

edilportale[®]

TOUR 2016

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

in collaborazione con



Padova, 19 maggio 2016

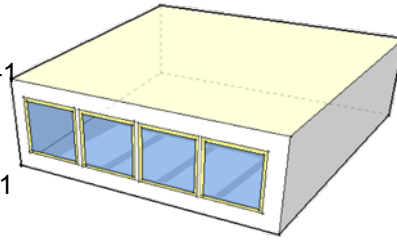
“Efficienza energetica e comfort termoigrometrico degli occupanti”

Andrea Gasparella

Edifici di Riferimento



Involucro:
Vetro singolo
 $U_{gl}=5.7 \text{ W m}^{-2} \text{ K}^{-1}$
Telaio in legno
 $U_{fr}=3.2 \text{ W m}^{-2} \text{ K}^{-1}$



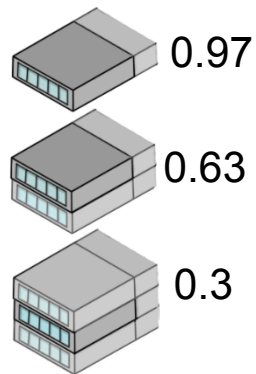
Generatore: Standard
Emissione: Radia
Controllo: On-Off
Distribuzione: Isolamento moderato



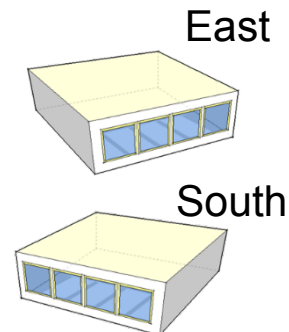
Involucro opaco

$R_1=0.97 \text{ m}^2\text{KW}^{-1}$
 $R_2=2.04 \text{ m}^2\text{KW}^{-1}$

Rapporto S/V



Orientazione



Clima



12 Edifici di riferimento in due località

Strategie per la riqualificazione energetica



ISOLAMENTO ESTERNO

Da 0 a 20 cm (step 1cm)

- Muri esterni
- Solaio copertura
- Solaio pavimentazione



SISTEMA RISCALDAMENTO

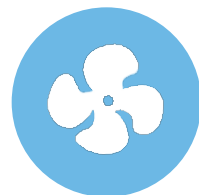
- Caldaia a modulazione,
 $\eta = 96\%$
- Caldaia a condensazione,
 $\eta = 101\%$



SOSTITUZIONE INFISSI

Telaio alte prestazioni

- DH – Doppio, Alto SHGC
- DL – Doppio, Basso SHGC
- TH – Triplo, Alto SHGC
- TL – Triplo, Basso SHGC

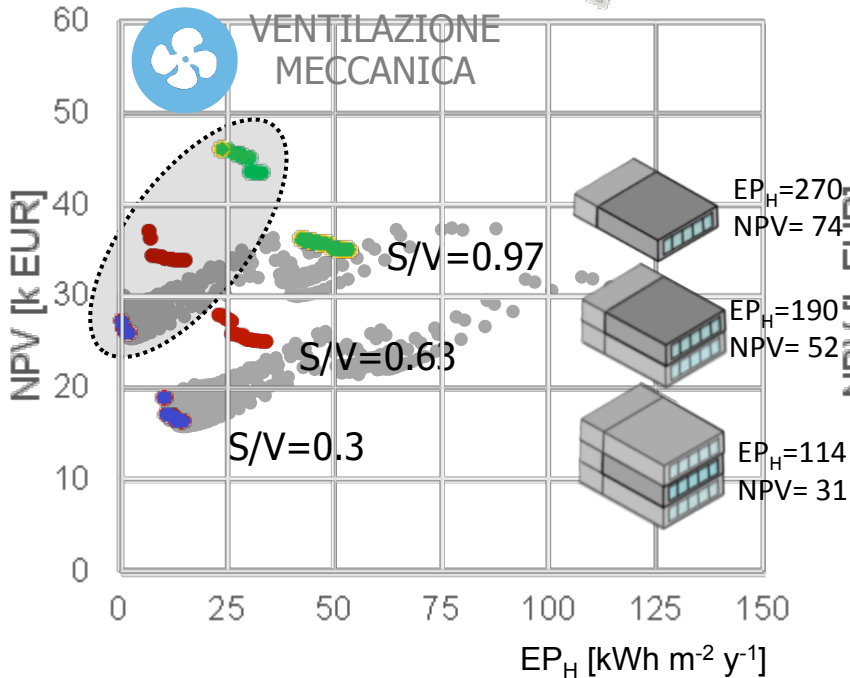


SISTEMA VENTILAZIONE

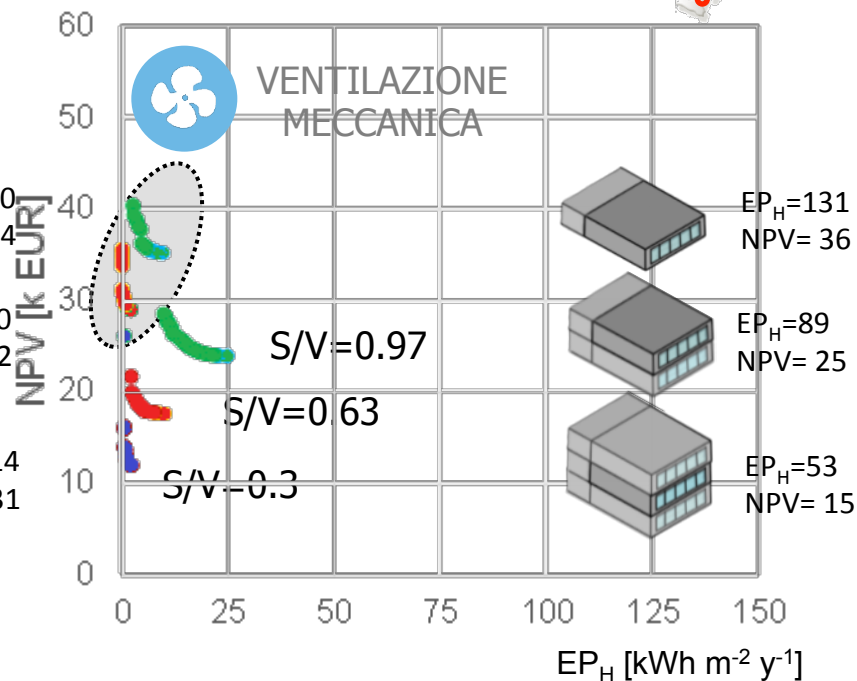
Sistema di ventilazione meccanica con recuperatore di calore

