



**ENVIRONMENT
PARK** Parco Scientifico
Tecnologico per l'Ambiente



GREEN BUILDING

EnviPark - Soluzioni innovative per l'edilizia sostenibile

ENVIRONMENT PARK

efficiencyJobs⁺



UNIONE EUROPEA
Fondo sociale europeo

Co-financiado por el
Programa de Aprendizaje Permanente
de la Unión Europea



Proyecto: 2013-1-ES1-LEO05-66818-AN

The company

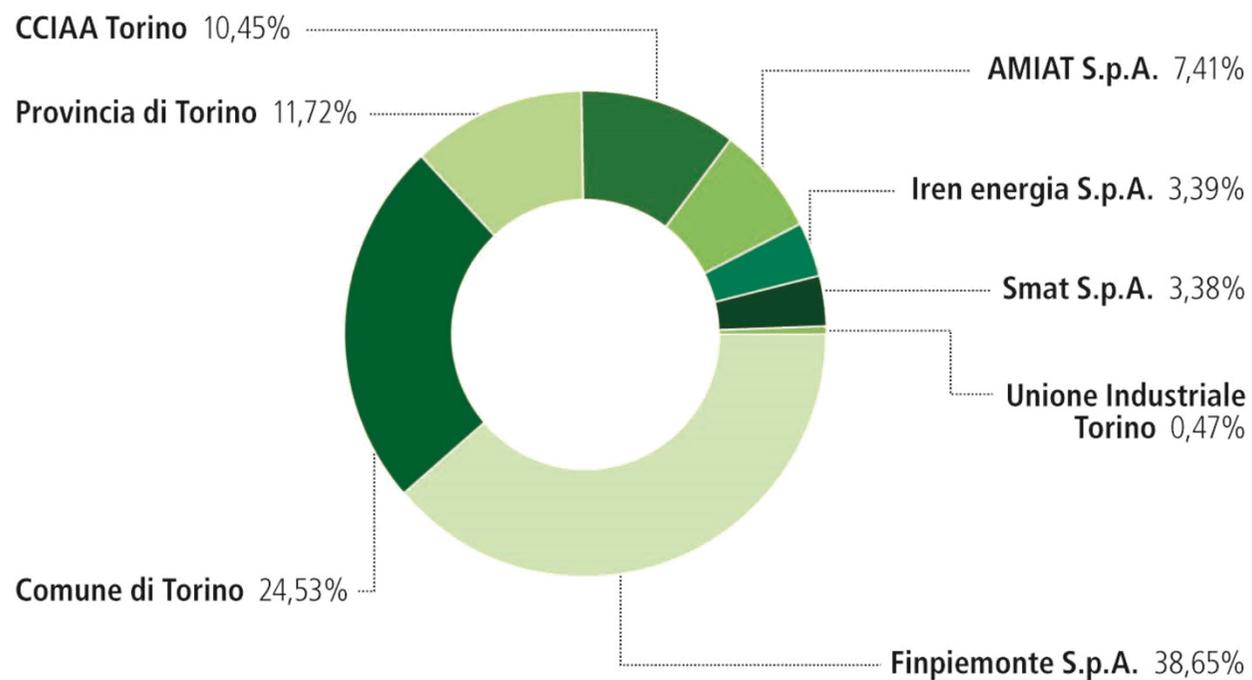
Environment Park is an innovation accelerator aiming to partner with enterprises engaged in implementing cleaner and eco-efficient solutions for their products and processes.

Our company is a profit shared enterprise with Public Entities as shareholders; being established in 1996, Environment Park started up in Torino one of the major urban transformation in Europe.

Environment Park is today a privileged partner for companies investing in clean innovation and counts on an experience of over 10-years collaboration with manufacturing industry.

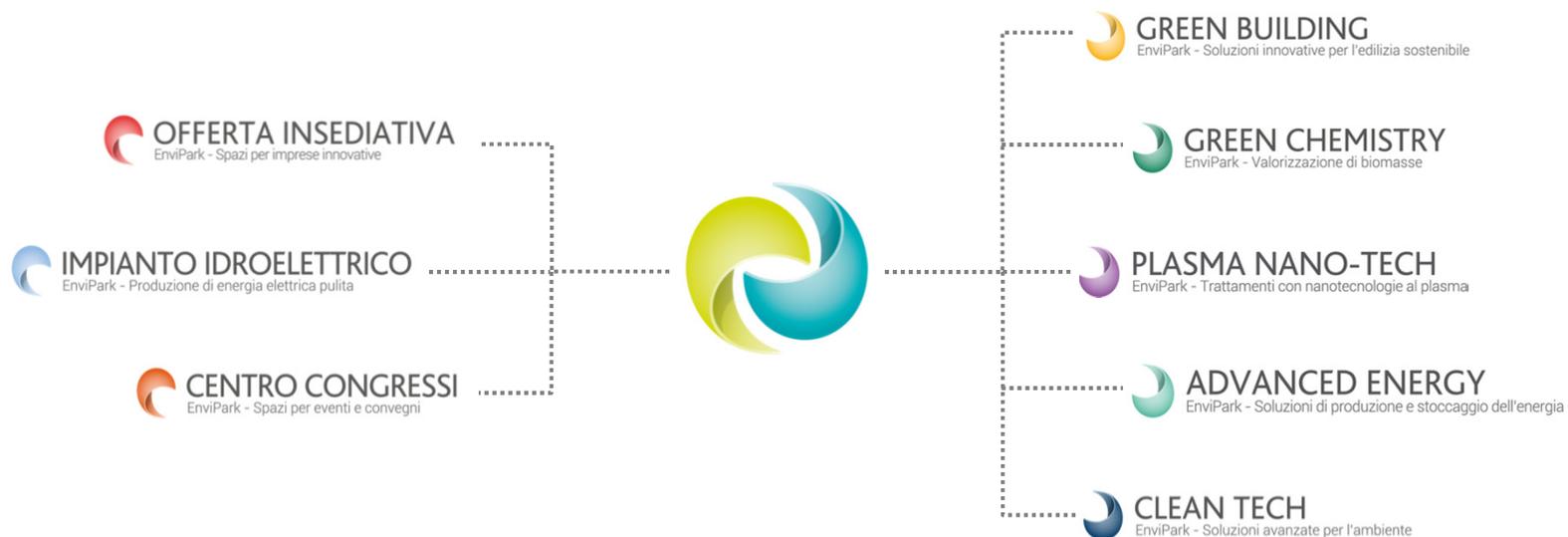


Our shareholders



The business model – Business units

- 1) **Real Estate services:** include all the activities related to the management of the Park as a campus.
- 2) **Innovation and development:** include all the knowledge-based activities and services related to clean innovation; this unit is splitted into several thematic sectors - Green Building, Plasma Nano-Tech, Green Chemistry, Advanced Energy e Clean Tech.



Green Building

This sector operates as a competence center offering to enterprises, engineering firms and Public Administration support to implement innovative solutions in the domain of sustainable design, construction and building components.

- Energy and environmental certification standards
- Low energy buildings
- Energy management
- Innovation in construction products and components
- Sustainable building codes and standard,





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Standard Passivhaus in Piedmont Region



REGIONE
PIEMONTE



REPUBBLICA ITALIANA



UNIONE EUROPEA
Fondo sociale europeo

The **Passive House design approach** takes advantage of material performance characteristics to create a building structure that needs very little supplemental heating or cooling to provide year-round occupant comfort, dramatically reducing the home's annual energy consumption. To achieve this high level of energy efficiency, Passive House designers carefully evaluate how to assemble the building envelope to achieve optimal performance in four key areas: superinsulation, air-sealing, passive heating (solar gain) and effective ventilation.

One example in Piedmont Region

FUNDING >> PIEDMONT REGION

CUSTOMER/OWNER >> Agenzia Territoriale per la Casa del Piemonte Centrale

DESIGN GROUP >> ATC del Piemonte Centrale, ATC PROJECT.TO, ENVIRONMENT PARK S.p.A.

