

School buildings for XXI century

Energy retrofit: data analysis

Nation: Italy (Lombardy, Piedmont, Veneto, Liguria)

Numbers of infant schools: 5 (24.577*)

Numbers of primary schools: 16 (17.555*)

Numbers of secondary schools: 5 (8.025*)

Years: 2004-2014

Total amount of cost: 19.182.455,67€

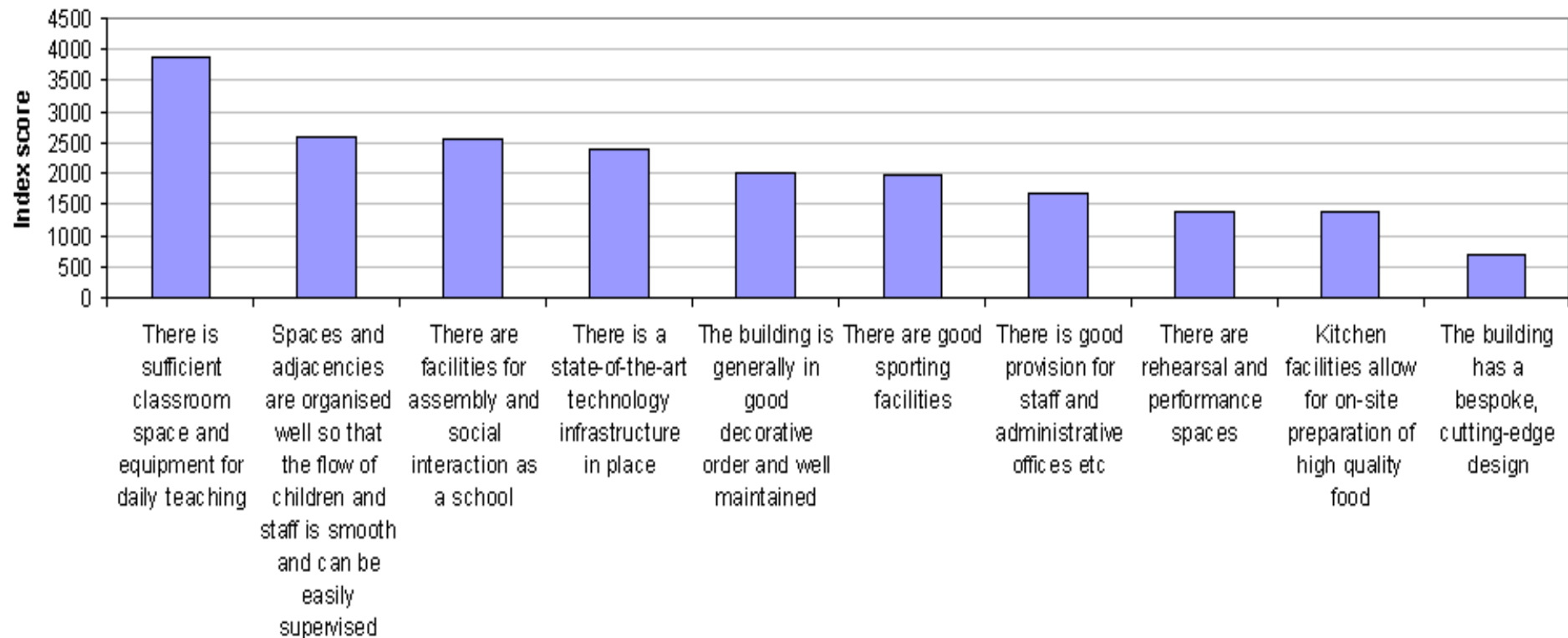
Government funding: 2.882945,71€

*ISTAT data

School buildings for XXI century

What about parent's needs?

