

# edilportale<sup>®</sup>

## TOUR 2016

Efficienza energetica e comfort abitativo  
Tecnologie non invasive e sicurezza  
Sostenibilità economica e ambientale

in collaborazione con

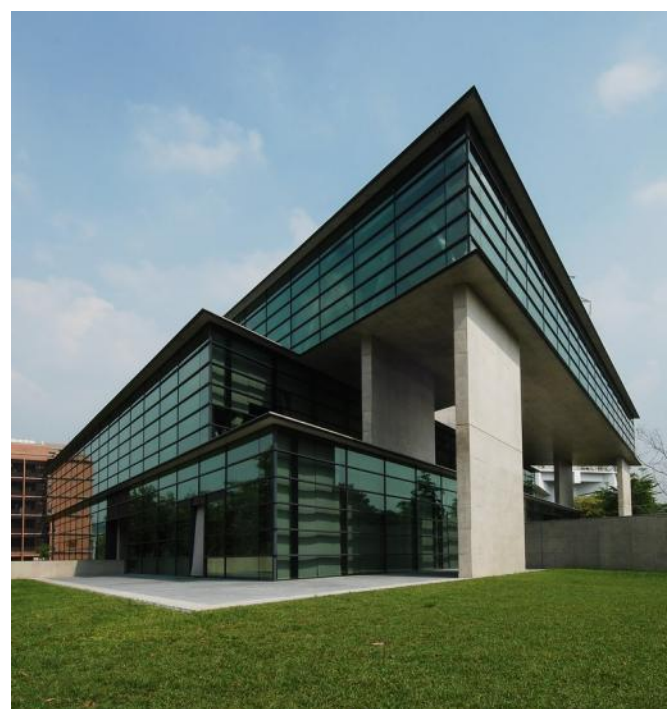


**Bolzano, 20 aprile 2016**

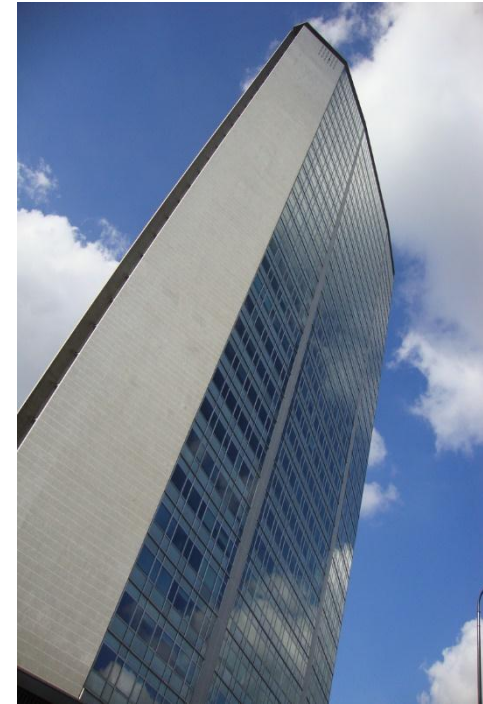
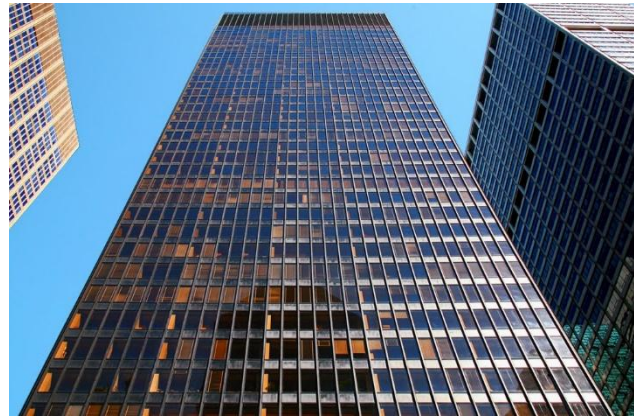
**Vetro e Architettura: cambiare l'idea di finestra**

**Niccolò Aste**

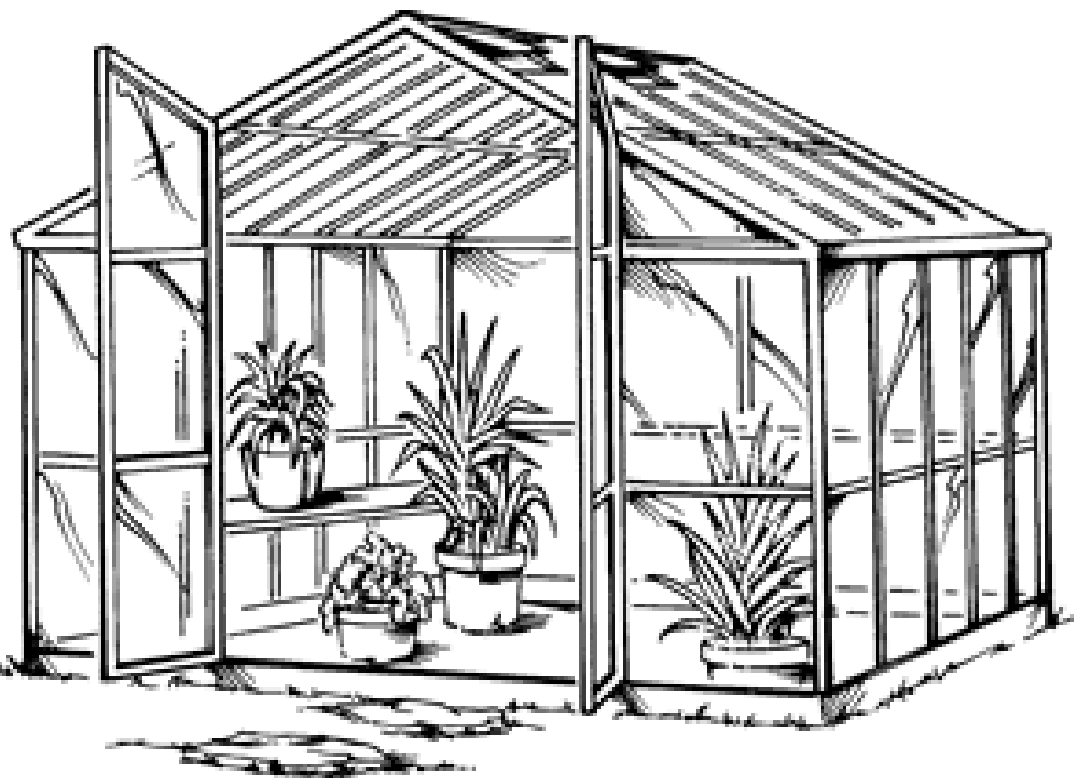
# ARCHITETTURA CONTEMPORANEA...



