

CALCULATION EXAMPLE

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CENSE

**Leading the CEN Standards on Energy performance
of buildings to practice**

*Towards effective support of the EPBD implementation and acceleration in
the EU Member States*

The building



Building data

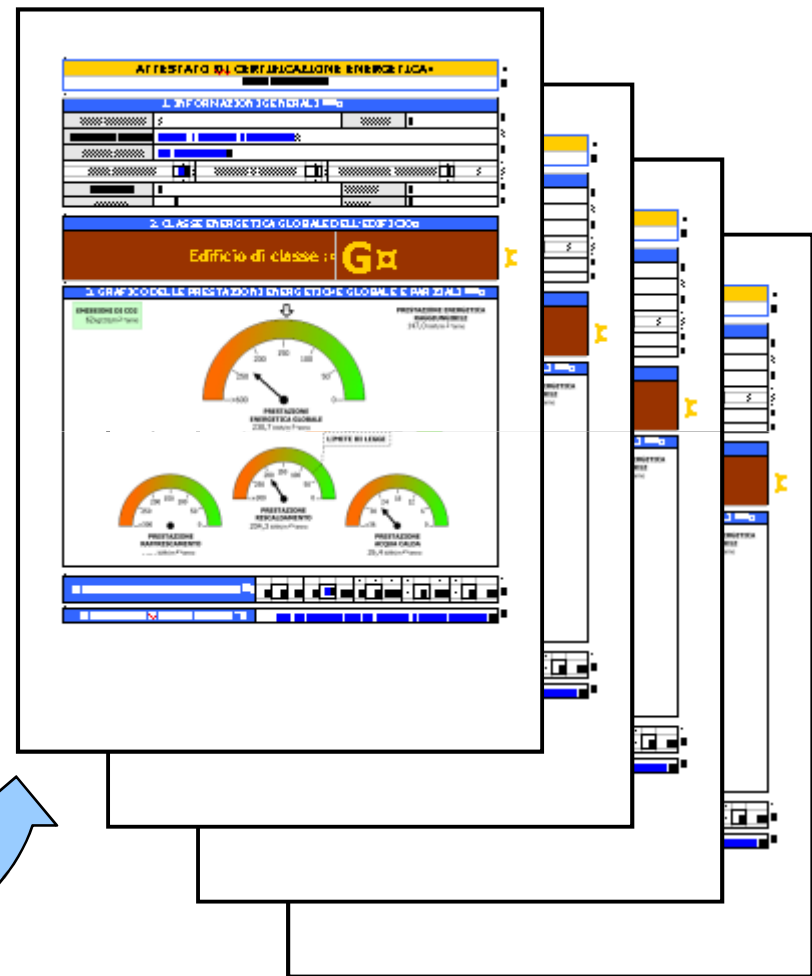
10. BUILDING DATA			
Building type	3 floor, 12 apartments building		
Building typology	Reinforced concrete frame		
Building year	1960	Dwelling units number	12
Gross heated volume V (m ³)	3514,7	Net floor area (m ²)	911,2
Exposed surface (m ²)	1768,3	Climatic zone / degree days	E / 2383
S/V ratio	0,503	Building use	E.1 (residential)