Risultati per ottimizzazione EP_H e NPV

MILANO



MESSINA



REF 1 - EST

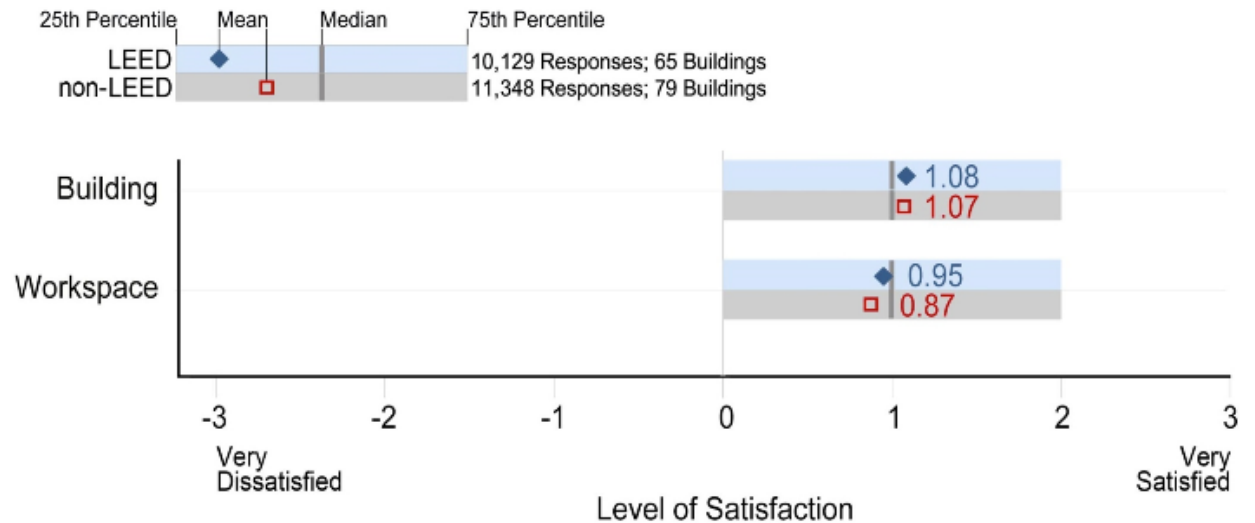
It is a great pleasure and an honor for me to have been asked to welcome you to the National Bureau of Standards today to discuss a subject of mutual interest, namely, that of the effects of energy conservation in buildings on human comfort. With the increased emphasis on energy conservation practices in existing buildings as well as new building designs that emphasize energy conservation, you, our leading scientists, engineers, government officials, architects, physiologists, and manufacturers are faced with the challenge of protecting the comfort, health, and performance of building users. This symposium, therefore, is unusual because we will be trying to explore how much we really know about the effects of interior thermal environments on people.

J. R. Wright
Institute for Applied Technology
National Bureau of Standards
Washington, D.C. 20234

Proceedings of a Symposium Held at the
National Bureau of Standards
Gaithersburg, Maryland
February 11, 1977

Qualità dell'ambiente

Dataset	LEED Buildings	Non-LEED Buildings	Total
Buildings	65	79	144
Occupant responses	10,129	11,348	21,477



Occupant satisfaction in LEED and non-LEED certified buildings – S. Schiavon, S. Altomonte

