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NETWORK AND KNOWLEDGE SHARING

Active House

Edifici che producono più di quanto consumano

Presentato da:
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Contacts:
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General Secretary
Active House Alliance,

Active House

L'origine del progetto

Piano EU 2020

- 20% Riduzione CO_2
- 20% Energia rinnovabile
- 20% Efficienza energetica

Direttive sulle prestazioni energetiche degli edifici (2010)

- Edifici a energia quasi zero (NZEB)
- Piani nazionali di attuazione

Applicazioni a livello nazionale (2011=>)

- Interpretazione della normativa NZEB
- Metodologia di sviluppo
- Aggiornamento legislativo e dei requisiti edilizi

Active House

La situazione attuale

40% dell’energia mondiale

- viene utilizzata per il riscaldamento e il raffrescamento degli edifici
- il 90% del patrimonio edilizio attuale sarà ancora in uso nel 2050

Trascorriamo il 90% del nostro tempo

- all’interno di edifici,
- almeno il 30% degli edifici non offre un clima interno sano

Le sfide climatiche si giocano a livello globale

- le risorse sono limitate
- i rifiuti aumentano

È ora di agire!

Le tecnologie già esistenti possono fare la differenza!

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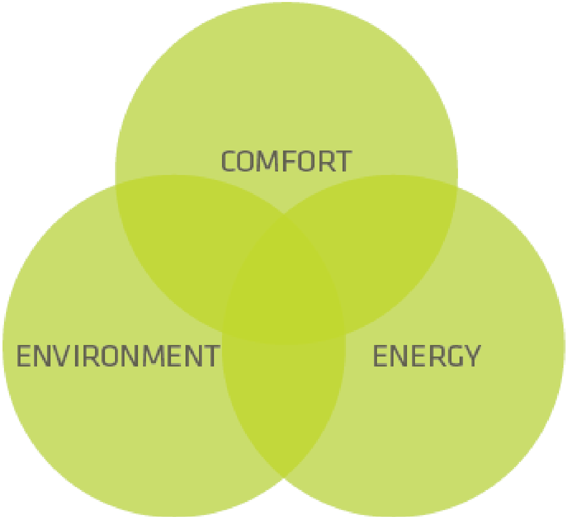
Active House Alliance

Partner e target groups

Active House: la visione

Edifici che producono più di quanto consumano

L'idea su cui si basa il concetto di Active House è quella di realizzare edifici che permettono una vita sana e confortevole a chi li abita, senza impattare in modo negativo sul clima.



Comfort
– *Crea condizioni abitative migliori*
Una Active House offre ai suoi abitanti un clima interno più sano e confortevole, apportando luce naturale e ventilazione. I materiali utilizzati non impattano negativamente sul comfort e sul clima interno.

Energia
– *Permette agli edifici di ottenere un bilancio energetico positivo*
Una Active House è un edificio ad alta efficienza energetica. Tutta l'energia necessaria al suo funzionamento deriva da fonti di energia rinnovabili integrate nell'edificio stesso o da vicini impianti collettivi di energia.

Ambiente
– *Ha un impatto positivo sull'ambiente*
Una Active House interagisce in modo positivo con l'ambiente circostante, inserendosi in maniera ottimale all'interno del contesto locale, grazie a un uso attento delle risorse e a un basso impatto ambientale durante il suo intero ciclo di vita.

Active House: approfondimenti

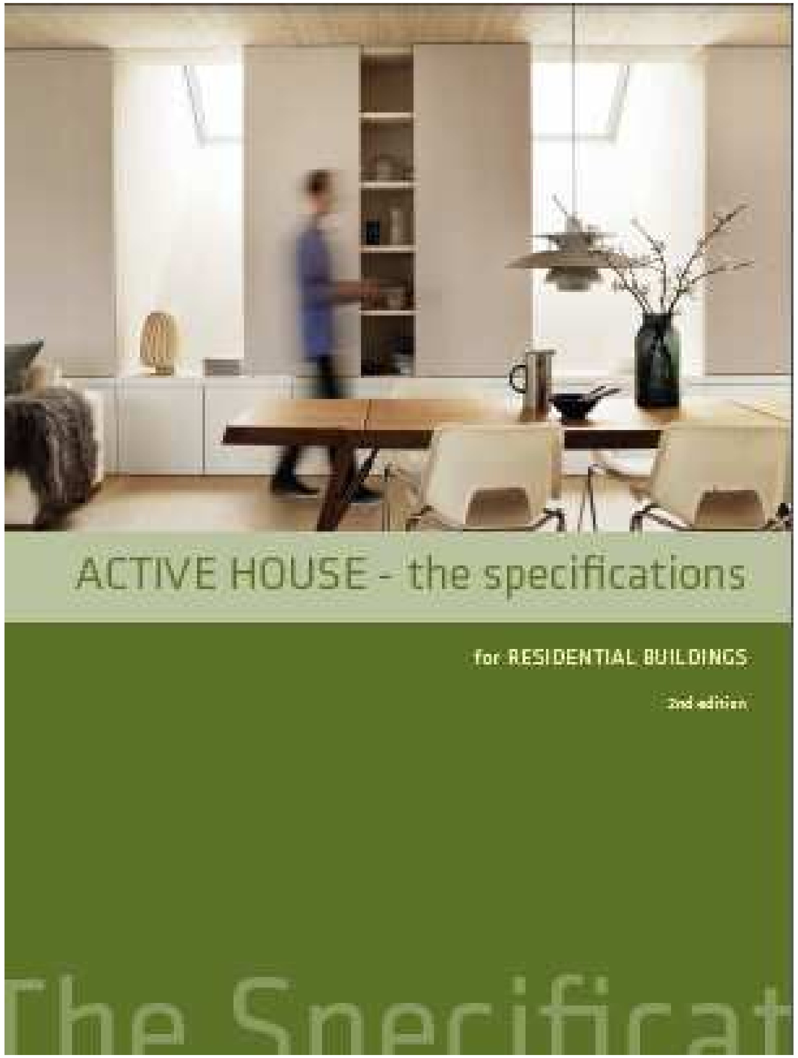
Edifici che producono più di quanto consumano

Criteri quantitativi
Classificazione: 1 (migliore) – 4 (accettabile)

Comfort
- Luce Naturale
- Temperatura degli ambienti
- Qualità dell’aria all’interno degli ambienti

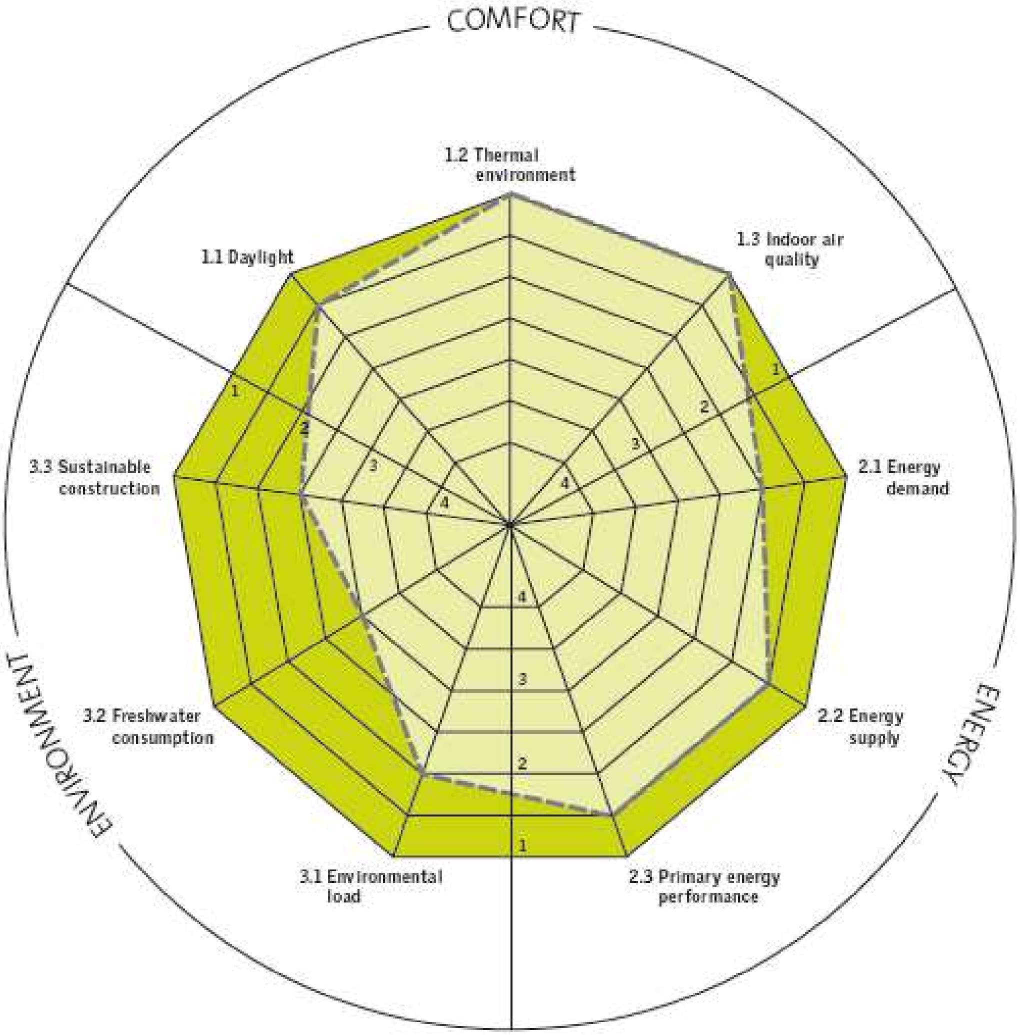
Energia
- Consumo energetico
- Fornitura energetica
- Prestazione energetica

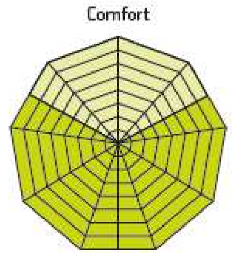
Ambiente
- Carico ambientale
- Consumo di acqua
- Edilizia sostenibile



Active House: approfondimenti

Prestazioni nel diagramma radar





Active House: approfondimenti

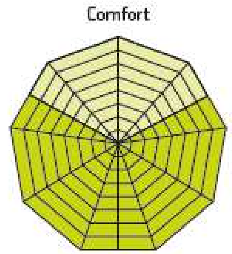
Comfort

Trascorriamo il 90% del nostro tempo in ambienti chiusi; di conseguenza la qualità del clima interno ha un impatto significativo sulla nostra salute e sul nostro comfort.

Un clima interno sano è una caratteristica fondamentale di una Active House. Il design stesso dell'edificio deve permettere di ottenere buone condizioni di illuminazione naturale, un buon comfort termico e una buona qualità dell'aria.
Per ottenere questi risultati è importante rispettare determinati dettagli costruttivi.

Active House: approfondimenti

Comfort



Luce Naturale

PARAMETER	VALUE	CRITERIA	SCORE
1.1.1 Daylight factor		The amount of daylight in a room is evaluated through average daylight factor levels on a horizontal work plane: 1. DF > 5% on average 2. DF > 3% on average 3. DF > 2% on average 4. DF > 1% on average Daylight factors are calculated using a validated daylight simulation program.	
1.1.2 Direct sunlight availability		For minimum one of the main habitable rooms, sunlight provision should be available between autumn and spring equinox: 1. At least 10% of probable sunlight hours 2. At least 7.5% of probable sunlight hours 3. At least 5% of probable sunlight hours 4. At least 2.5% of probable sunlight hours The evaluation is made according to British Standard BS 8206-2:2008 "Lighting for buildings – Part 2: Code of practice for daylight".	
		TOTAL AVERAGE:	

Temperatura degli ambienti

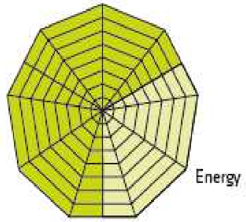
PARAMETER	VALUE	CRITERIA	SCORE
1.2.1 Maximum operative temperature		The maximum indoor temperature limits apply in periods with an outside T_{rm} of 12°C or more. For living rooms, kitchens, study rooms, bedrooms etc. in dwellings without mechanical air conditioning and with adequate opportunities for natural (cross or stack) ventilation, the maximum indoor operative temperatures are: 1. $T_{i,o} < 0.33 \times T_{rm} + 20.8°C$ 2. $T_{i,o} < 0.33 \times T_{rm} + 21.8°C$ 3. $T_{i,o} < 0.33 \times T_{rm} + 22.8°C$ 4. $T_{i,o} < 0.33 \times T_{rm} + 23.8°C$ T_{rm} is the Running Mean outdoor temperature as defined in "chapter 3.11 External temperature, running mean of EN 15251:2007". For living rooms etc. in residential buildings with air conditioning, the maximum operative temperatures are: 1. $T_{i,o} < 25.5°C$ 2. $T_{i,o} < 26°C$ 3. $T_{i,o} < 27°C$ 4. $T_{i,o} < 28°C$ For bedrooms (especially at night time), a 2°C lower value should preferably be used than indicated above as people are more sensitive to high temperatures when sleeping or trying to fall asleep. Also, in kitchens higher temperatures than indicated can be allowed periodically, e.g. during cooking activities. The system should be designed to achieve the values, the users can however choose other settings. Reference: EN 15251:2007.	
1.2.2 Minimum operative temperature		The minimum indoor temperature limits apply in periods with an outside T_{rm} of 12°C or less. For living rooms, kitchens, study rooms, bedrooms etc. in dwellings, the minimum operative temperatures are: 1. $T_{i,o} > 21°C$ 2. $T_{i,o} > 20°C$ 3. $T_{i,o} > 19°C$ 4. $T_{i,o} > 18°C$ The system should be designed to achieve the values, the users can however choose other settings.	
		TOTAL AVERAGE:	

