TERMOSOGLIA AND TERMOIMBOTTE
Critical isotherms	Yes	No
THAT IS TO SAY		
Potential condensation near the window frame under 'normal' conditions	Yes	No
Minimum surface temperature near the installation joint	Minimum 10.04°C	Minimum 13.87°C
THAT IS TO SAY		
Moisture content which may lead to condensation	About 55%	About 68%
Minimum external temperature to avoid mould	13.35°C	9.20°C
THAT IS TO SAY		
Provinces where mould should not occur (ref. 10349-1 January)	No municipality	Cosenza, Catanzaro, Lecce, Salerno, Caserta, etc.
Thermal bridge value Ψ	0.363 (W/mK) 0.611 (W/mK)	0.271 (W/mK) 0.318 (W/mK)

TO RECAP

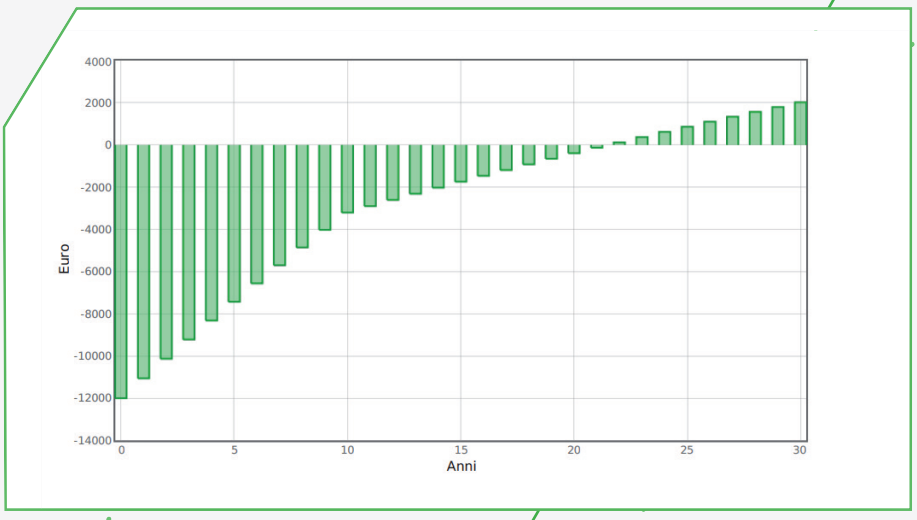
OVERALL ENERGY SAVINGS WITH THE COPRIMURO SYSTEM in MILAN
about 410 kWh/a per m²

OVERALL ENERGY SAVINGS WITH THE COPRIMURO SYSTEM in BOZEN
about 680 kWh/a per m²

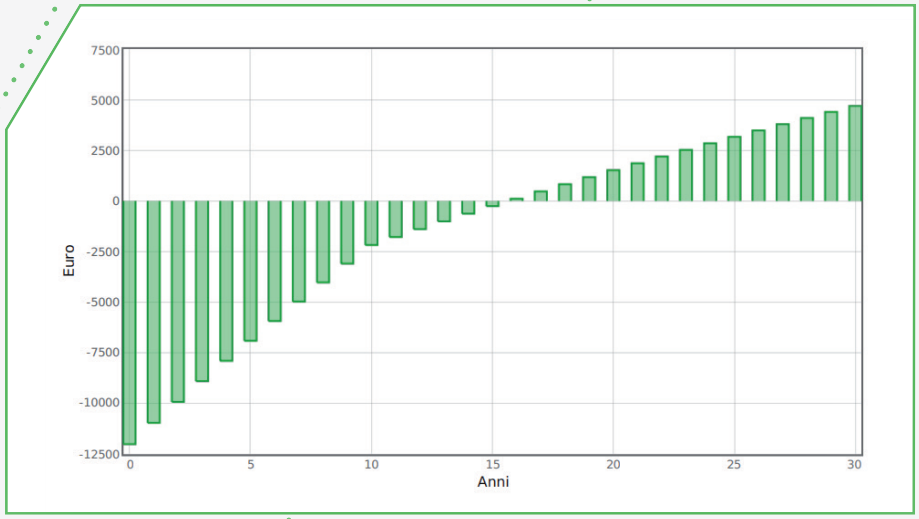
Conclusions

Here is a chart with the estimated economic savings with the Coprimuro system:

MILAN

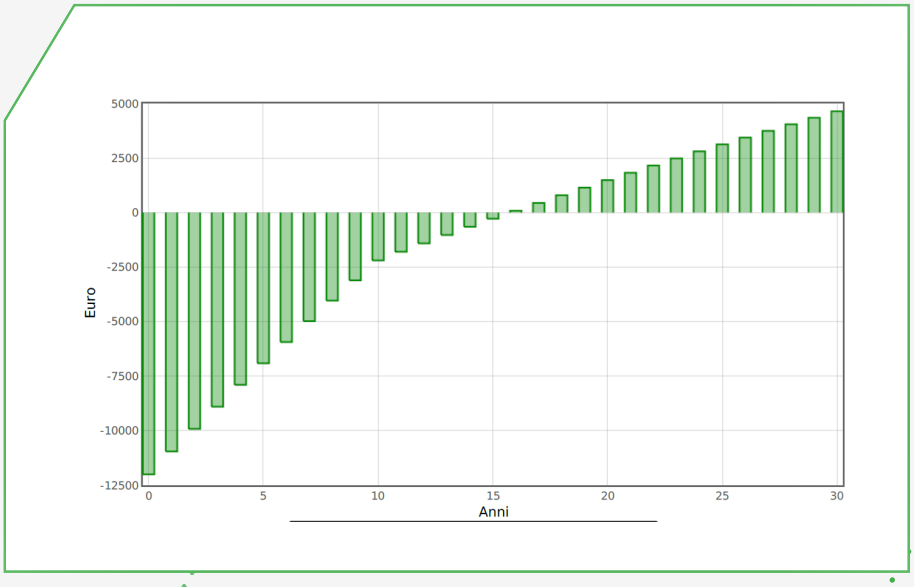


Estimated savings generated by the replacement of 16 m^2 1970s window frames with 1.3 W/m^2K window frames.

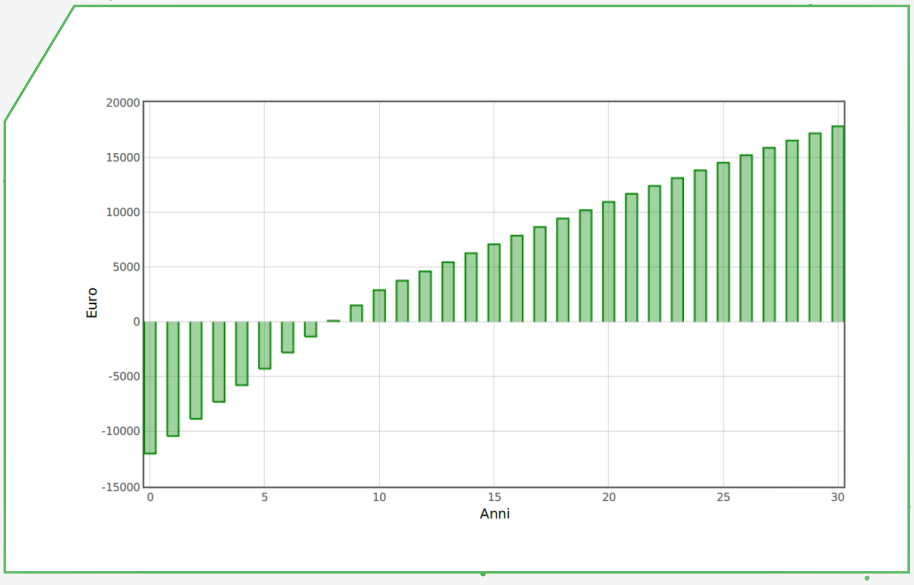


Estimated savings generated by the replacement of 16 m^2 1970s window frames with 1.3 W/m^2K window frames and use of Termoimbotte and Coprisoglia.

