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

Bari, *2 Aprile 2014*

Il protocollo Active House in clima mediterraneo:

ricerche e sperimentazioni sviluppate nel laboratorio VeluxLAB al Politecnico di Milano

Arianna Brambilla – 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

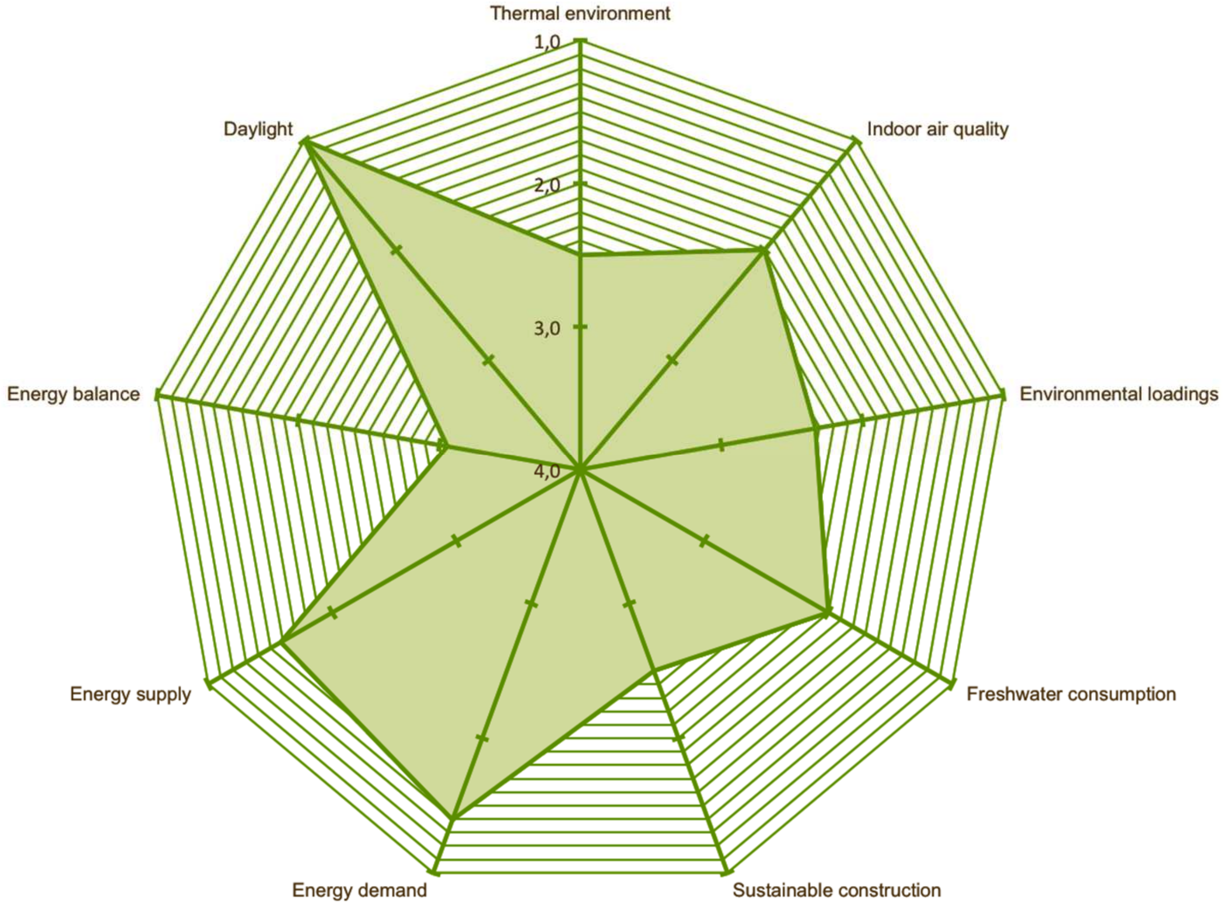
Net Zero Energy Costs

Net Zero Site Energy


POLITECNICO DI MILANO
VELUX lab

Certificazione Active House

Dati Radar

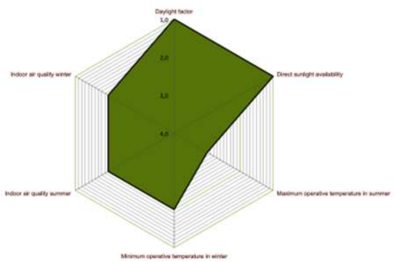


activehouse.INFO
NETWORK AND KNOWLEDGE SHARING

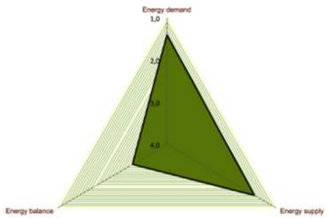
Primo edificio italiano "Net Zero Energy" inserito in un campus universitario

Prima Active House registrata in Italia

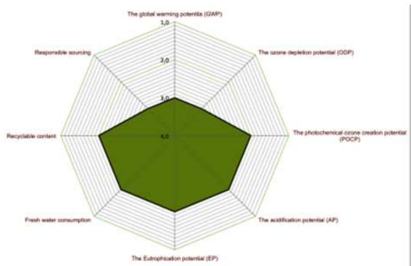
Comfort



Energia

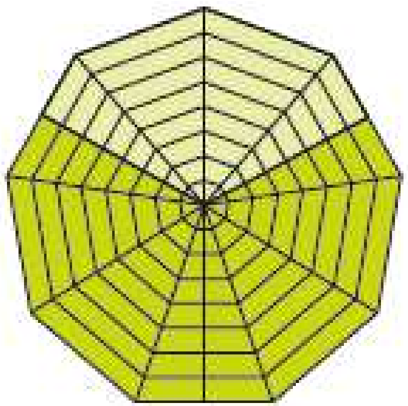


Ambiente



VELUX lab

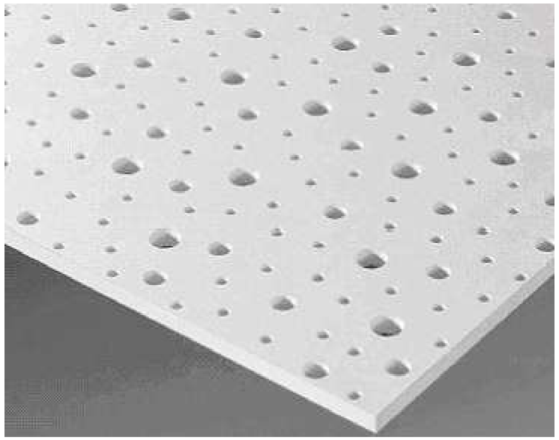
COMFORT



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

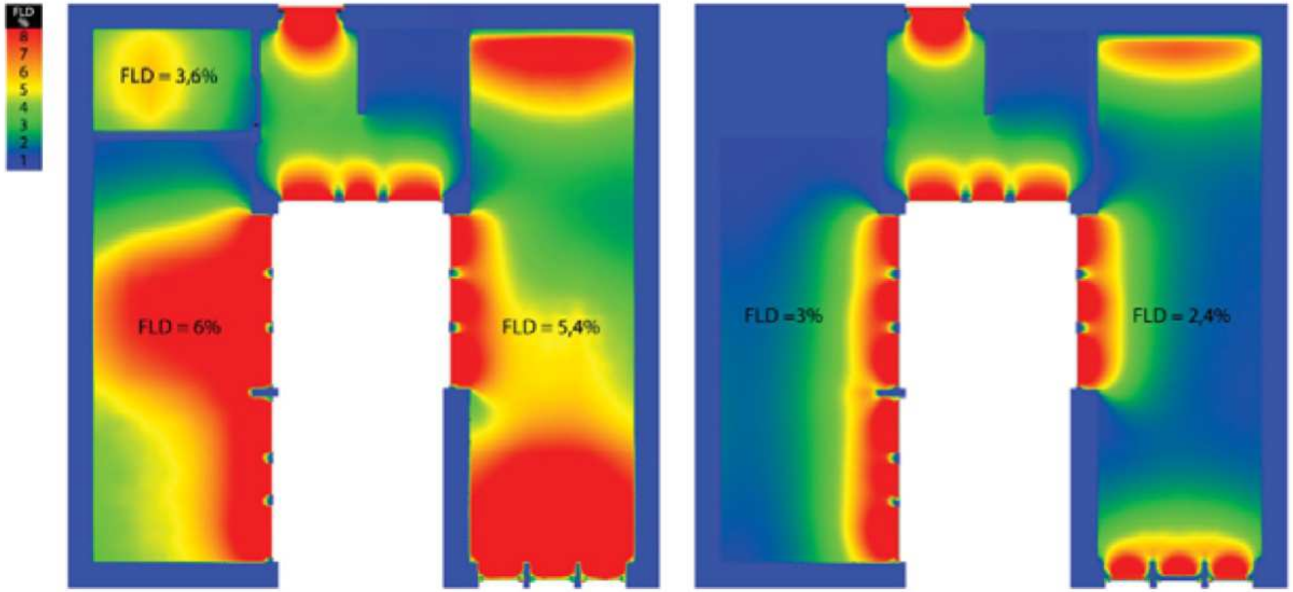
Vetrate triplo vetro basso emissivo. Serramento a taglio termico SCHÜCO

Finestre tetto VELUX ad alte prestazioni

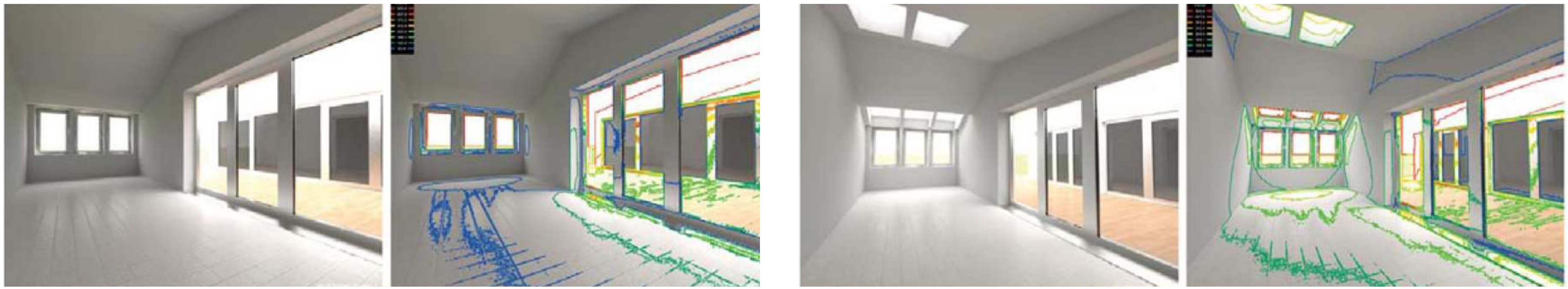
Isolamento copertura

Controsoffitto "Knauf-Cleaneo"

Analisi illumnotecniche

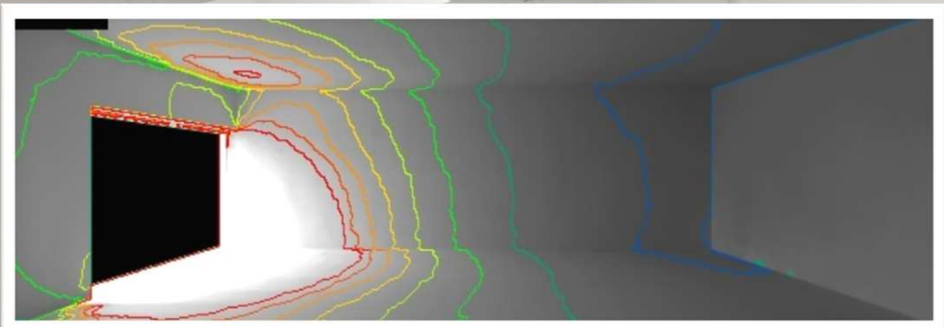


Fattore medio di luce diurna e Rapporto aeroilluminante. Nella situazione reale (a sinistra), la luce zenitale assicura alti valori di FLD (blu-verde scuro) e di RAI (0,10 minimo – Comune di Milano), rispetto alla situazione di studio (a destra) priva di aperture zenitali.