**Typical collective building with centralized heating system
in northern Italy**

**Built during years 1960...1980
Energy saving potential 30...50%**

One certificate for each dwelling



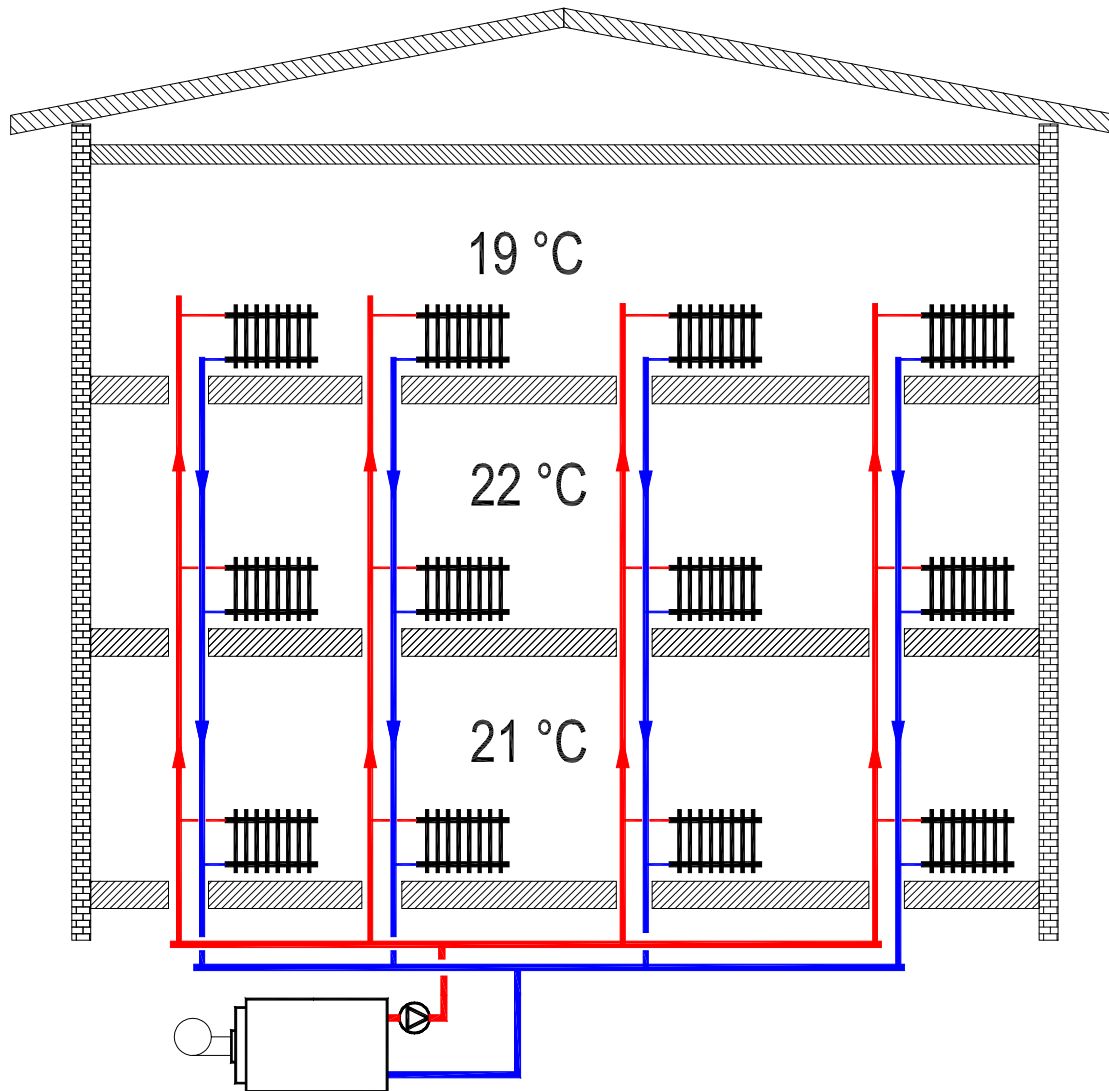
Recommendations

Procedure

- Plan a logical sequence of energy saving steps
- Check energy consumption reduction for each step
- Determine the new class for each step
- Calculate cost reduction (*shall be linked to actual consumption*)
- Estimate costs of each step
- Evaluate pay-back time
- If pay-back < 10 years → achievable energy performance

Typical solution for centralised heating system: control improvement (thermostatic valves), roof insulation, condensing boiler