CERTIFICATION >> ZEPHIR Passivhaus Italia S.r.l.

The Passive House Institute (PHI) is an **independent research institute** that has played an especially crucial role in the development of the Passive House concept - the only internationally recognised, performance-based energy standard in construction.

1 The building must be designed to have an annual heating and cooling demand as calculated with the Passivhaus Planning Package of not more than 15 kWh/m² per year in heating and 15 kWh/m² per year cooling energy **OR** to be designed with a peak heat load of 10W/m²

2 Total primary energy (source energy for electricity, etc.) consumption (primary energy for heating, hot water and electricity) must not be more than 120 kWh/m² per year

3 The building must not leak more air than 0.6 times the house volume per hour ($n_{50} \leq 0.6$ / hour) at 50 Pa (N/m²) as tested by a blower door

The performances must be checked by PHPP tool (Passive House Planning Package)

Progettazione Passivhaus



Edificio:	Intervento di edilizia residenziale pubblica per anziani		
Via:	Località Strada Case Sparse Battandero		
CAP/Città:	10073 Ciriè (TO)		
Paese:	Italia		
Tipo di costruzione:	Intervento di edilizia residenziale pubblica per anziani		
Clima:	Ciriè		
Committente/i:	Agenzia Territoriale per la Casa della Provincia di Torino		
Via:	Corso Dante, 14		
CAP/Città:	10134 Torino		
Architetto:	Arch. Laura Einaudi - ATC Proget.to s.r.l.		
Via:	Corso Dante, 14		
CAP/Città:	10134 Torino		
Termotecnico/a:	Ing. Sebastiano Ciavarella - ATC Proget.to s.r.l.		
Via:	Corso Dante, 14		
CAP/Città:	10134 Torino		
Anno di costruzione:	2009-2014	Temperatura interna:	20,0 °C
Numero di unità abitative:	14	Apporti termici interni:	2,1 W/m ²
Volume lordo V _g :	3347,6 m ³	Altezza media piani:	2,7 m
Numero di persone:	21,5		

Indici riferiti alla superficie utile netta		Procedura utilizzata: Procedura mensile	
		Requisiti	Conseguito?*
Riscaldamento	Superficie utile netta:	754,1 m ²	
	Fabb. termico annuo per riscaldamento	15 kWh/(m ² a)	15 kWh/(m ² a) si
	Carico termico:	9 W/m ²	10 W/m ² si
Raffrescamento	Fabb. frigor. annuo per raffrescamento:	5 kWh/(m ² a)	16 kWh/(m ² a) si
	Carico frigorifero:	8 W/m ²	- -
	Frequenza di ore surriscaldate (Ti > 25 °C)	%	- -
Energia primaria	riscaldam., raffrescam., ACS, corr.el. e deumidificaz., c.e.ausiliaria	113 kWh/(m ² a)	120 kWh/(m ² a) si
	ACS, riscaldamento e corrente elettrica ausiliaria	45 kWh/(m ² a)	- -
	Risparmio energetico per la produzione di corrente da FV	22 kWh/(m ² a)	- -
Tenuta all'aria	Risultato del test Blower-Door n ₅₀	0,6 1/h	0,6 1/h si

* campo vuoto: mancano dati; -: nessun requisito

Passivhaus? si

- > Very high levels of insulation without thermal bridges
- > Windows technology
- > Intelligent use of solar and internal gains
- > Good indoor air quality provided by a mechanical ventilation system

1 Annual heating and cooling demand not more than 15 kWh/m² per year in heating and 15 kWh/m² per year cooling energy OR to be designed with a peak heat load of 10W/m²

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Volume lordo V _g :	3347,6 m ³	Altezza media piani:	2,7 m
Numero di persone:	21,5		

Indici riferiti alla superficie utile netta		Procedura utilizzata: Procedura mensile	
		Superficie utile netta: 754,1 m ²	
Riscaldamento	Fabb. termico annuo per riscaldamento	15 kWh/(m²a)	15 kWh/(m ² a) si
	Carico termico:	9 W/m²	10 W/m ² si
Raffrescamento	Fabb. frigor. annuo per raffrescamento:	5 kWh/(m²a)	16 kWh/(m ² a) si
	Carico frigorifero:	8 W/m²	- -
	Frequenza di ore surriscaldate (Ti > 25 °C)	%	- -
Energia primaria	riscaldam., raffrescam., ACS, corr.el. e deumidificaz., c.e.ausiliaria	113 kWh/(m²a)	120 kWh/(m ² a) si
	ACS, riscaldamento e corrente elettrica ausiliaria	45 kWh/(m ² a)	- -
	Risparmio energetico per la produzione di corrente da FV	22 kWh/(m ² a)	- -
Tenuta all'aria	Risultato del test Blower-Door n ₅₀	0,6 1/h	0,6 1/h si

* campo vuoto: mancano dati; -: nessun requisito

Passivhaus?	si
-------------	-----------

Total primary energy (source energy for electricity, etc.) consumption (primary energy for heating, cooling, hot water and electricity) must not be more than 120 kWh/m² per year



HEATING



COOLING



ELECTRICITY



SANITARY HOT
WATER

2 Total primary energy (source energy for electricity, etc.) consumption (primary energy for heating, cooling, hot water and electricity) must not be more than 120 kWh/m² per year

3 The building must not leak more air than 0.6 times the house volume per hour ($n_{50} \leq 0.6$ 1/hour) at 50Pa (N/m²) as tested by a blower door



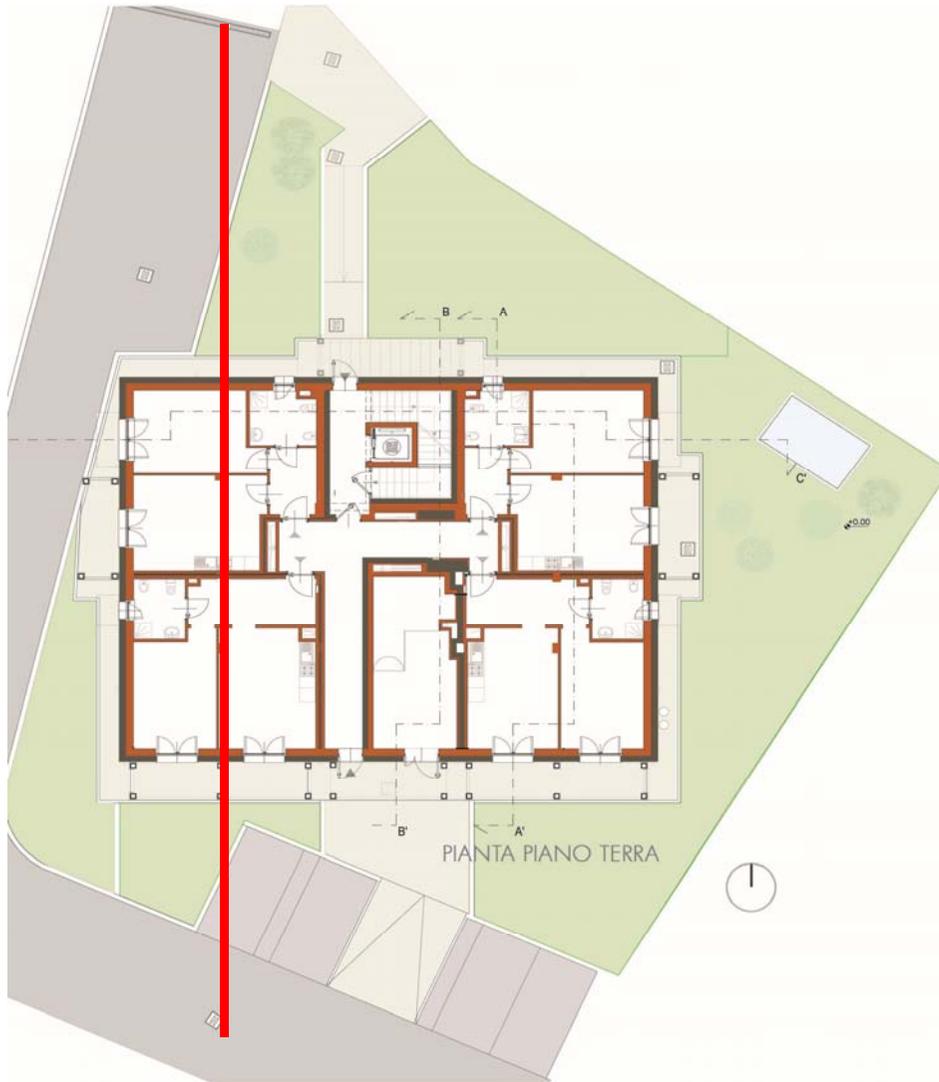
A blower door is a powerful fan that mounts into the frame of an exterior door. The fan pulls air out of the house, lowering the air pressure inside. The higher outside air pressure then flows in through all unsealed cracks and openings. The auditors may use a smoke pencil to detect air leaks. These tests determine the air infiltration rate of a building.