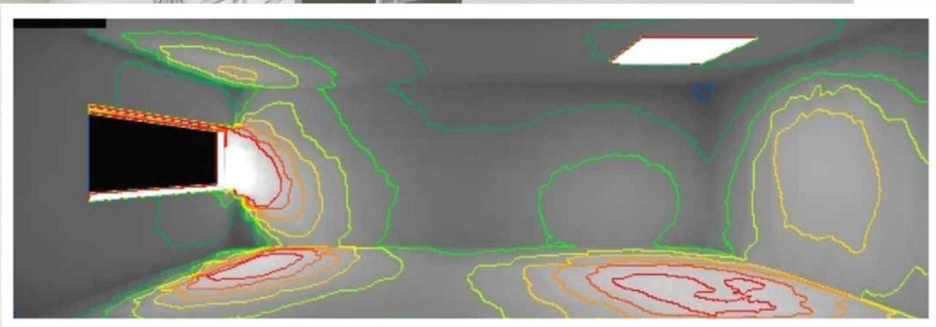


Luminanza. Il confronto della luminanza (21 Giugno - h 12:00) fra la situazione reale (in presenza di lucernari) e di studio (in assenza di lucernari), mostra come la luce zenitale renda i valori più omogeneamente distribuiti all'interno dei locali. Inoltre, il fenomeno dell'abbagliamento è ben controllato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

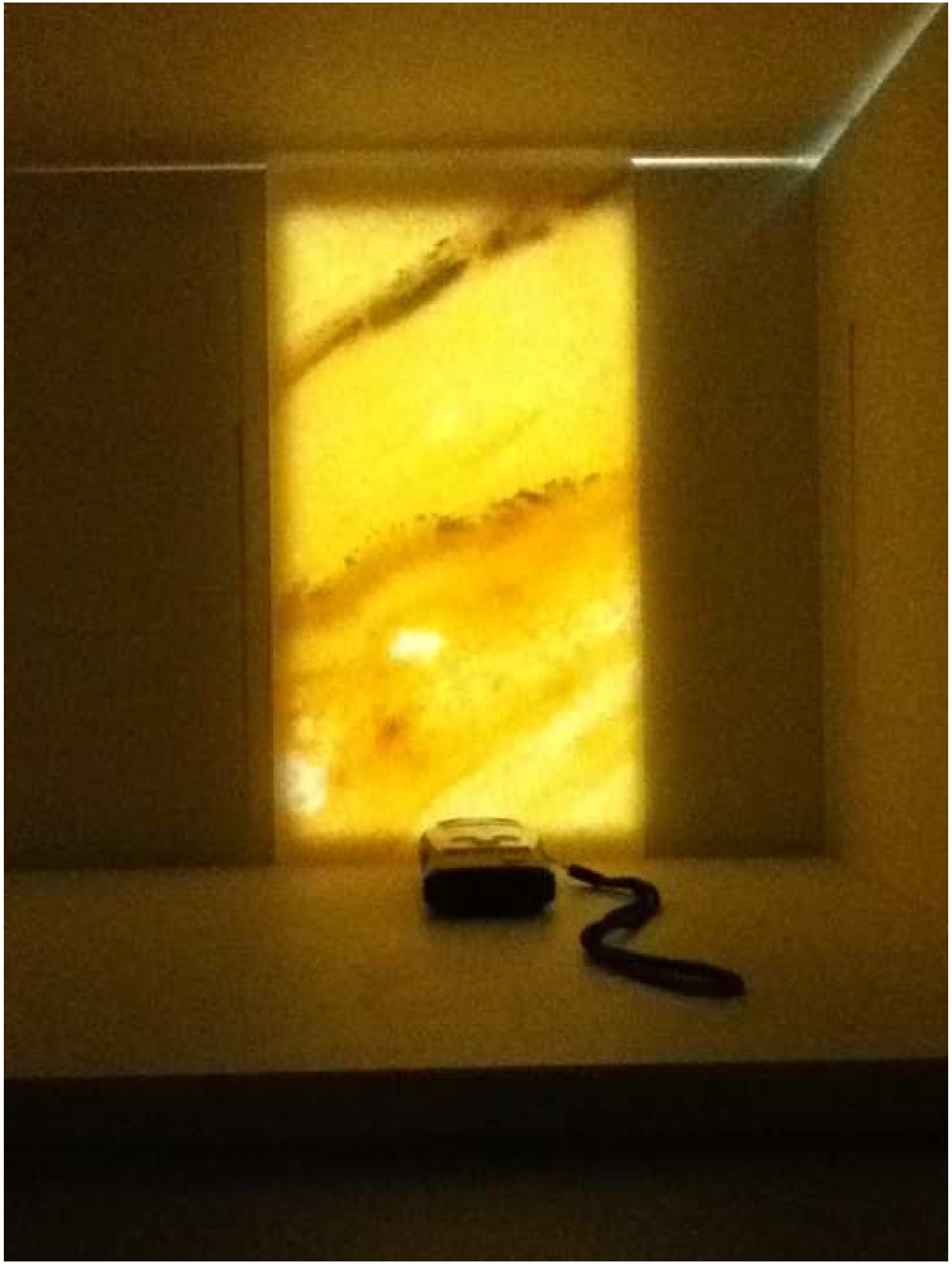
Team:

Luigi Ferrario
Camilla Massironi
Alice Schinella


g. 3.4.57


Fig. 3.4.58


Fig. 3.4.59



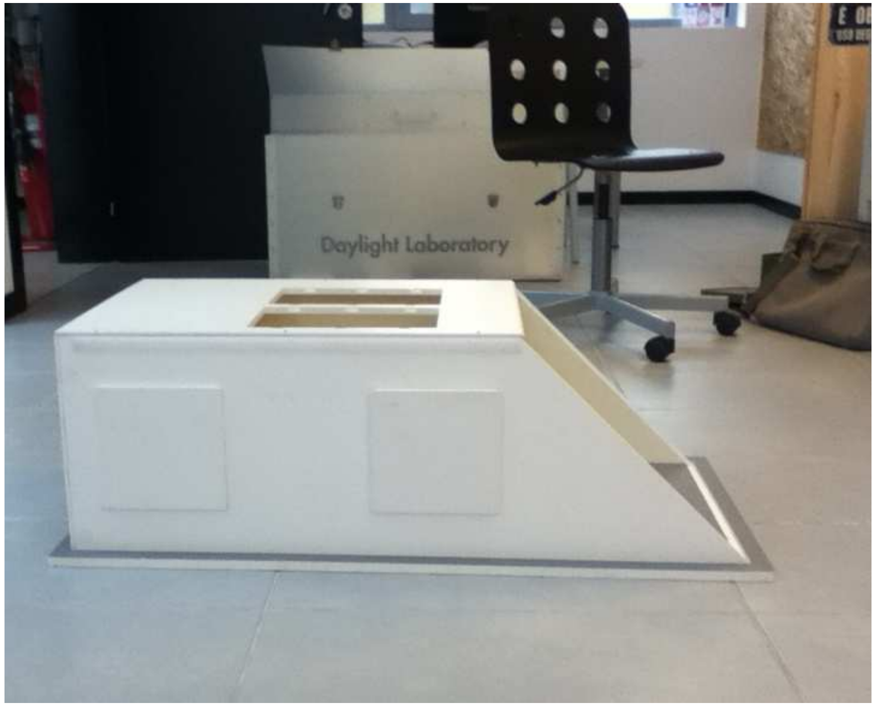
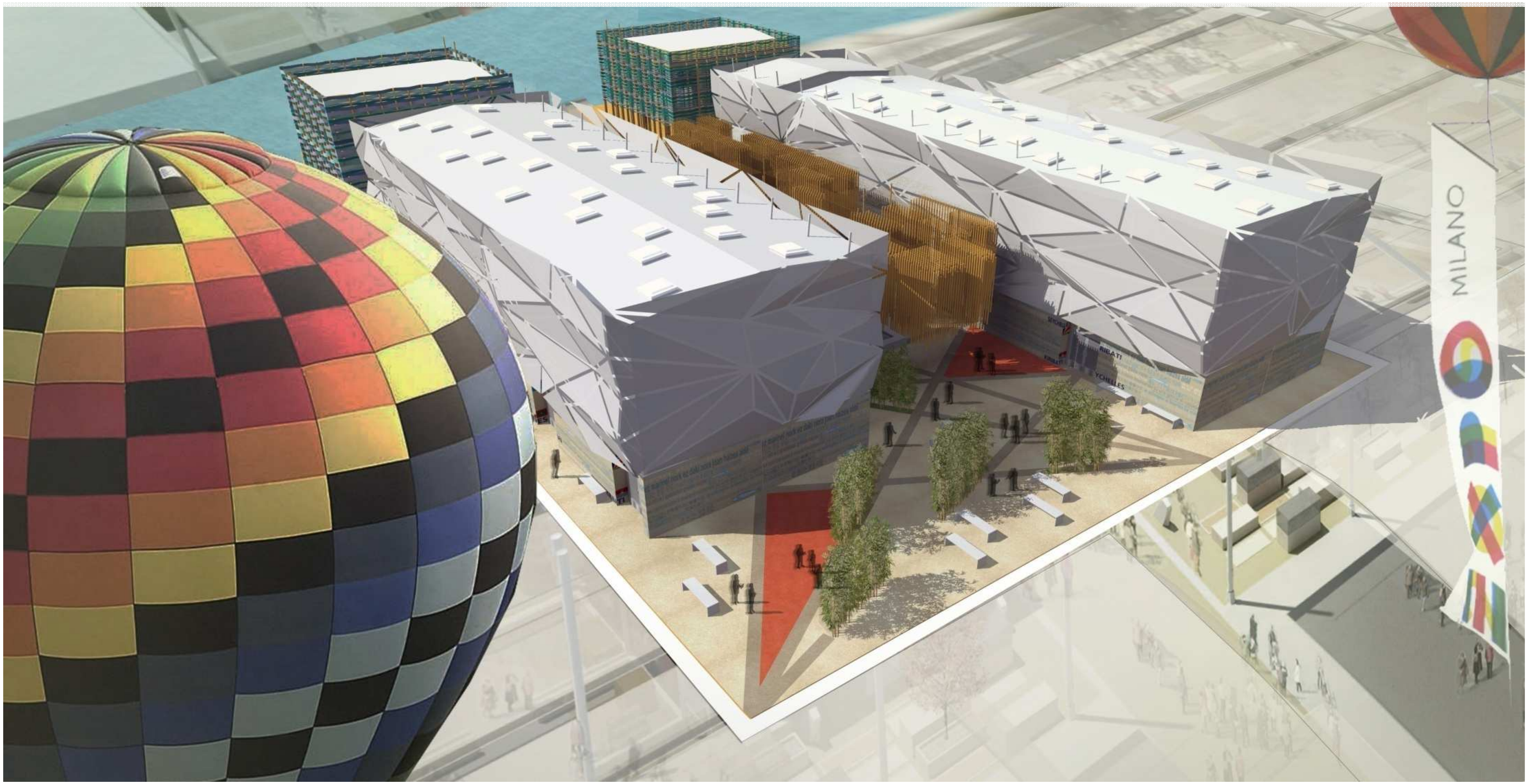


Fig. 3.4.77

Fig. 3.4.

Il Cluster "Island, sea and food"