Qualità dell'ambiente Prestazioni

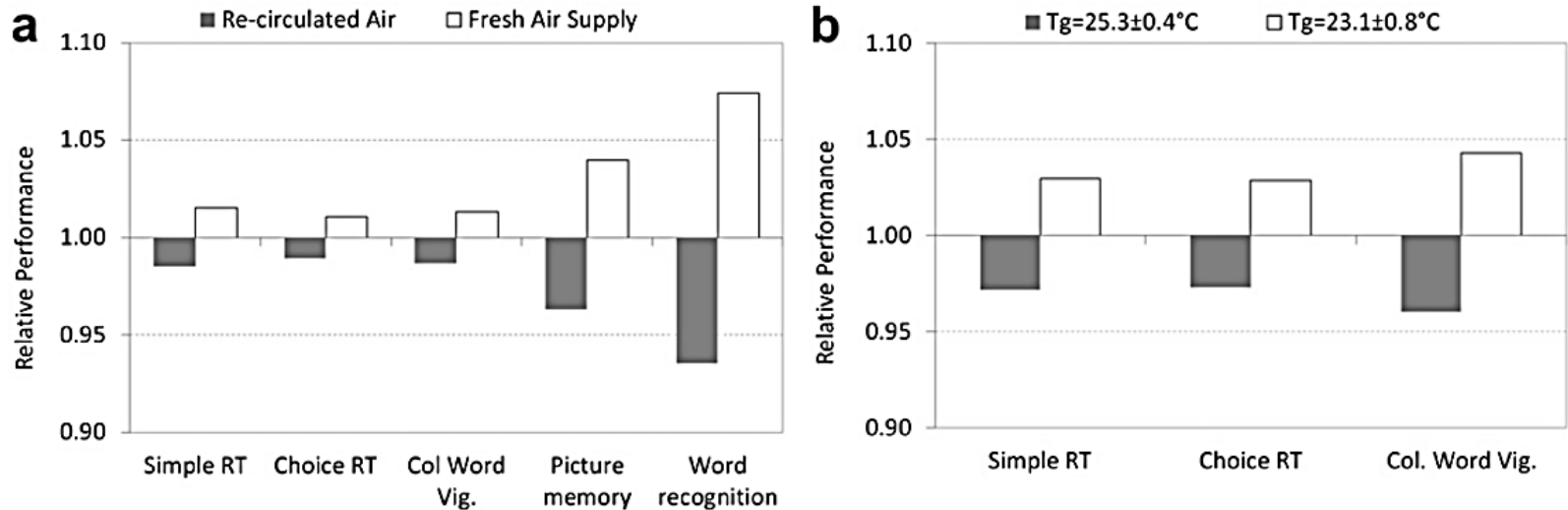


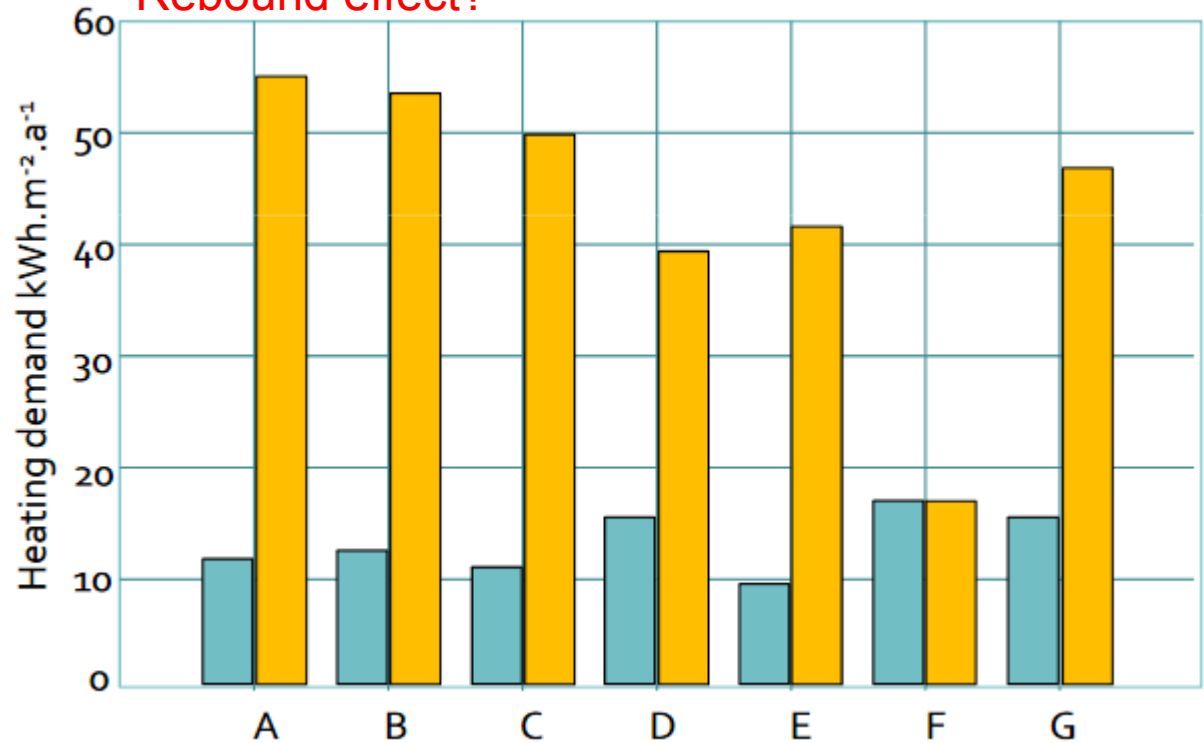
Fig. 4. Relative effects of Ventilation (a) and Thermal environment (b) on Pupil performance and learning.

Zs. Bakó-Biró, D.J. Clements-Croome, N. Kochhara, H.B. Awbia, M.J. William, 2012, Ventilation rates in schools and pupils' performance, *Buildings and Environment*

Prestazioni

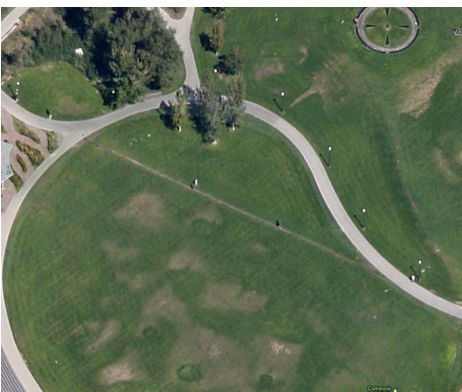
Fabbisogni termici per 7 edifici riqualificati - valori di progetto e prestazioni effettive:

Rebound effect?