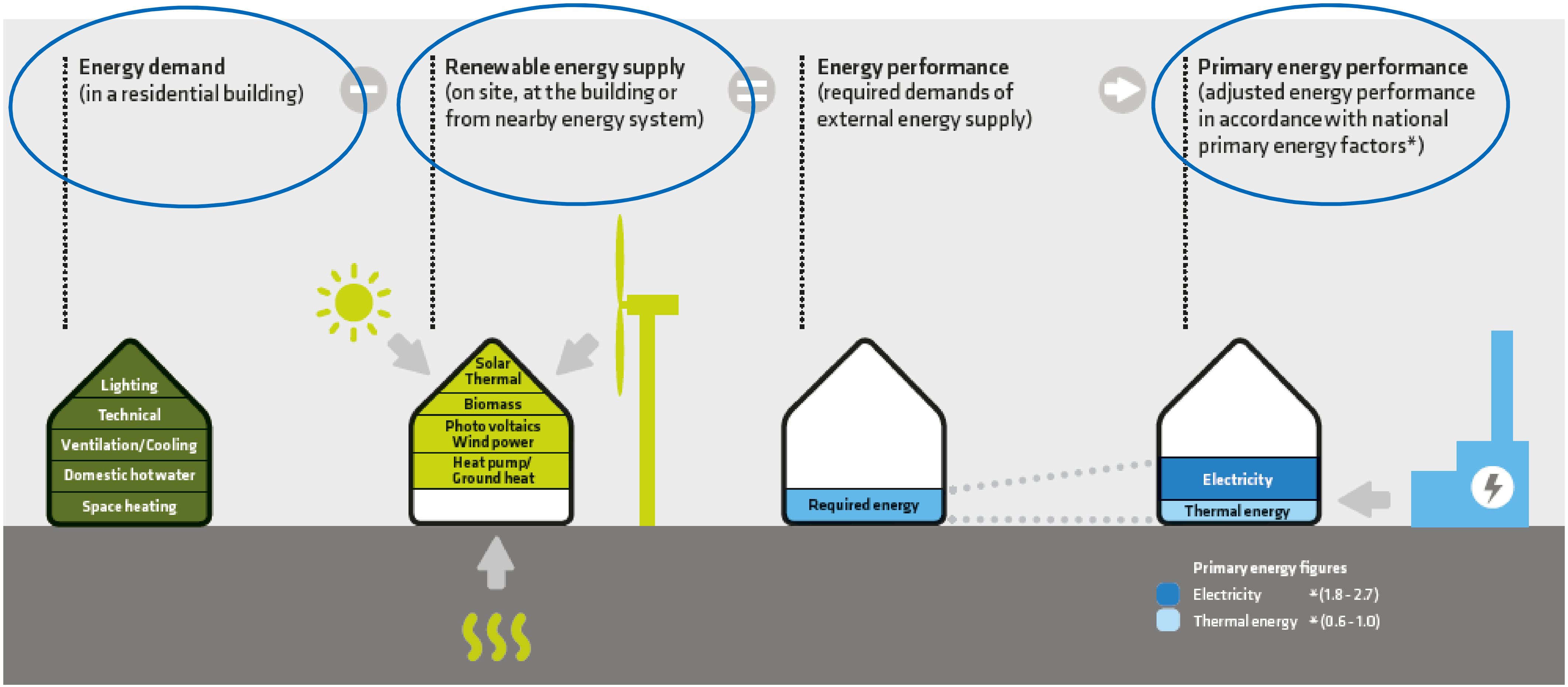
Qualità dell'aria negli ambienti

PARAMETER	VALUE	CRITERIA	SCORE
1.3.1 Standard fresh air supply		The fresh air supply shall be established according to the below limit values for indoor CO_2 concentration in living rooms, bedrooms, study rooms and other rooms with people as the dominant source and that are occupied for prolonged periods: 1. 500 ppm above outdoor CO_2 concentration 2. 750 ppm above outdoor CO_2 concentration 3. 1000 ppm above outdoor CO_2 concentration 4. 1200 ppm above outdoor CO_2 concentration	

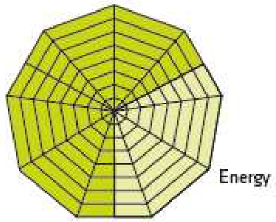
Active House: approfondimenti

Energia





Active House: approfondimenti



Energia

Consumo energetico

PARAMETER	VALUE	CRITERIA	SCORE
2.1 Annual energy demand		1. ≤ 40 kWh/m^2 2. ≤ 60 kWh/m^2 3. ≤ 80 kWh/m^2 4. ≤ 120 kWh/m^2	

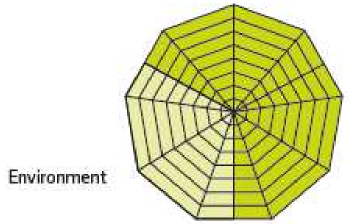
Energia rinnovabile

PARAMETER	VALUE	CRITERIA	SCORE
2.2 Origin of energy supply		1. 100% or more of the energy used in the building is produced on the plot or in a nearby system 2. ≥ 75% of the energy used in the building is produced on the plot or in a nearby system 3. ≥ 50% of the energy used in the building is produced on the plot or in a nearby system 4. ≥ 25% of the energy used in the building is produced on the plot or in a nearby system	

Prestazione energetica

PARAMETER	VALUE	CRITERIA	SCORE
Annual primary energy performance		1. < 0 kWh/m^2 for the building 2. 0-15 kWh/m^2 for the building 3. 15-30 kWh/m^2 for the building 4. ≥ 30 kWh/m^2 for the building	

Active House: approfondimenti

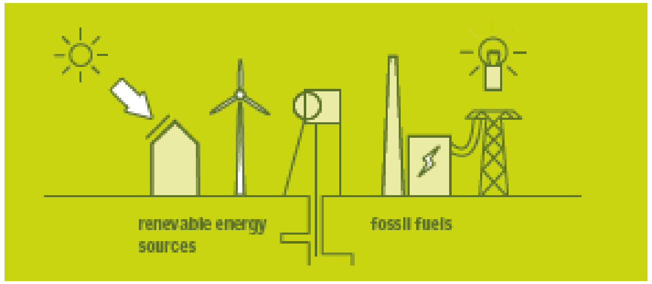


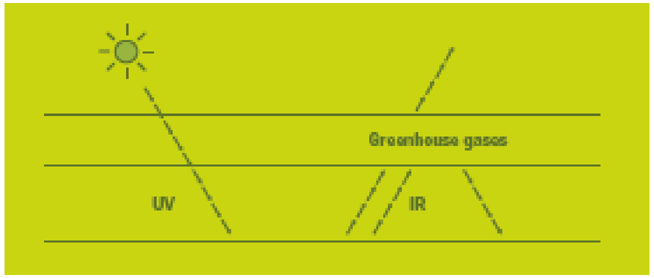
Ambiente

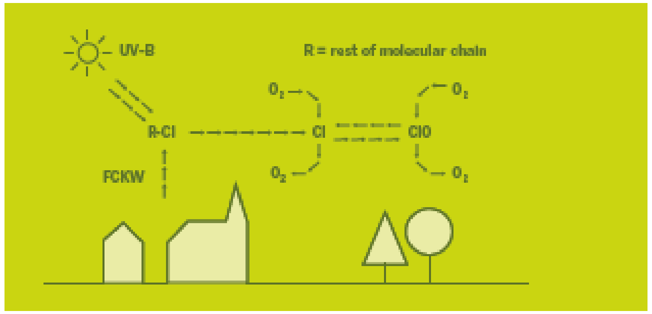
Le sfide che affrontiamo in ambito ambientale si giocano a livello locale, regionale e globale.

Nella progettazione di una Active House è importante che tali sfide vengano prese in considerazione. Soprattutto con l’obiettivo di ottenere una nuova generazione di edifici con un impatto positivo sull’ambiente.

Già in fase di progettazione dovrebbero essere fatte delle considerazioni in merito a come le Active House utilizzano materiali edilizi e risorse.

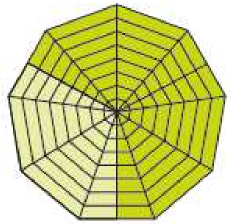






Active House: approfondimenti

Ambiente



Carico ambientale

PARAMETER	VALUE	CRITERIA	SCORE
3.1.1 Building's primary energy consumption during entire life cycle		1. < -150 kWh/m^2 x a 2. < 15 kWh/m^2 x a 3. < 150 kWh/m^2 x a 4. < 200 kWh/m^2 x a	
3.1.2 Global warming potential (GWP) during building's life cycle.		1. < -30 kg CO_2-eq./m^2 x a 2. < 10 kg CO_2-eq./m^2 x a 3. < 40 kg CO_2-eq./m^2 x a 4. < 50 kg CO_2-eq./m^2 x a	
3.1.3 Ozone depletion potential (ODP) during building's life cycle.		1. < 2.25E-07 kg R_{11}-eq/m^2 x a 2. < 5.3E-07 kg R_{11}-eq./m^2 x a 3. < 3.7E-06 kg R_{11}-eq./m^2 x a 4. < 6.7E-06 kg R_{11}-eq./m^2 x a	
3.1.4 Photochemical ozone creation potential (POCP) during building's life cycle.		1. < 0.0025 kg C_3H_4-eq./m^2 x a 2. < 0.0040 kg C_3H_4-eq./m^2 x a 3. < 0.0070 kg C_3H_4-eq./m^2 x a 4. < 0.0085 kg C_3H_4-eq./m^2 x a	
3.1.5 Acidification potential (AP) during building's life cycle.		1. < 0.010 kg SO_2-eq./m^2 x a 2. < 0.075 kg SO_2-eq./m^2 x a 3. < 0.100 kg SO_2-eq./m^2 x a 4. < 0.125 kg SO_2-eq./m^2 x a	
3.1.6 Eutrophication potential (EP) during building's life cycle.		1. < 0.0040 kg PO_4-eq./m^2 x a 2. < 0.0055 kg PO_4-eq./m^2 x a 3. < 0.0085 kg PO_4-eq./m^2 x a 4. < 0.0105 kg PO_4-eq./m^2 x a	
		TOTAL AVERAGE:	

Consumo di acqua

PARAMETER	VALUE	CRITERIA	SCORE
3.2.1 Minimisation of freshwater consumption during building's use[1]		Calculation is based on the national average water consumption per building per year 1. Improvement ≥ 50% (vs average) 2. Improvement ≥ 30% 3. Improvement ≥ 20% 4. Improvement ≥ 10% $\% = \frac{\text{National average} - \text{building consumption} \times 100}{\text{National average}}$	

Edilizia sostenibile

PARAMETER	VALUE	CRITERIA	SCORE
3.3.1 Recyclable content		By weight, the average of recycled content for all building materials (weighted by the proportion of the material in the building) could be: 1. ≥ 50% 2. ≥ 30% 3. ≥ 10% 4. ≥ 5% 80% of the weight of the building should be accounted for. (In the recycled content, we take into account internal, pre-consumer and post-consumer recycling).	
3.3.2 Responsible sourcing		1. 100% of the wood used is certified (FSC, PEFC) and 80% of the new material suppliers have a certified EMS 2. 80% of the wood used is certified (FSC, PEFC) and 50% of the new material suppliers have a certified EMS 3. 65% of the wood used is certified (FSC, PEFC) and 40% of the new material suppliers have a certified EMS 4. 50% of the wood used is certified (FSC, PEFC) and 25% of the new material suppliers have a certified EMS	
		TOTAL AVERAGE:	

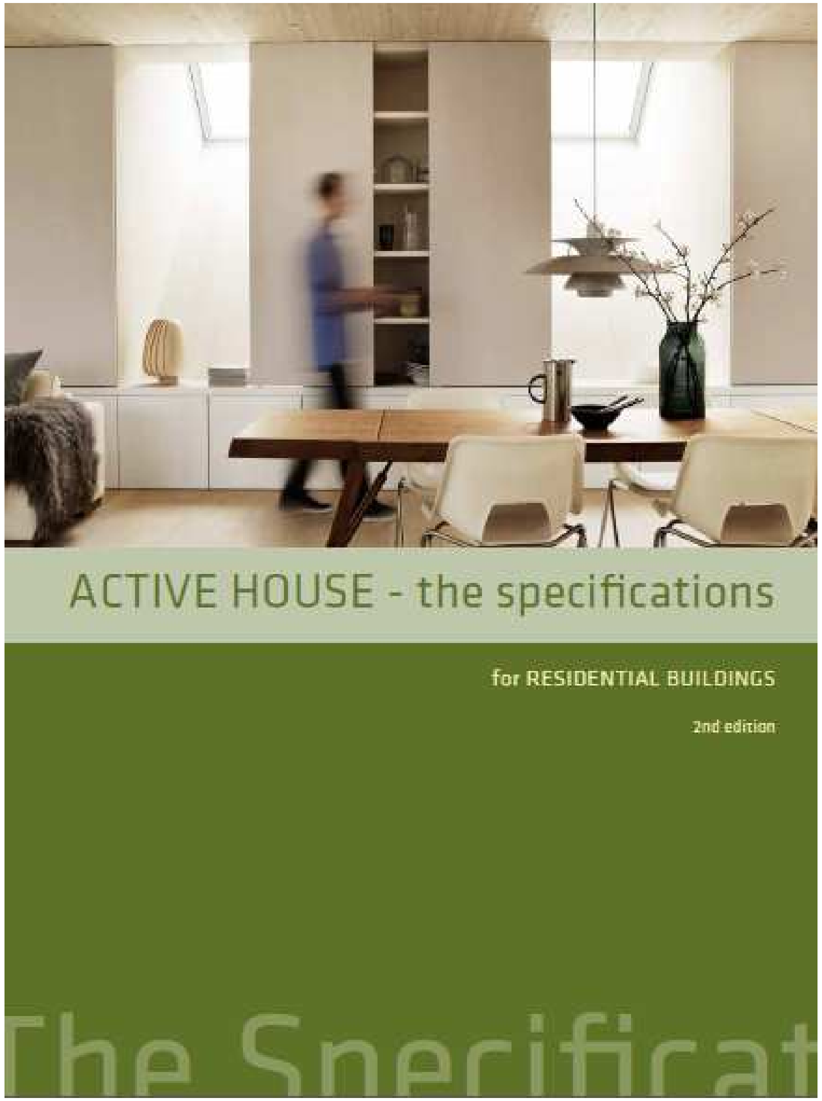
Active House: approfondimenti

Manuale sui dettagli tecnici

La seconda edizione del manuale può essere scaricato dalla homepage del sito Active House:
www.activehouse.info

Sono disponibili alcune copie.