RYTHM OF DISCOVERY

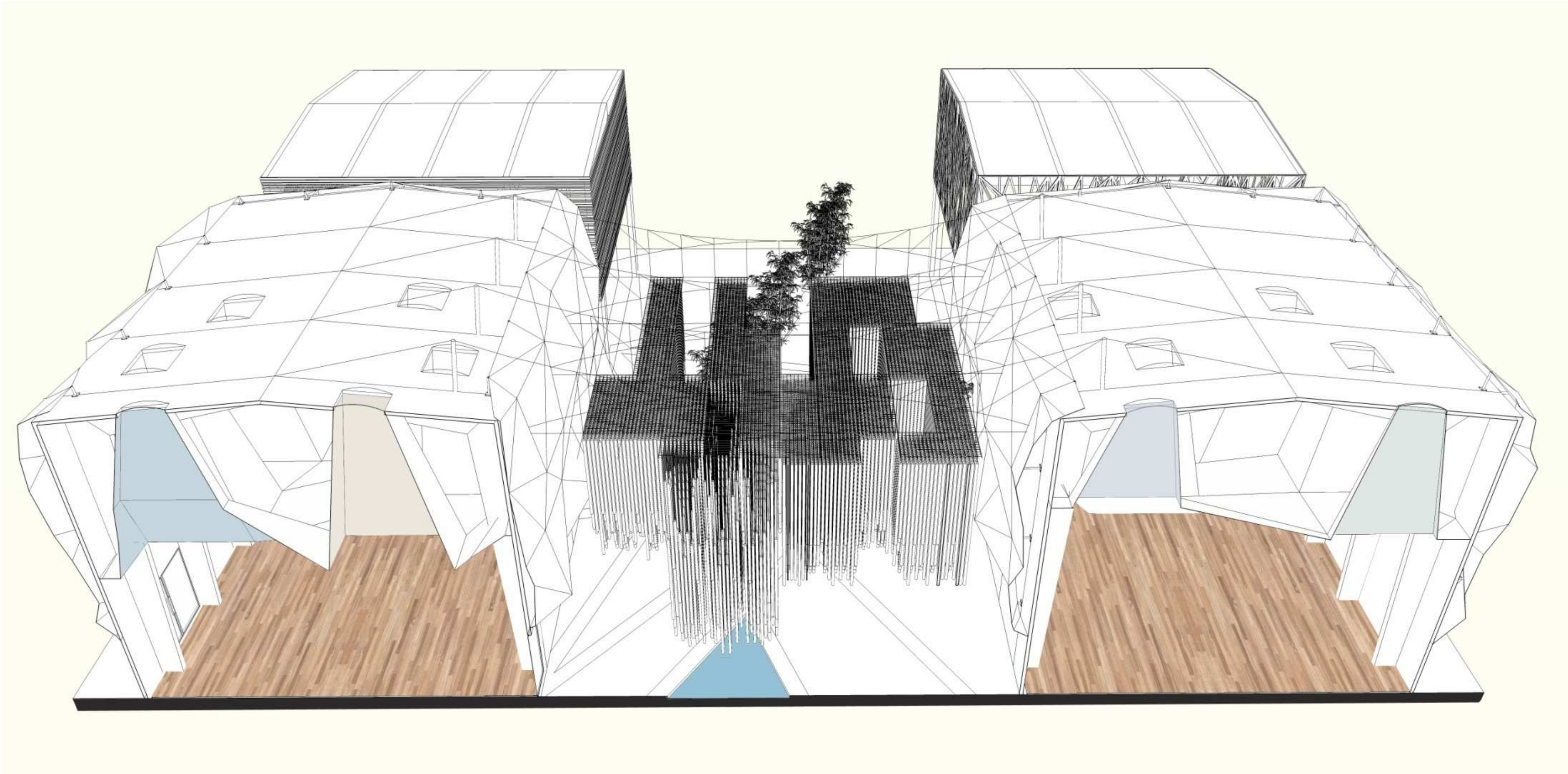


MILANO 2015
NUTRIRE IL PIANETA
ENERGIA PER LA VITA

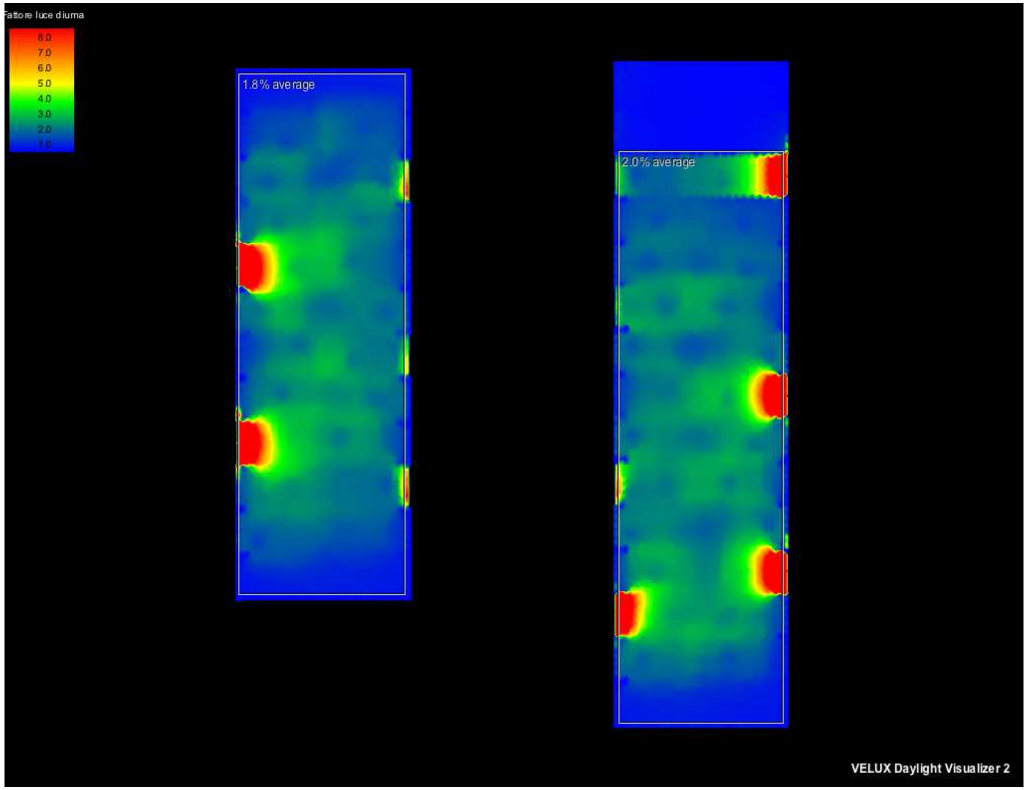
Team:

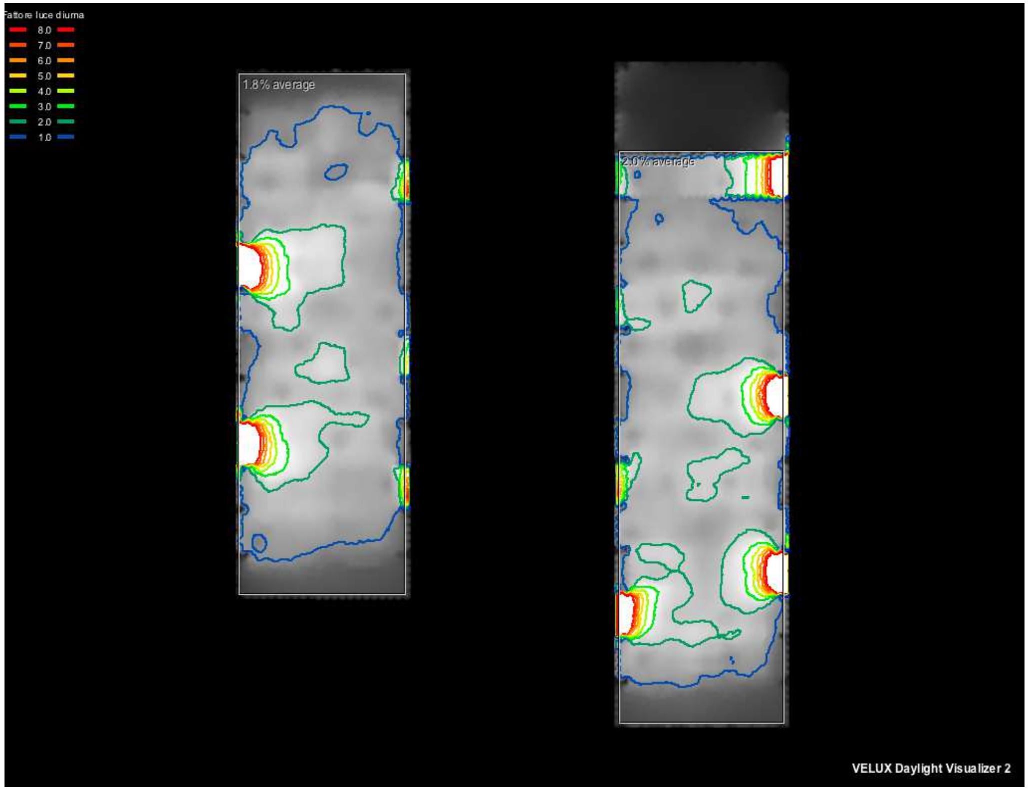
Giuliana Iannacone
Andrea Vanossi
Paola Trivini
Valentina Gallotti
Chiara Valsecchi

Analisi illumnotecniche



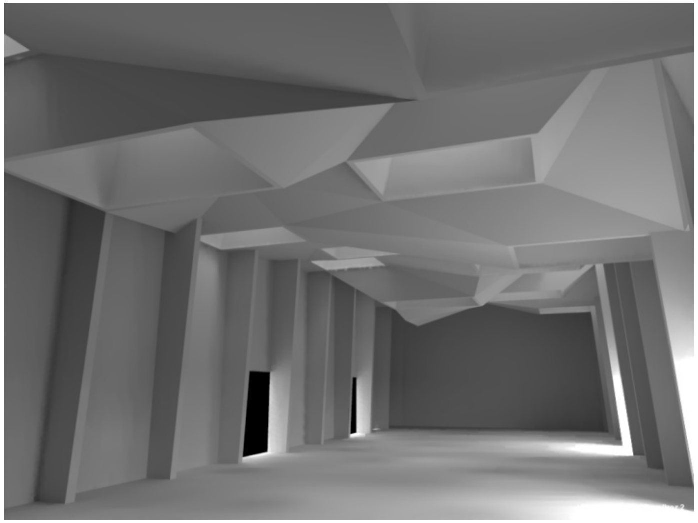
Analisi illumnotecniche



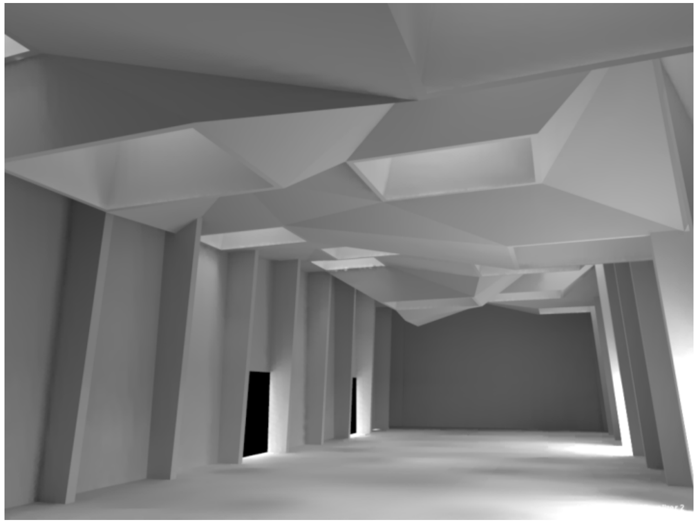


FATTORE MEDIO DI LUCE DIURNA (F^{MLD})
Le simulazioni consentono di rilevare buoni valori di F^{mld} con una distribuzione omogenea della luce al di sotto dei “Vulcani di luce” nonostante questi siano elementi puntuali. Si verifica quindi il corretto funzionamento del controsoffitto nel diffondere la luce diretta.