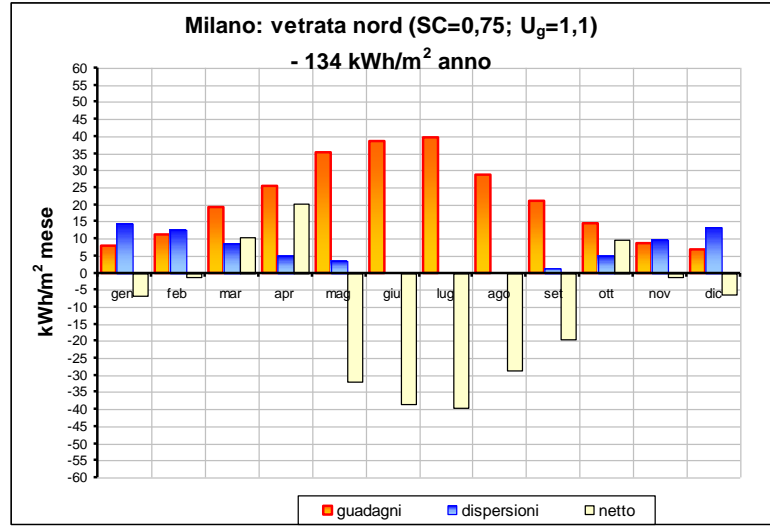
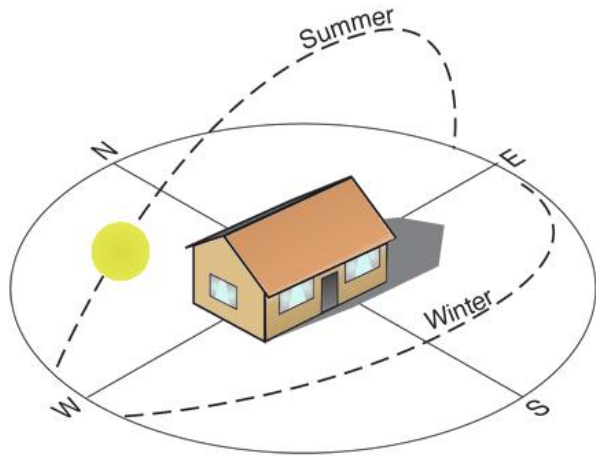
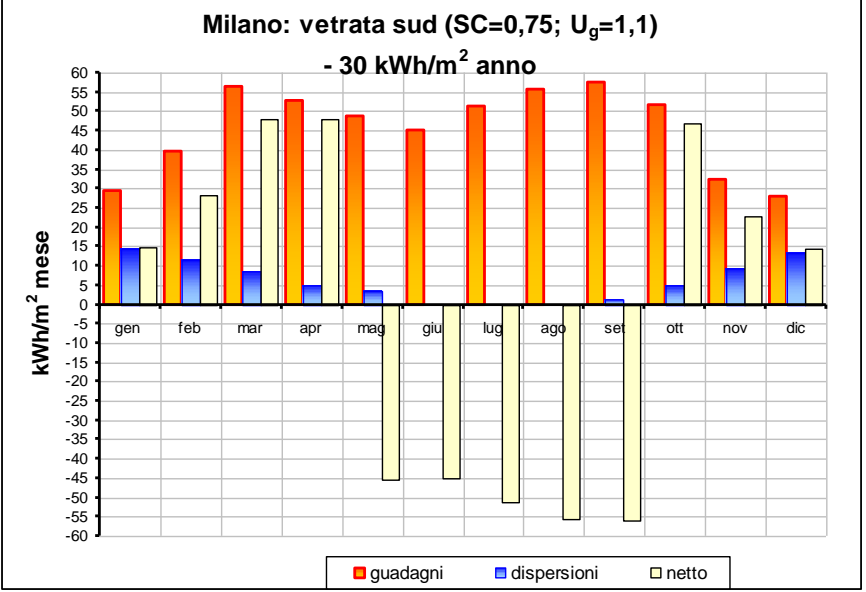
# ARCHITETTURA MODERNA...



# ...UN CONCETTO ANTICO

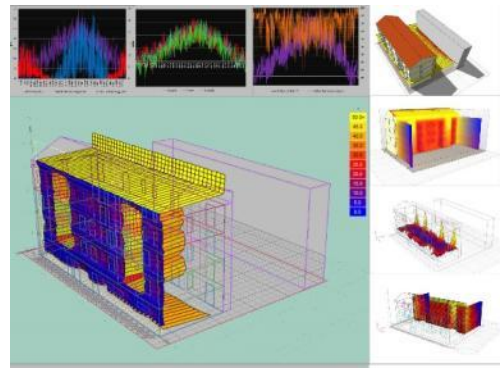
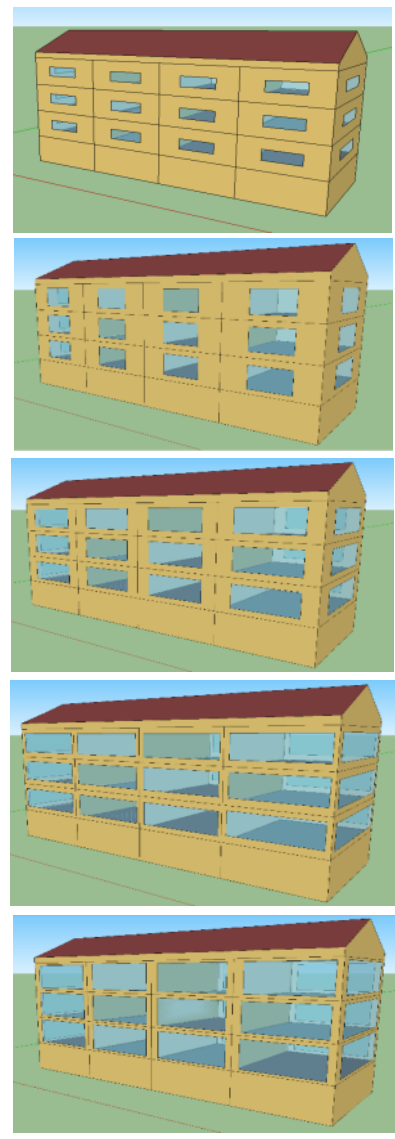
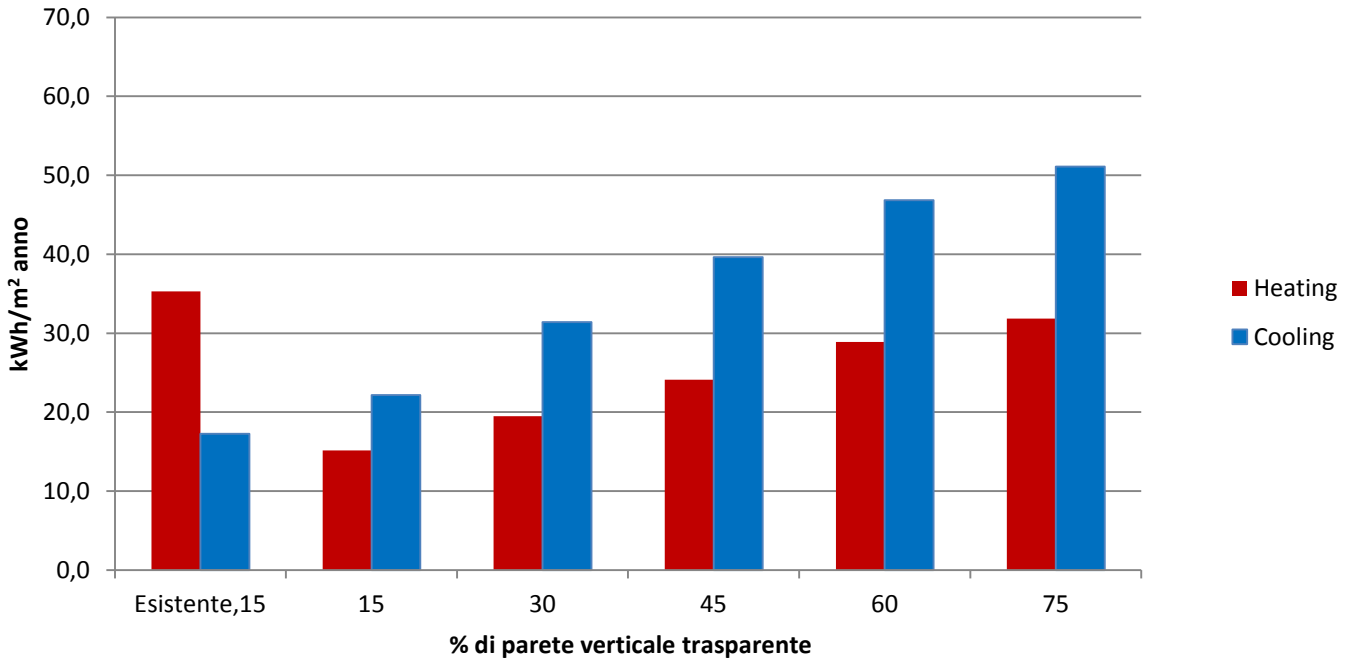