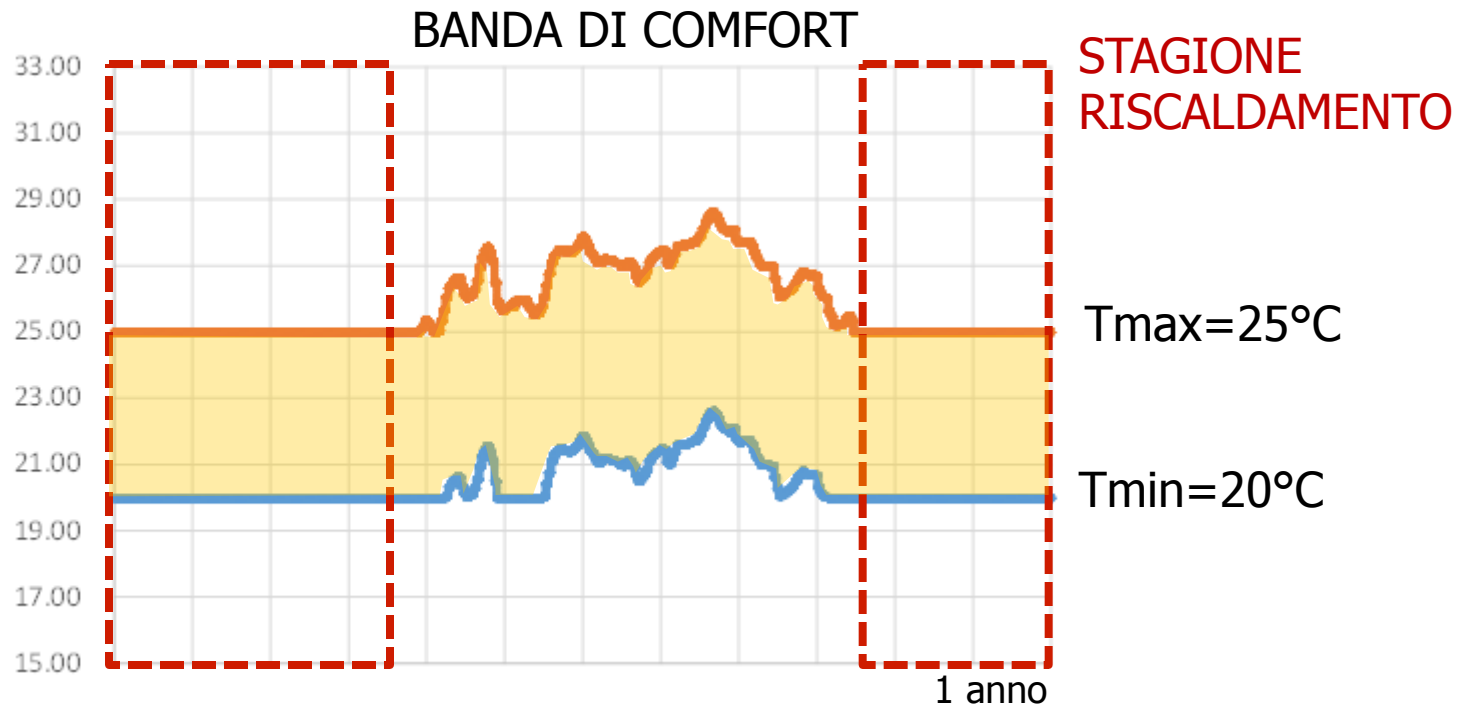
P.P. Housez, U.
Pont, A.
Mahdavi, 2014,
*A comparison of
projected and
actual energy
performance of
buildings after
thermal retrofit
measures*

Prestazioni



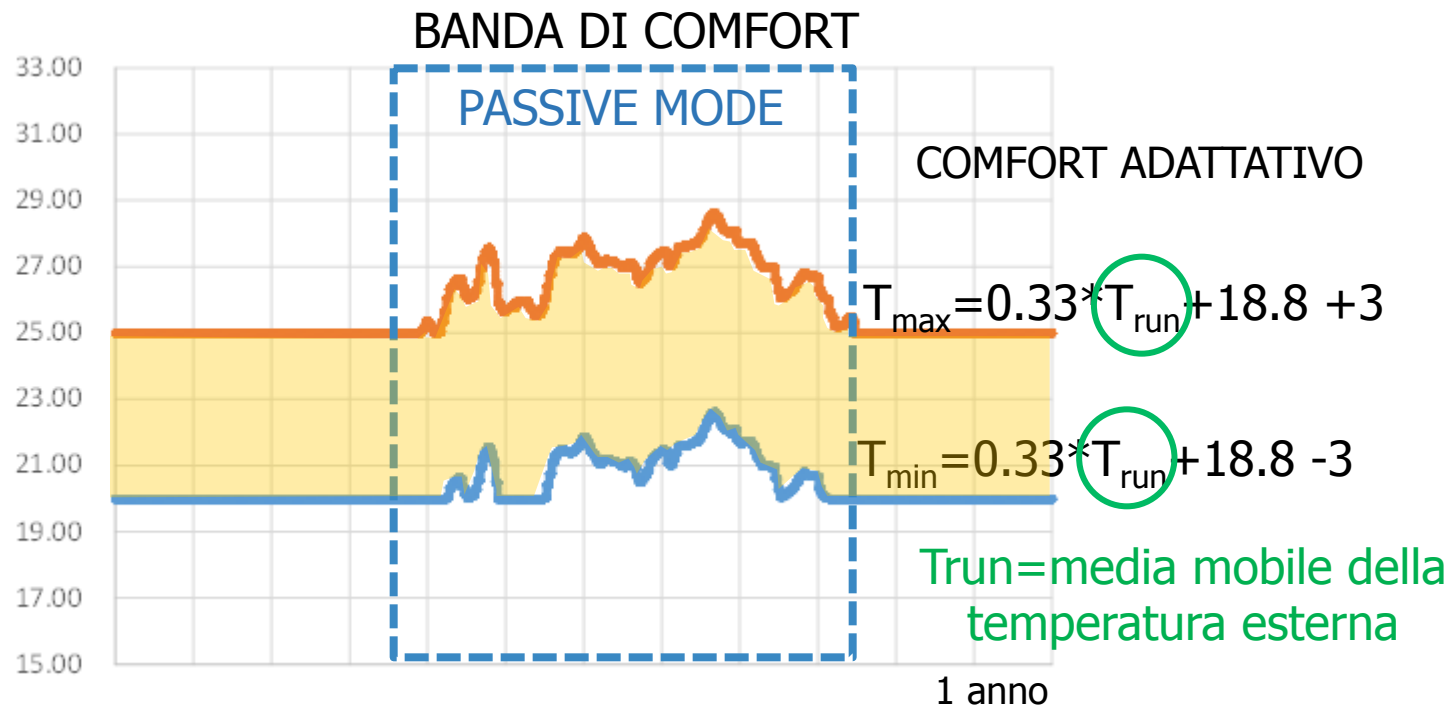
WDT (Weighted Discomfort Time) EN 15251:2007