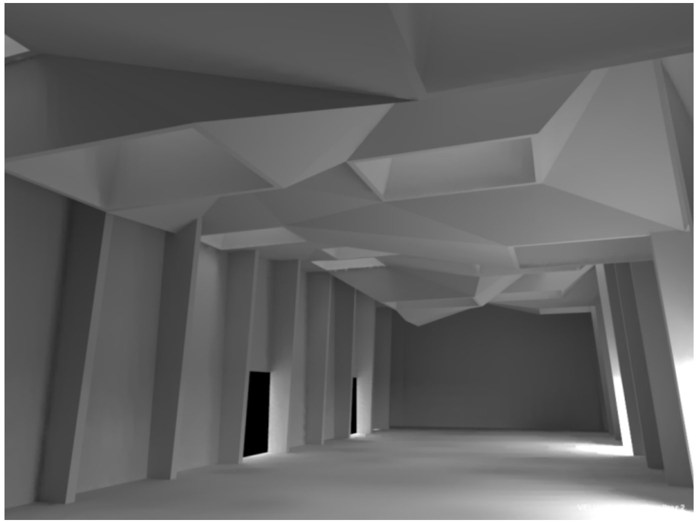
Analisi illumnotecniche



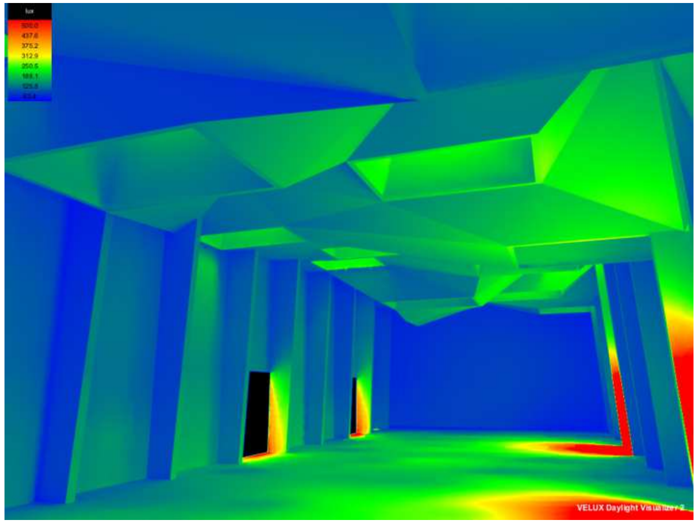
21 aprile

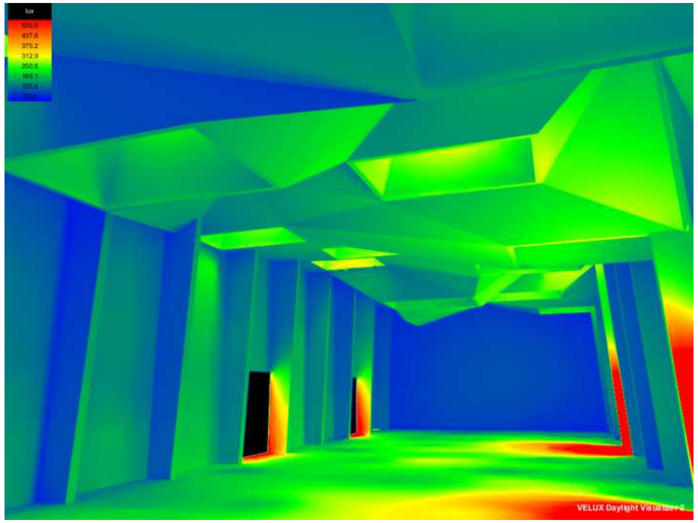


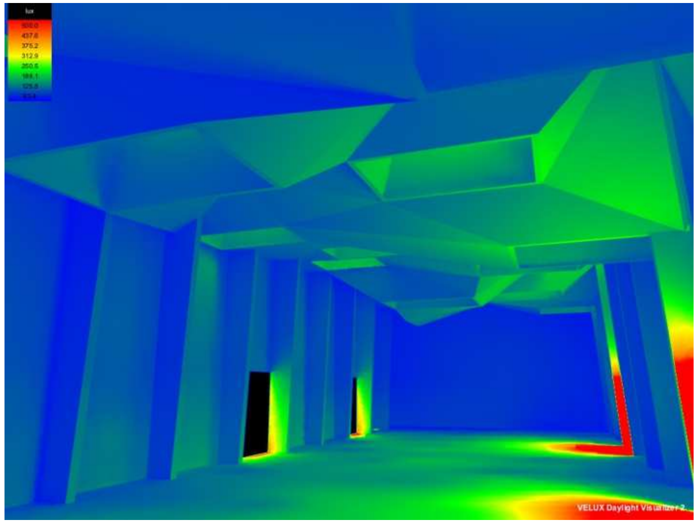
21 giugno



21 ottobre





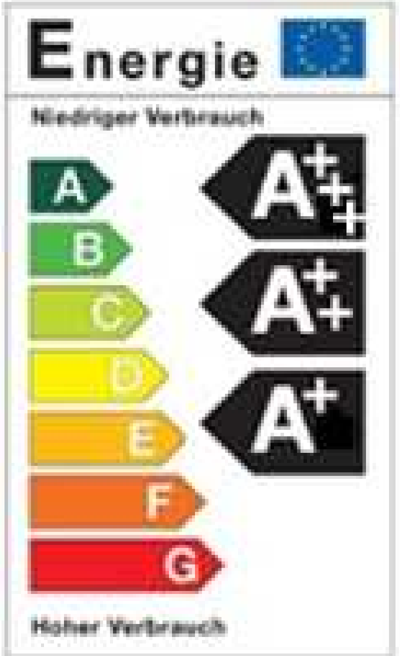


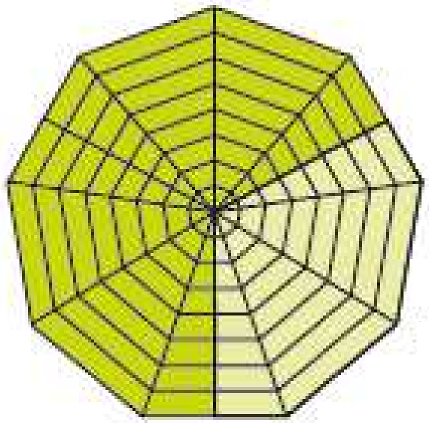
ILLUMINANZA - Padiglione EST - Cielo parzialmente coperto

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.

MnM Symposium – Keo University Tokyo

ENERGIA



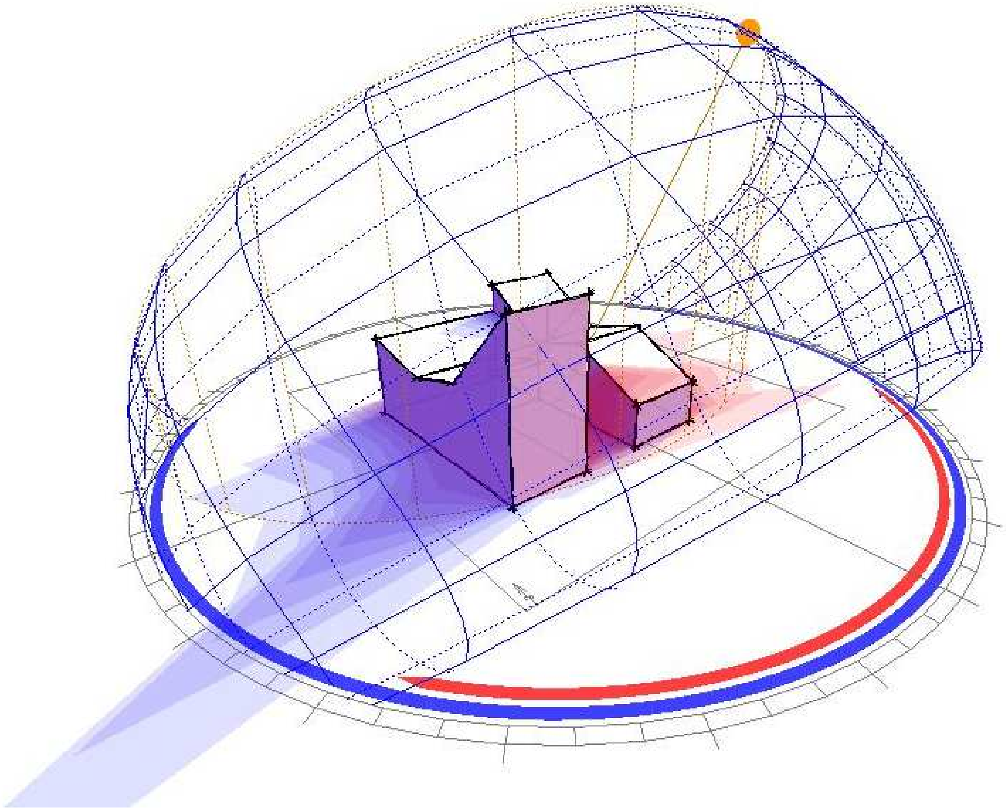


VeluxLAB:

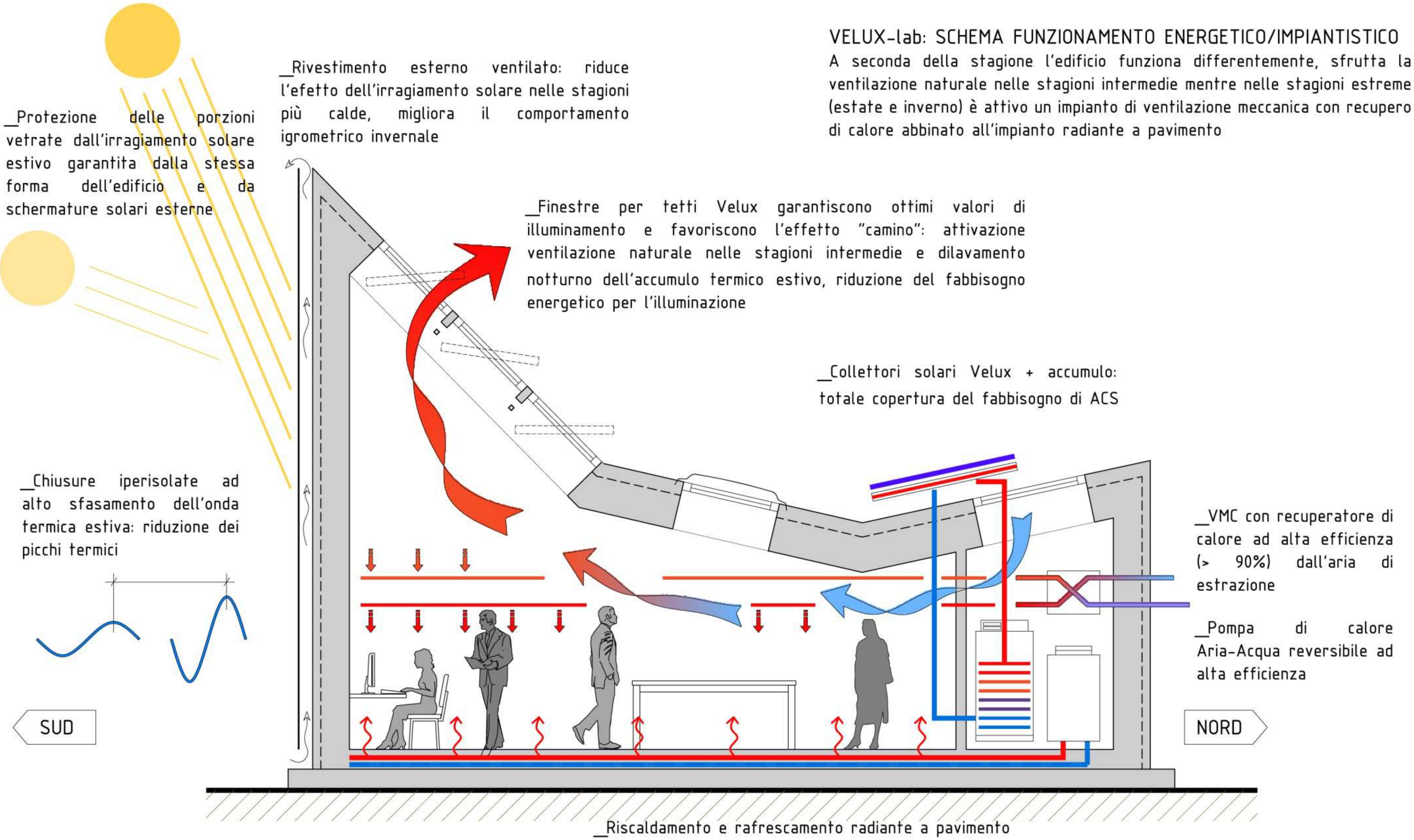
_ ottimizzazione luce e ventilazione naturale
calcolo FLD