Iscriviti alla newsletter:
www.activehouse.info



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Progetti in evidenza sulla homepage del sito

COMPLETION: 13 DECEMBER 2012
BOTTICELLI PROJECT - CASA ECO PASSIVHAUS -
MASCALUCIA - CT - SICILY, ITALY
Botticelli Project intends to diffuse concept of Active H... building which focus the Third Industrial Revolution [J...

COMPLETION: AUGUST 2011
CARBONLIGHT HOMES
KETTERING, UNITED KINGDOM (GREAT BRITAIN)
The CarbonLight Homes provide bright, healthy living s... efficiency and a respect for the environment. This proje... understanding of sustainable living...

COMPLETION: MARCH 2013
DE POORTERS VAN MONTFOORT
MONTFOORT, NETHERLANDS
De Poorters of Montfoort are the first houses in the Net... principles of Active House, using a sustainable renova... VELUX Group and Danfoss...

COMPLETION: JUNE 2012
ECO-ENERGY RETROFIT
BELFAST, UNITED KINGDOM (GREAT BRITAIN)
Retrofitting an1896 solid wall terraced house within the Trias Energetica concept and Active House principles against a 1990 baseline

COMPLETION: NOVEMBER 2009
ENERGYFLEXHOUSE
TÅSTRUP, COPENHAGEN, DENMARK
EnergyFlexHouse is two one's family houses, each of 2... a test building, and the other building is a one family h...

COMPLETION: 18.10.2013
GREAT GULF ACTIVE HOUSE
THOROLD, ONTARIO, CANADA
Great Gulf Active House was achieved through a collab... architects, the award-winning Toronto architecture firm committed to...

COMPLETION: 2009
GREEN LIGHTHOUSE
COPENHAGEN, DENMARK
Green Lighthouse is Denmark's first public CO2 neutral... than a year in a close public/private partnership.

COMPLETION: APRIL 2009
HOME FOR LIFE
LYSTRUP, DENMARK
Home for Life is inspired by a traditional Danish 1... of home has a relatively small surface with many p...

COMPLETION: UNDER CONSTRUCTION
HOTT | HOUSE OF TOMORROW T
STERKSEL NB, NETHERLANDS
HoTT is dutch's first building completely designed... Slimbouwen and Active House. The layout is base... residential program.

COMPLETION: SEPTEMBER 2009
HOUSE OF THE FUTURE
REGENSBURG, GERMANY
How will we live and heat our homes in the future? ... Regensburg, Germany impressively demonstrates t...

COMPLETION: SEPTEMBER 2011
ISOBO AKTIV - A HOUSE FOR TH
SANDNES, NORWAY
Jadarhus was among the first in Norway to develop... this category, ISOBO, was established in 2003. Th... new active design...

COMPLETION: NOVEMBER 2010
LICHTAKTIV HAUS
HAMBURG, GERMANY
LichtAktiv Haus is an energy-efficient renovation of...

COMPLETION: 2010
LUMINA HOUSE
DLUGOLEKA, POLAND
Lumina House is an energy efficient, ecological so... comfortable, intelligent, optimal and affordable new...

COMPLETION: APRIL 2012
NATURFREUNDEHAUS KNOFELEB
SCHNEEBERG/KNOFELEBEN A-2652 HIRSCHWANG, AUSTRIA
The old hut burned down in April. New building sho... friendly than the old one and more user-friendly for t...

COMPLETION: 2009
OSRAM CULTURE CENTRE
COPENHAGEN, DENMARK
A very attractive energy and indoor climate renovation of a former industrial building, now in use as a cultural centre as part of a neighbourhood renewal project.

COMPLETION: OCTOBER 2009
SOLAR-ACTIVEHOUSE
KRAIG, AUSTRIA
Energy used for heating/hot water - whether it's from wood, coal, oil or natural gas - has literally been burned up. A solution is the solar-activehouse

COMPLETION: NOVEMBER 2010
SOLHUSET - DENMARK´S MOST CLIMATE FRIENDLY NURSERY
HØRSHOLM, DENMARK
Children in Hørsholm can now play in the most climate-friendly nursery in Denmark.

COMPLETION: OCTOBER 2010
SUNLIGHTHOUSE
PRESSBAUM, WIEN, AUSTRIA
Sunlighthouse is Austria's first carbon-neutral single-family house. Nestled in a wooded, mountainous region, the home's sloping roof and architectural elements take full advantage of the sun to...

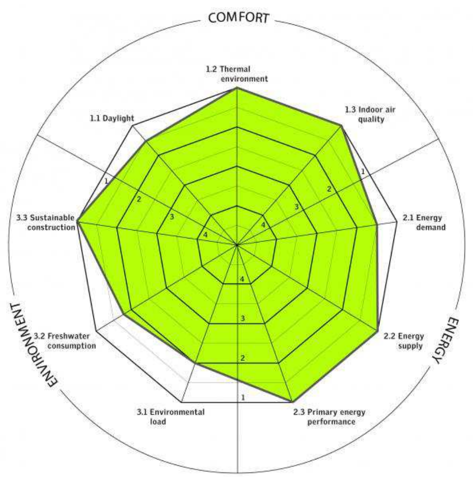
COMPLETION: SEPTEMBER 2011
THE FIRST ACTIVE HOUSE IN RUSSIA
MOSCOW, RUSSIAN FEDERATION
The First Active House in Russia is designed to set a new standard for residential house construction in Russia. The house design is based on the Active House principles.

COMPLETION: DECEMBER 2012
TRANSFORMATION POORTERS VAN MONTFOORT
MONTFOORT, NETHERLANDS
- DE POORTERS VAN MONTFOORT - Light is an experience, air is the future and space makes living possible.

COMPLETION: 2011
VELUXLAB
MILAN, ITALY
VELUXlab is the first Italian nearly zero energy building in a University Campus. It is placed in Bovisa Campus of Politecnico of Milan and it is a new laboratory for research.

Active House

Great Gulf Active House



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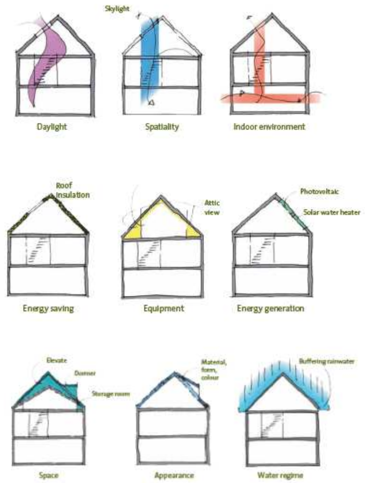
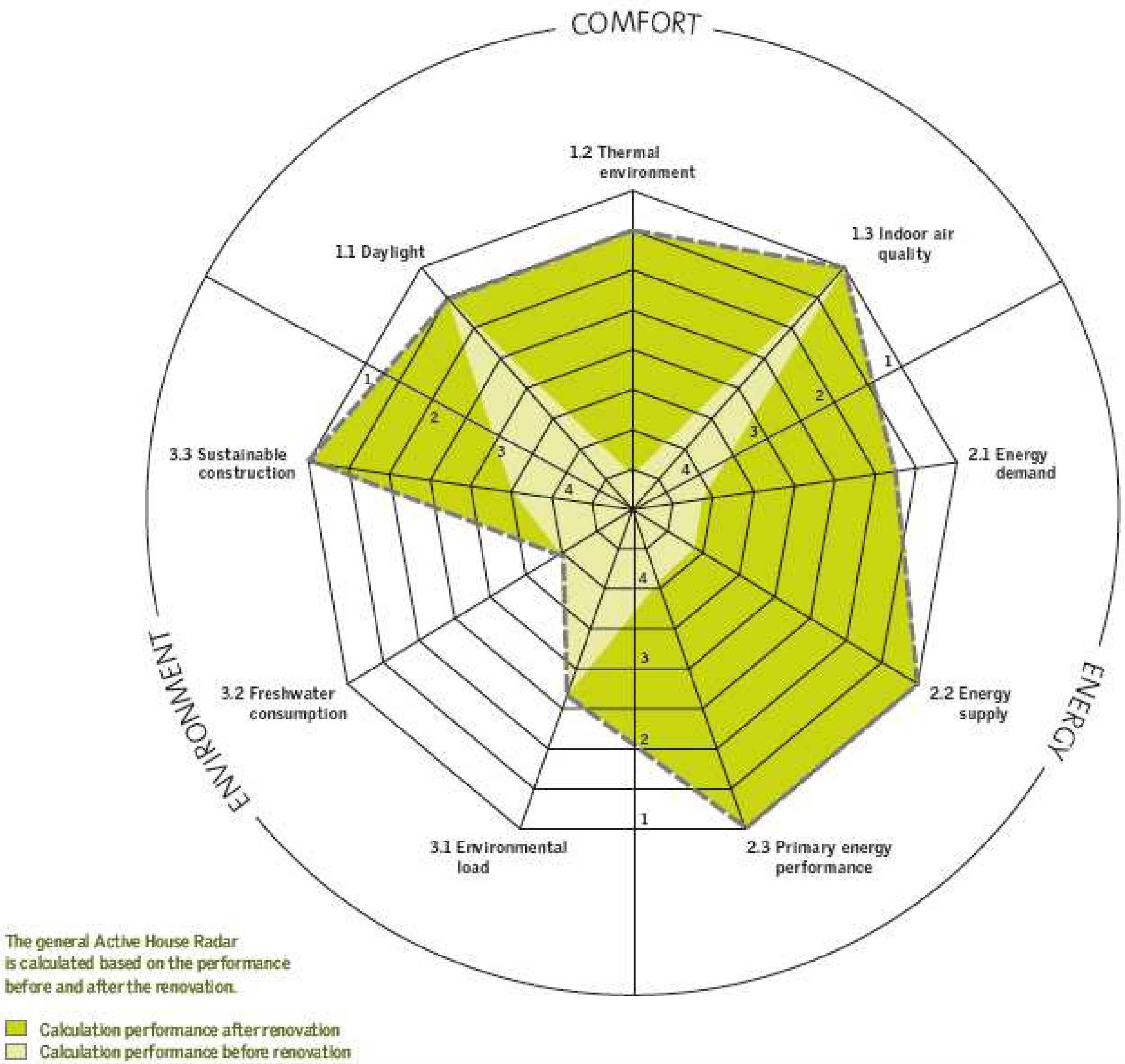
Ristrutturazione Montfoort



Project description

Building name:	De Poorters van Montfoort
Building type:	10 terraced single-family homes
Location:	Montfoort, the Netherlands
Active House evaluation basis:	Renovation
No. of storeys and areas	3 floors
Heated floor area:	Gross m² 131 m² Net m² 122 m²
Primary constructions:	Internal and external walls of bricks. Bearing interior walls of concrete. Concrete slabs.
Primary heating supply:	Electricity
Heating system:	Water-water heat pump supplemented by thermal solar collectors
Renewable energy:	Thermal solar collectors and heat pump for hot water supply and room heating. PV for electricity generation.

Active House
Ristrutturazione Montfoort



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ISCRIVITI ALLA NEWSLETTER

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Grazie per l’attenzione!

Vuoi far parte dell’Alleanza e seguirne gli sviluppi?
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Contatta la segreteria:
secretariat@activehouse.info

edilportale® TOUR 2014

La mostra convegno in 18 tappe
su Efficienza energetica,
Luce e Ventilazione naturale,
Acustica e Active House.

in collaborazione con VELUX

partner SCHÜCO ROCKWOOL KNAUF

Bolzano, *16 aprile 2014*

Il protocollo Active House in clima mediterraneo:
ricerche e sperimentazioni sviluppate nel laboratorio VELUXlab al Politecnico di Milano

Gabriele Masera – Politecnico di Milano

VELUX®


POLITECNICO DI MILANO
VELUX lab

Non è la specie più forte o la più intelligente a sopravvivere ma quella che si adatta meglio al cambiamento.