Di quanto e per quanto tempo la Temperatura operativa é fuori dalla banda di comfort durante il periodo di occupazione



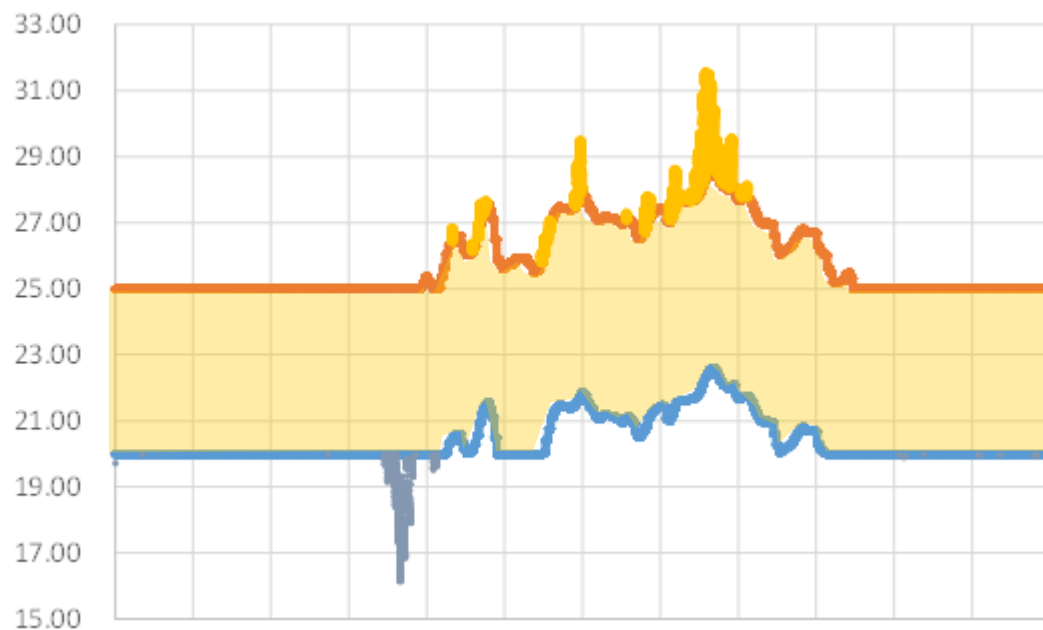
WDT (Weighted Discomfort Time) EN 15251:2007

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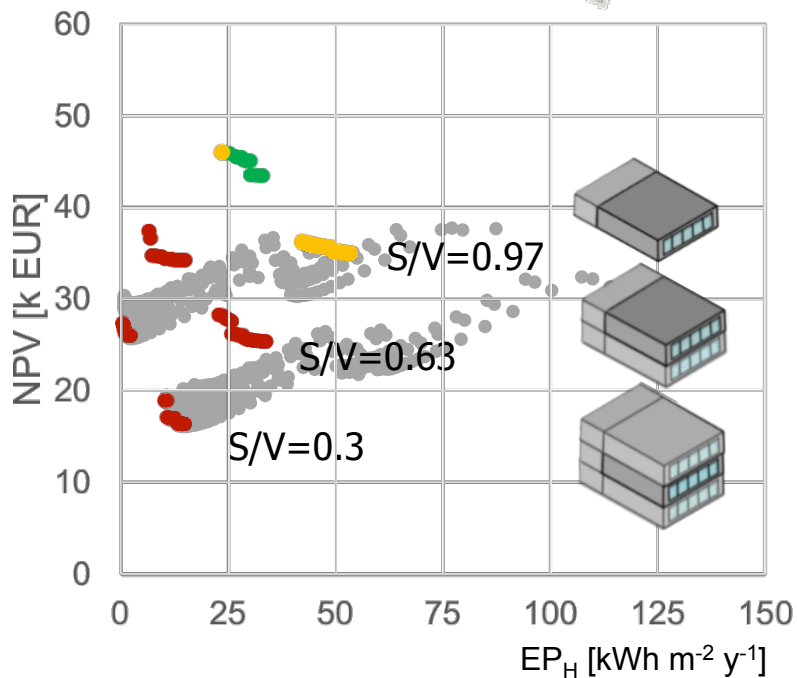