_ ottimizzazione energetica

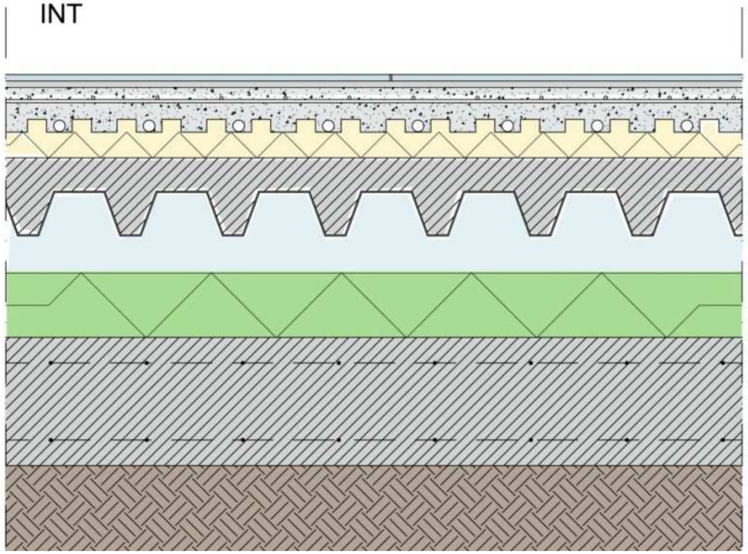
_ Rilevazione dati continua



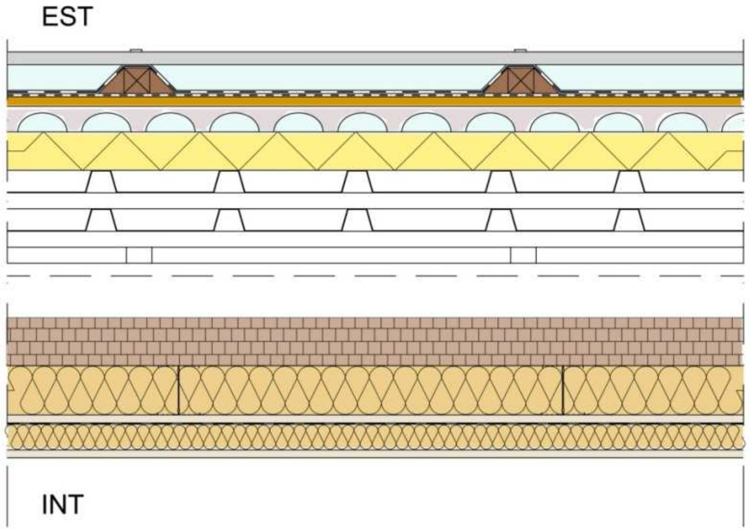
Schema energetico



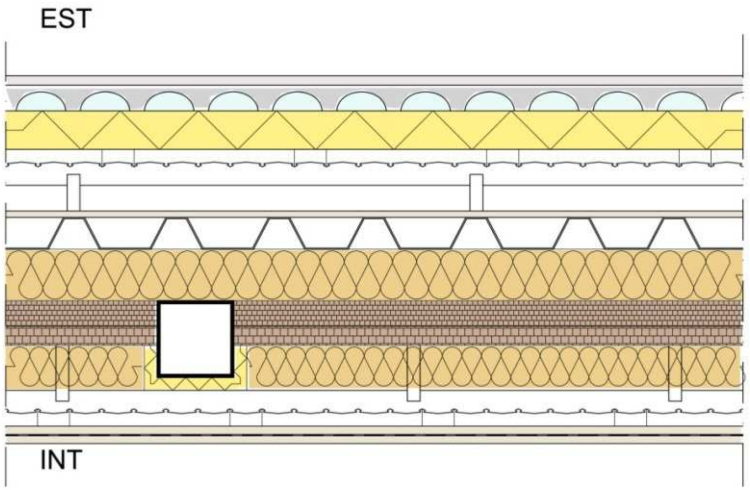
Prestazioni



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

Installazione finestre

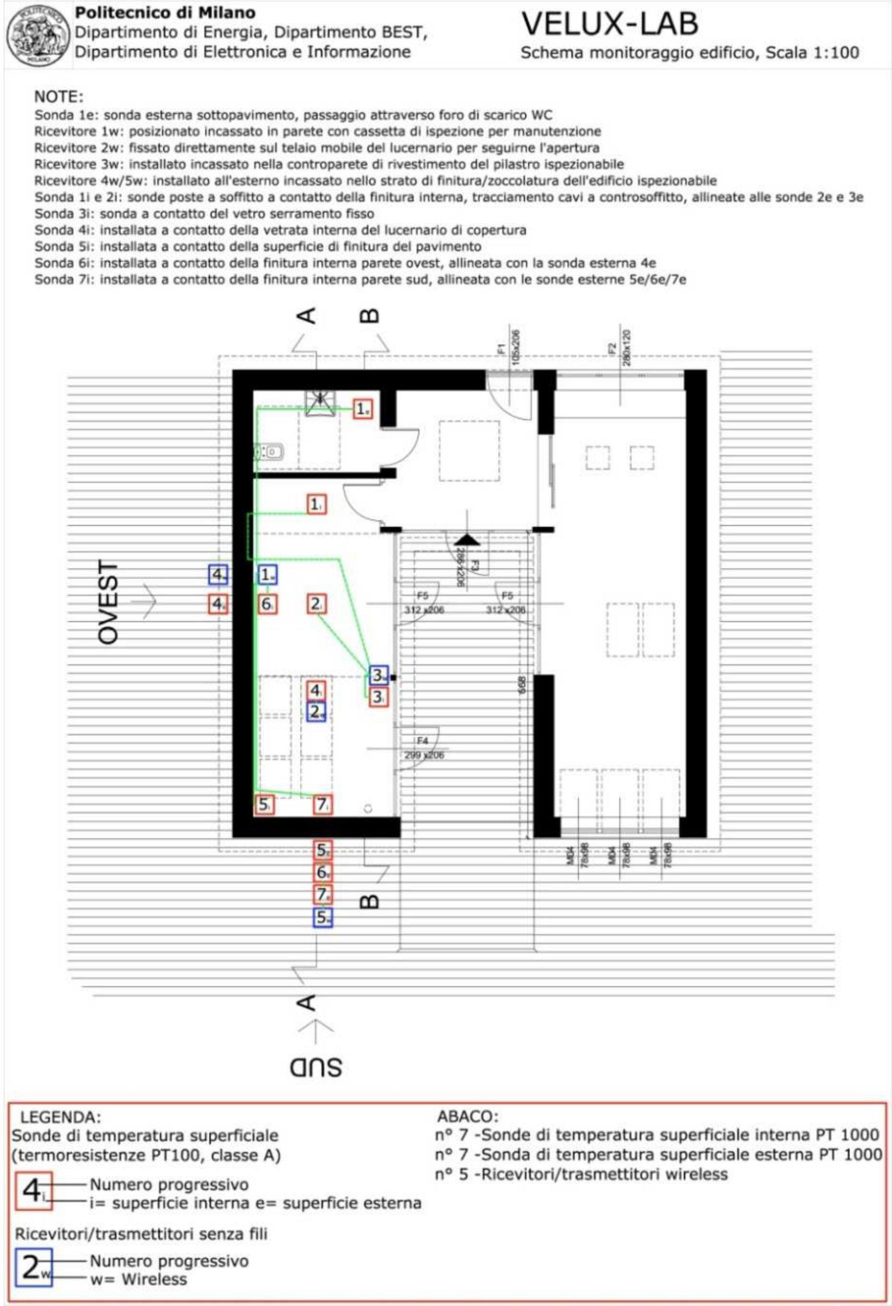
Impianti

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

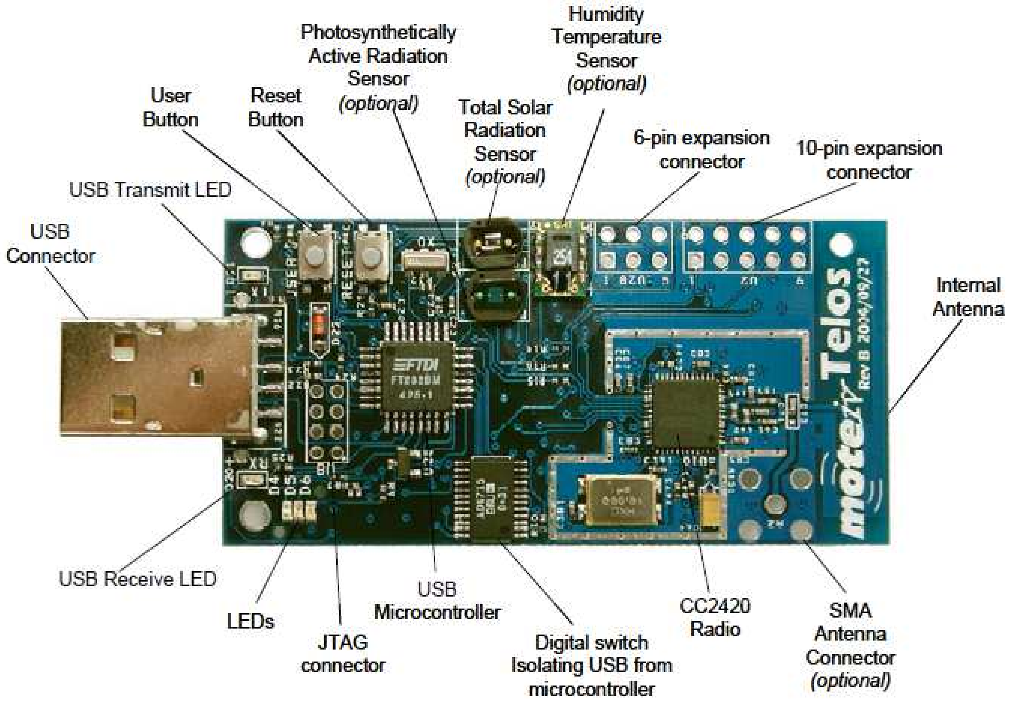


Sistema di monitoraggio Wireless

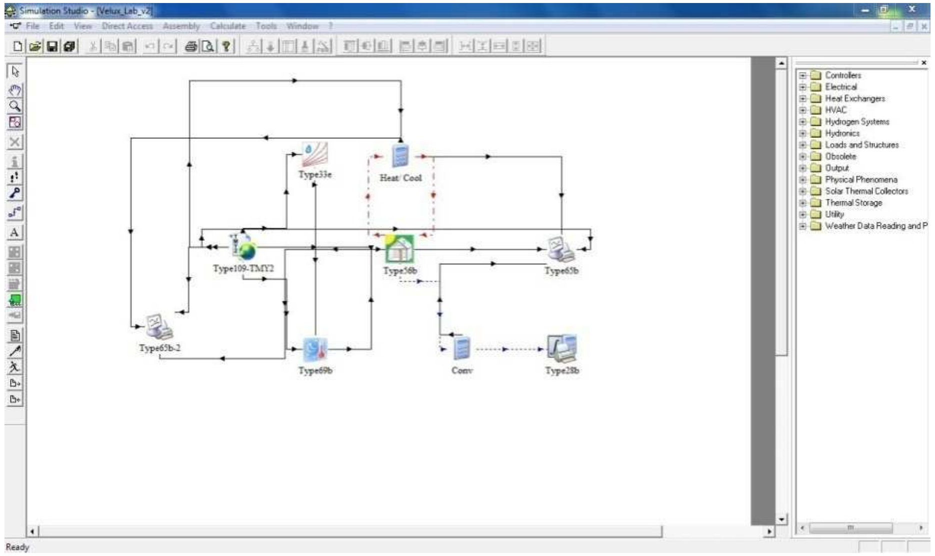
Rete di sensori wireless (WSN):
_Nodi realizzati mediante dispositivi **TelosB** ai quali è stata collegata una scheda di acquisizione dati progettata ad hoc (< 0,1 ° C di errore nella lettura della temperatura) utilizzando sonde PT1000.

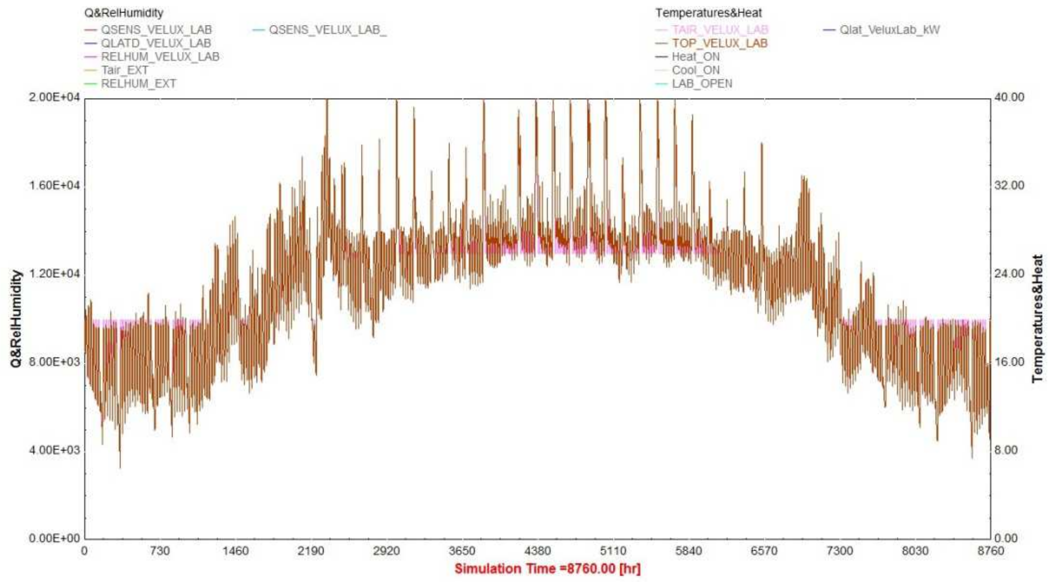
_Software messo a punto dal **dipartimento DEI del Politecnico di Milano.**

I sensori installati:
- **14 Sonde di temperatura** superficiale **PT 1000 classe A** con elemento sensibile al Platino per il monitoraggio dell' involucro
- **6 Sonde di temperatura** superficiale **PT 1000 classe A** con elemento sensibile al Platino e **3 contatori elettrici** dedicati per il monitoraggio dell' impianto
-**7 Micro Data-logger** wireless **TelosB** a cui sono collegati i sensori di temperatura