Charles Darwin, *L' origine delle Specie, 1859*


POLITECNICO DI MILANO
VELUX lab

Net Zero Energy Emissions

Net Zero Energy Emissions

Net Zero Source Energy

Net Zero Site Energy

Net Zero Source Energy

Net Zero Source Energy

Net Zero Site Energy

Net Zero Site Energy

Net Zero Energy Costs

Net Zero Energy Emissions

Net Zero Energy Costs

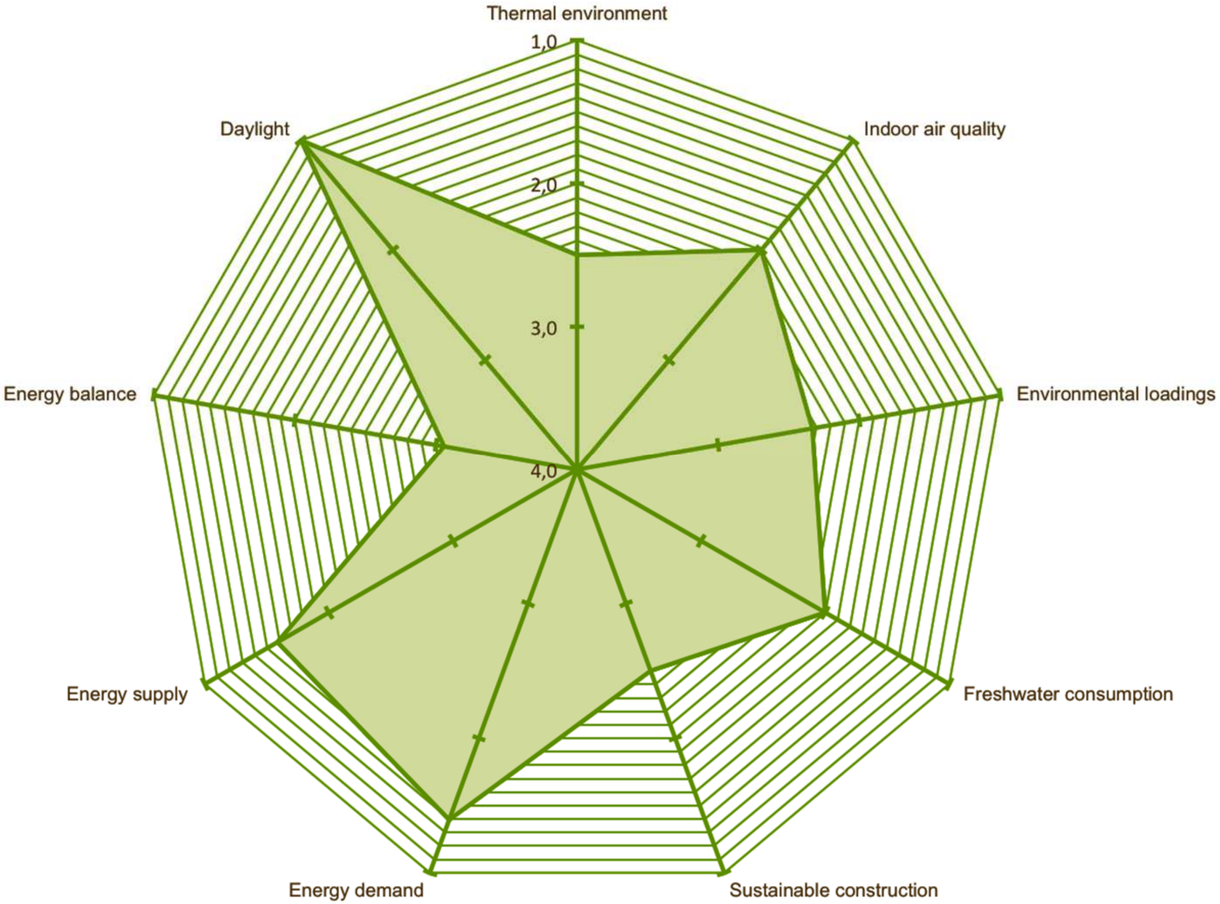
Net Zero Energy Emissions

Net Zero Energy Costs

Net Zero Site Energy

Certificazione Active House

Dati Radar



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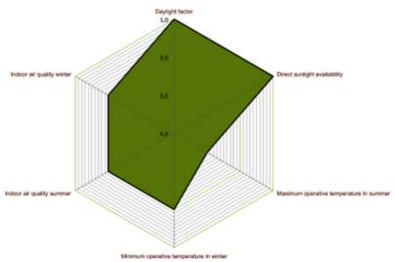
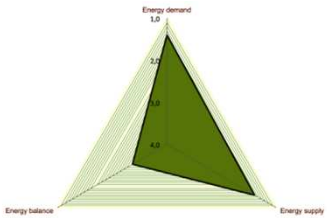
Primo edificio italiano "Net Zero Energy" inserito in un campus universitario

Prima Active House registrata in Italia

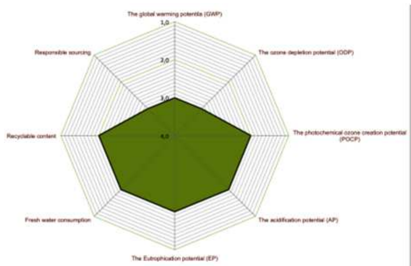
Comfort



Energia

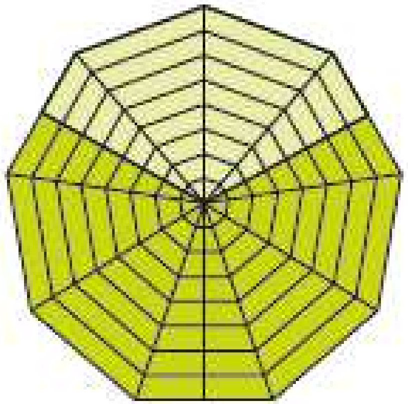


Ambiente



VELUX lab

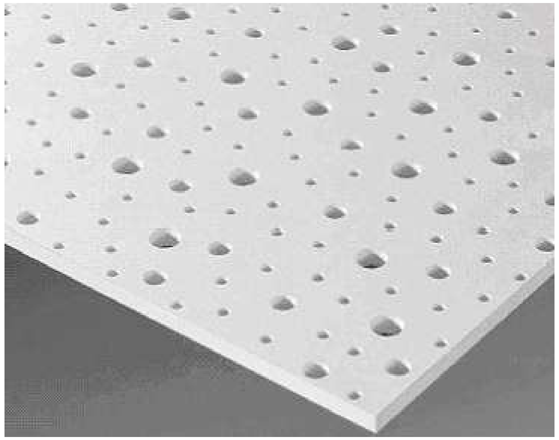
COMFORT



Componenti

Struttura in acciaio, solaio a pavimento in lamiera grecata e getto collaborante

Iper-isolamento in poliuretano, polistirene, in lana minerale e lana di legno



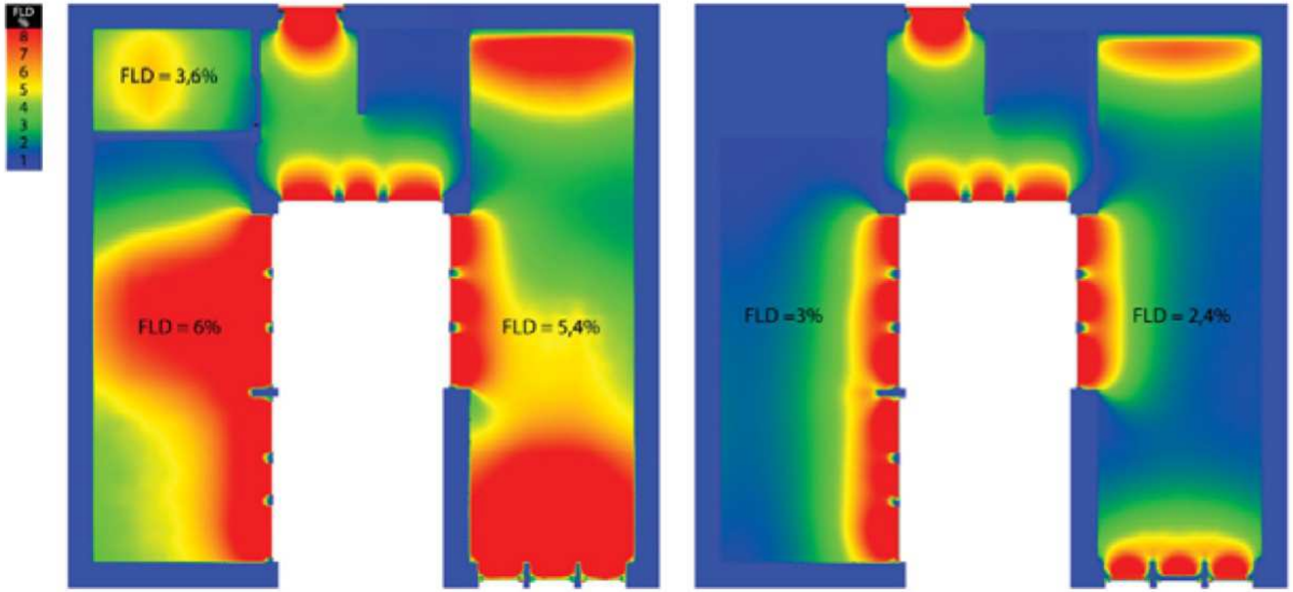
Pannello in gesso e zeolite
KNAUF-CLEANEO

Vetrate triplo vetro basso emissivo. Serramento a taglio termico SCHÜCO

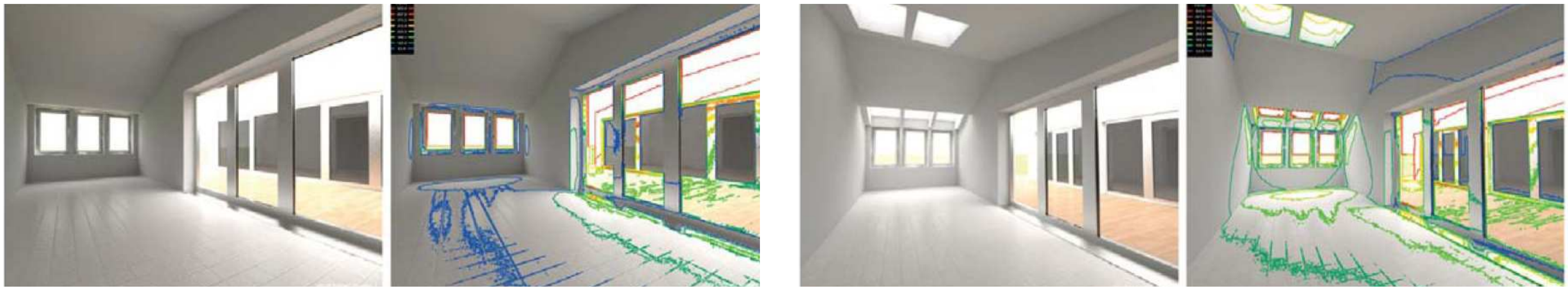
Finestre tetto VELUX ad alte prestazioni

Controsoffitto "Knauf-Cleaneo“

Analisi illuminotecniche

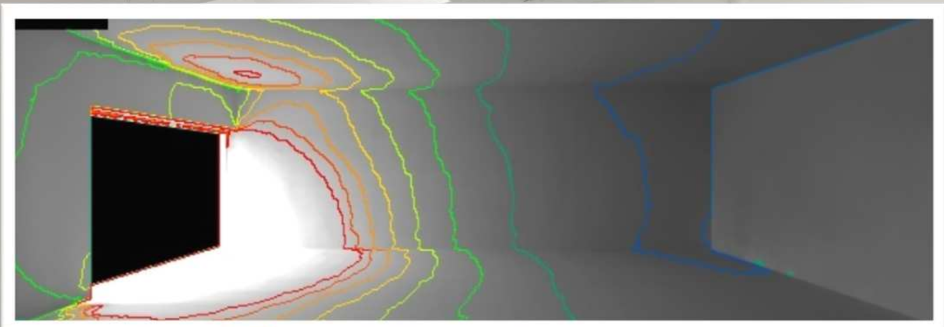


Fattore medio di luce diurna e Rapporto aeroilluminante. Nella situazione reale (a sinistra), la luce zenitale assicura alti valori di FLD (blu-verde scuro) e di RAI (0,10 minimo – Comune di Milano), rispetto alla situazione di studio (a destra) priva di aperture zenitali.

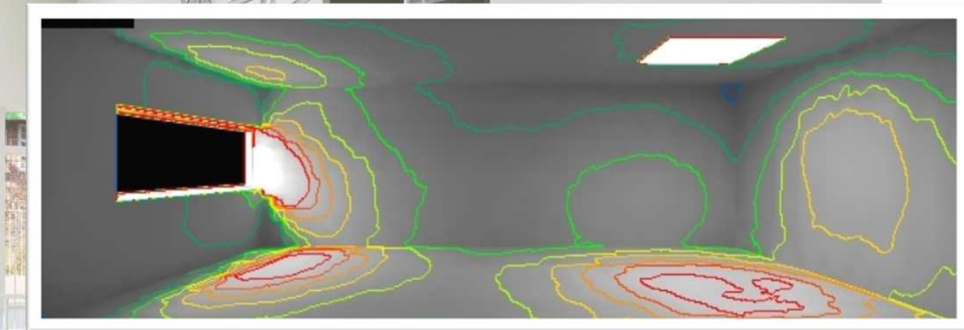


Luminanza. Il confronto della luminanza (21 Giugno - h 12:00) fra la situazione reale (in presenza di lucernari) e di studio (in assenza di lucernari), mostra come la luce zenitale renda i valori più omogeneamente distribuiti all’interno dei locali. Inoltre, il fenomeno dell'abbagliamento è ben controllato dai sistemi di schermatura posti all’esterno.

Distribuzione della luce con aperture zenitali



6m² superficie vetrata
154 lux medi



4m² superficie vetrata (-33%)
225 lux medi (+45%)

Agua de MARMORE

Team:

Luigi Ferrario
Camilla Massironi
Alice Schinella

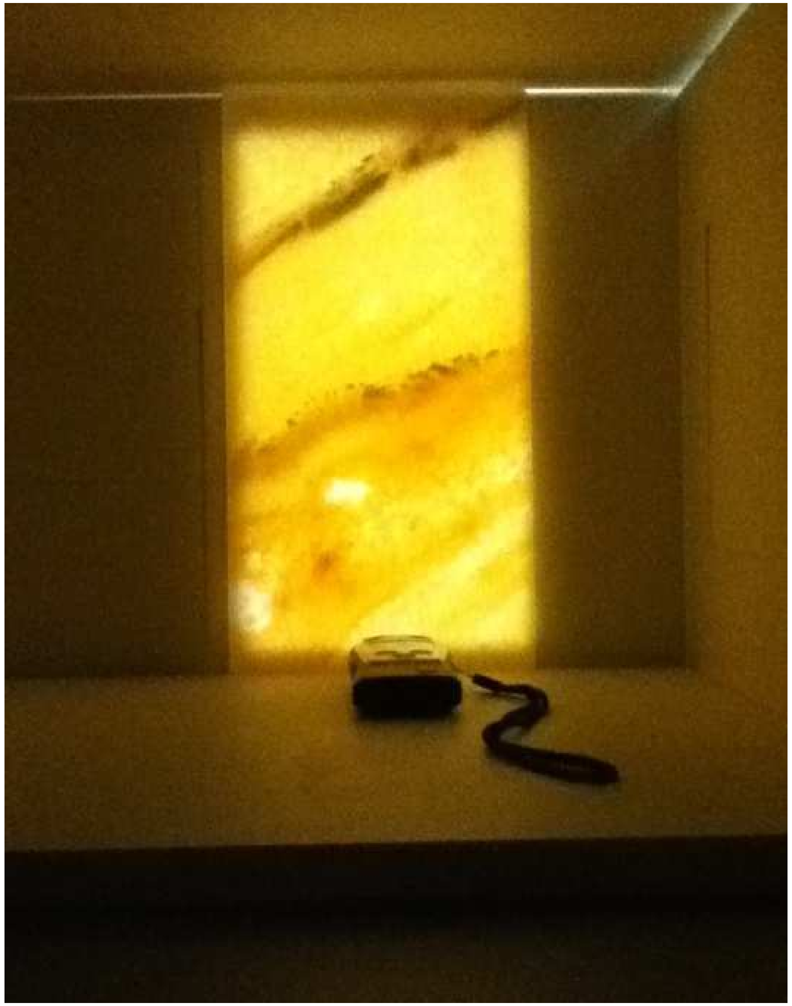
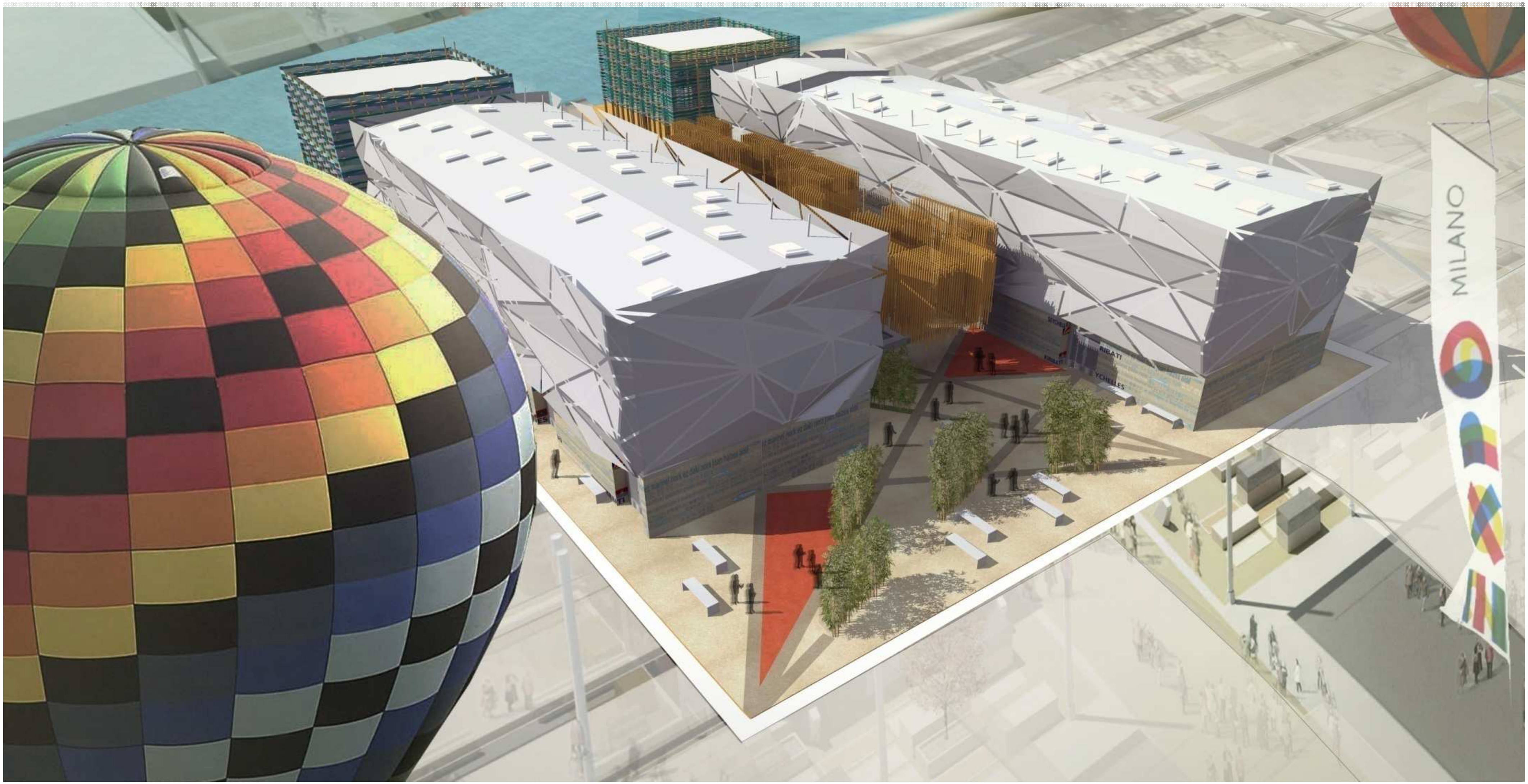


Fig. 3.4.58

Fig. 3.4.59

Il Cluster “Island, sea and food”

RYTHM OF DISCOVERY



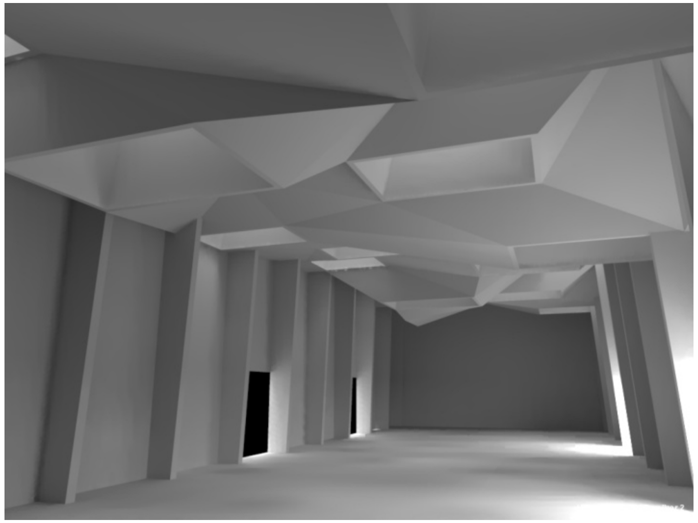
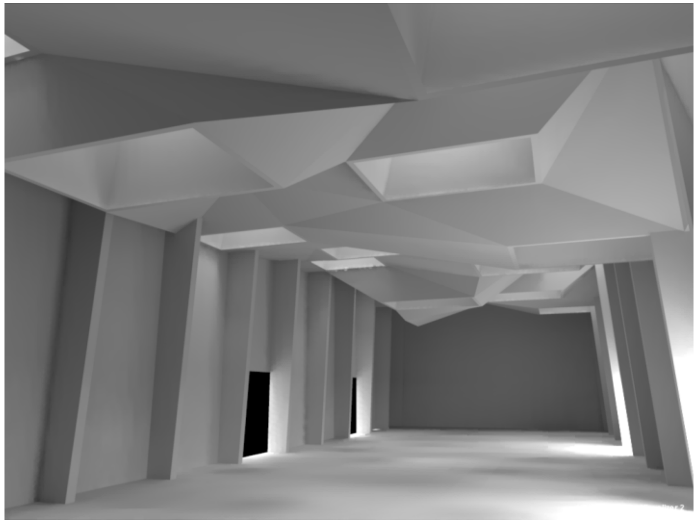
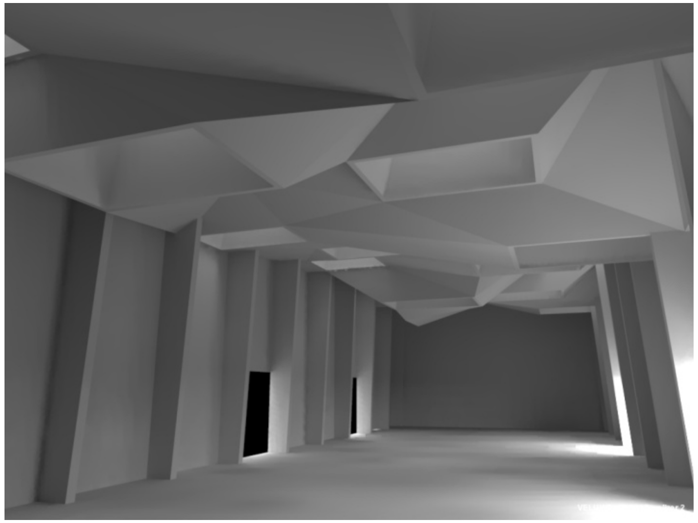
MILANO 2015

NUTRIRE IL PIANETA
ENERGIA PER LA VITA

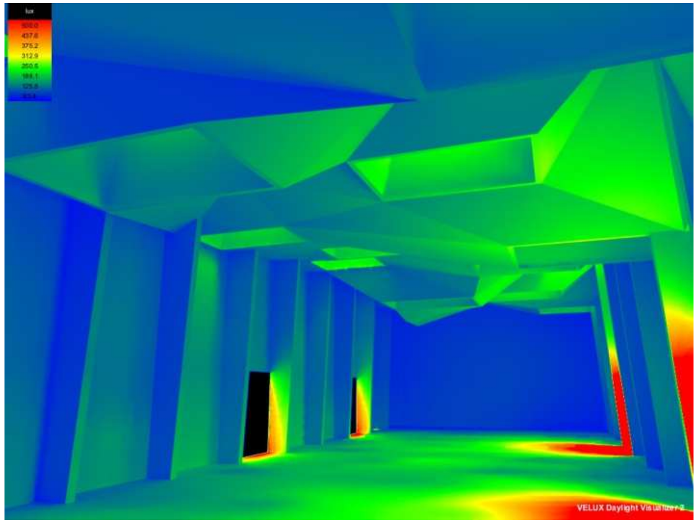
Team:

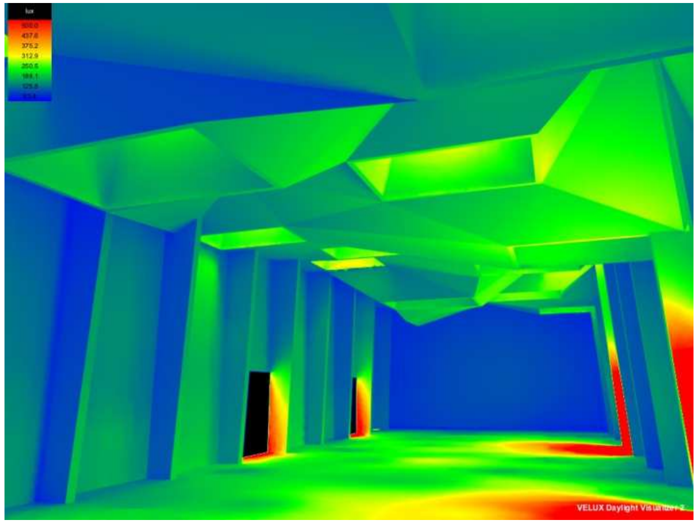
Giuliana Iannacone
Andrea Vanossi
Paola Trivini
Valentina Gallotti
Chiara Valsecchi

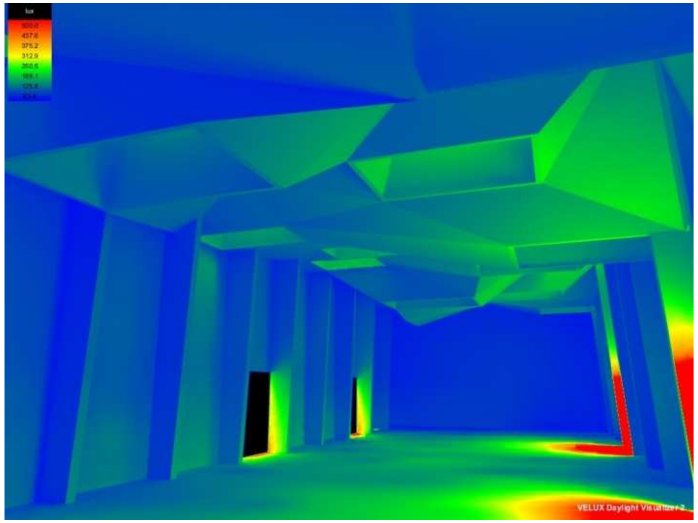
Analisi illuminotecniche

21 aprile | 21 giugno | 21 ottobre



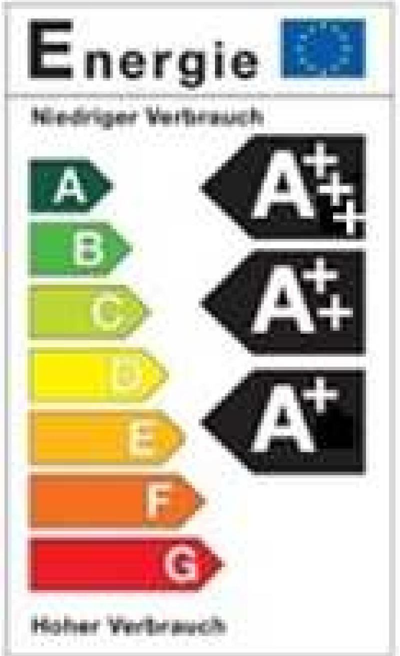


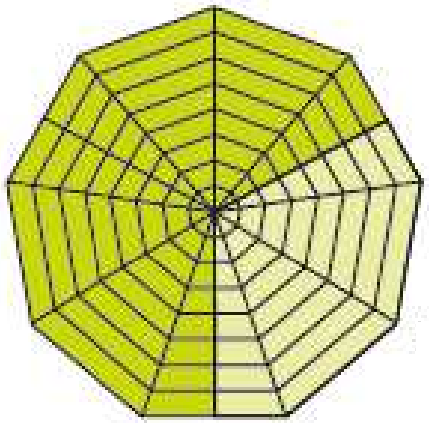


ILLUMINANZA - Padiglione EST - Cielo parzialmente coperto

In condizioni di cielo coperto è possibile verificare ottimi livelli di illuminamento dell’intero spazio espositivo con valori di illuminanza omogenei e prossimi ai 250 lux. È quindi possibile verificare l’efficacia dei “Vulcani di luce” anche in condizioni meteo meno favorevoli.