The test must be done according to UNI EN 13829 Thermal performance of buildings – Determination of air permeability of buildings – Fan pressurization method

3 The building must not leak more air than 0.6 times the house volume per hour ($n_{50} \leq 0.6$ 1/hour) at 50Pa (N/m^2) as tested by a blower door

Airtightness

Building envelopes under the Passivhaus standard are required to be extremely airtight compared to conventional construction. Passive house is designed so that most of the air exchange with exterior is done by controlled ventilation through a heat-exchanger in order to minimize heat loss (or gain, depending on climate), so uncontrolled air leaks are best avoided. This is achieved through air barriers, careful sealing of every construction joint in the building envelope, and sealing of all service penetrations.

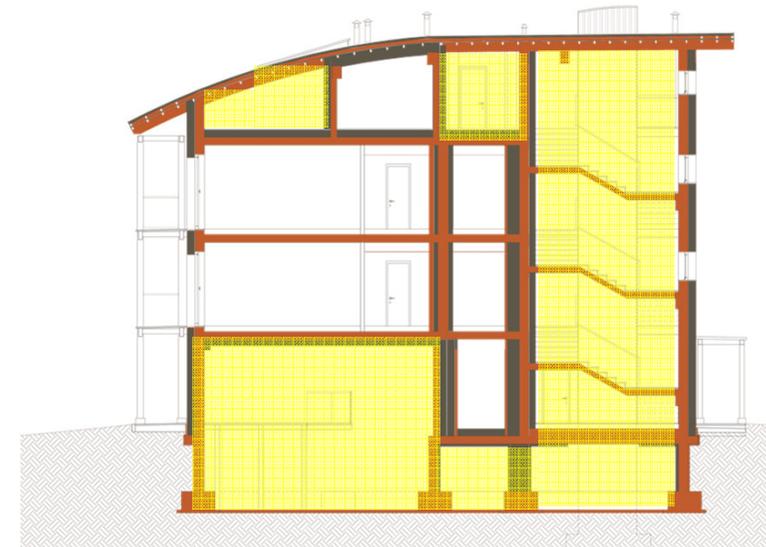


>> orientation:

The fact the sun is lower in the sky in Winter than in Summer allows us to plan and construct buildings that capture that free heat in Winter and reject the heat in Summer. The orientation of the whole building plays an important part in ensuring such a 'passive' process works. Refer to the diagram below for an explanation.

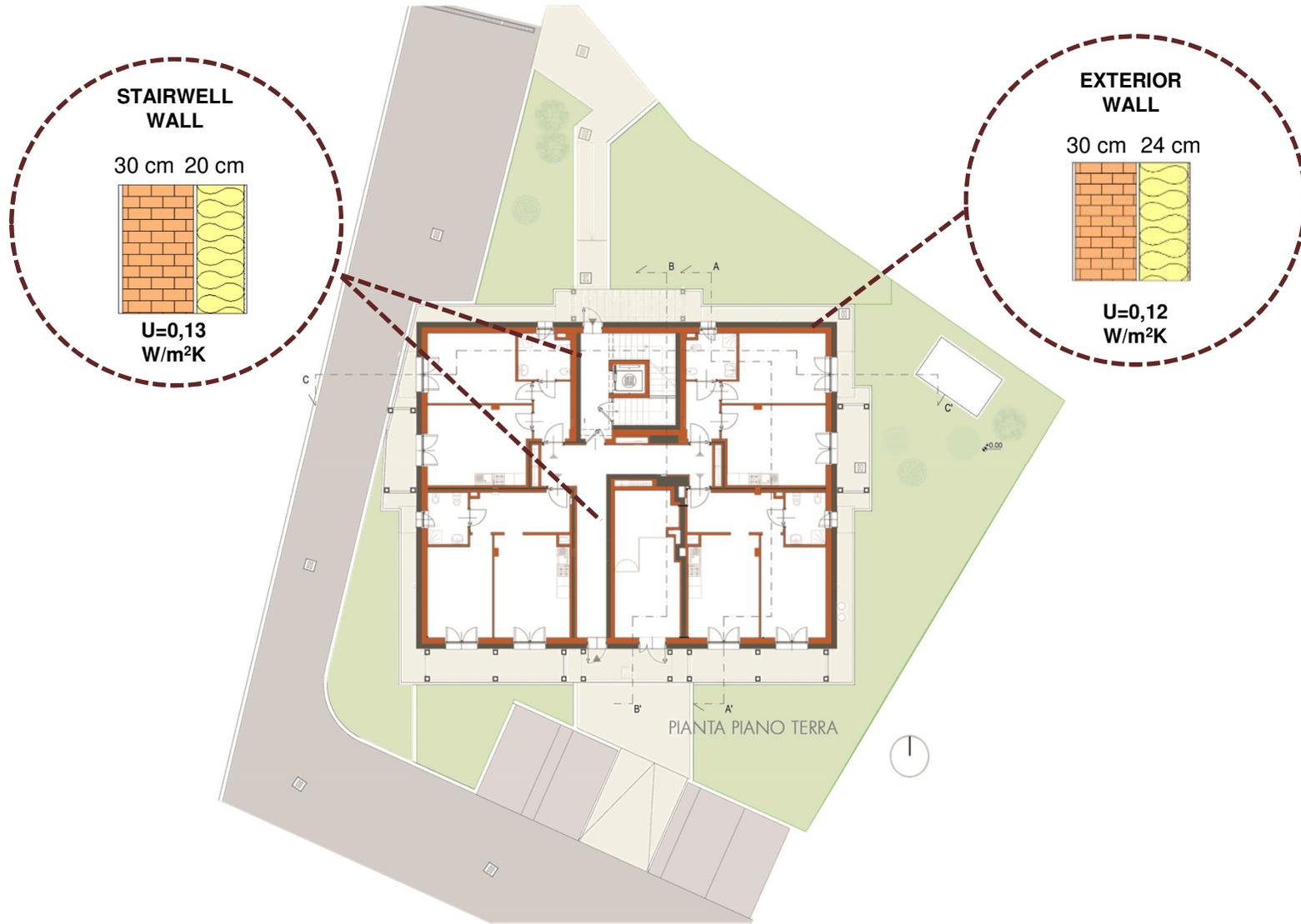
Ideal house orientation

The ideal house orientation is that the main long axis of the building runs East-West,. You can move this by as much as 20 degrees without ill effect, but the most glass on the building must be facing towards the Sun.