BOZEN

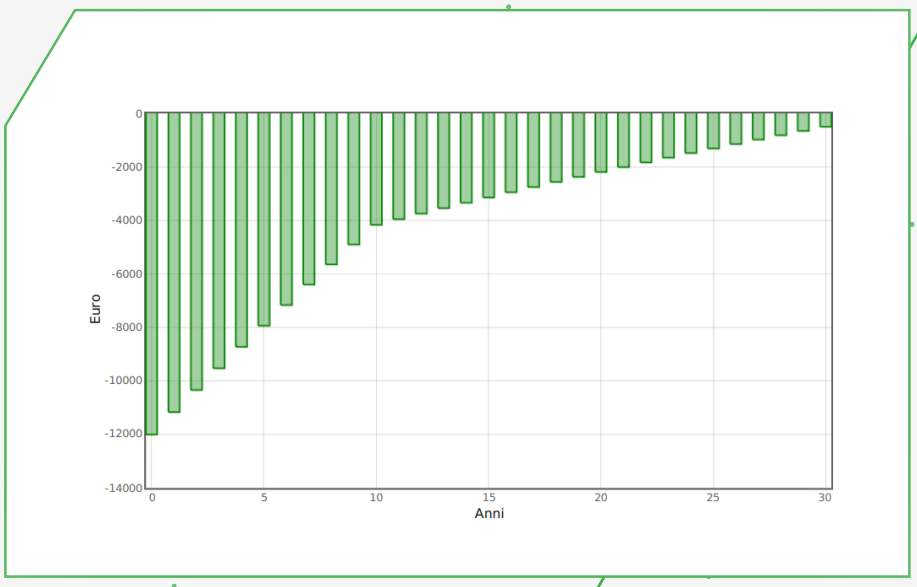


Estimated savings generated by the replacement of 16 m² 1970s window frames with 1.3 W/m ²K window frames.

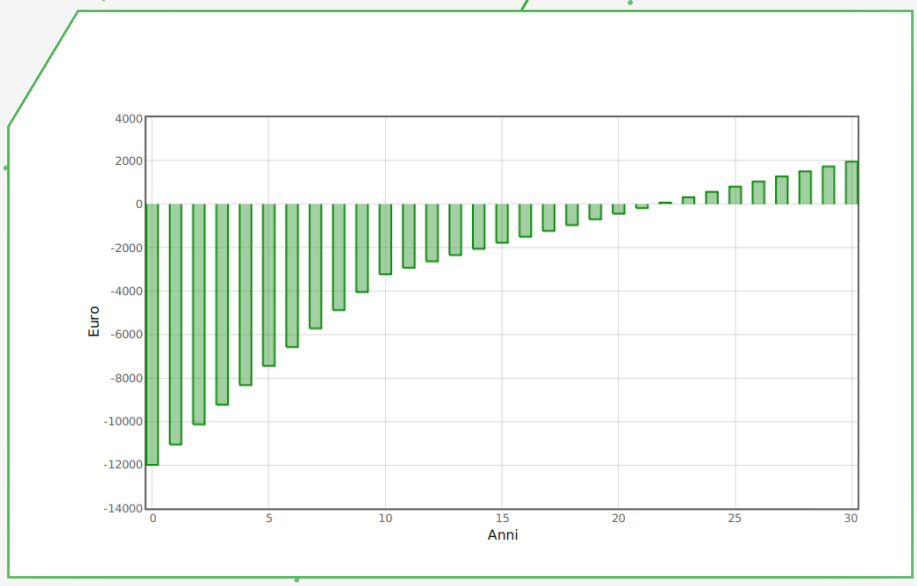


Estimated savings generated by the replacement of 16 m² 1970s window frames with 1.3 W/m ²K window frames and use of Termoimbotte and Coprisoglia.

ANCONA

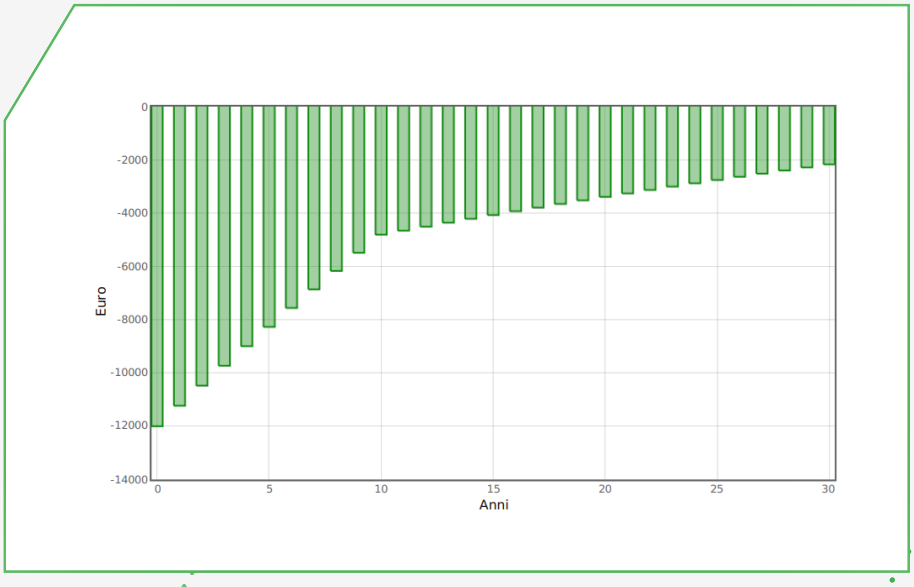


Estimated savings generated by the replacement of 16 m² 1970s window frames with 1.3 W/m ²K window frames.