ENERGIA



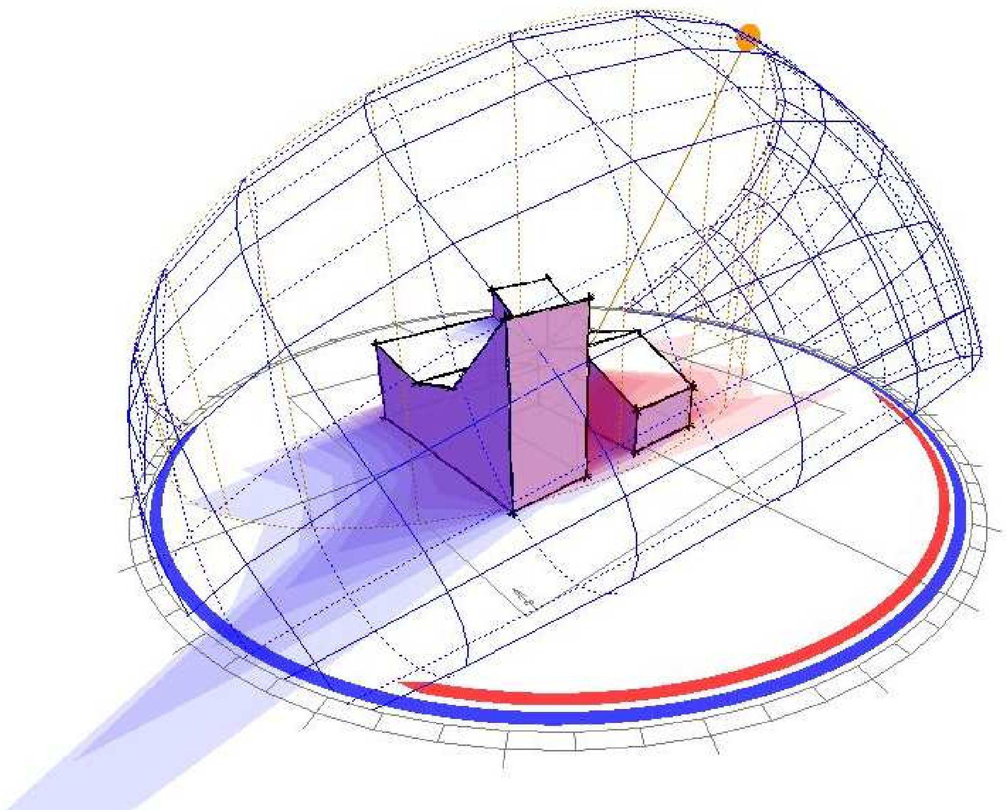


VELUXlab:

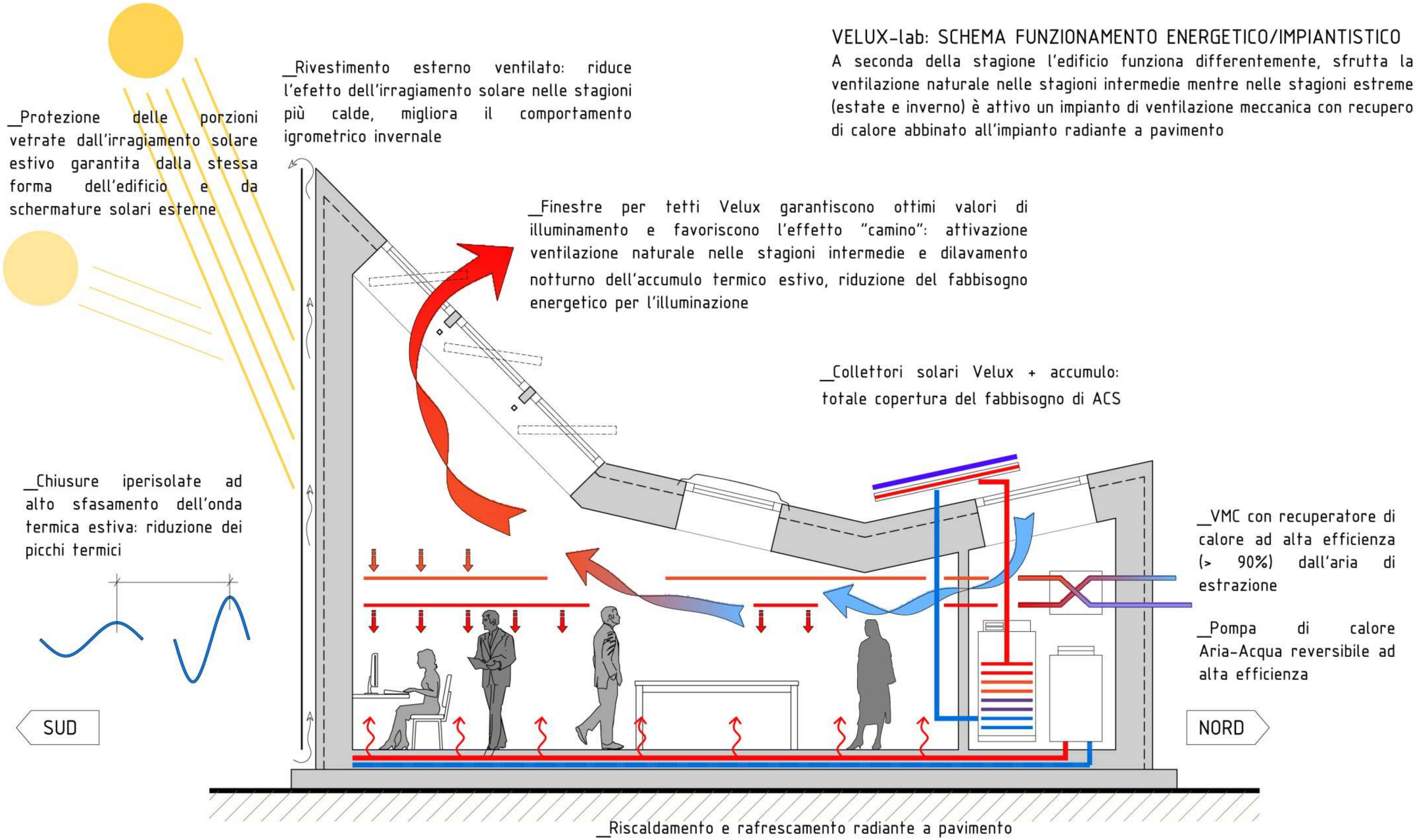
_ ottimizzazione luce e ventilazione naturale
calcolo FLD

_ ottimizzazione energetica

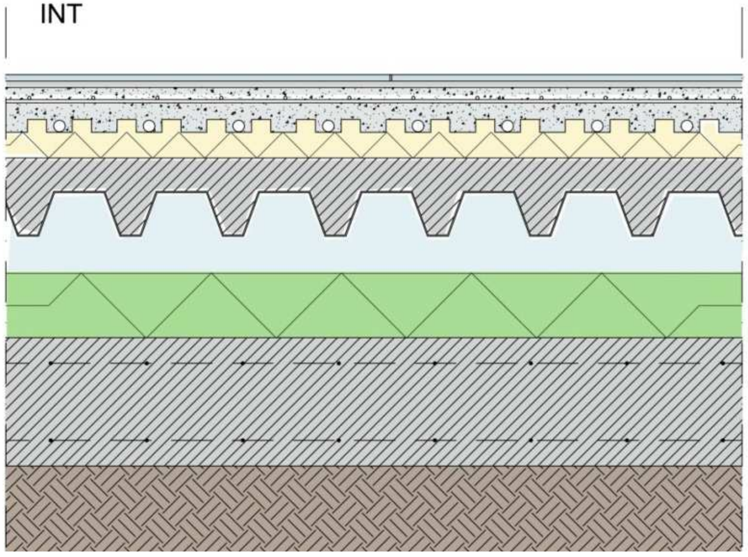
_ rilevazione dati continua



Schema energetico

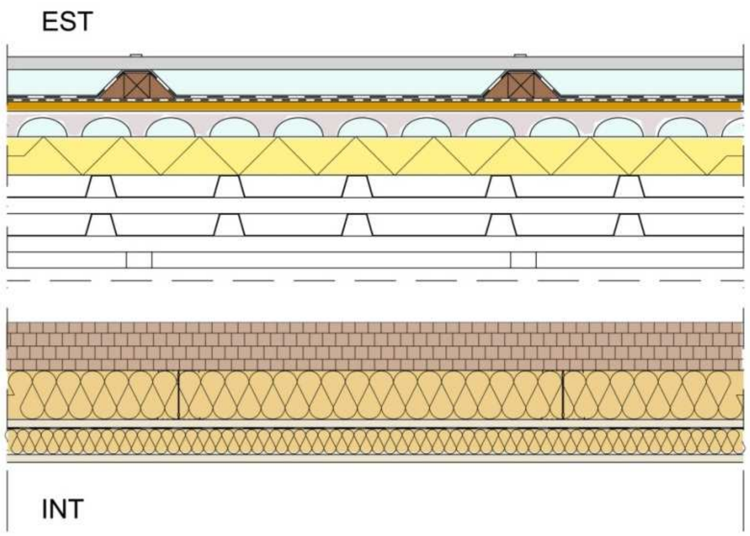


Prestazioni



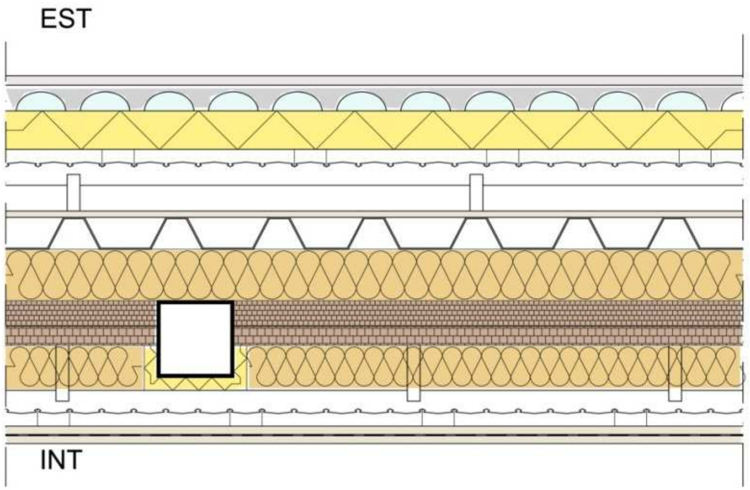
Solaio controterra U = 0.214 W/m2K

Ground floor slab



Copertura U = 0.133 W/m2K

Roof



Chiusura estrena U = 0.124 W/m2K

External wall

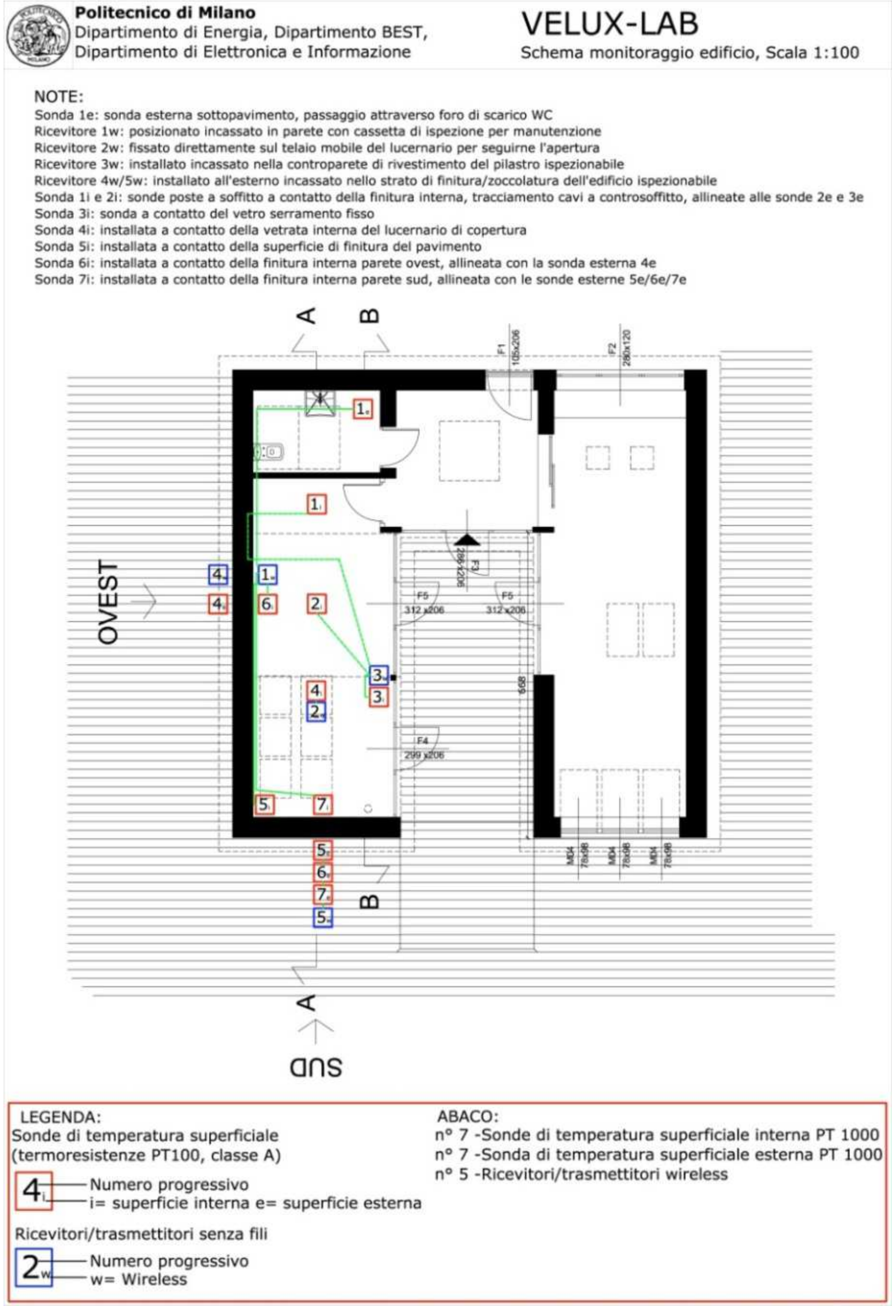
Impianti

Ventilazione meccanica (portata massima 470 m^3/h) con recuperatore di calore (>90%)