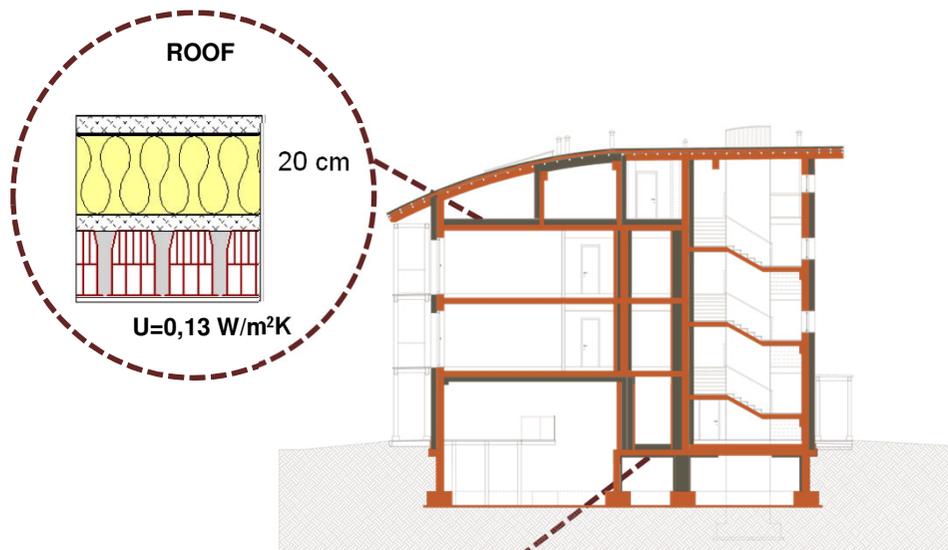


>> The project is a 3 storied building with 14 small and middle size typologies apartments so distributed: 4 apartments in the ground floor, 5 in the first and second floor.

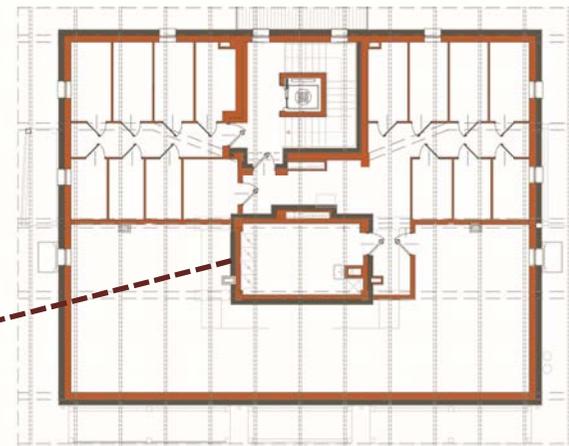
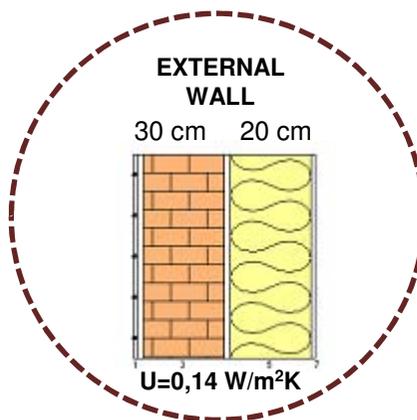
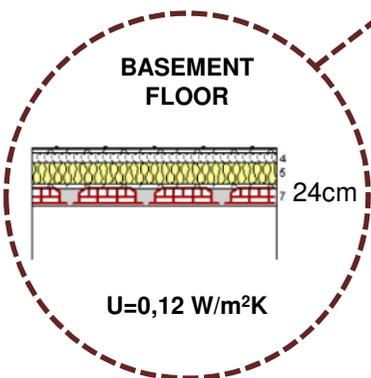
The boiler room is in the basement accessible from the southern side. The laundry, common to everyone, and the pertaining garrets are in the attic. The south leaning building has a compact shape (parallelepiped) to guarantee an ideal shape factor S/V for the project apartment typologies. The longer side is south oriented where the most of the glass walls are in order to tap the free sun's energy during winter time.



>> Componenti opachi dell'involucro "



PIANTA PIANO PRIMO / SECONDO

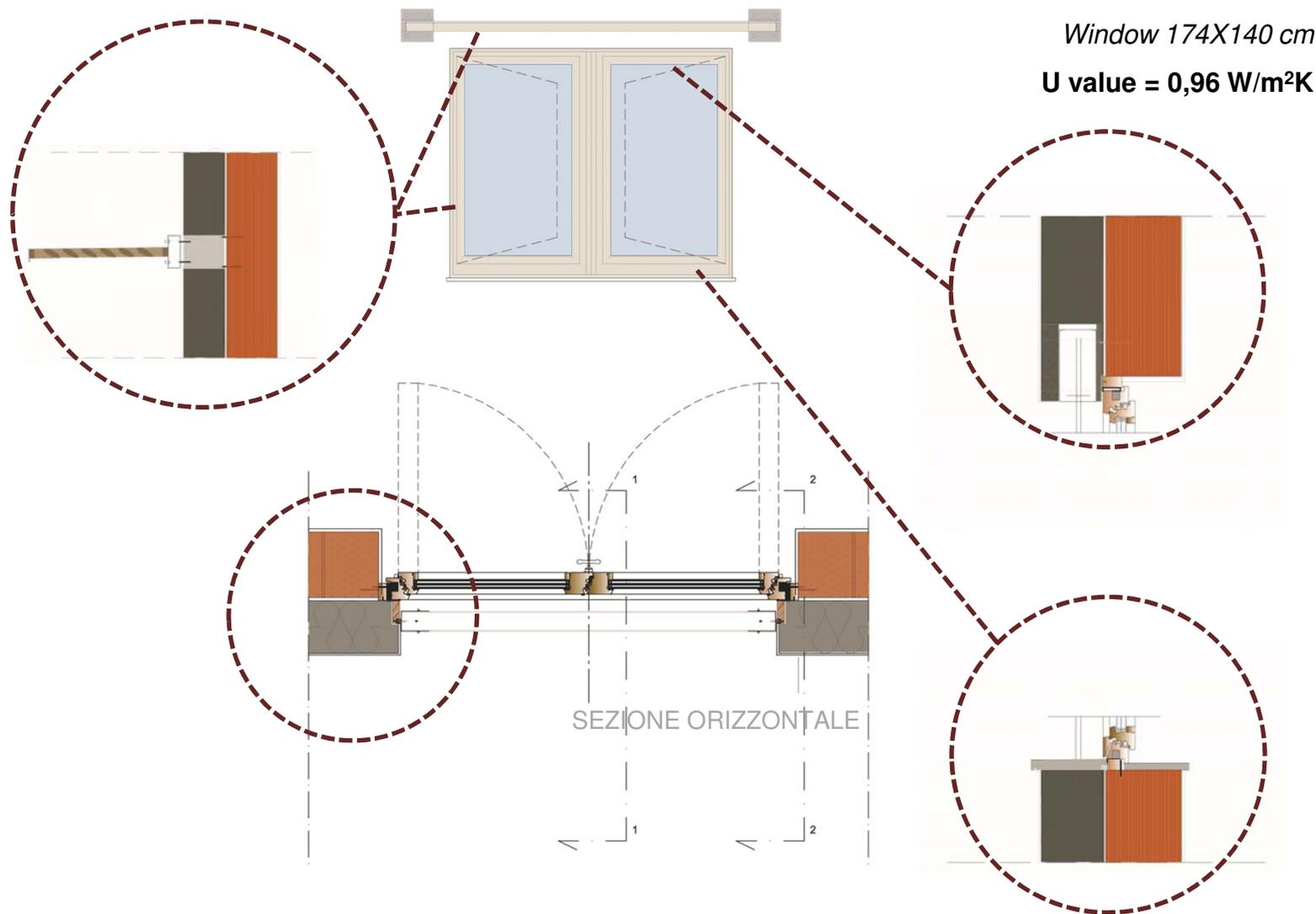


PIANTA SOTTOTETTO

Advanced window technology

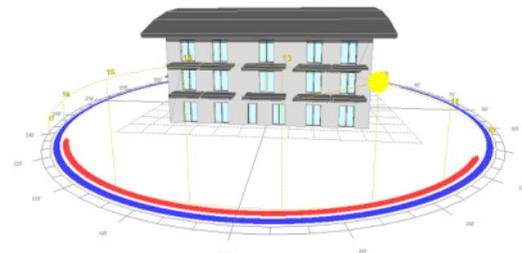
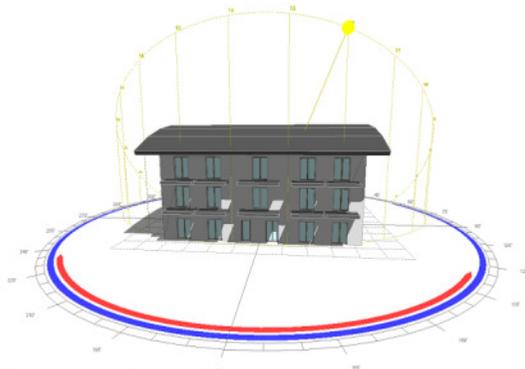
Typical **Passive House** windows