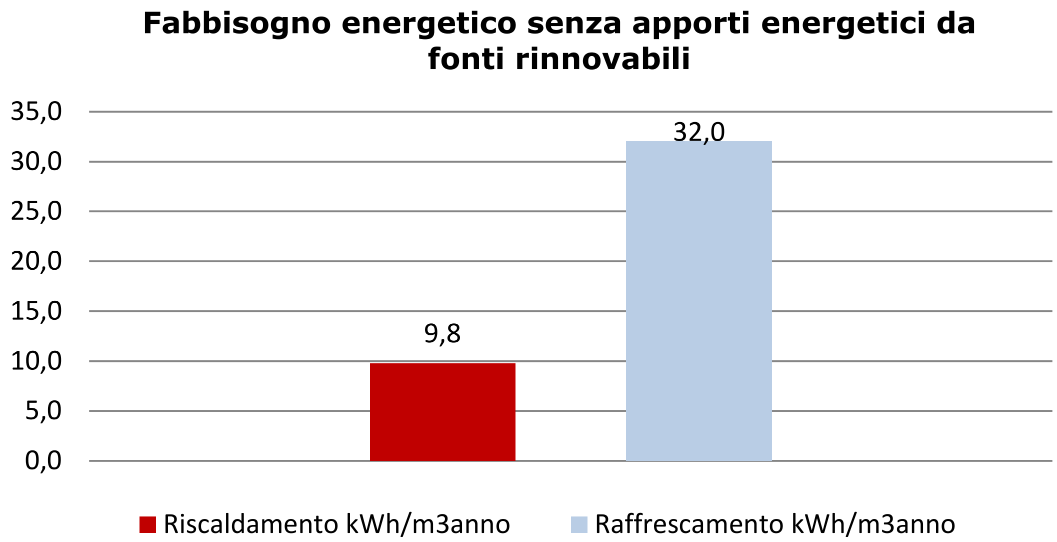


Simulazioni energetiche e sistema di servizi

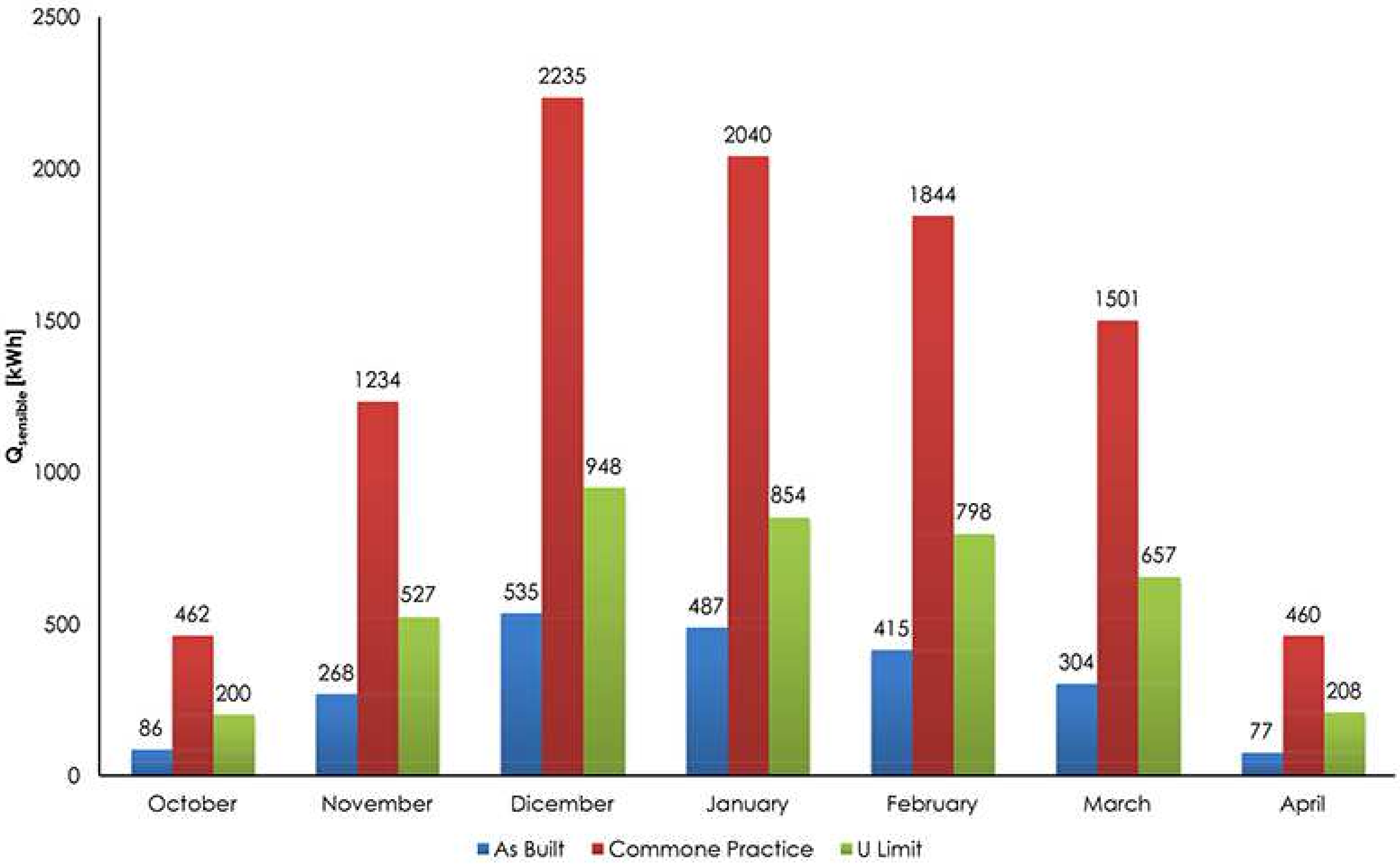




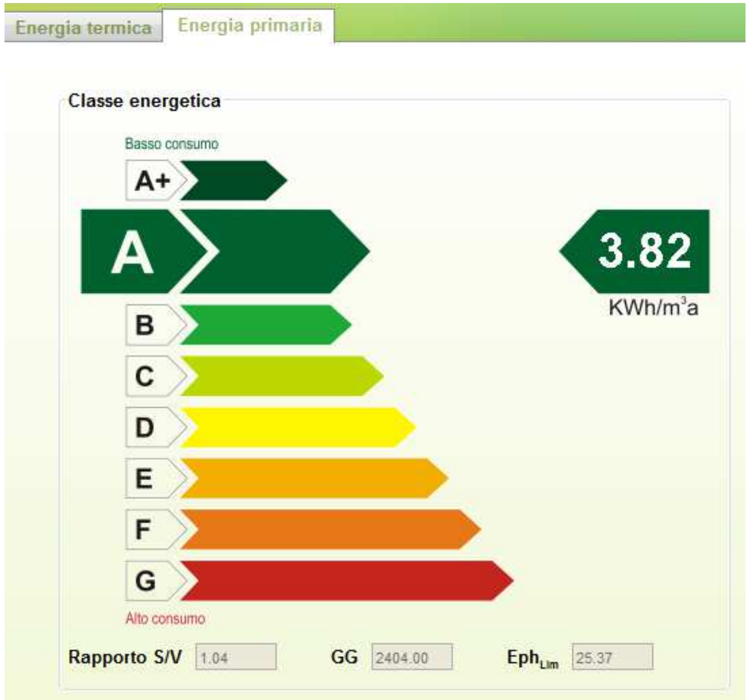
Valutazione energetica dell'edificio mediante simulazioni energetiche in regime dinamico svolte con il software **TRNSYS.**



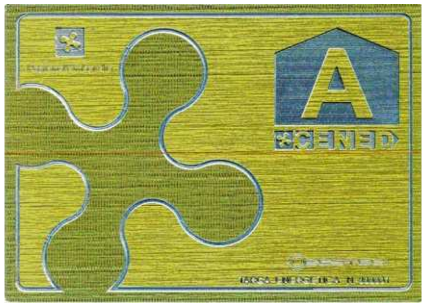
Fabbisogno energetico mensile _ VeluxLAB Campagna sperimentale inverno 2013



Certificazione CENED+



VELUXlab si inserisce nello scenario futuro degli **Edifici ad Energia Quasi Zero** (Nearly Zero Energy Building) previsto a partire dal 2020 dalla **direttiva europea 2010/31/UE** ed è inserito nel progetto più ampio, voluto dal Politecnico di Milano, chiamato **"Campus Sostenibile"**, azione primaria del Politecnico nell'anno del suo 150° anniversario.



PLEA2013 - 29th Conference, Sustainable Architecture for a Renewable Future, Munich, Germany 10-12 September 2013

Comfort and Energy Assessment of the First Italian Nearly Zero Energy Building in a University Campus

M. IMPERADORI[1], M. SAUCHELLI[1], A. BRAMBILLA[1], N. FALCONE[1], C. ZANELLO[1], V.A. ZORZI[1]

[1]Department of Architecture, Built Environment and Construction Engineering, Politecnico di Milano, Milan, Italy

ABSTRACT: The aim of the work proposed in this paper is to test and evaluate the dry stratified construction technology for building envelope in warm climate (such as in Milan, Italy), showing the actual comfort and energy assessment of the first Italian Nearly Zero Energy Building in a University campus. Analyses are conducted on the VELUXlab building, recently opened within the Politecnico di Milano (Italy). VELUXlab is an experimental laboratory coming from a deep energetic and technological retrofit done on the VELUX Atika model home. During the construction phase an innovative wireless sensors network has been installed, including 14 surface temperature sensors on the building envelope. Here is proposed a comparative analysis between the actual data recorded and the theoretical data analysed through dynamic energy simulations. Further analyses are conducted in order to compare VELUXlab data with the data of average existing Italian buildings, and with the theoretical data referring to the minimum requirements suggested by Italian regulations for new buildings.
Keywords: NZEB, thermal comfort analysis, dynamic thermal modelling

INTRODUCTION

VELUXlab is the first Italian NZEB in a University campus. It is placed in Bovisa Campus of Politecnico di Milano and it is a prototype and a case study for the future buildings. The recent European Directive 2010/31/EU states that, by the end of the 2020, all the new buildings shall be "nearly zero energy". Actually there are no clear suggestions about these new type of constructions [1, 2], and a real example of their peculiarities and features could be a concrete way to make architects aware about the needs of a sustainable design and to provide a sample to follow. In 2011 Velux, the worldwide leader in roof windows, in collaboration with Politecnico di Milano and the design firm Atelier2, converted the demo-house Atika into an experimental laboratory with very low energy request and very high energy efficiency. Thanks to dynamic simulations it was possible to calibrate the intervention in order to minimize the energy needs of the lab, keeping as much as possible the old materials. New technological layers were added in order to optimize the building for the warm climate of Milan. The building envelope was designed as a multi-layer dry construction, based on the duo structure/envelope, and the adopted technology was studied and defined in order to represent a feasible possible solution for zero-energy buildings in Mediterranean region [3, 4]. Furthermore, during the construction phase, an innovative wireless sensors network was installed.
In this paper first results about VELUXlab behaviour are proposed, concerning both energy consumption and indoor environmental quality. A comparison between the data recorded by the sensors during the first year and the theoretical data obtained from the dynamic simulations is addressed in order to understand how much a NZEB behaviour is affected by external and unpredictable interferences. Studies show that, for other NZEBs, during their real life, due to the assumptions and simplifications of the virtual model, the energy consumed is more than the predicted one [5, 6, 7]. In this paper analyses are conducted on VELUXlab in order to quantify and evaluate the real performances of the building. This is the first step to define a nearly zero energy building optimized for Mediterranean climate through the evaluation and comprehension of its real operative performances.

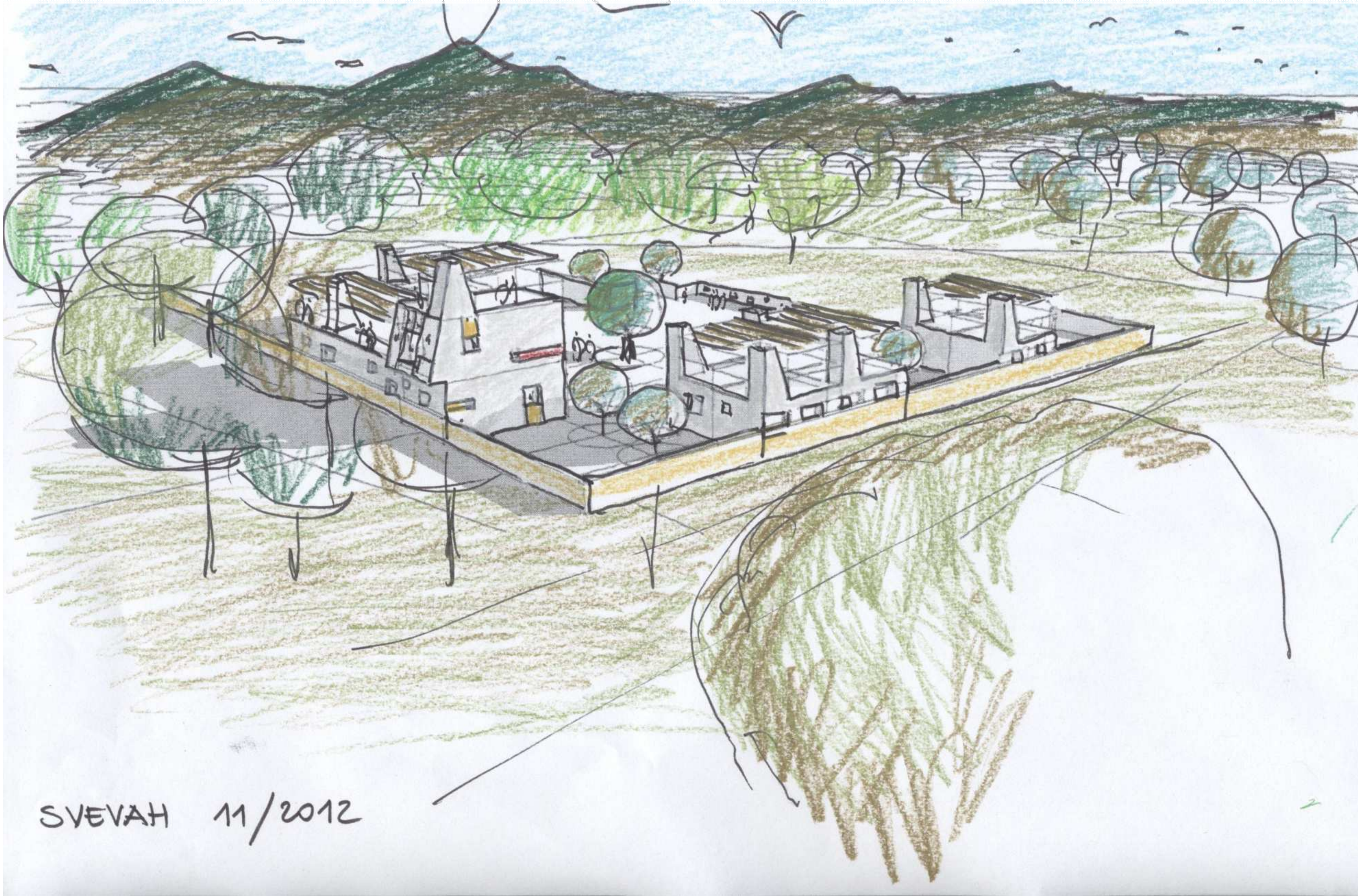
BUILDING STOCK ANALYSIS

In order to comprehend which is the level of improvement introduced with the project, a comparison between VELUXlab and the existing building stock is proposed. The comparative analysis refers to CENED certificated buildings in Lombardia (a region in the north of Italy), where VELUXlab is placed, to figure out strengths and weak points of the intervention.