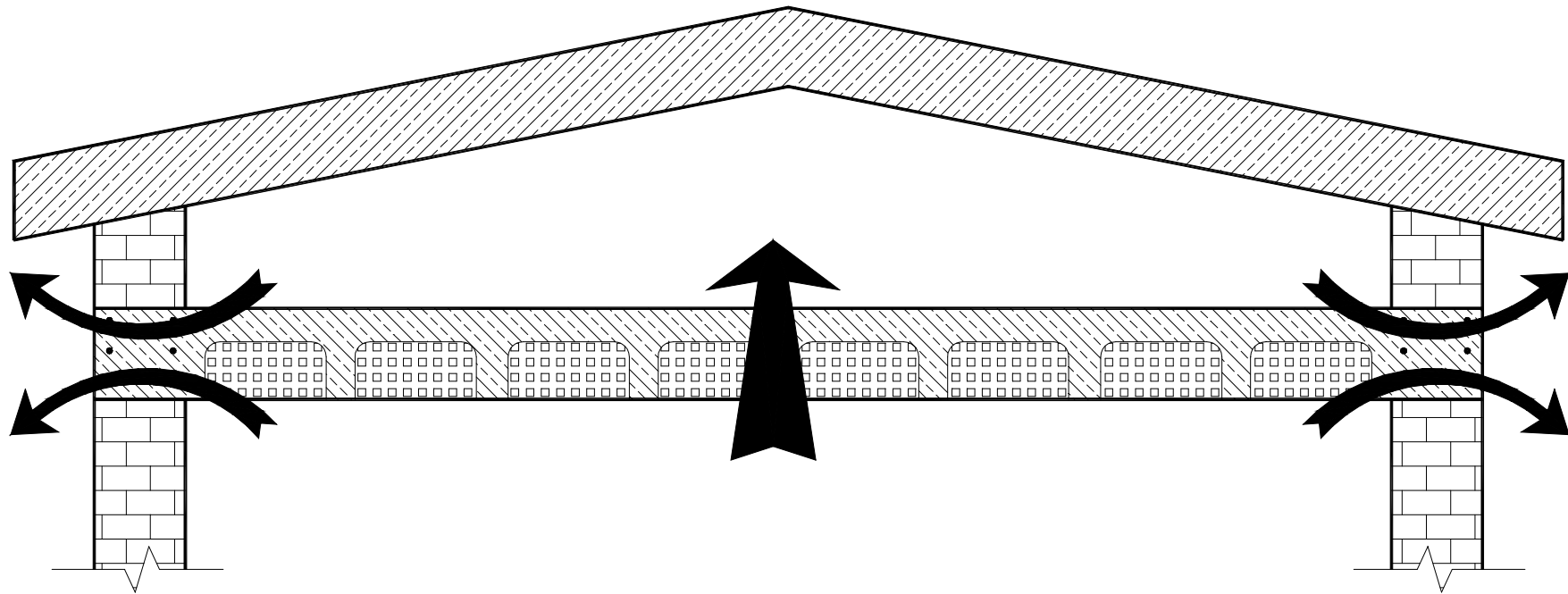


INITIAL STATUS

UNBALANCED SYSTEM,
NO ROOF INSULATION

LOW TEMPERATURE IN
UPPER FLOOR
APARTMENTS

OPENED WINDOWS AT
INTERMEDIATE FLOOR