To meet the requirements of the Passivhaus standard, windows are manufactured with exceptionally low U-values $0,85 \text{ W}/(\text{m}^2.\text{K})$ for the entire window (including the frame). These normally combine triple-pane insulated glazing (with low-emissivity coatings, good solar heat-gain coefficient, sealed argon gas filled inter-pane voids, and 'warm edge' (insulating glass spacers) with air-seals and specially developed thermally broken window frames.

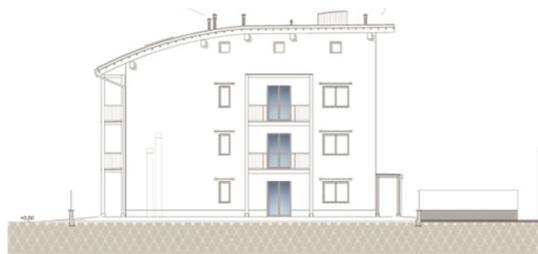
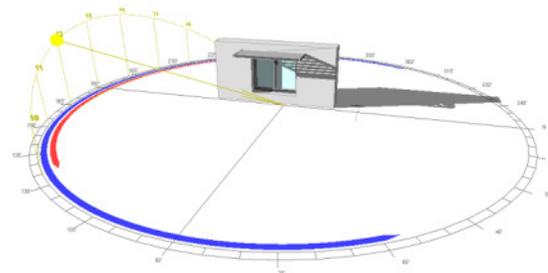
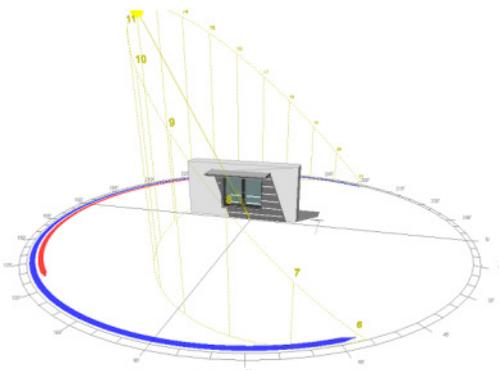


>> *Shade analysis*

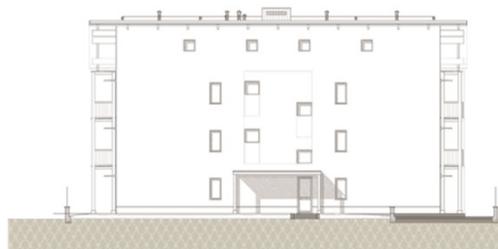
>> *South elevation*



>> *East windows*



PROSPETTO EST

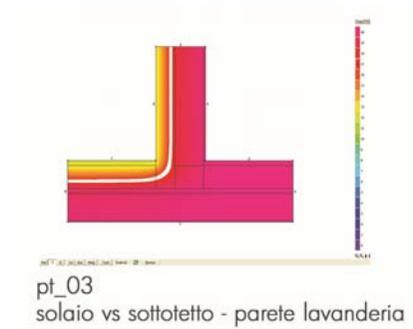
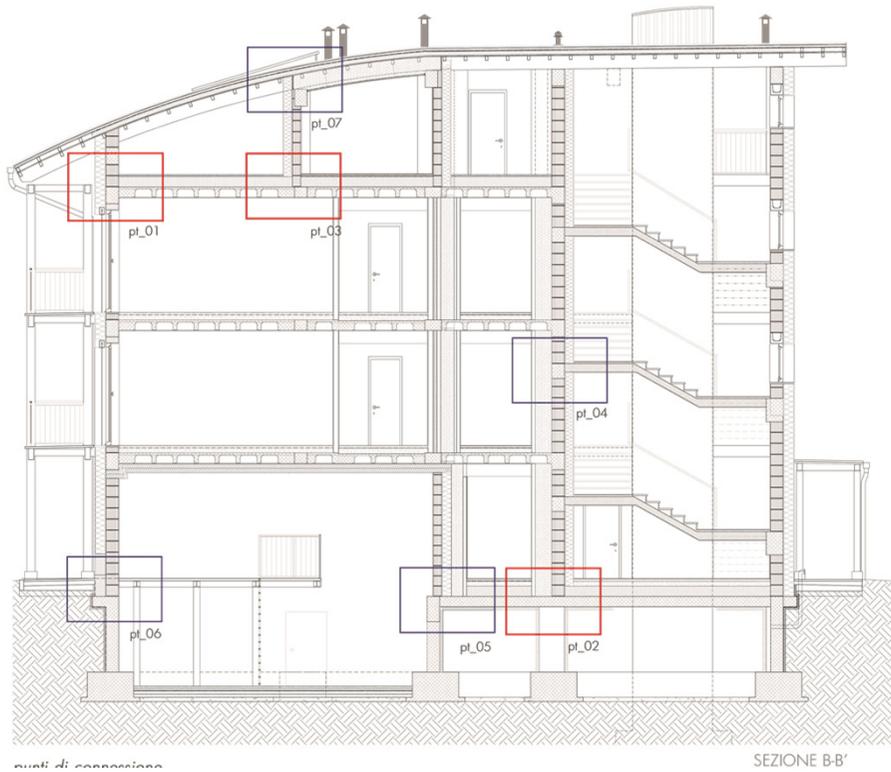


PROSPETTO NORD



PROSPETTO SUD

Thermal bridges analysis



Mechanical systems

Ventilation Zehnder, 3 Comfo-Air 550

3 heat recovery units (effective heat recovery rate according to the certificate is 84%).

The building specific effective heat recovery rate is 77%.

Heating installation Geothermal heat pump;

The house is primarily heated through the ventilation system. The geothermal heat pump supplies the heat pump for the hot water production stored in the inertial water storage (800l capacity). From the inertial water storage the hot water flows inside the heating array.

The heated air flows inside the heating array increasing its temperature. From the heating array hot water pipes and hot air pipes reach all the apartments. For each apartment another heating array is provided.

The hot cooled water flows back to the heat pump and the hot cooled air flows back to the air-air heat recovery units.

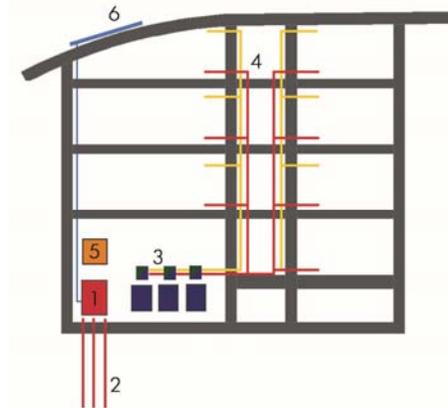
In case of cold particular weather conditions the water-tube radiators are activated. The gas condensing water is activated to rise the temperature in the inertial water storage.