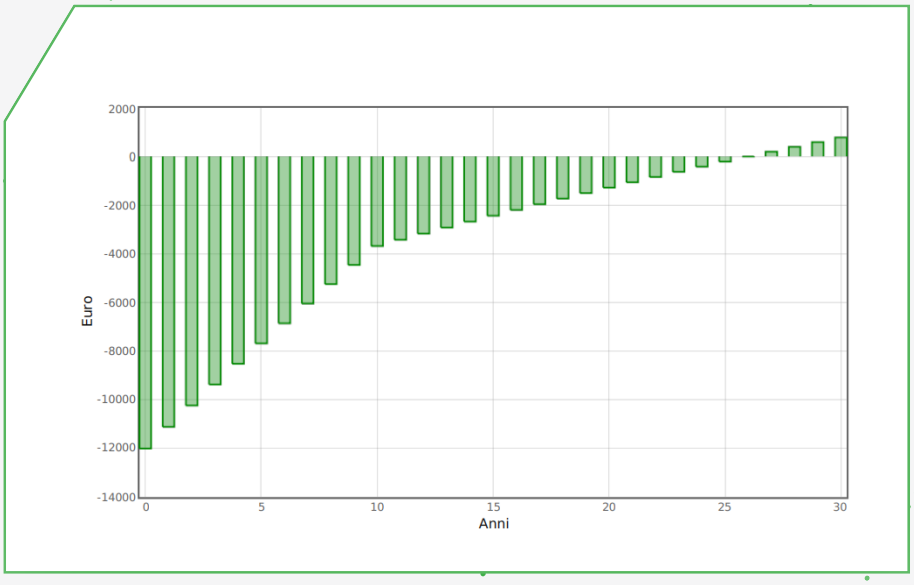


Estimated savings generated by the replacement of 16 m² 1970s window frames with 1.3 W/m ²K window frames and use of Termoimbotte and Coprisoglia.

ROME

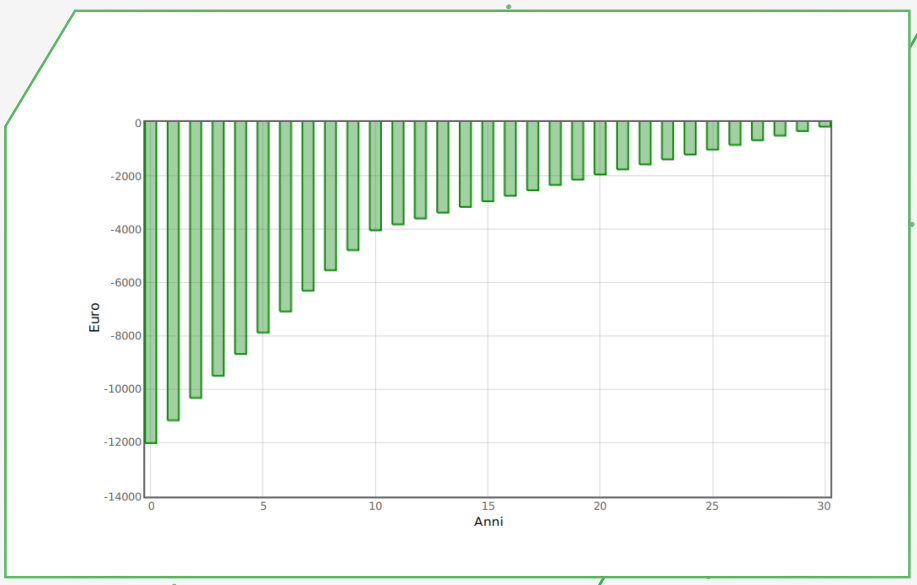


Estimated savings generated by the replacement of 16 m² 1970s window frames with 1.3 W/m ²K window frames.