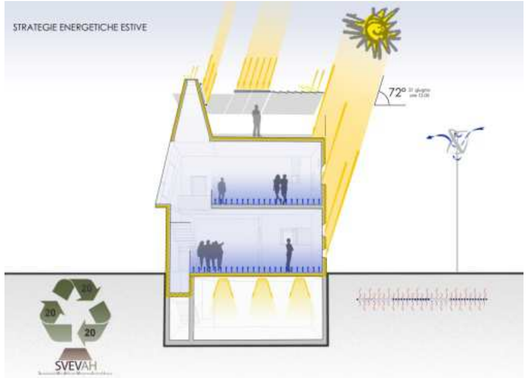
The European Directive 2002/91/CE was emanated with a double purpose: a reduction of the energy consumption with limited emissions of GHG and the respect of the responsibilities taken with the Kyoto Protocol, reducing at the same time the dependency of the EU from the external fossil fuel sources.
The Directive leaves the responsibility to create the certification system to a National or Regional level,

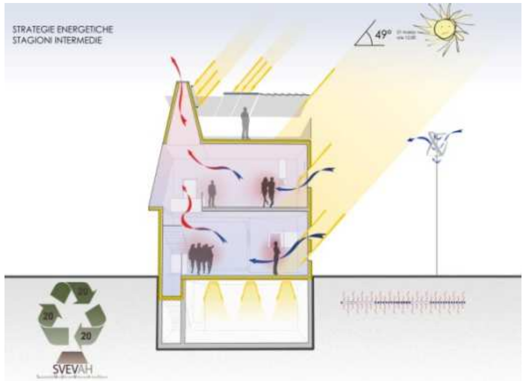
SvevAH

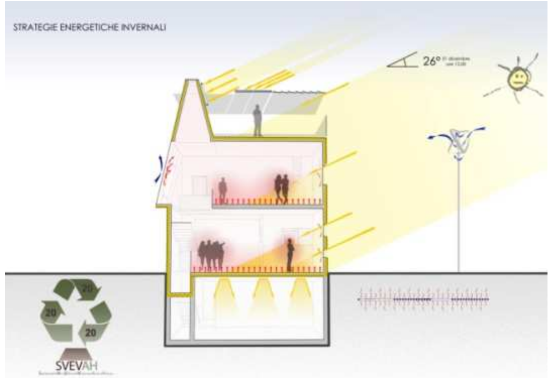
Arianna Brambilla (Politecnico di Milano – Aalborg University)

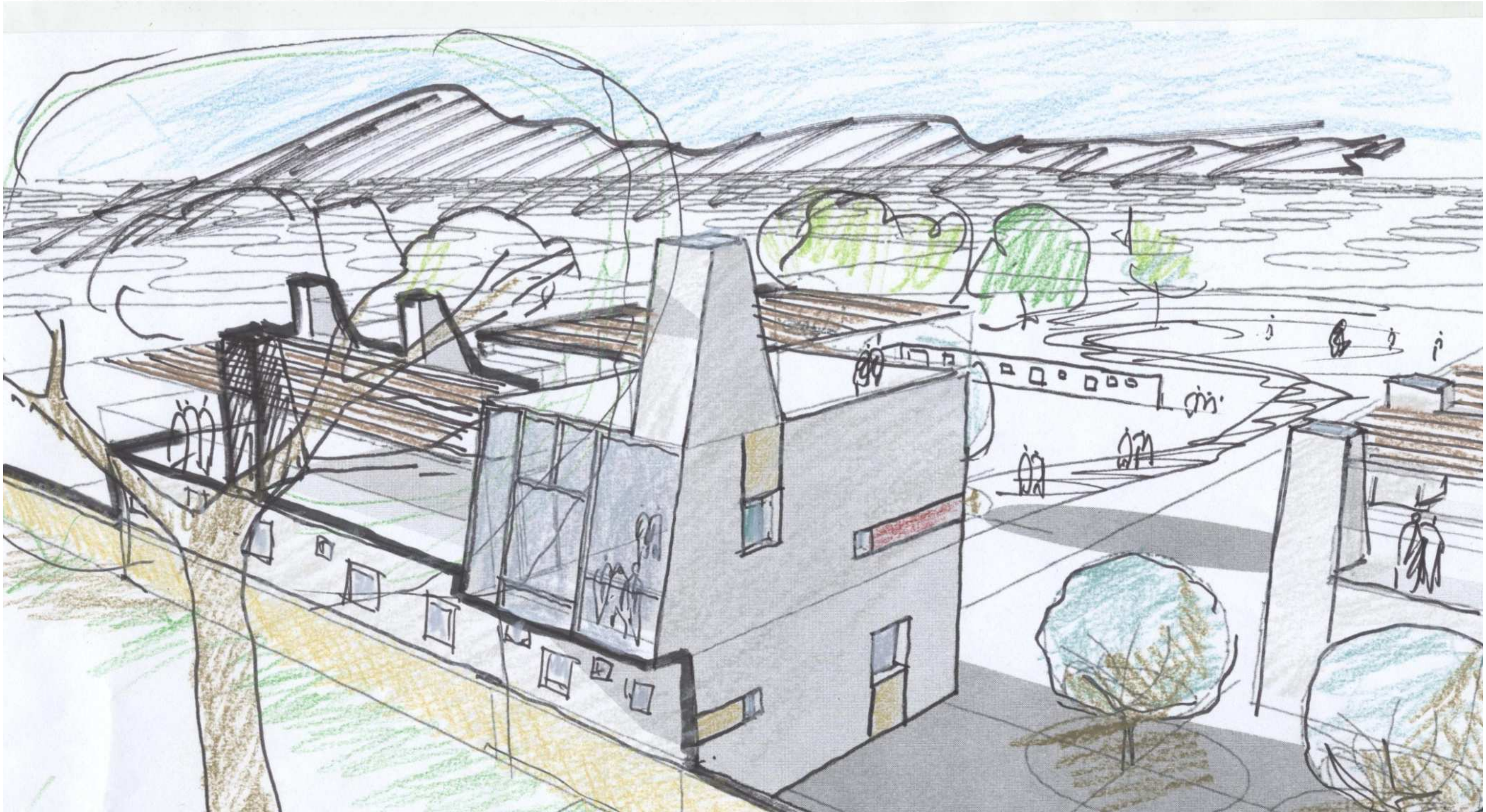


SVEVAH 11/2012


STRATEGIE ENERGETICHE ESTIVE
72°
20
20
20
SVEVAH

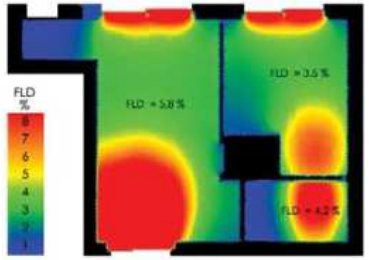

STRATEGIE ENERGETICHE
STAGIONI INTERMEDIE
49°
20
20
20
SVEVAH


STRATEGIE ENERGETICHE INVERNALI
26°
20
20
20
SVEVAH



Team:

Nicola Falcone
Chiara Zanello
Valentina Zorzi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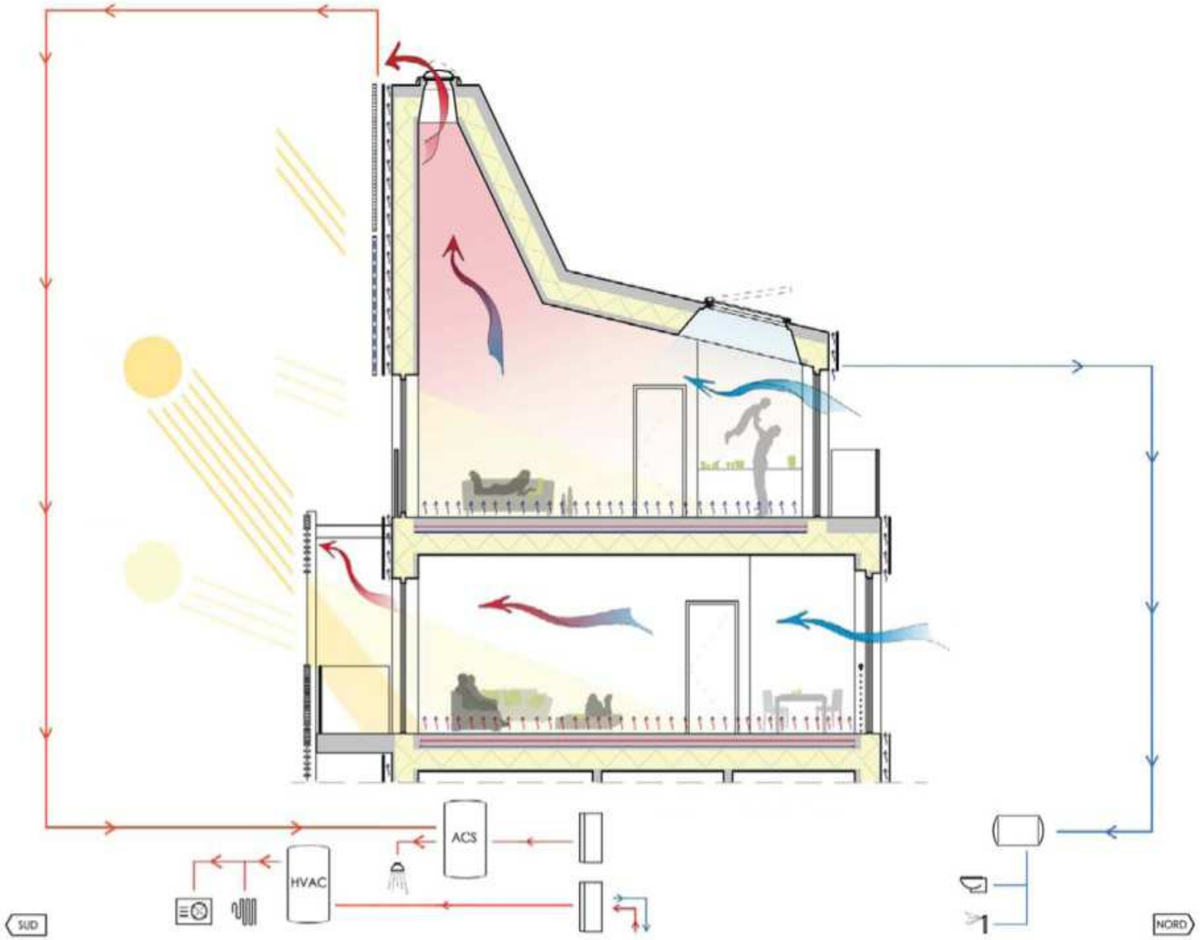
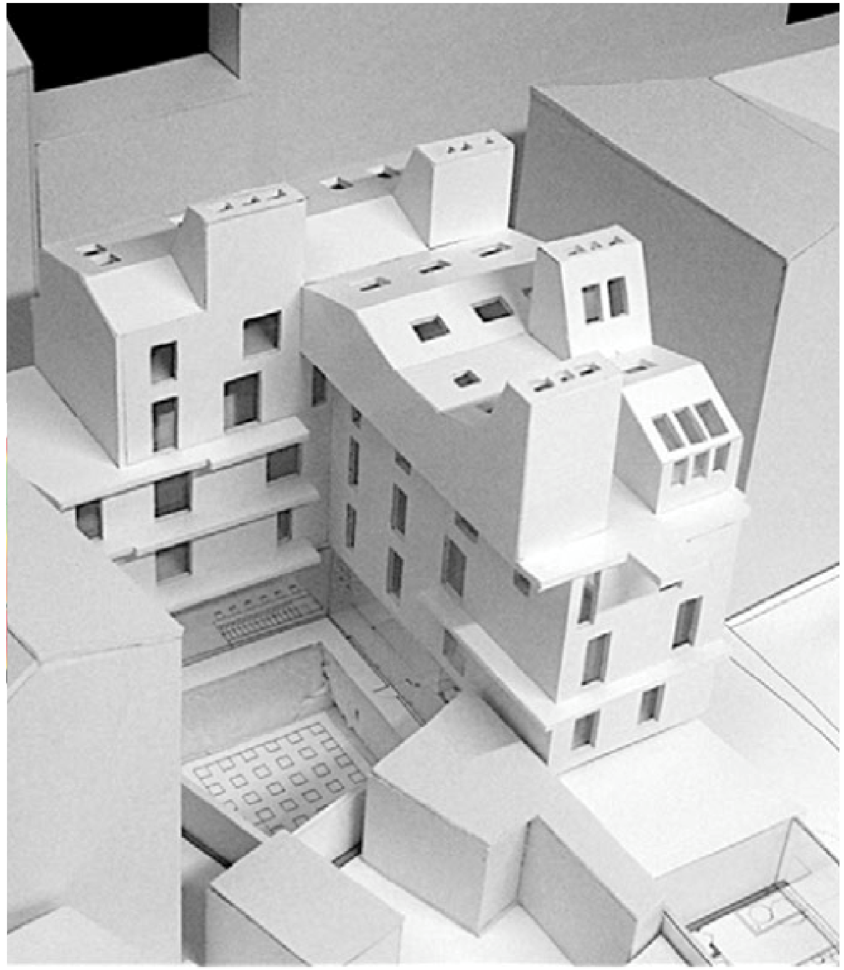

ACS
HVAC
SUD
NORD



Installazione impianto fotovoltaico

Caratteristiche impianto fotovoltaico:

9 pannelli (1652x994 mm) ovvero 14,8 mq.