# VETRO E PRESTAZIONE ENERGETICA (1)

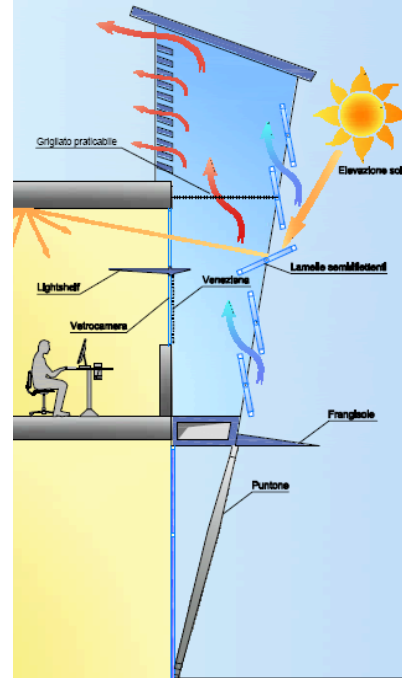
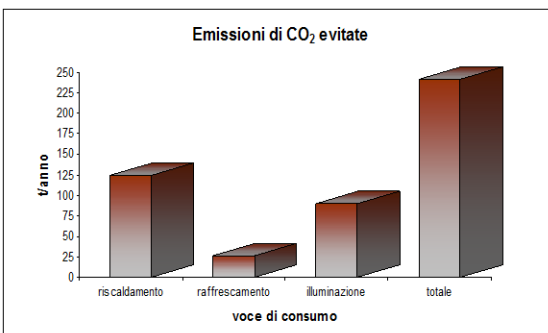
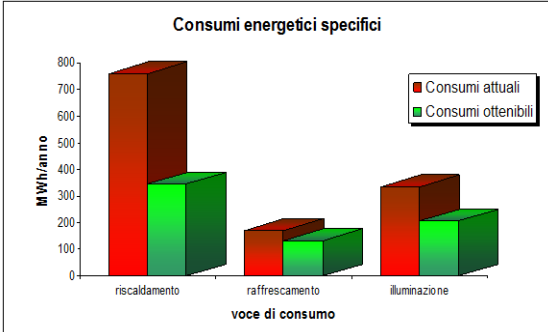
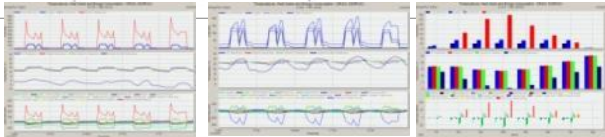
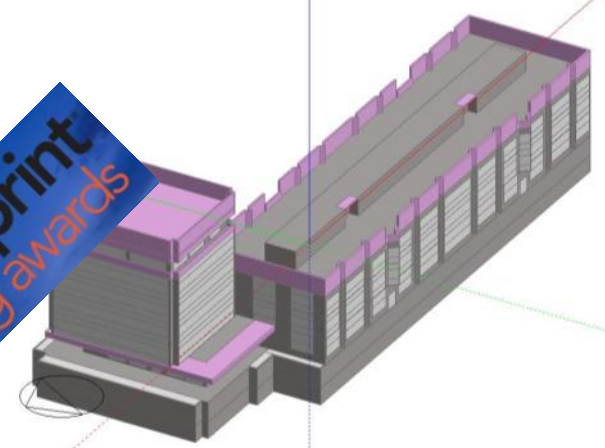


# VETRO E PRESTAZIONE ENERGETICA (2)

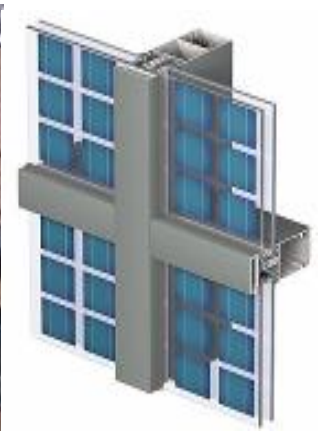
Fabbisogno utile al variare della superficie vetrata



# ENERGY RETROFIT: ERGO BUILDING



# VETRO E FOTOVOLTAICO





# SMART WINDOWS

**nature**  
THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

## Windows upgrade

Smart nanocrystal-in-glass composites regulate light and heat transmission  
PAGES 270 & 273