Index of importance rankings of school features

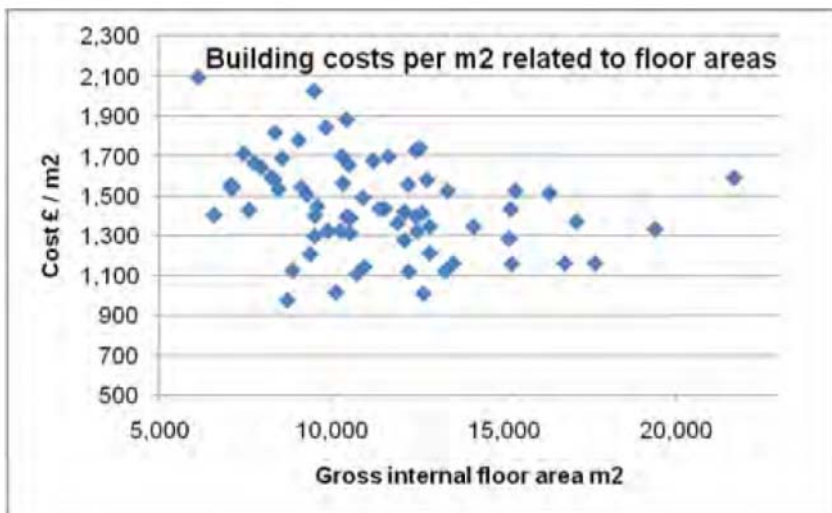


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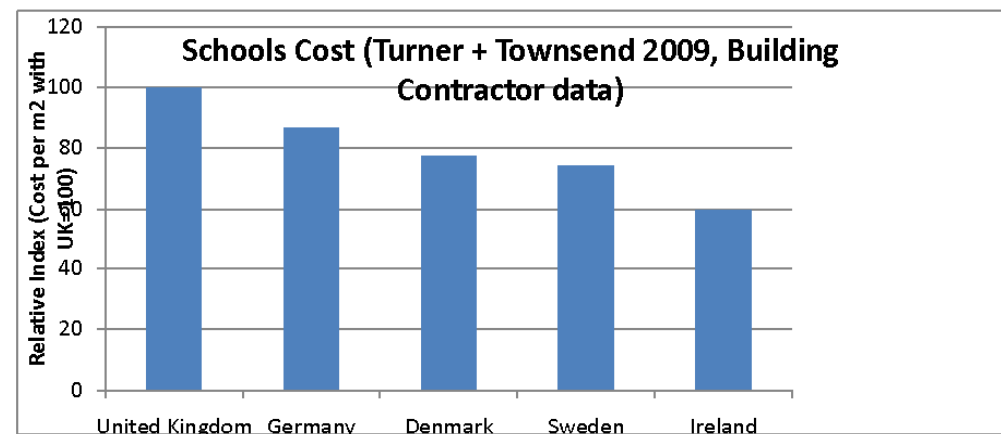
New school buildings – costs

2012 - England - Department of Education bans curved buildings

Royal Institute of British Architects concerns “Not delivering long-term sustainability and value
The lack of engagement between sufficiently experienced design teams, educationalists and end users risks these minimum requirements being delivered without consideration of the particular needs of each school community. If the baseline designs are not developed appropriately to meet the teaching and operational needs of every school they may not be fit for purpose and therefore will not deliver the value for money solutions that the government intends.”



Source: PfS management information



Source: Turner and Townsend

School buildings for XXI century

Primary school in Ossona (MI)

Design 2006 – Realization Cost: 1.127.169,30€ - Floor area 1286 mq



Curtain wall:

$U=5,3 \text{ W/mqk}$

Acoustic insulation: 29 dB

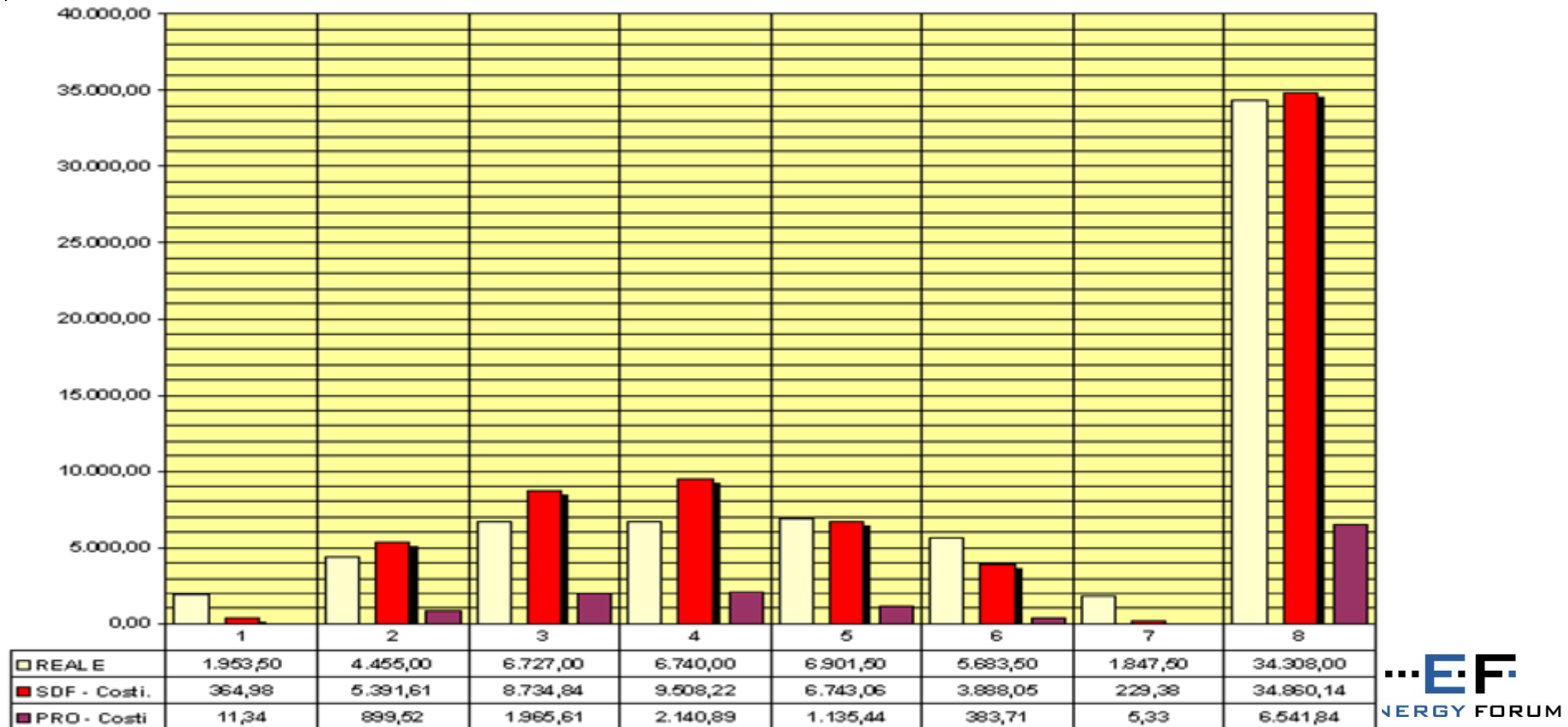
Mass: 0,62 kN/sm

Solar control: internal blinds

School buildings for XXI century

Primary school in Ossona (MI)

Heating expenses: before, design, after realization.



CHIUSURA VERTICALE OPACA

SC 01c. FACCIATA VENTILATA IN COTTO

| | | |
|---|---|---------------------------|
| Prestazioni energetiche $U < 0,240 \text{ W/m}^2\text{K}$ $12h < f < 16h$ | Prestazioni acustiche $R'_w > 58 \text{ dB}$ | Prestazioni REI REI 60 |
|---|---|---------------------------|

School buildings for XXI century

Primary school in Ossona (MI)



Curtain wall:

$U=0,231 \text{ W/m}^2\text{K}$

$R'_w: 48 \text{ dB}$

Mass: $2,73 \text{ kN/sm}$

Solar control: external blinds

School buildings for XXI century

Primary school in Ossona (MI)

Still to be realized: greenhouse spaces with PV panels



School buildings for XXI century

Primary school in Pogliano Milanese (MI)

Design 2008 – Realization Cost: 633.900,47€ - Floor area 2901 sm



Curtain wall:

$U=5,3 \text{ W/m}^2\text{K}$

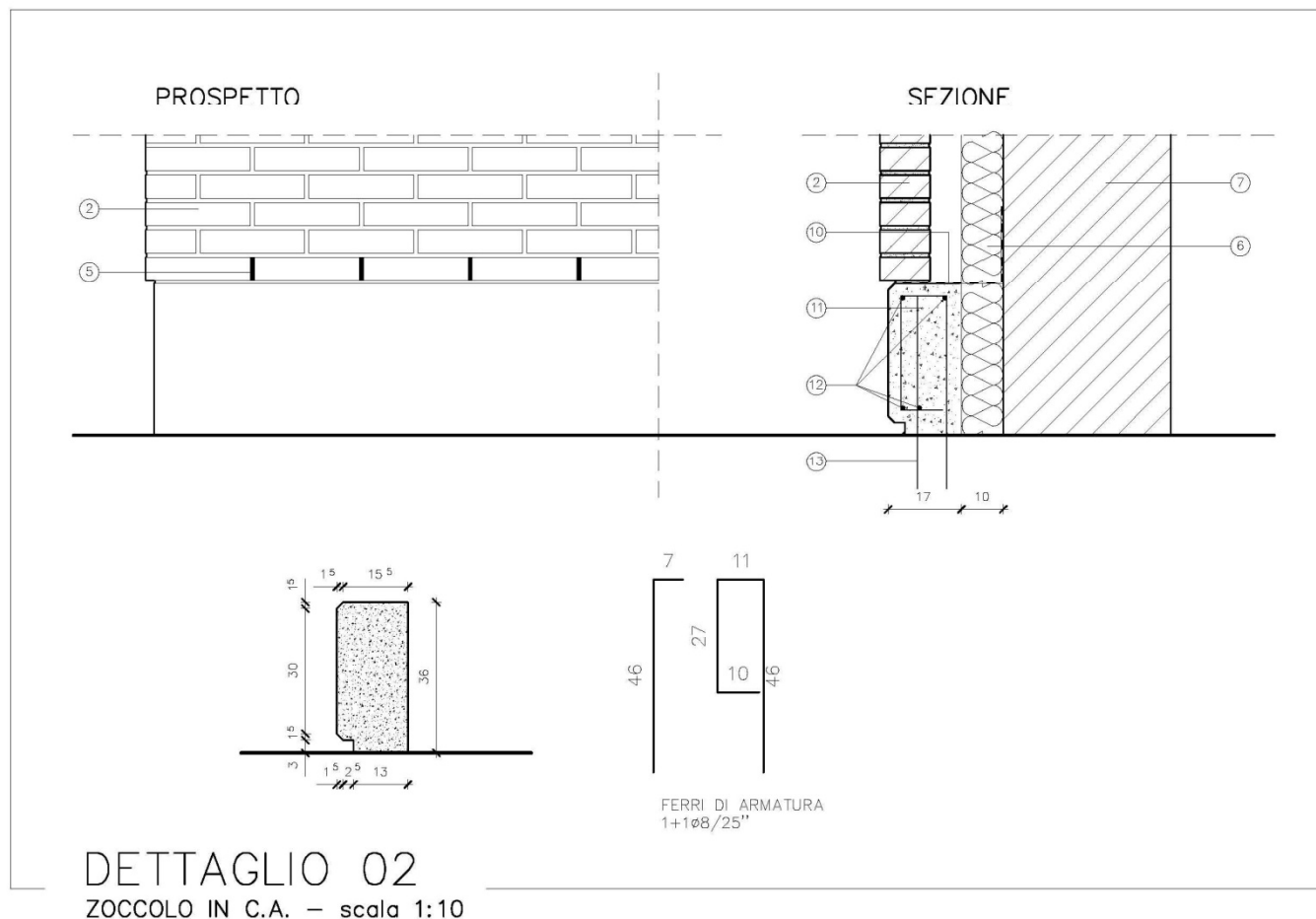
Acoustic insulation: 29 dB

Mass: 0,62 kN/sm

Solar control: internal blinds

School buildings for XXI century

Primary school in Pogliano Milanese (MI)



Primary school in Pogliano Milanese (MI)



School buildings for XXI century

Primary school in Pogliano Milanese (MI)



Curtain wall:

$U=2,2 \text{ W/m}^2\text{K}$

Acoustic insulation: 49 dB

Mass: 3,22 kN/sm

Solar control: external blinds

School buildings for XXI century

Energy retrofit: results

| | | |
|-----------------------|---------------|-------|
| Total amount of cost: | 19.182.455,67 | € |
| Total surface: | 60.199,00 | sm |
| Cost/sm: | 318,65 | €/ sm |
| Only façade+windows: | 203,08 | €/ sm |
| Façade+plants: | 503,37 | €/ sm |

School buildings for XXI century

Just cost or energy analysis?

| | | |
|-----------------------|---------------|-------|
| Total amount of cost: | 19.182.455,67 | € |
| Total surface: | 60.199,00 | sm |
| Cost/sm: | 318,65 | €/ sm |
| Only façade+windows: | 203,08 | €/ sm |
| Façade+plants: | 503,37 | €/ sm |

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Thank you!

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