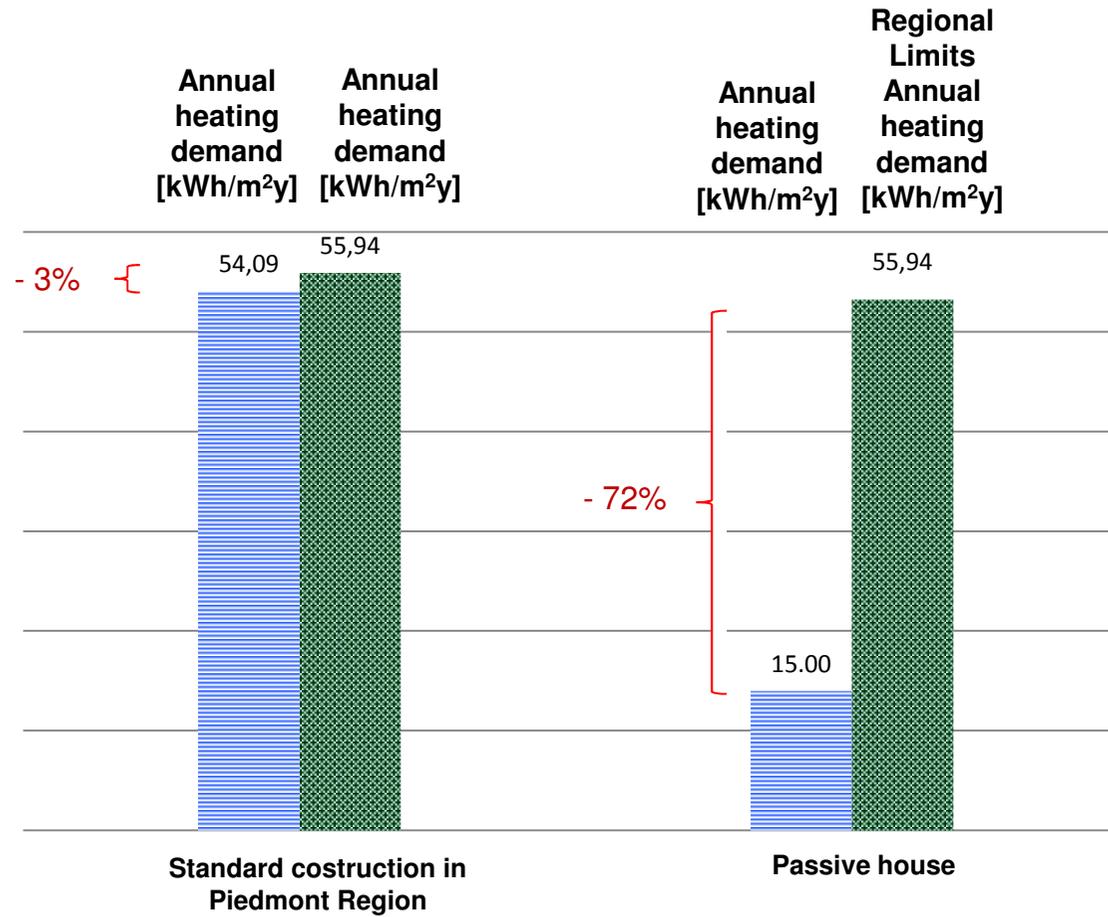
The hot water pipes and the ventilation pipes (insulated with reflecting thermal insulation) are distributed through the technical courtyard inside the thermal envelope.

Domestic hot water Geothermal heat pump and gas condensing water;

The sanitary hot water is produced by the heat pump connected to the geothermal system and it is accumulated in a 300l tank.

The gas condensing water is activated to generate anti legionnaires' disease thermal shocks and to rise the hot water temperature produced by the heat pump. The sanitary hot water pipes (insulated with reflecting thermal insulation) are distributed through the technical courtyard inside the thermal envelope.