**PSYCHOLOGY**  
**UNRELIABLE EVIDENCE**  
The vagaries of eyewitness testimony  
PAGE 256

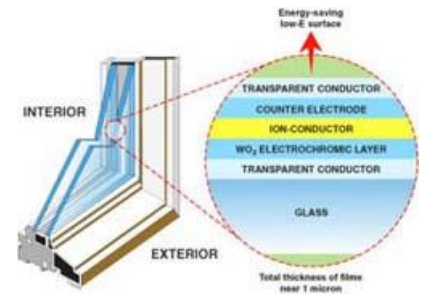
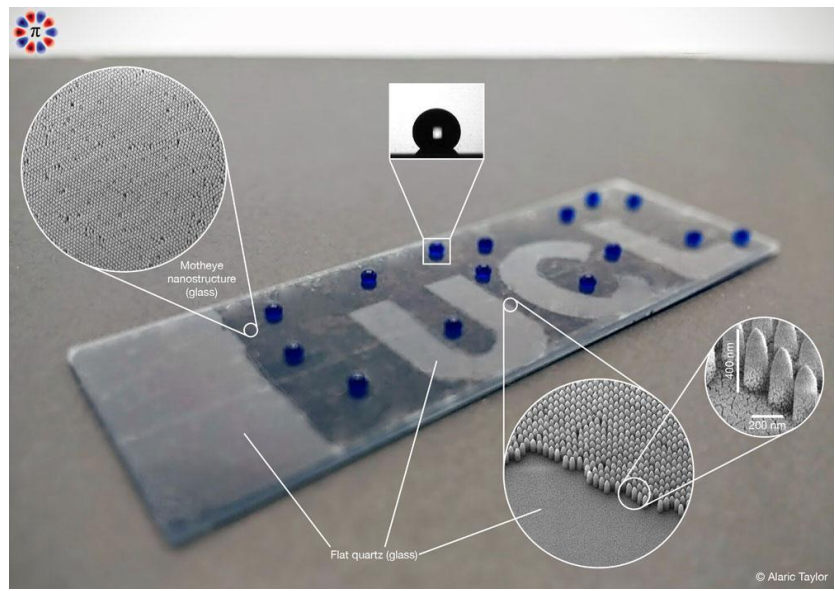
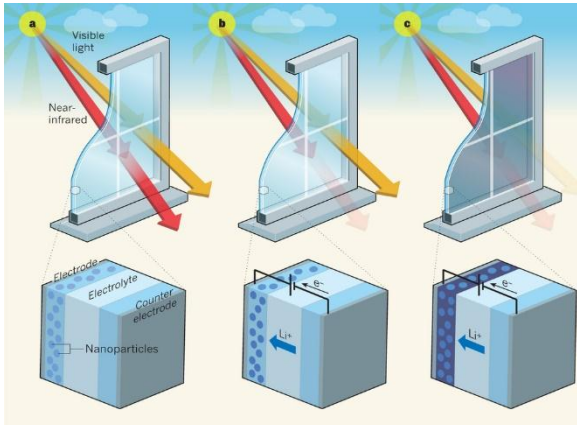
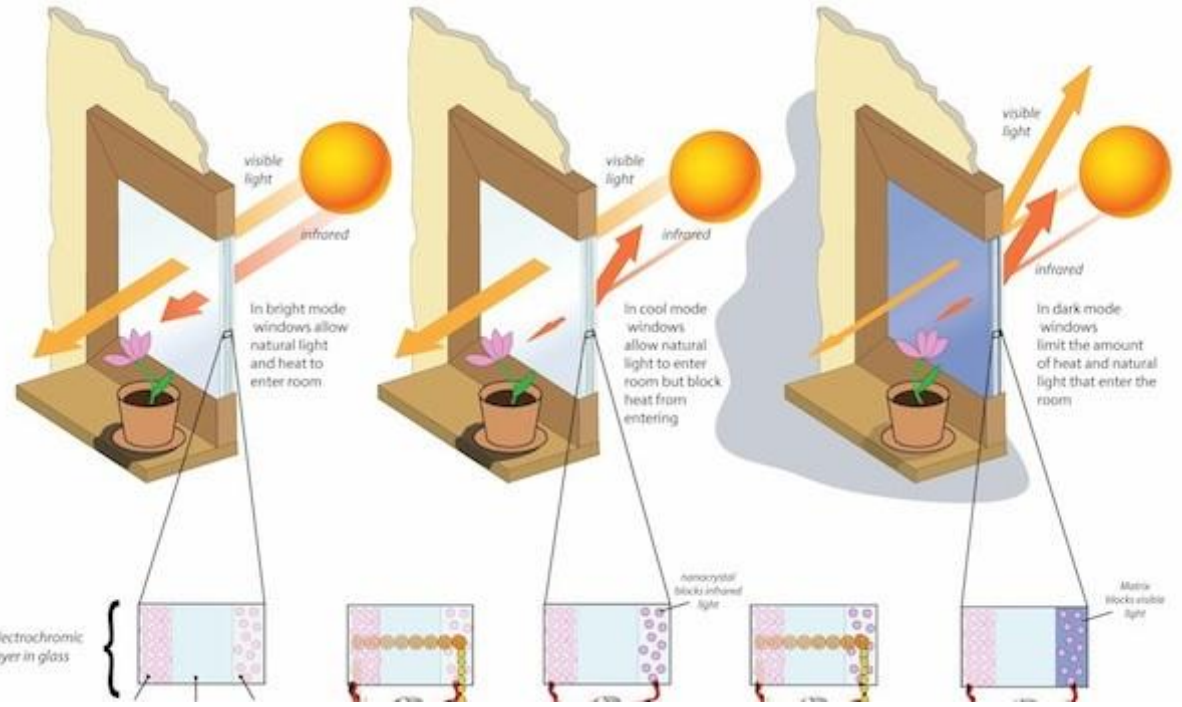
**ECOLOGY**  
**CARBON SINKS FEEL THE HEAT**  
Climate extremes could raise atmospheric CO<sub>2</sub>  
PAGE 267

**QUANTUM INFORMATION**  
**BRIDGING THE GAP**  
Two new approaches to on-demand teleportation  
PAGES 262, 315 & 319

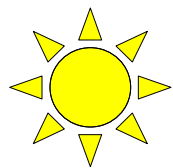
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ISSN 0028-0836

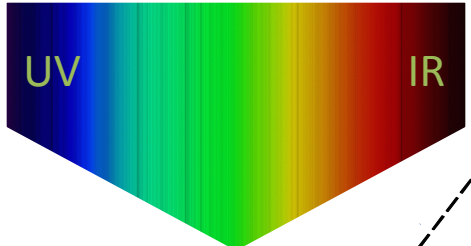
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# CONCENTRATORI SOLARI LUMINESCENTI (LSC)



**RADIAZIONE SOLARE INCIDENTE**



## LASTRA ATTIVA

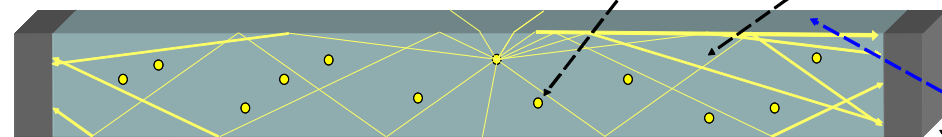
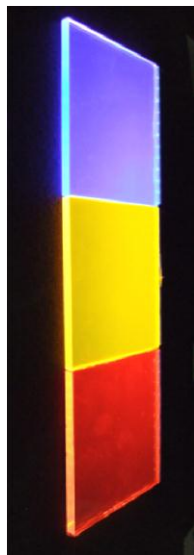
I coloranti fluorescenti sono dispersi in una matrice trasparente; essi assorbono la luce solare nel range spettrale UV-VIS e la convertono nella radiazione VIS-NIR, dove le celle fotovoltaiche hanno efficienza più elevata

## GUIDA D'ONDA

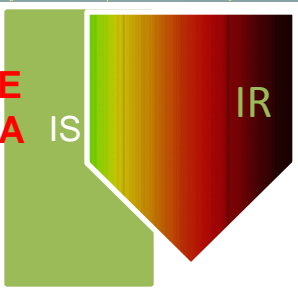
La maggior parte della radiazione convertita è concentrata ai bordi della lastra per riflessione interna

## CONCENTRAZIONE SULLE CELLE FOTOVOLTAICHE

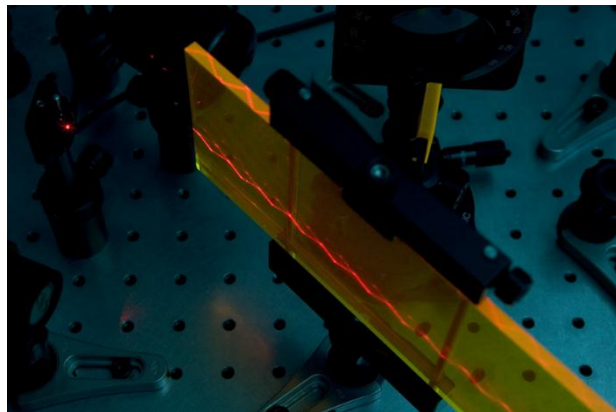
La luce assorbita sull'elevata area della lastra è concentrata su piccole celle PV poste ai bordi



**RADIAZIONE TRASMESSA**

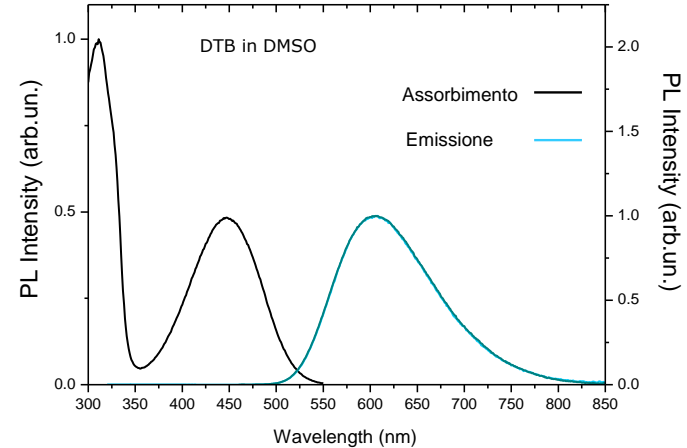


- VANTAGGI PRINCIPALI**
- ✓ moduli PV colorati e trasparenti
  - ✓ sfruttamento della luce diffusa
  - ✓ complementarità con il PV tradizionale