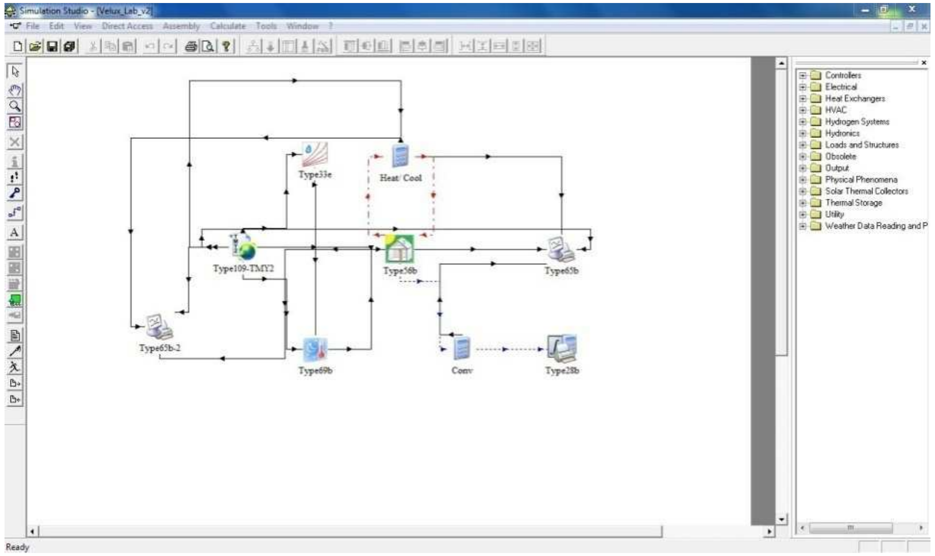
Riscaldamento (90 W/m^2) e raffrescamento (30 W/m^2) radiante a pavimento

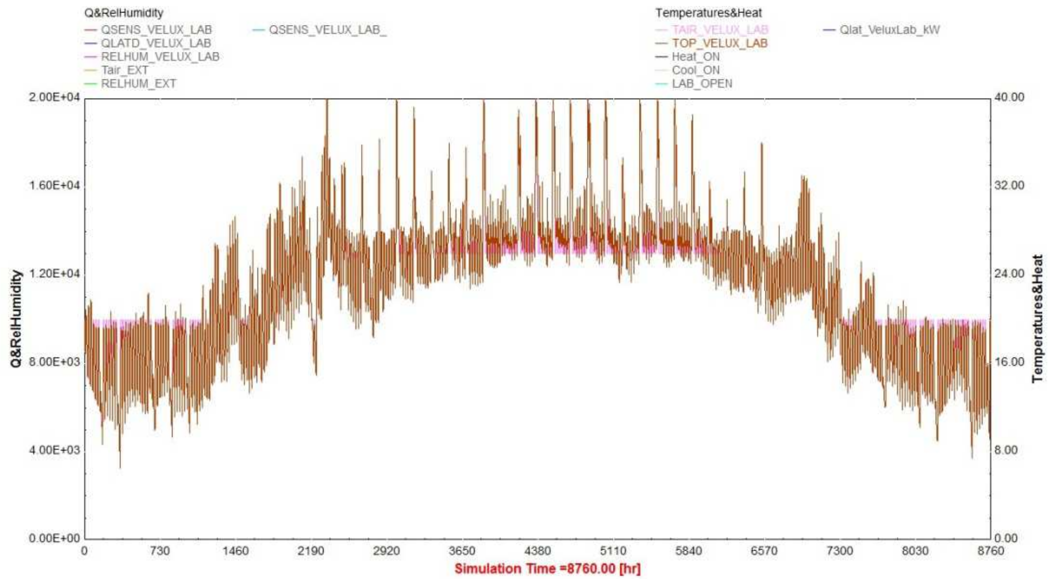
Pompa di calore aria-acqua (7 kW per riscaldamento, 6.1 kW per il raffrescamento). Solare termico (3 collettori solari, 160 l serbatoio di accumulo)

Sistema di monitoraggio Wireless

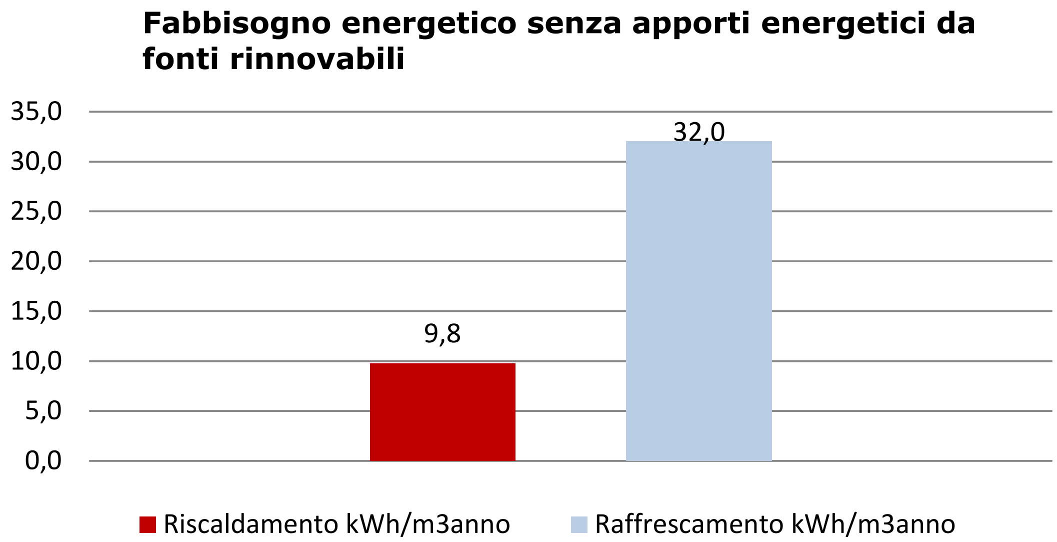


Simulazioni energetiche e sistema di servizi

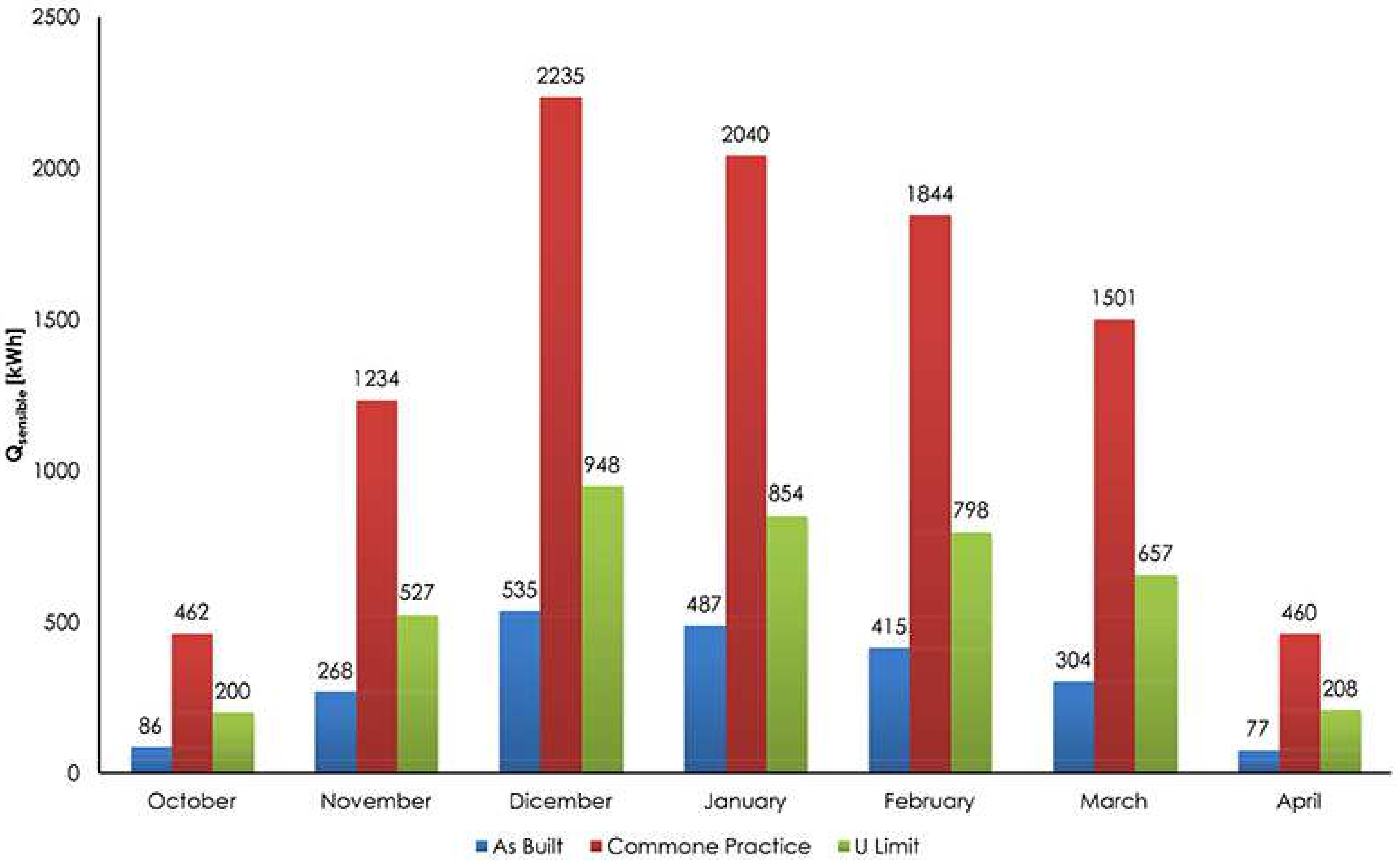




Valutazione energetica dell'edificio mediante simulazioni energetiche in regime dinamico svolte con il software **TRNSYS.**

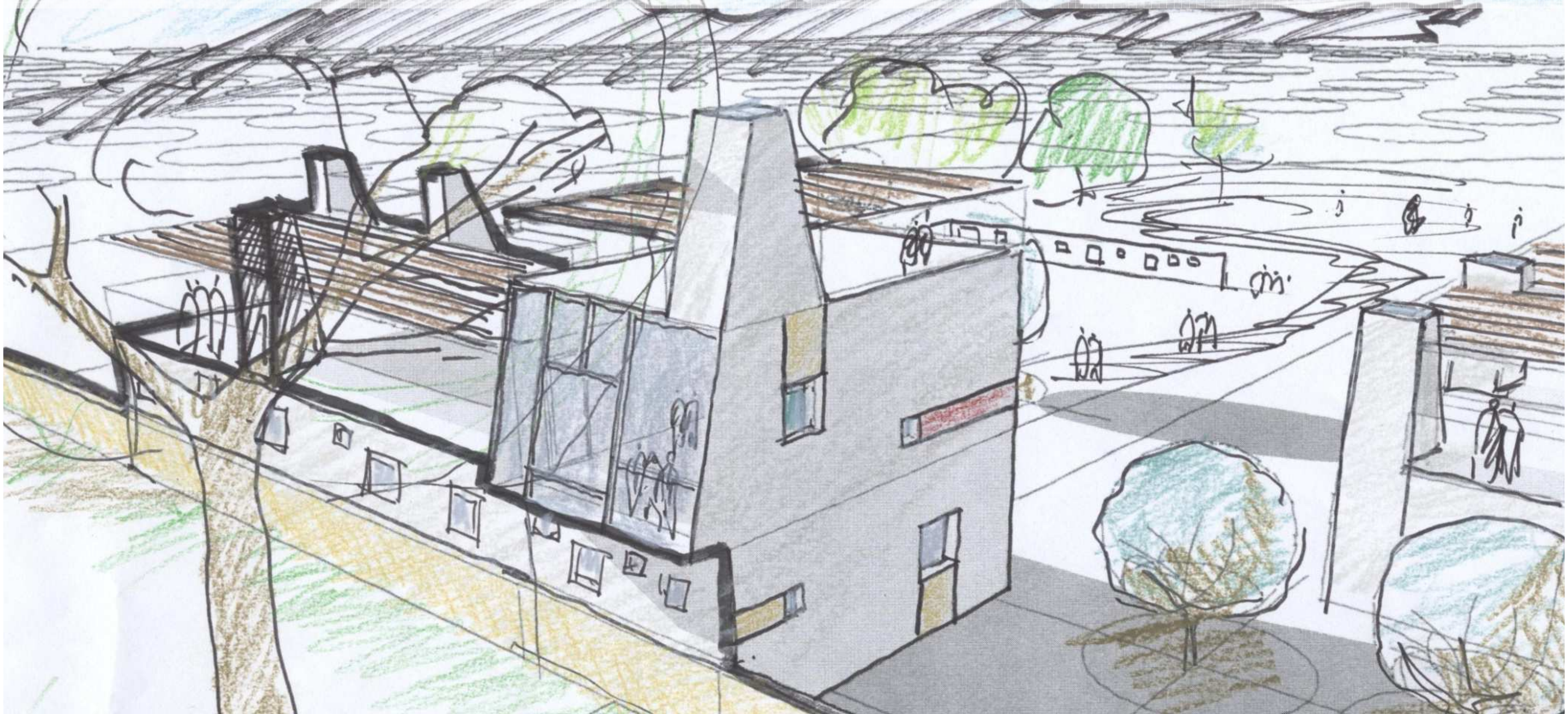


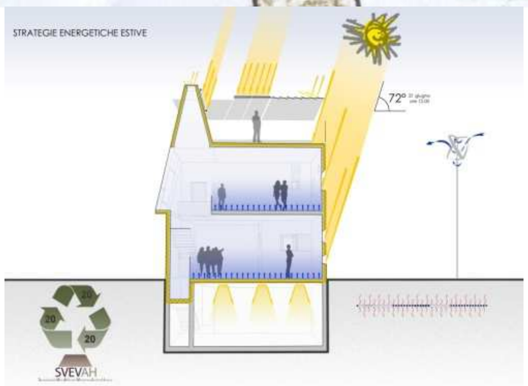
Fabbisogno energetico mensile _ VELUXlab Campagna sperimentale inverno 2013