COST OF AN UNINSULATED ROOF

Area: 100 m² Transmittance : 1,9 W/m²K → 190 W/K

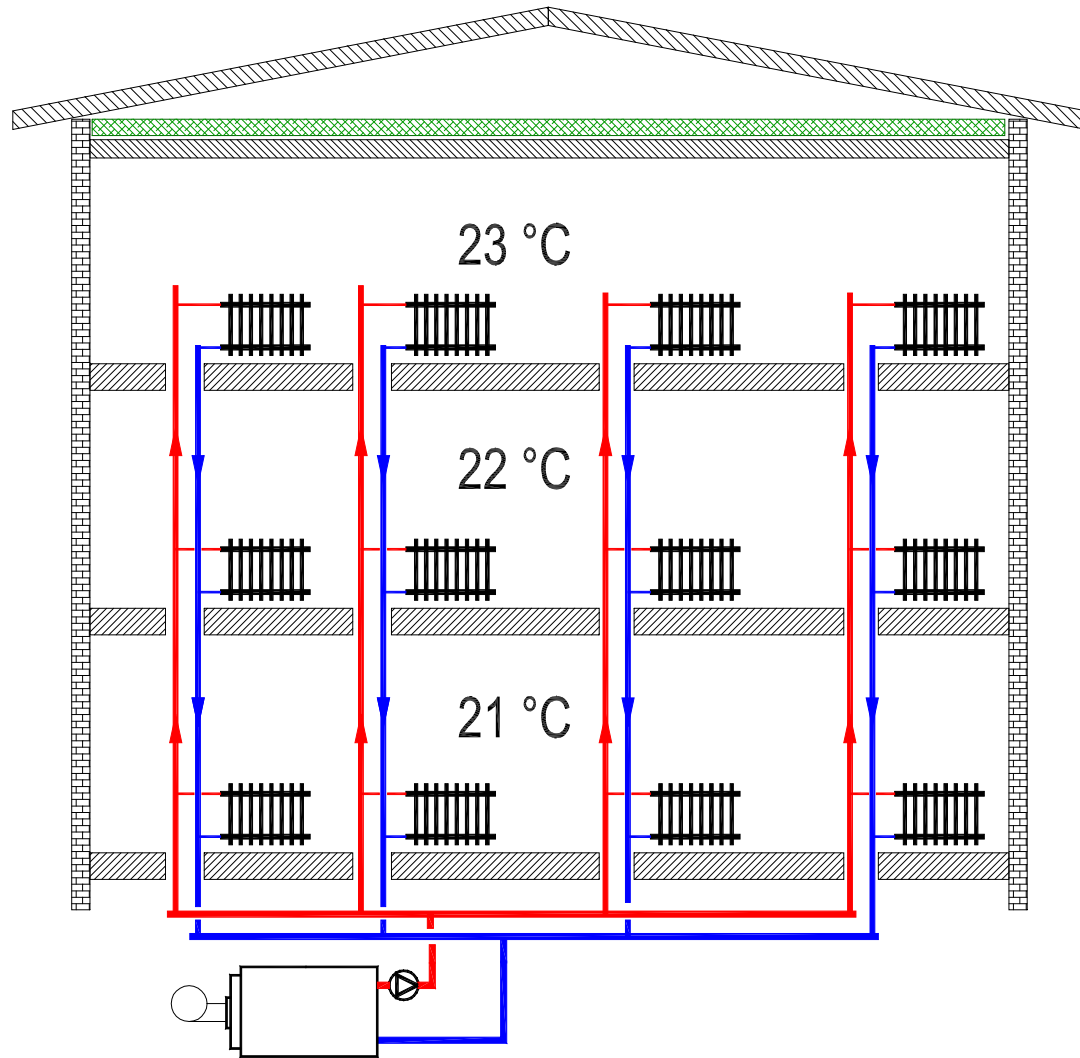
Yearly transmission losses 190 W/K x 9 K x 4300 h = 7350 kWh