# LA RICERCA DI ENI

- sviluppati coloranti originali estremamente promettenti in termini di prestazioni, stabilità e scale up
- progettate e testate celle solari al silicio ottimizzate per LSC
- definito processo di assemblaggio
- definita la catena del valore per la produzione su scala commerciale
- 28 domande di brevetto depositate



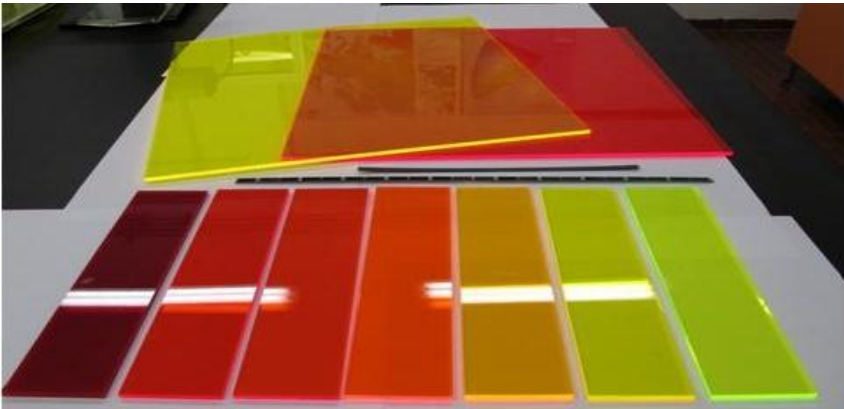
## Risultati tecnici

- scala di laboratorio: efficienza fino al 6.3% per dispositivi semitrasparenti  
**7.4% con un pannello riflettente sul retro (record mondiale per gli LSC!)**
- prove di invecchiamento accelerato (DIN EN ISO 4892-2) **in corso**
  - ✓ prestazioni stabili dopo oltre 8000 ore

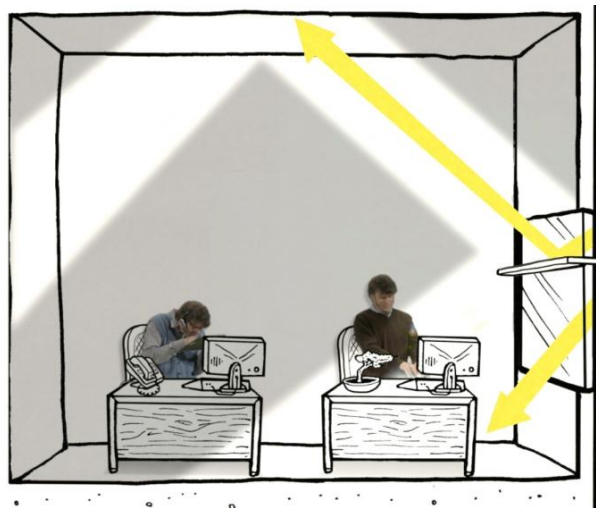
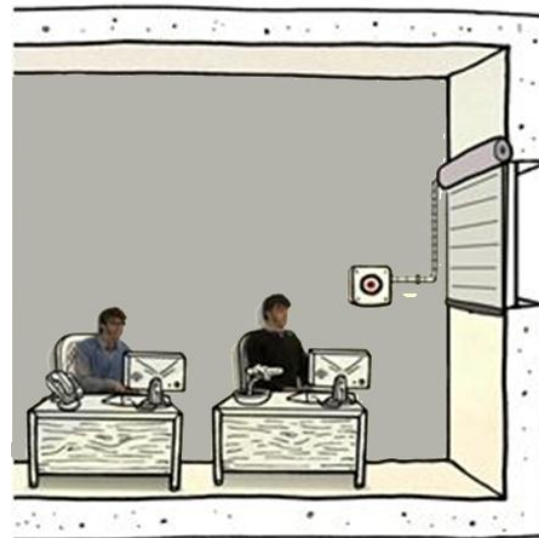
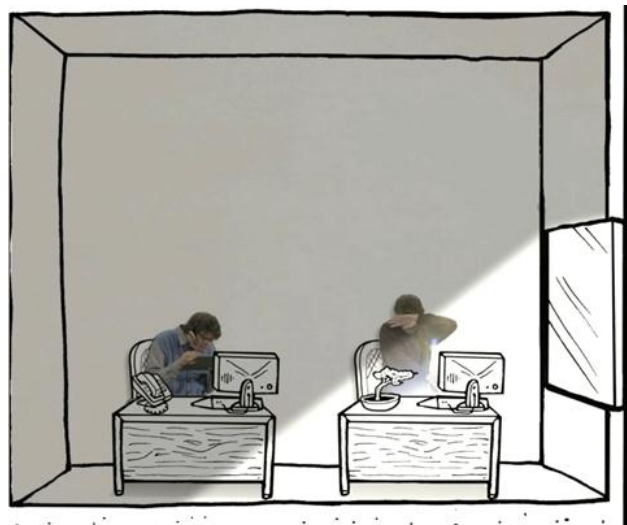
### *punti di forza ENI*

- coloranti con basso autoassorbimento
- coloranti a ridotto assorbimento nella regione dove è più sensibile l'occhio umano
- know-how per lo scale-up della tecnologia
- network di fornitori e potenziali partner

# SVILUPPO BIPV-LSC, ENI – POLITECNICO DI MILANO

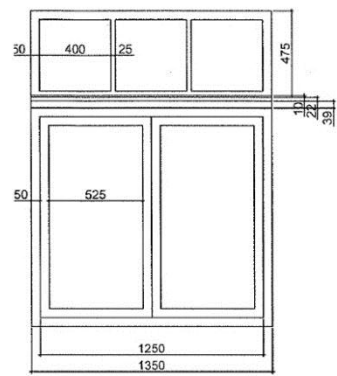
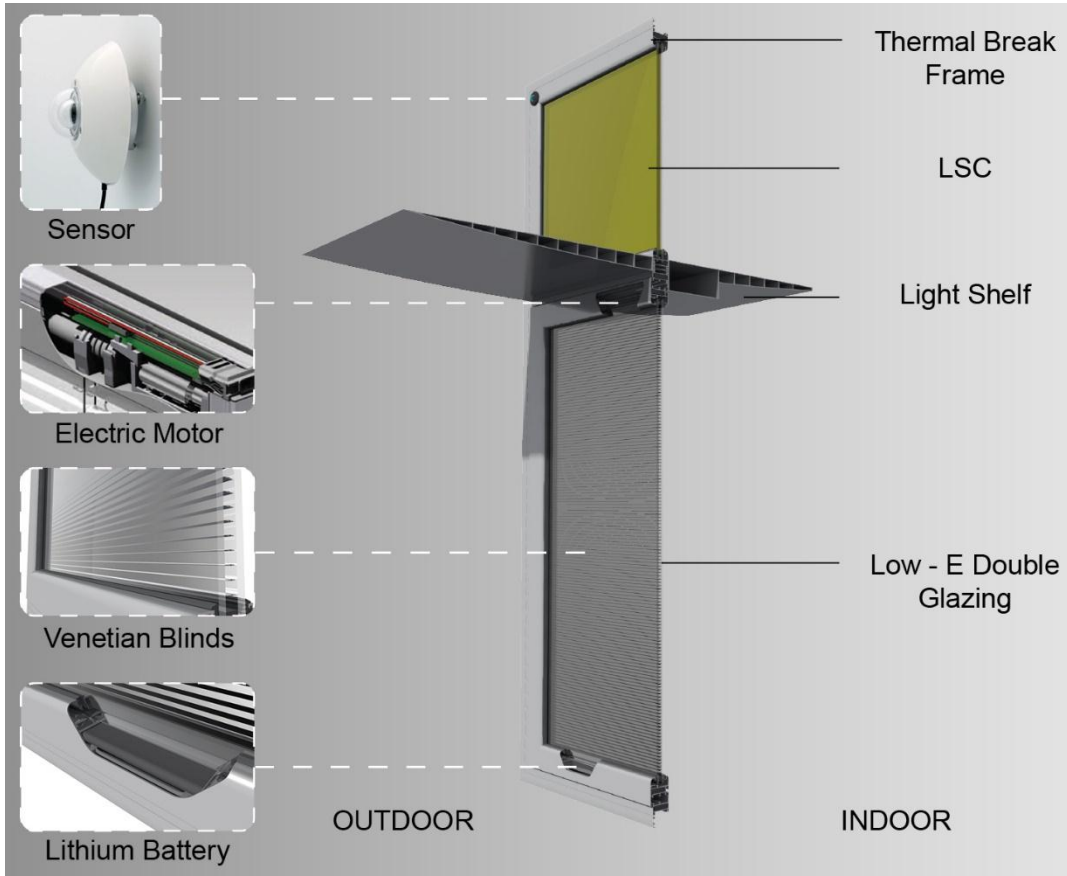