Potenza di picco nominale: 2,16 kWp

Produzione stimata: 2688 kWh/anno

Compensazione: >90% del fabbisogno dell'edificio

Il sistema di fissaggio sopra il dogato di alluminio garantisce la ventilazione del pannello (il pannello surriscaldandosi perde circa 0,5% di efficienza per ogni grado di temperatura)

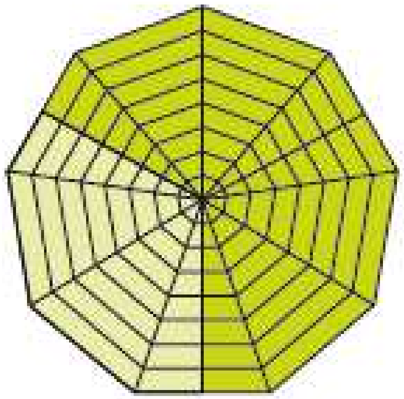
Esperimento Drone


POLIMI
SINCE 1863
Aermatica


POLITECNICO DI MILANO
VELUX lab


POLITECNICO DI MILANO
VELUX lab

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

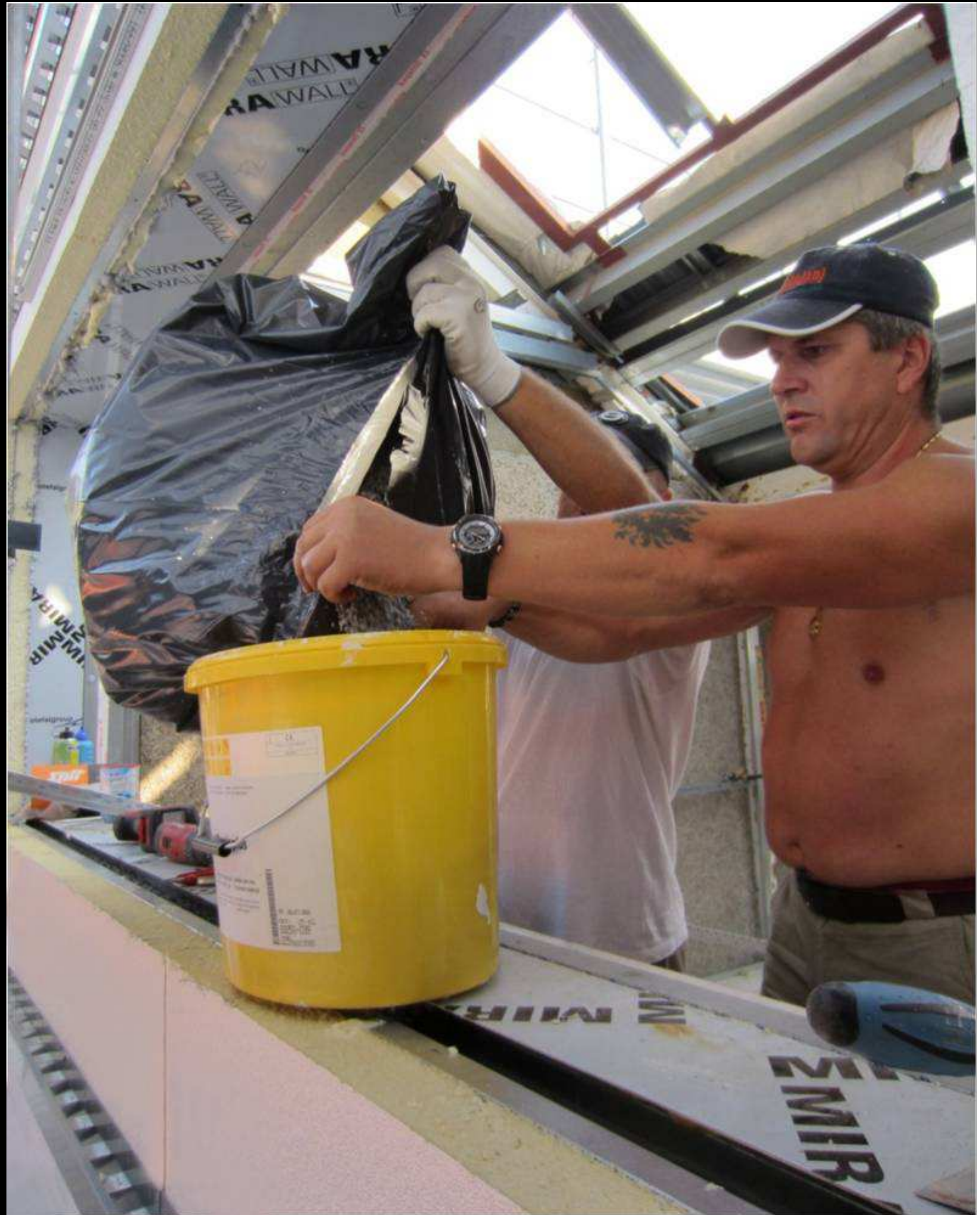
Pannelli isolanti in lana di roccia

Sistema isolante composto in poliuretano

Polistirene sbriciolato

Pannelli in OSB

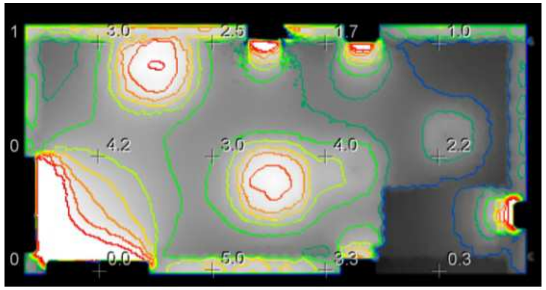

Bertoni

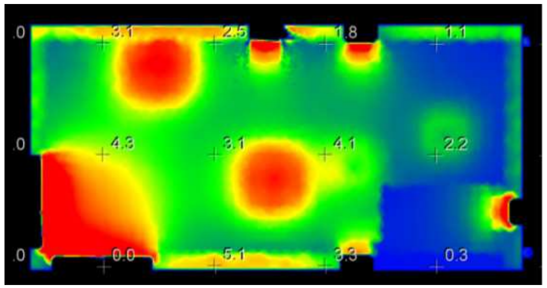


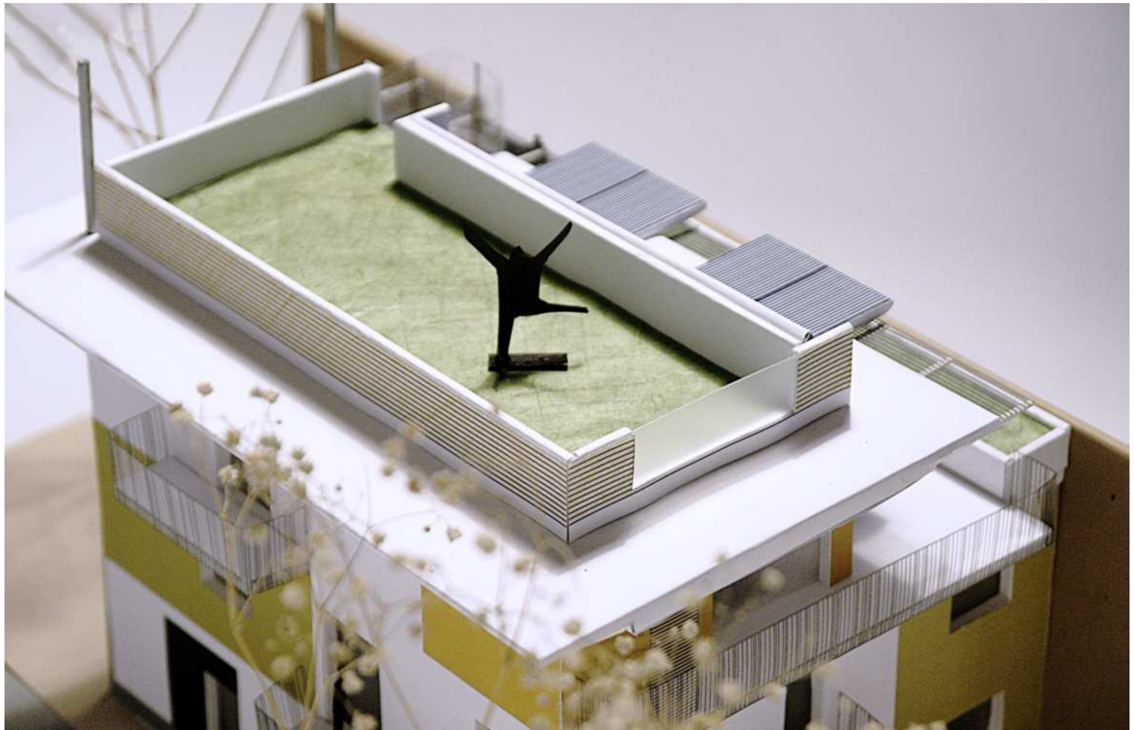
Isolanti interni in lana di roccia

Prima Active House a Bergamo – Maison Verte

Analisi illuminotecniche

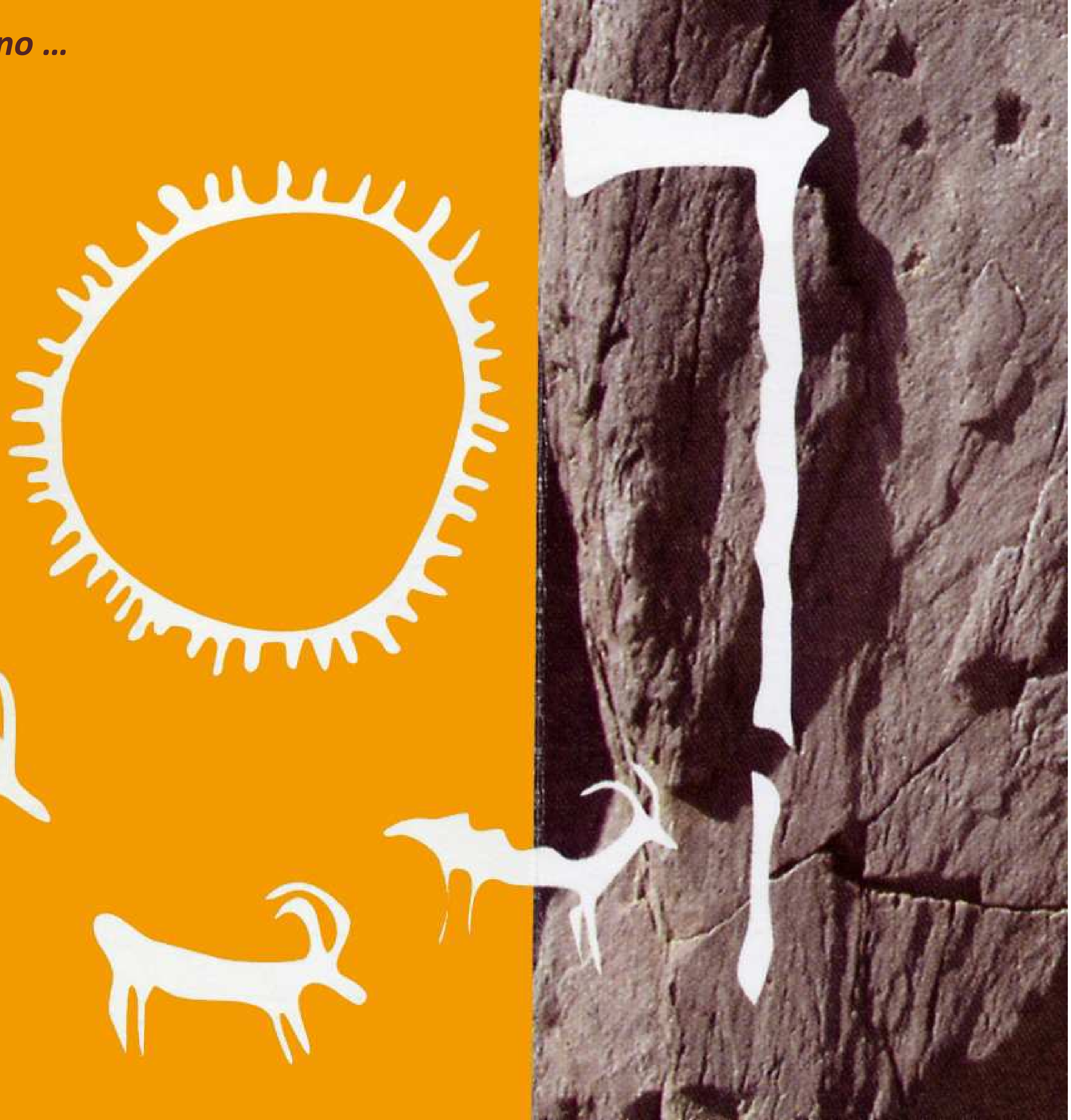






Il sole è nuovo ogni giorno …

Eraclito




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


SKATER

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33
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