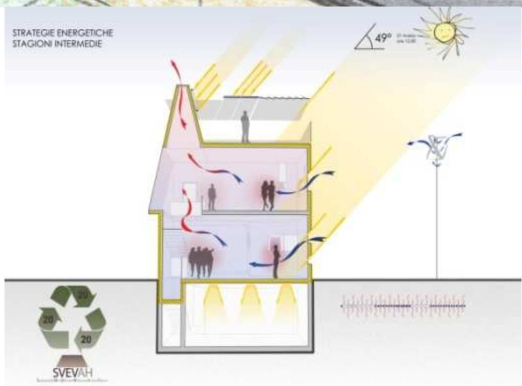


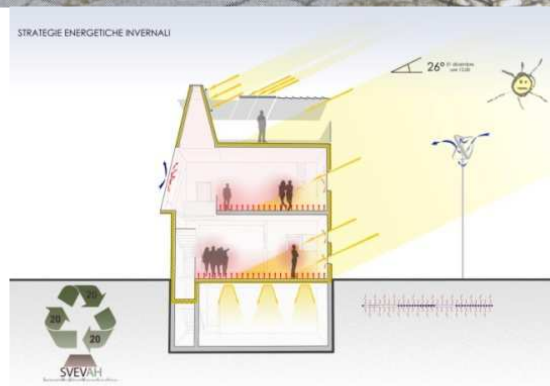
SvevAH

Arianna Brambilla (Politecnico di Milano – Aalborg University)



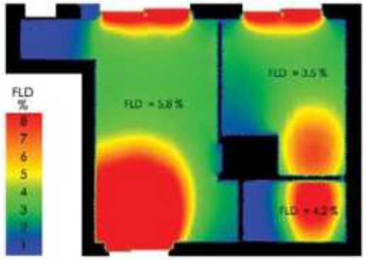






Team:

Nicola Falcone
Chiara Zanello
Valentina Zorzi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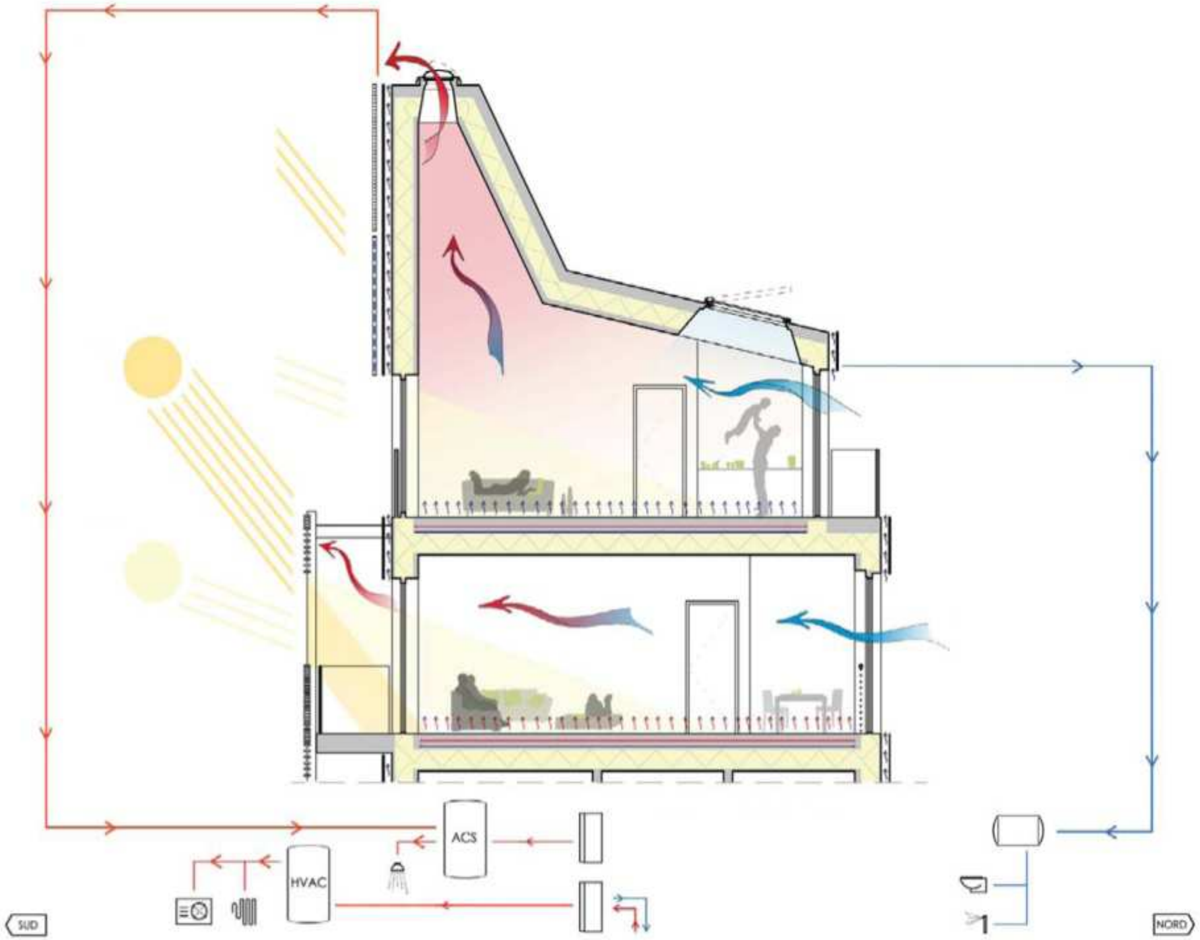
ACS
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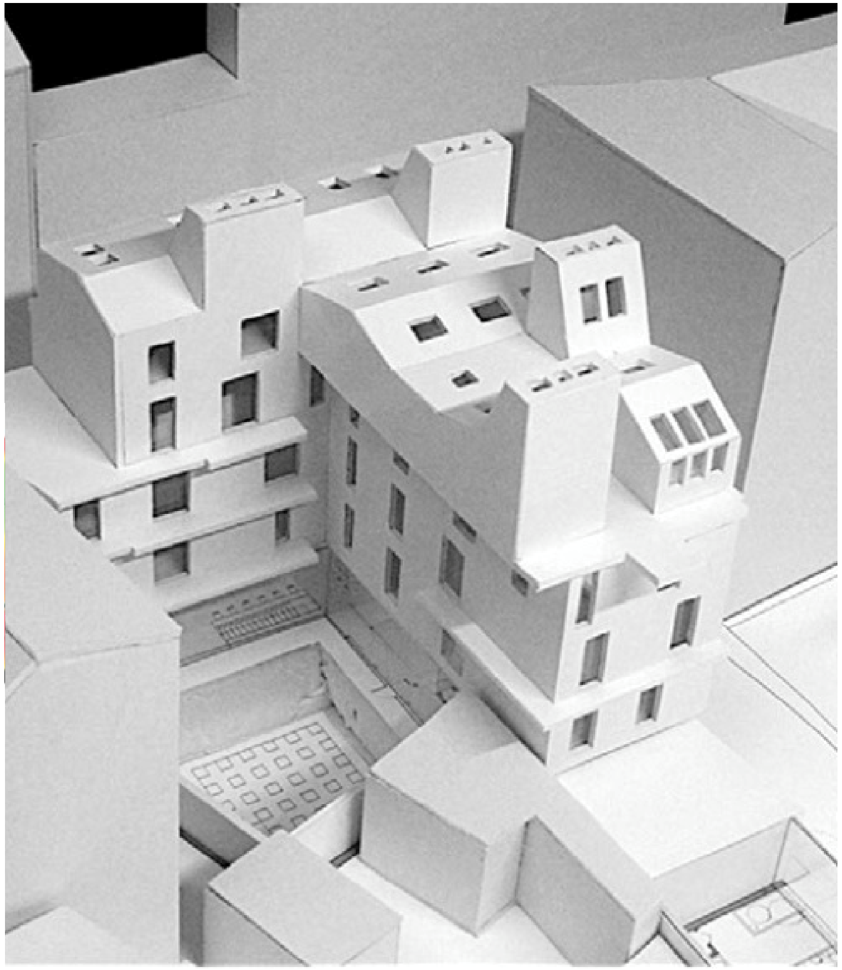
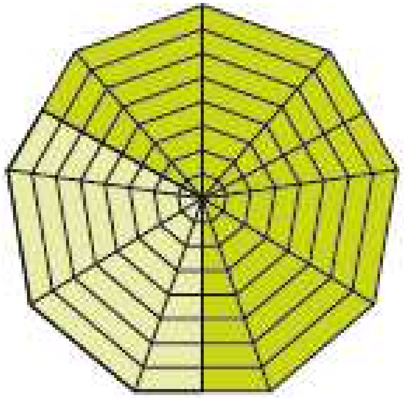


AMBIENTE



VELUXlab: Cantiere

Riuso dell' edificio

Bilbao 2007

Roma 2008

Milano, Rho Fiera, 2009

Politecnico di Milano, Campus Bovisa, 2011

1° Agosto 2011, h 6:00
Politecnico di Milano, Campus Bovisa

VELUXlab: inizio del cantiere

4 mesi di lavoro:
Più di 20.000 viti, 100 m^3 di isolamento

Materiali

Pannelli isolanti in fibra di legno

Pannelli isolanti in lana di roccia

Sistema isolante composto in poliuretano

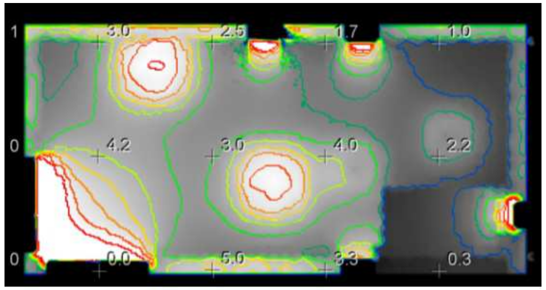
Polistirene sbriciolato

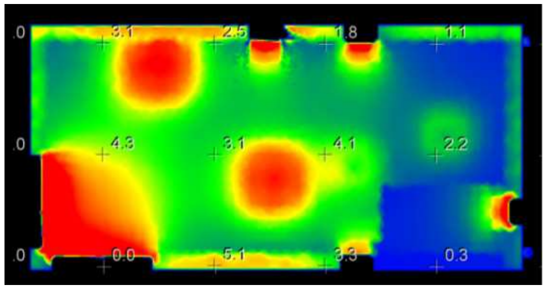
Pannelli in OSB


POLITECNICO DI MILANO
VELUX lab

Prima Active House a Bergamo – Maison Verte

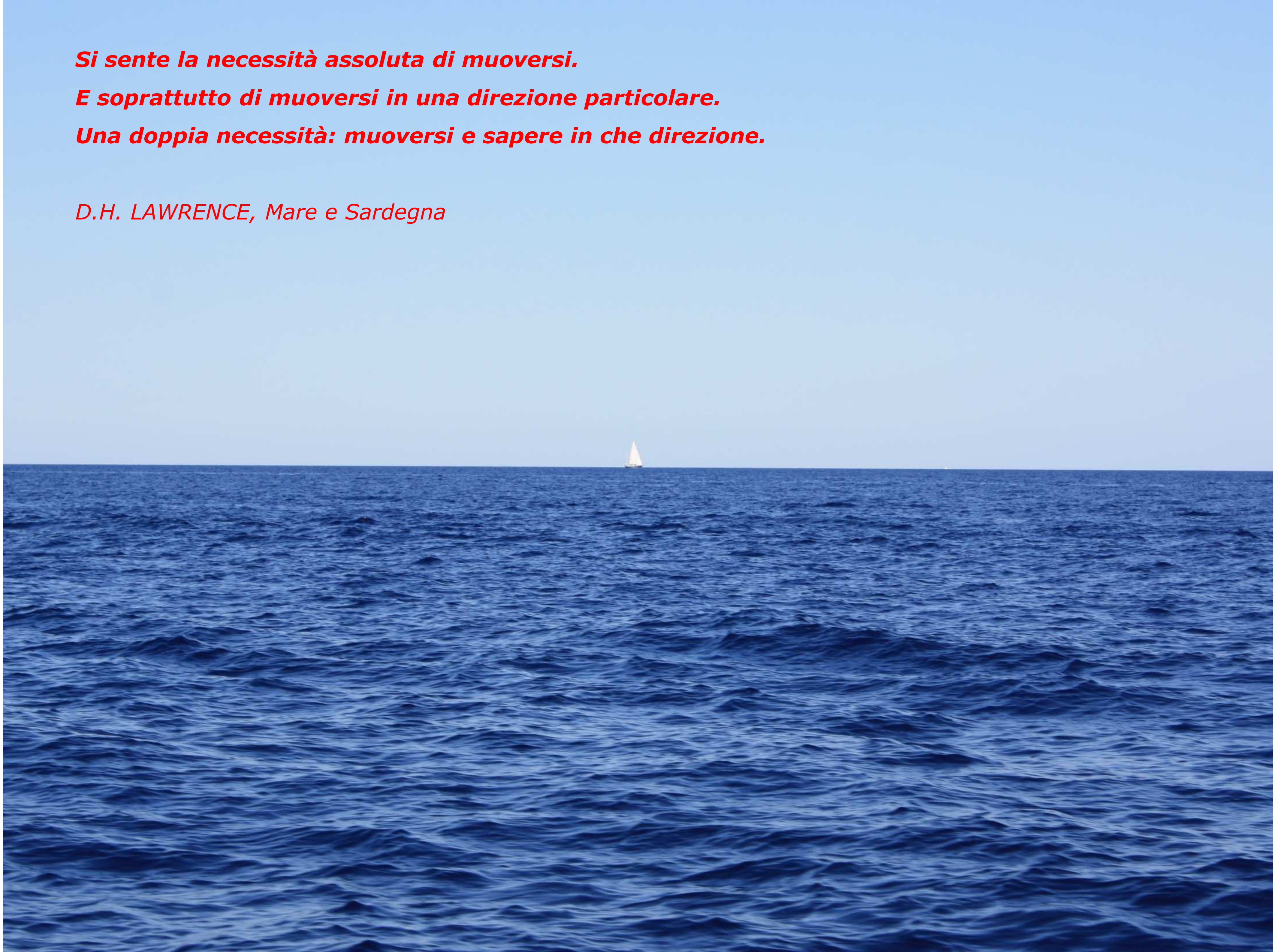
Analisi illuminotecniche






SKATER


33
33
Araldite
MASCHERPA
BELLOTTI
SELDÉN
GOTTIFREDI MAFFIOLI
Ti-Vu Plast
AIRTECH
VIADANA
CORECORK
DSM
selcom
POLITECNICO DI MILANO


Si sente la necessità assoluta di muoversi.
E soprattutto di muoversi in una direzione particolare.
Una doppia necessità: muoversi e sapere in che direzione.
D.H. LAWRENCE, Mare e Sardegna


POLITECNICO DI MILANO
VELUX lab