# DAYLIGHTING

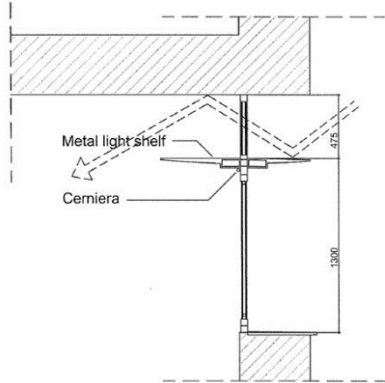
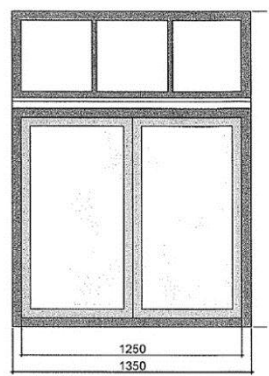


Fonte: Autodesk Sustainability Workshop

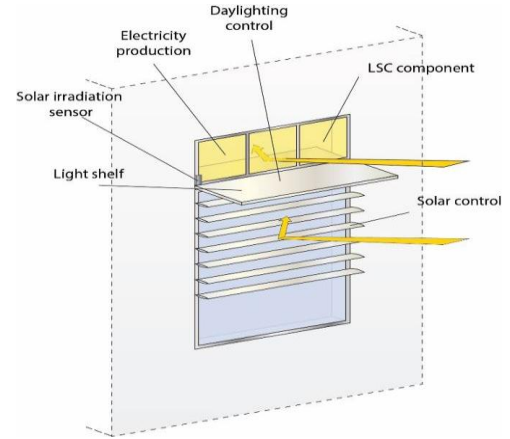
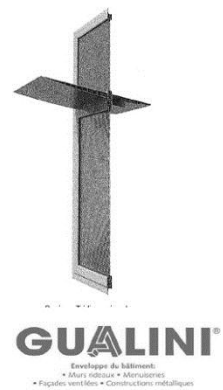
# PROGETTO SWING



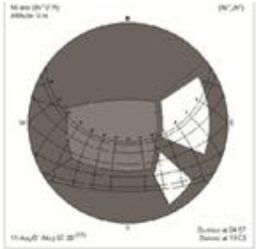
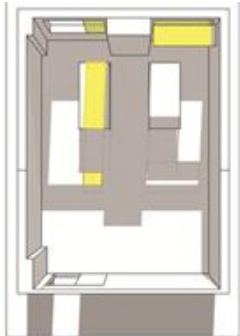
Prospetti, scala 1:20



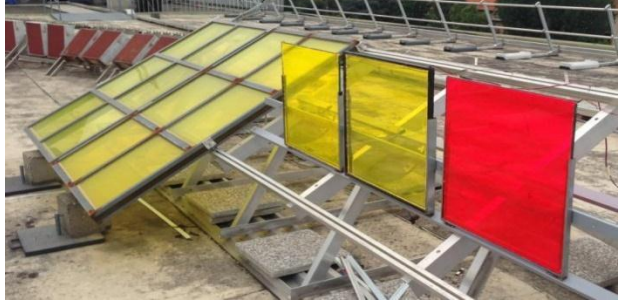
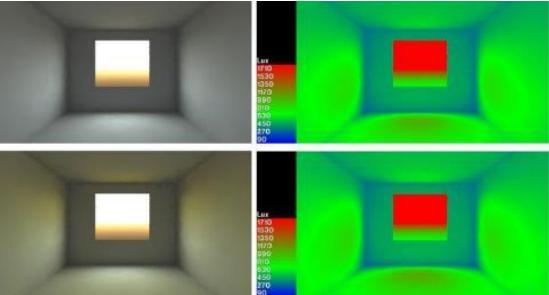
Sezione, scala 1:20



# LA CAMPAGNA SPERIMENTALE (1)



21 maggio 2013, ore 9:00  
1\_Posizione pannello/finestra: verticale e sopra luce con light sb  
2\_Esposizione solare: ESI  
3\_Situazione cielo: soleggiato



# LA CAMPAGNA SPERIMENTALE (2)



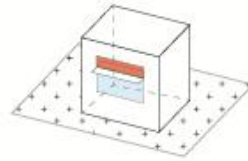
**Test room reale  
(9 punti di analisi)**

- distribuzione spettrale di potenza
- illuminamento (minimo, massimo e medio)
- coordinate cromatiche
- efficienza luminosa
- temperatura di colore
- uniformità



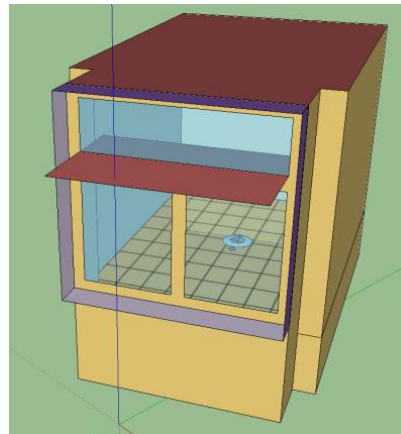
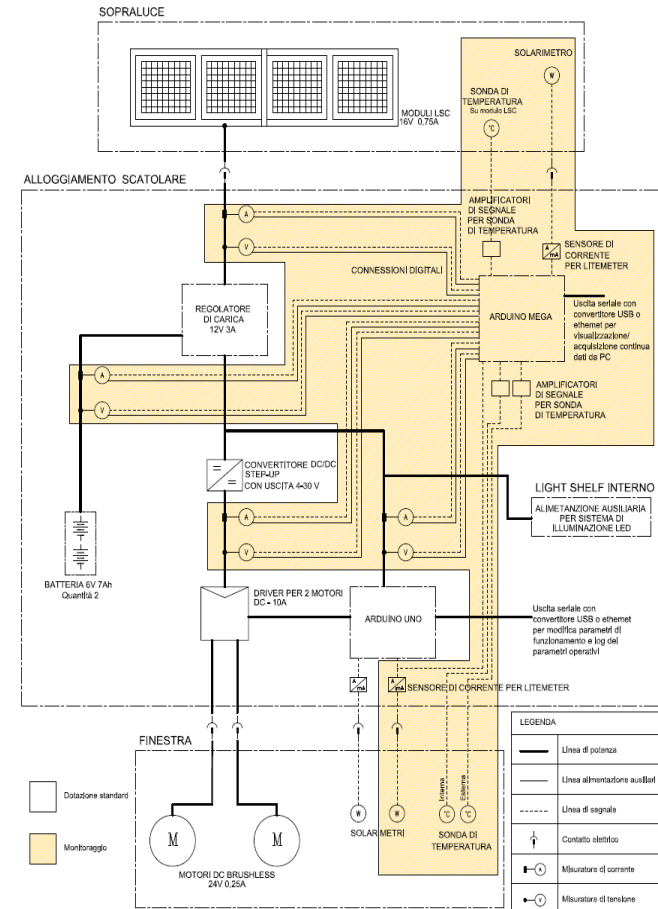
**Modello fisico della test room in scala  
(1 punto di analisi)**