$$wf = T_o - T_{limite}$$

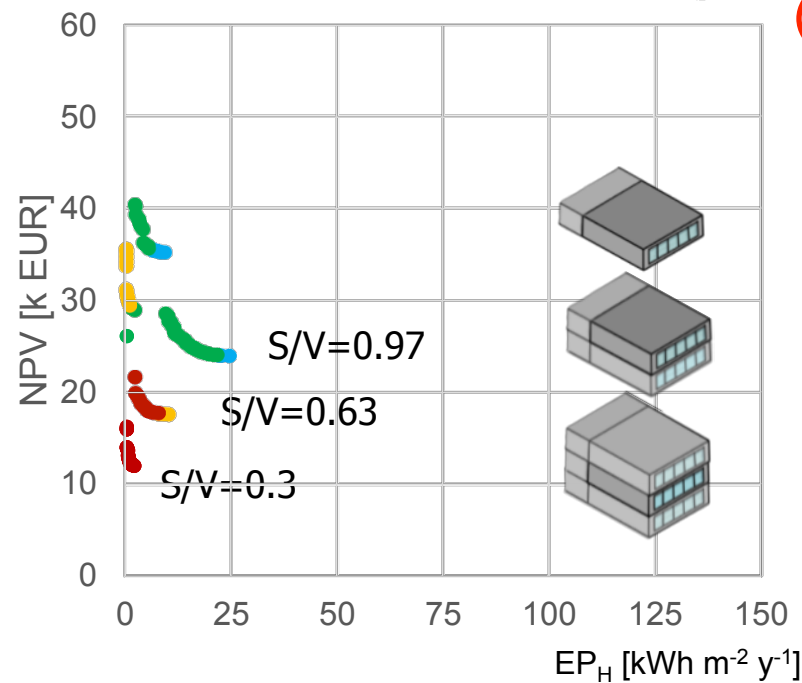
$$WDT = \sum wf * time$$

Risultati per ottimizzazione EP_H e NPV

MILANO



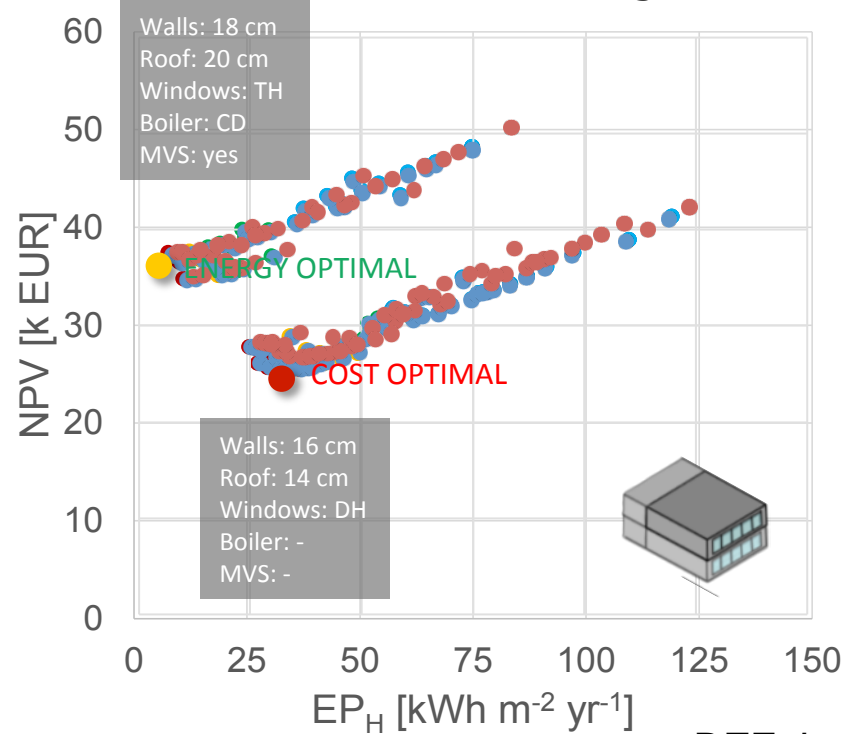
MESSINA



REF 1 - EST

Risultati

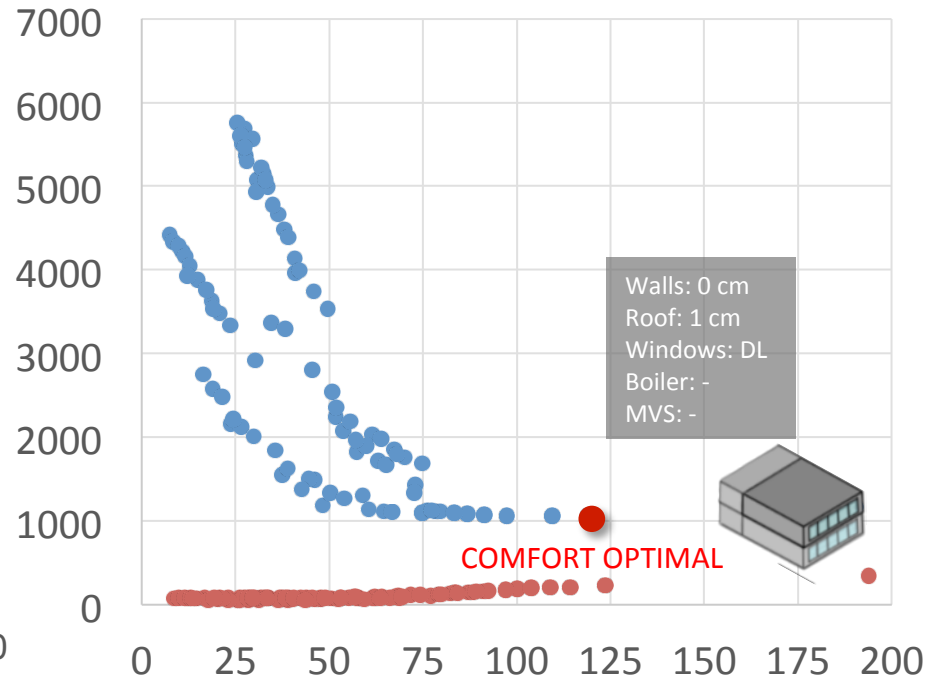
Costi vs Fabbisogno