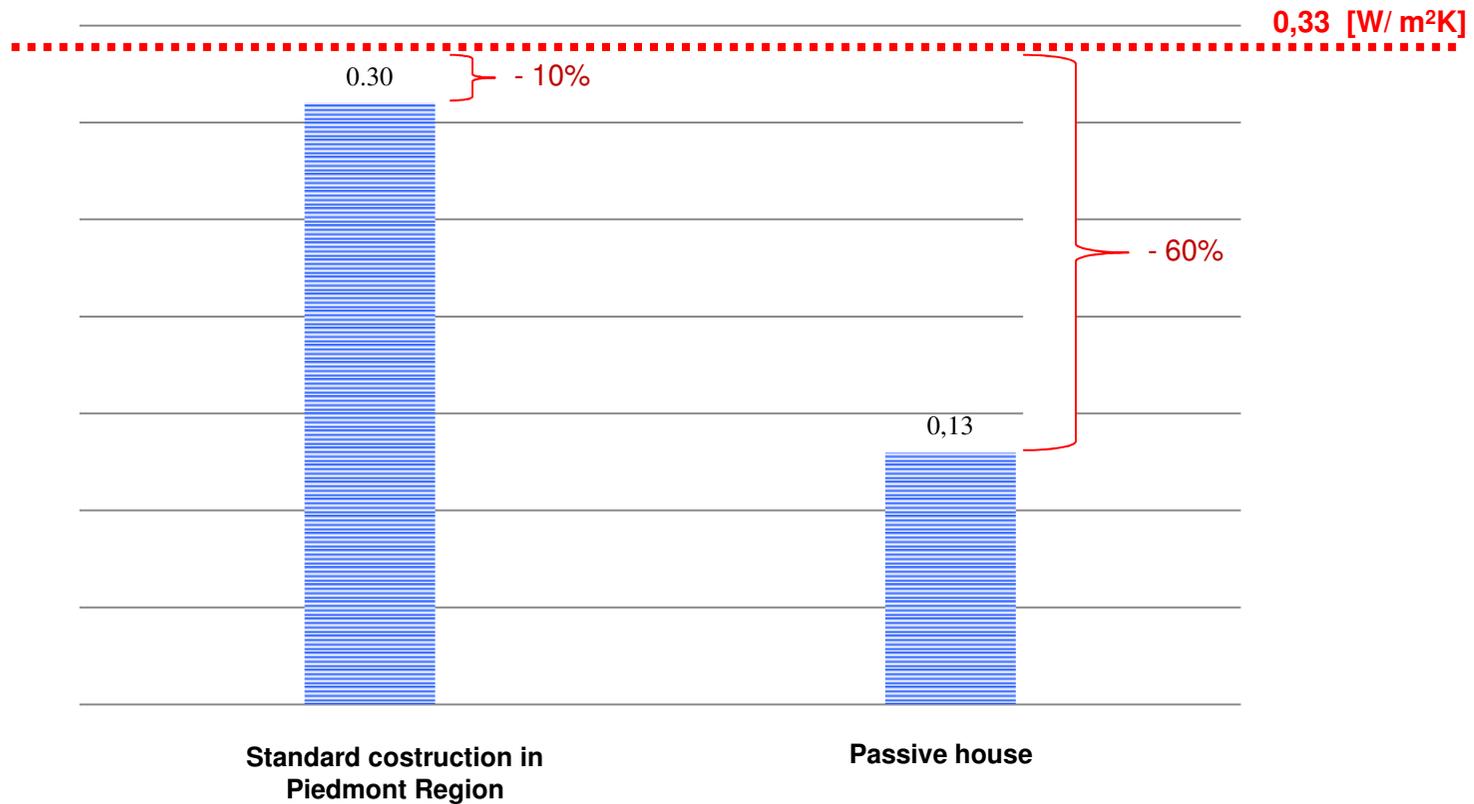




Italian Law >>> **Dlgs 311/ 2006**

Piedmont Region >>> **DGR 46-11968**

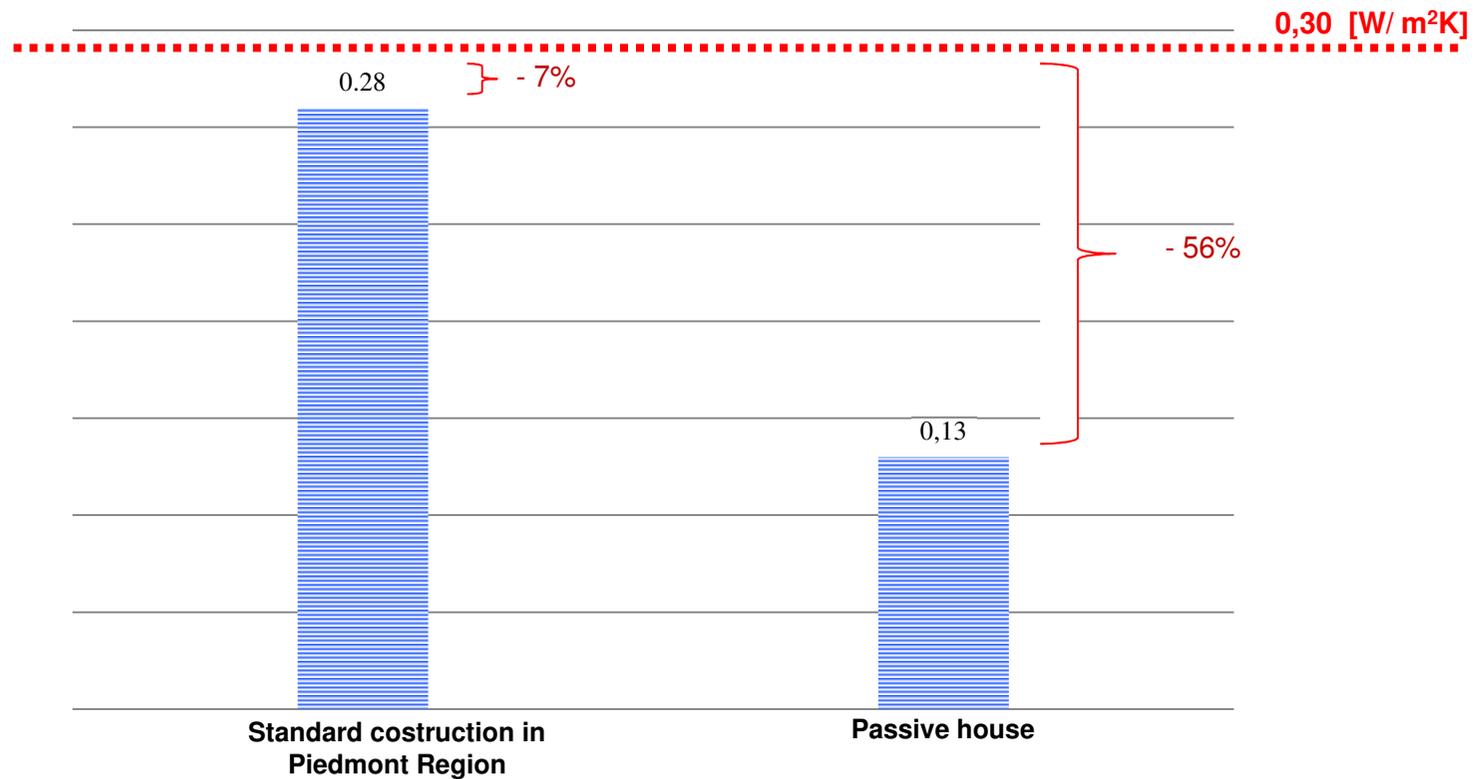
Regional limit law- thermal transmittance for exterior wall



Italian Law >>> Dlgs 311/ 2006

Piedmont Region >>> DGR 46-11968

Regional limit law- thermal
trasmittance roof

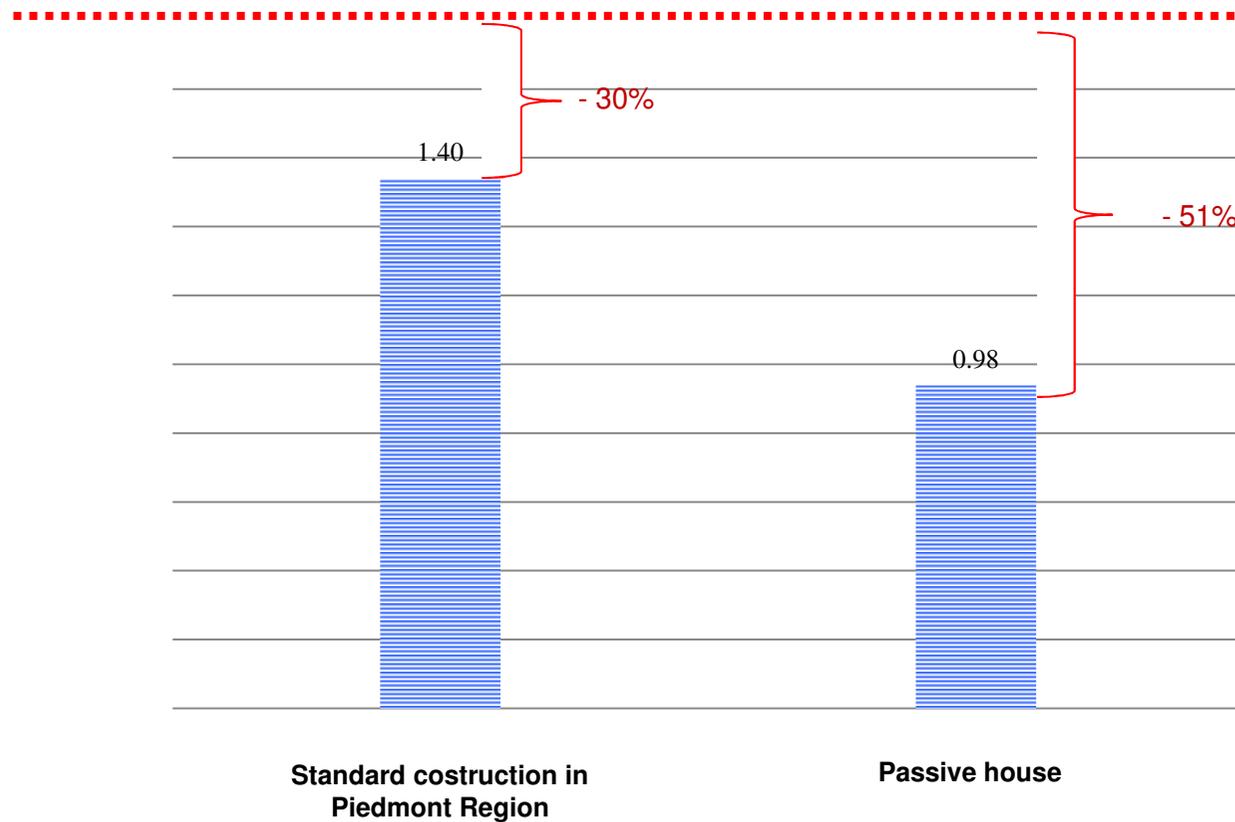


Italian Law >>> Dlgs 311/ 2006

Piedmont Region >>> DGR 46-11968

Regional limit law- thermal
transmittance for windows

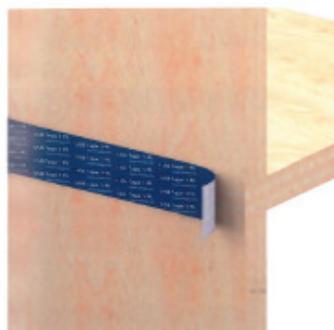
2,0 [W/ m²K]