- illuminamento
- temperatura di colore



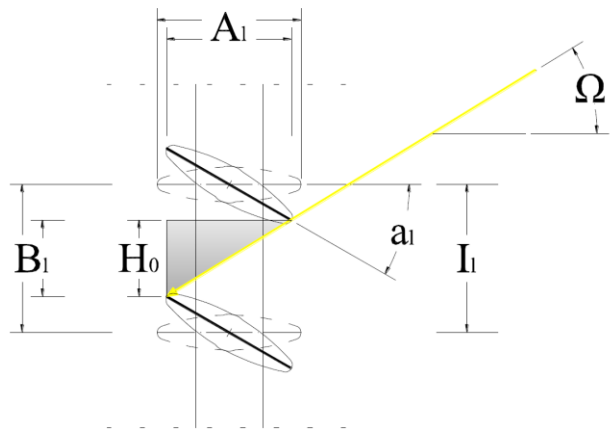
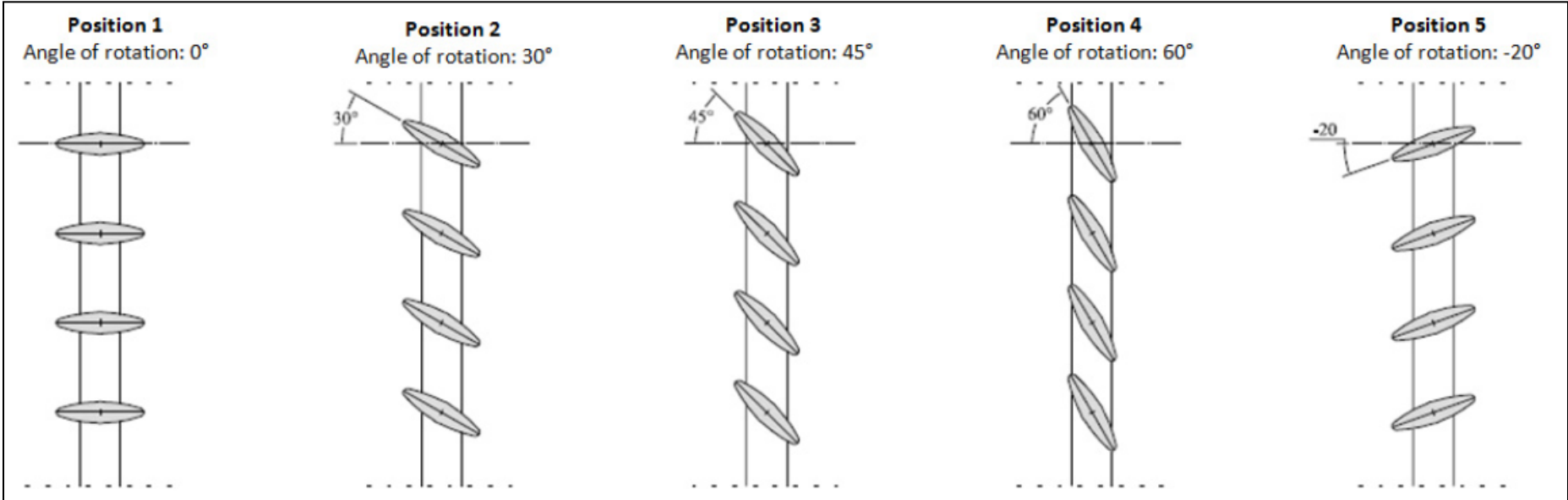
**Modello virtuale della test room  
(349 punti di analisi)**

- illuminamento

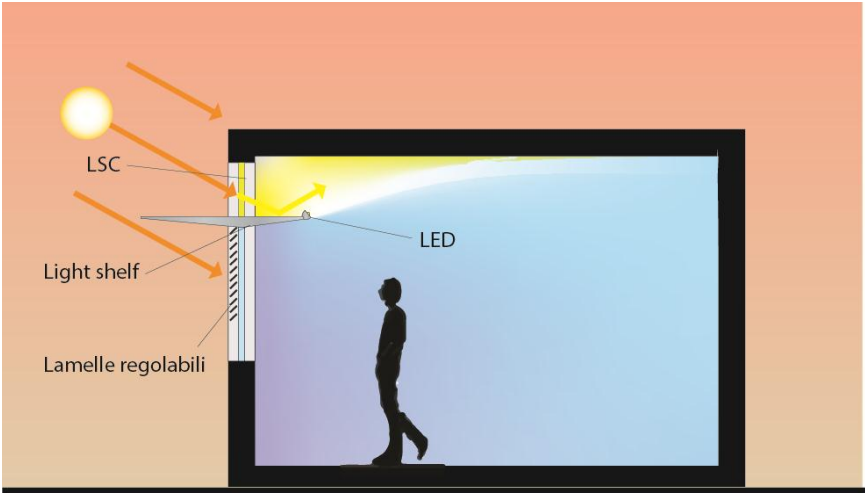
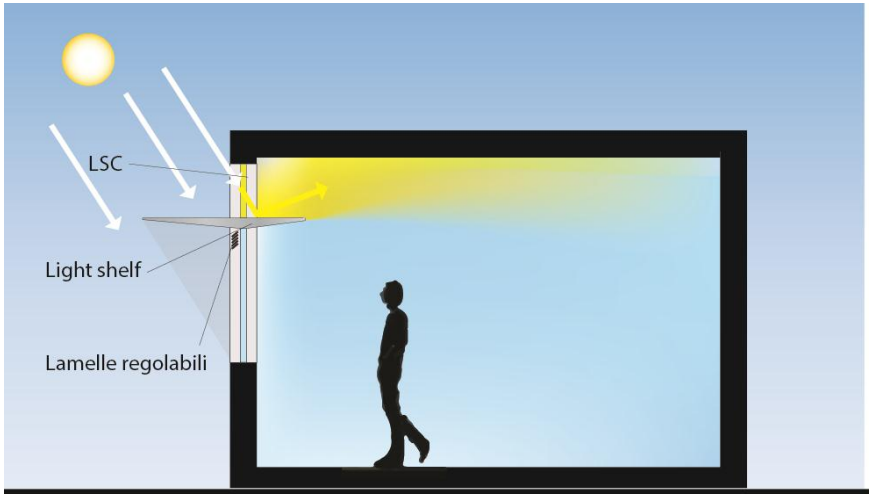
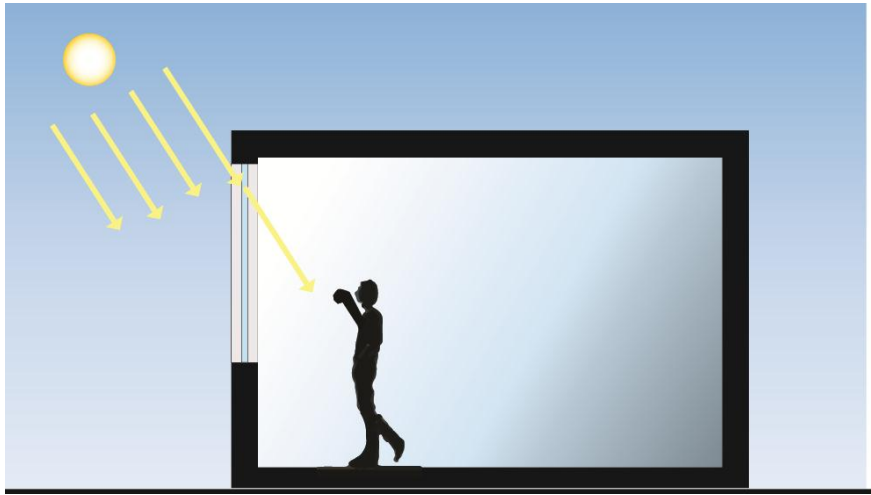