MILANO

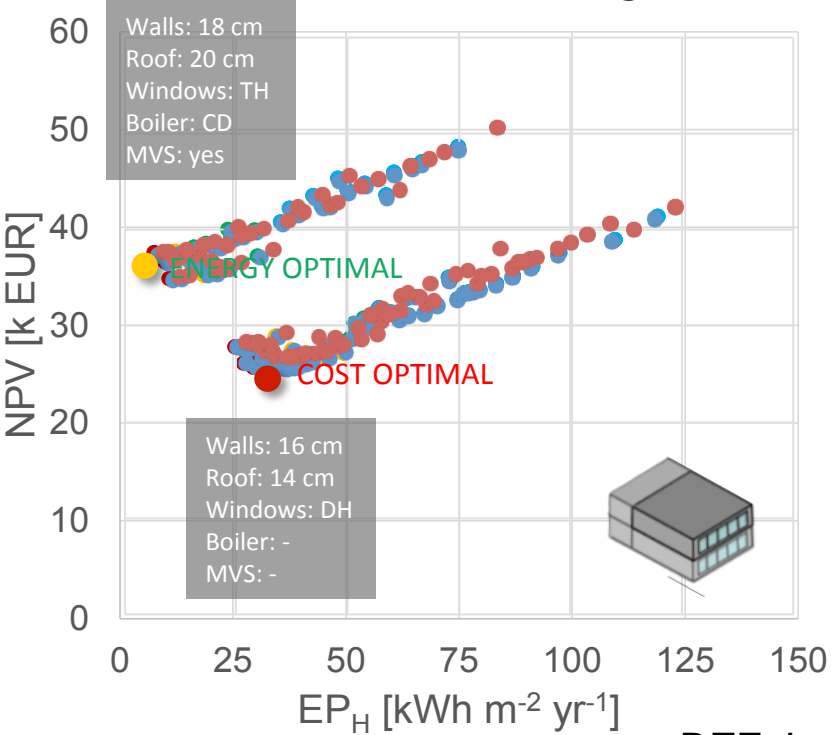


Comfort vs Fabbisogno



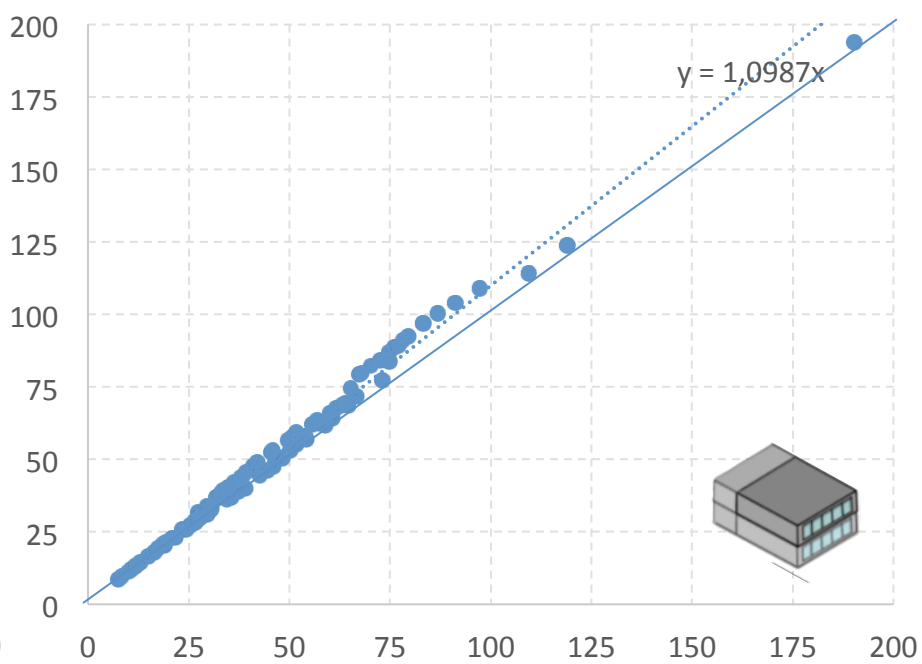
Risultati

Costi vs Fabbisogno



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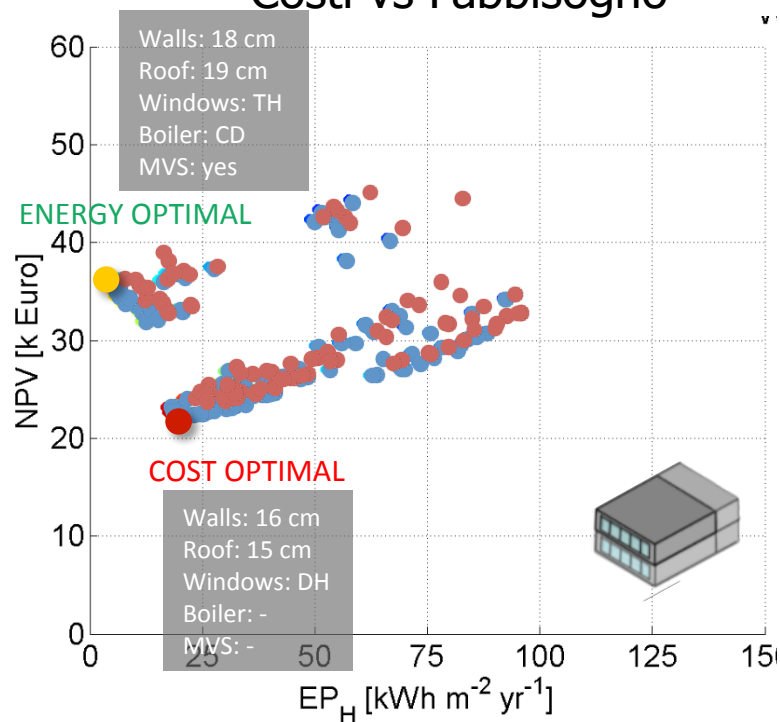
Fabbisogno vs Fabbisogno con gest.