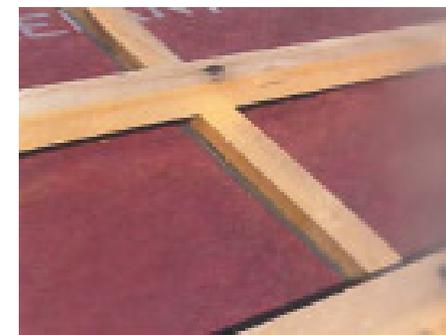
>> Airtight materials

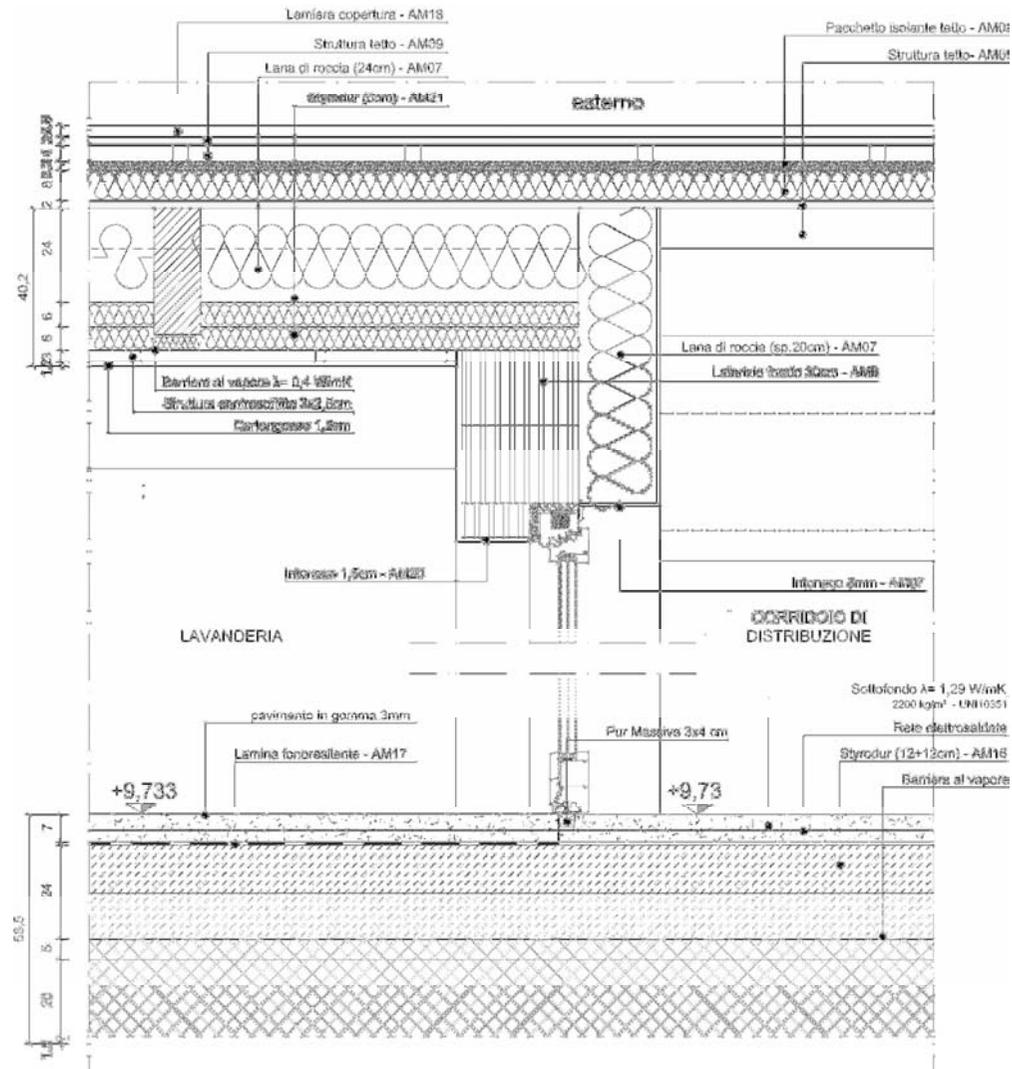


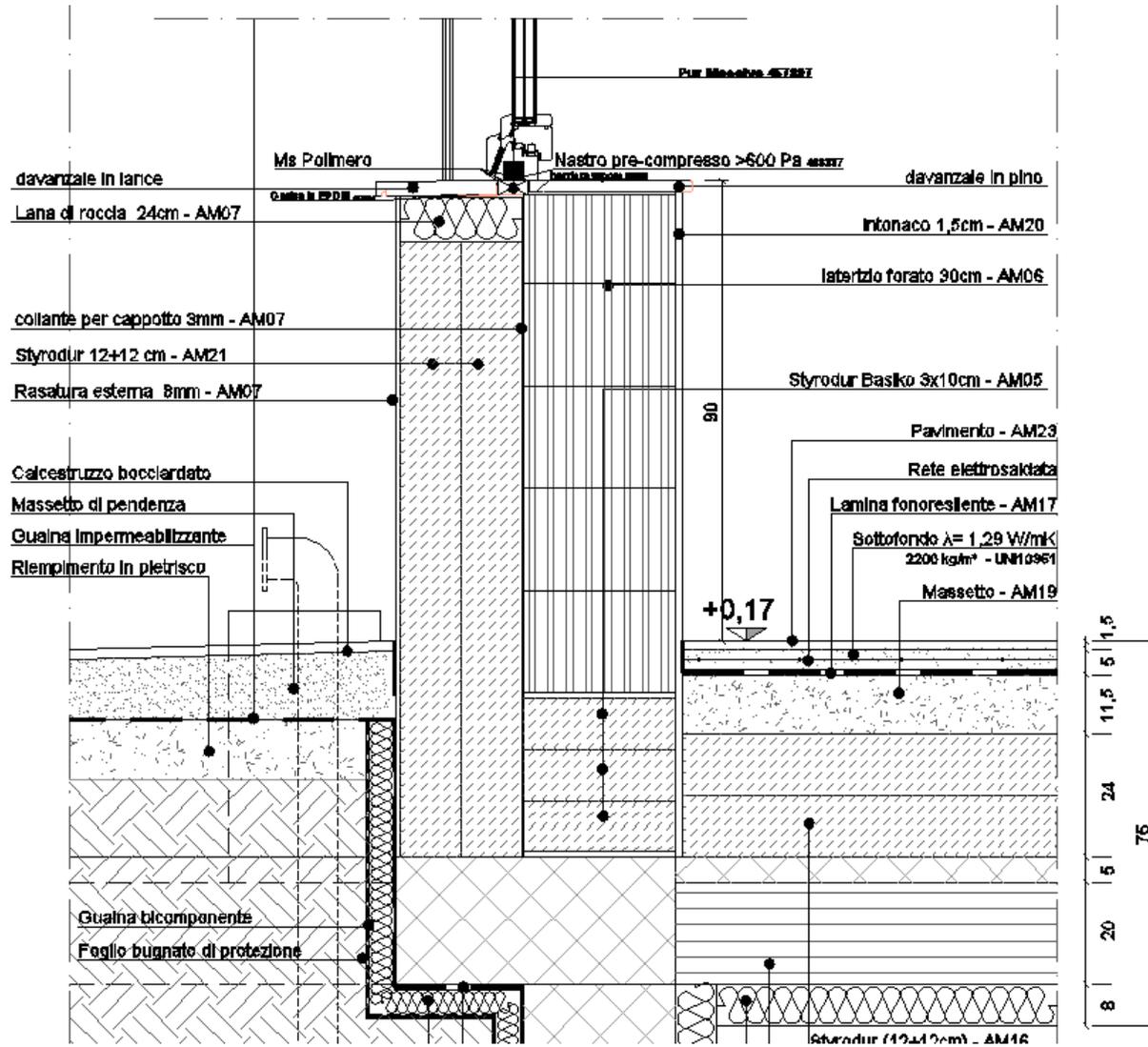
1. Polietilene
 2. Colla acrilica
 3. Rinforzo retinato in poliestere
 4. Colla acrilica
 5. Liner silconico pretagliato
1. 2. 3. 4. 5.



1. 2.







>>Building site



>> *Building site*



>>Building site



>>Building site



>>Building site







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Via Livorno, 60 - 10144 Torino - IT

T +39.011.2257566

F +39.011.2257225

envipark.com

Dott. Luca Galeasso

Senior Specialist

luca.galeasso@envipark.com



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