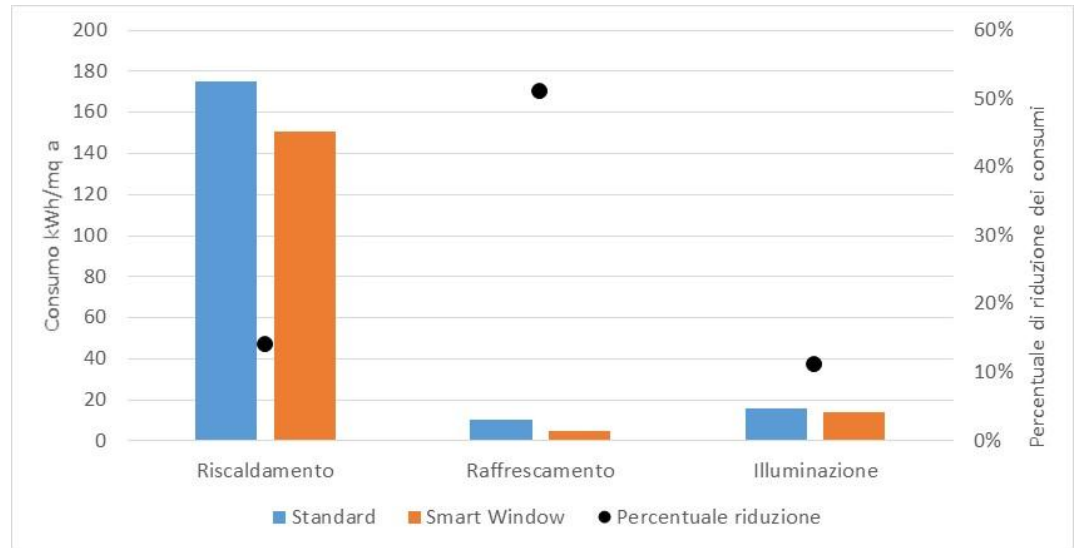
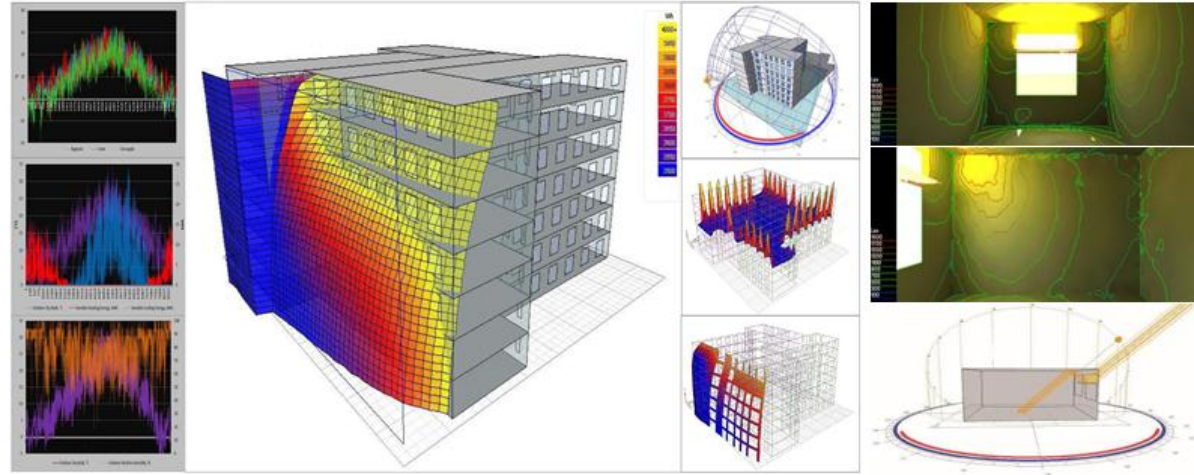
# CONTROLLO SOLARE



# SVILUPPO TECNOLOGICO



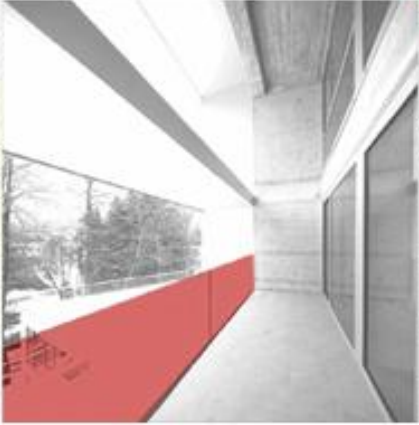
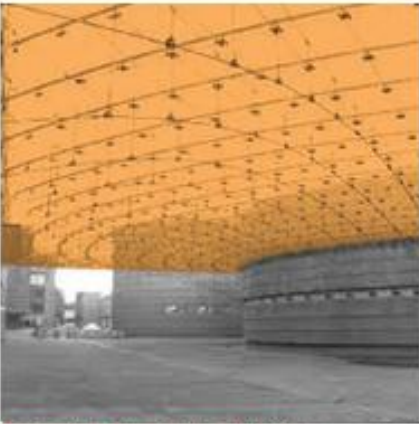
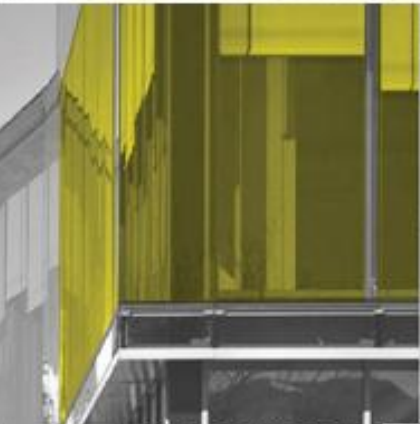
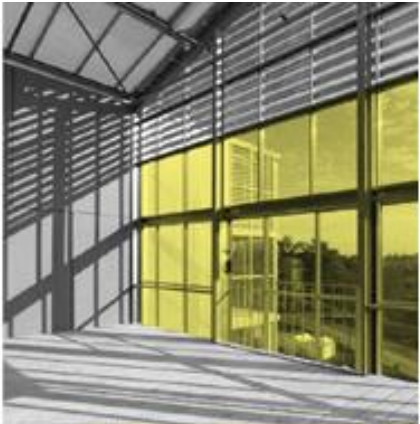
# PRESTAZIONI ENERGETICHE



# LSC DAYLIGHTING



# LSC ARCHITECTURE



# CAMPI D'APPLICAZIONE



BIPV



Pensiline



Pubblicità



Serre



Fotobioreattori



Automotive



Barriere antirumore