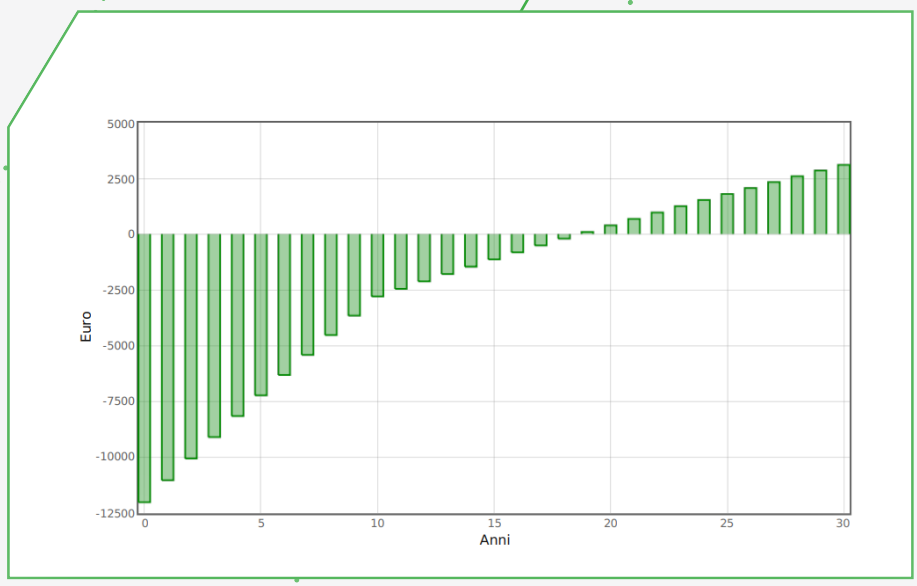


Estimated savings generated by the replacement of 16 m² 1970s window frames with 1.3 W/m ²K window frames and use of Termoimbotte and Coprisoglia.

SASSARI



Estimated savings generated by the replacement of 16 m^2 1970s window frames with 1.3 W/m^2K window frames.



Estimated savings generated by the replacement of 16 m^2 1970s window frames with 1.3 W/m^2K window frames and use of Termoimbotte and Coprisoglia.

Typical parameters used to create the charts:

- Replaced window frame 3.5 W/m^{2}K
- New window frame 1.3 W/m^{2}K
- Works amounting to 12,000.00 euros
- Works covering a surface of 16 m^2
- Fuel: methane
- System with generator with average efficiency levels

Thermal CHECK site

Site Via Genziana – Aprica (SO)

Test site for airtightness

Site via Moroder – Ancona

Coprimuro® products tested

TERMOSOGLIA®

WINDOWSILLS AND THRESHOLDS FOR FRENCH WINDOWS IN FIBREGLASS THERMALLY INSULATED WITH POLYURETHANE MEMBRANE WITH LOW THERMAL CONDUCTIVITY.

TERMOIMBOTTE

INSULATED FIBREGLASS PADDING FOR FRENCH WINDOW

WITH POLYURETHANE MEMBRANE, USEFUL FOR THERMALLY INSULATING THE WINDOW HOLE

“The superior man understands justice and fairness; the little man understands self-interest.”

Confucius

We began our presentation by talking about fairnessa and loyalty and we would like to say goodbye with these topics.

All the data reported, the investigations and the checks carried out are case studies. They are contexts deeply analysed and deeply questioned.

Yet, precisely because of the **transparent** communication we want to have with our partners, we cannot help but once again confirm how every possible situation – linked to increasingly different sites and increasingly varied contexts – can lead to values that differ from those expressed, both in terms of improvement and in terms of the decay of some values.

We never **wanted** to provide values that can certainly be superimposed on the next job that will be carried out, but rather to **document** a large database that can make our partner understand what we want and are able to do.

There are challenges that await us, challenges that await each one of us. This is the most demanding professional challenge we want to face.

We believe in it

I would like to thank *the engineers of the LegnoLegno Consortium, the National Window Makers Consortium, the site technicians of Coprimuro srl and all the other people involved in this project for their efforts in creating this technical tool.*
In addition to the enormous patience of my wife Silvia and my children.

Oscar Enrique Silva

Ahead in innovation

M.R. vetroresina SRL®

Tel: +39- 0541.658324
Fax: +39- 0541.650259
47853 Coriano (RN) – 29, Via Raibano – ITALY
www.coprimuro.net
info@coprimuro.net
commerciale@coprimuro.net

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PRODOTTI IN MARMORESINA E VETRORESINA CERTIFICATI CE

GROUP
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