REF 1 – EST – S/V = 0.63

Risultati

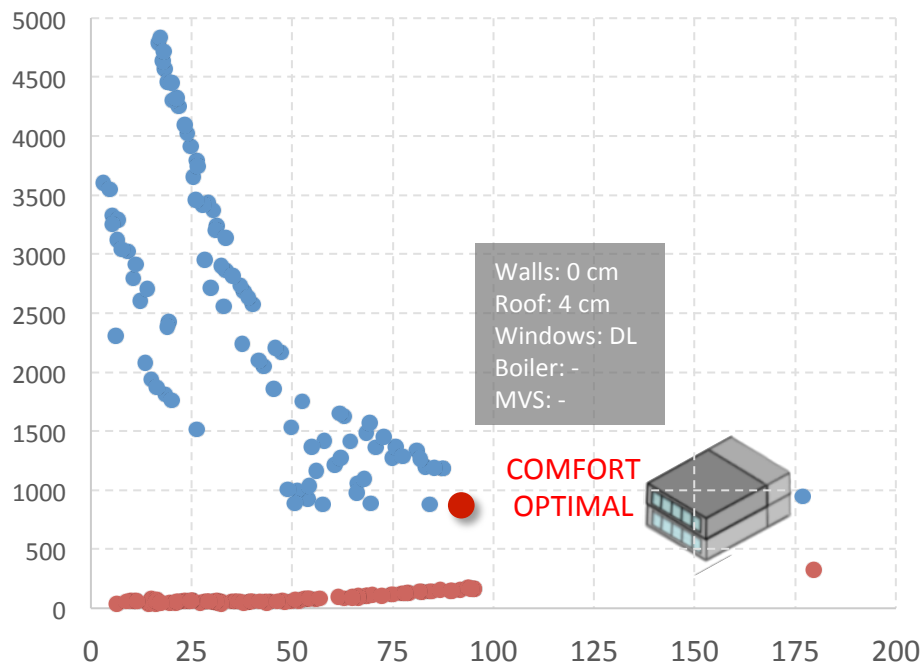
Costi vs Fabbisogno



MILANO



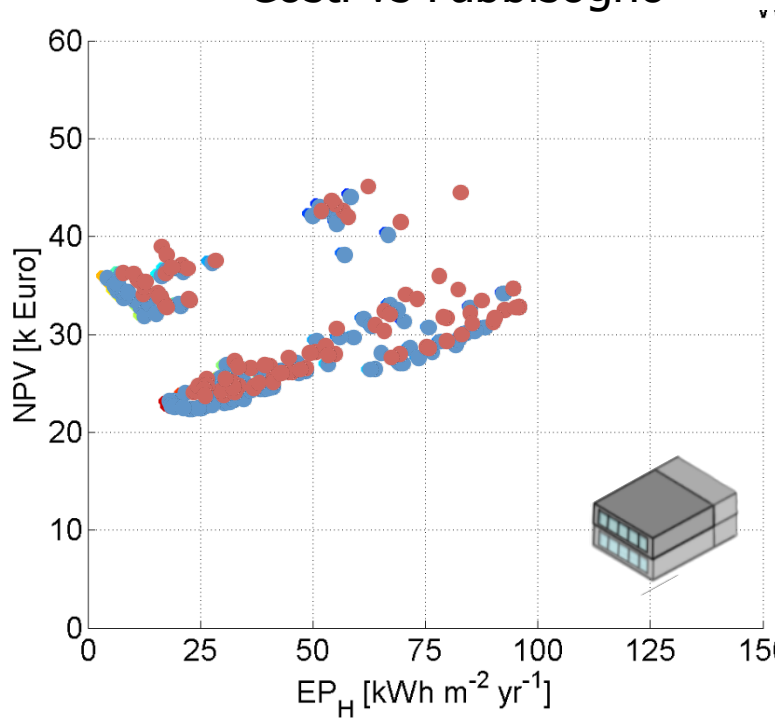
Comfort vs Fabbisogno



REF 1 – SUD – S/V = 0.63

Risultati

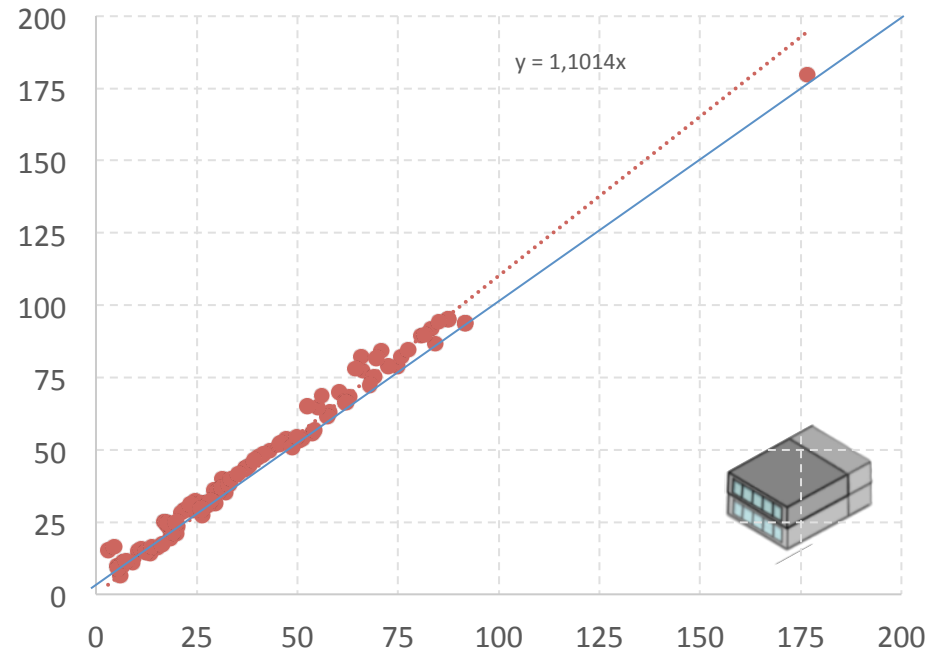
Costi vs Fabbisogno



MILANO



Fabbisogno vs Fabbisogno con gest.



REF 1 – SUD – S/V = 0.63

„Smart“ design

Michigan
State
University