Heating system efficiency 65 % → Fuel consumption 11000 kWh/year

Fuel cost: 11000 kWh x 0,65 €/m³ / 9,6 kWh/m³ = 745 € →

7,45 €/m² per year

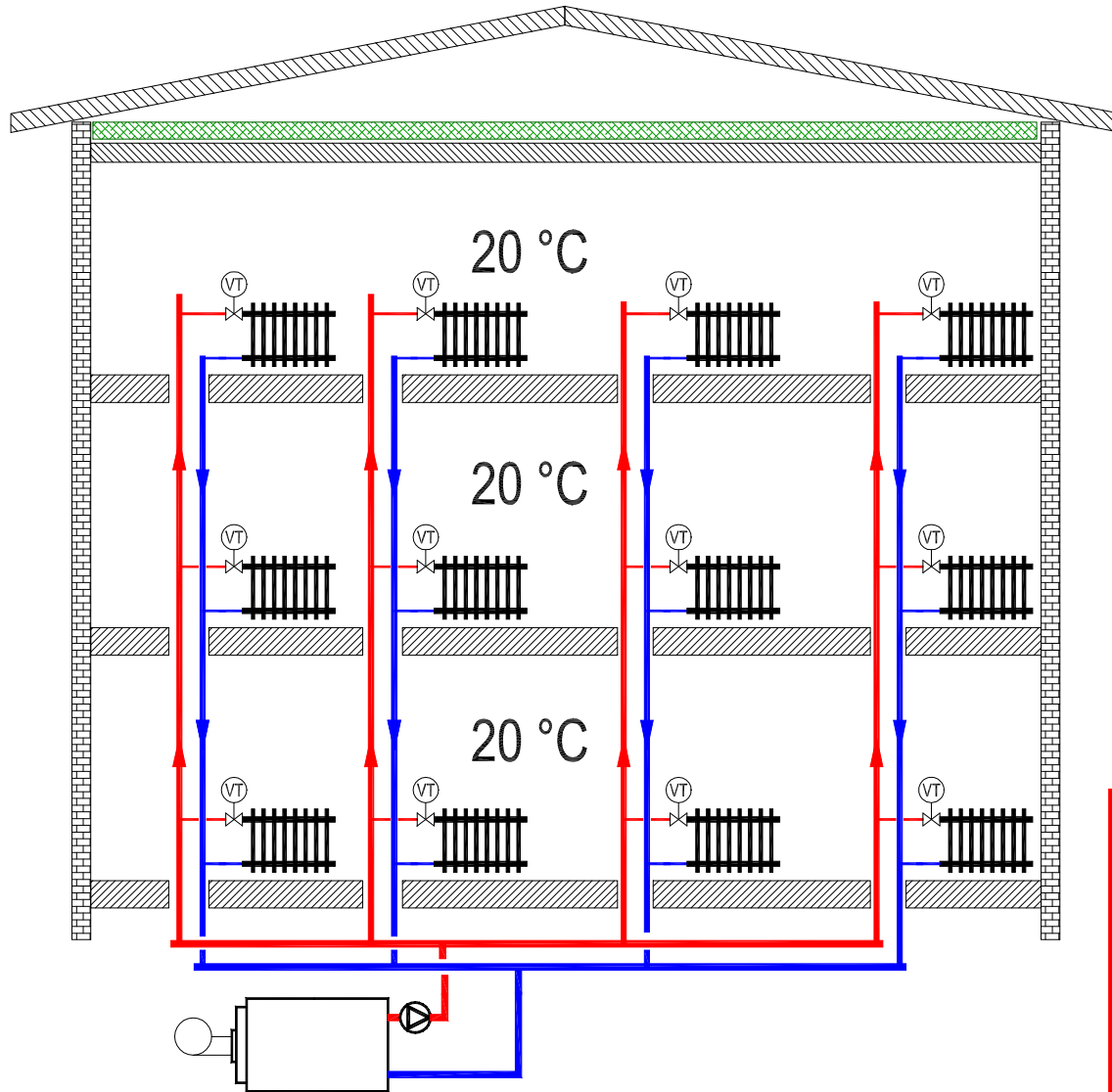




ROOF INSULATION ONLY:
THEORETICAL SAVING
20%

ACTUAL SAVING: $\approx 0\%$

*WITHOUT ROOM
CONTROL, THE NEW
ROOF INSULATION
UNBALANCES THE
NETWORK. AND THE
HEATING CURVE
CANNOT BE LOWERED*



CORRECT SOLUTION
ROOF INSULATION AND
THERMOSTATIC VALVES

SINGLE ROOM CONTROL
BALANCES THE SYSTEM
AND ENSURES THAT THE
REDUCTION OF LOSSES
BECOMES A REDUCTION
OF FUEL CONSUMPTION

**THE ACTUAL GOAL IS
REDUCING THE FUEL
CONSUMPTION**

**INSULATING THE
BUILDING IS JUST ONE
OF THE MEANS**

Recommendations sequence

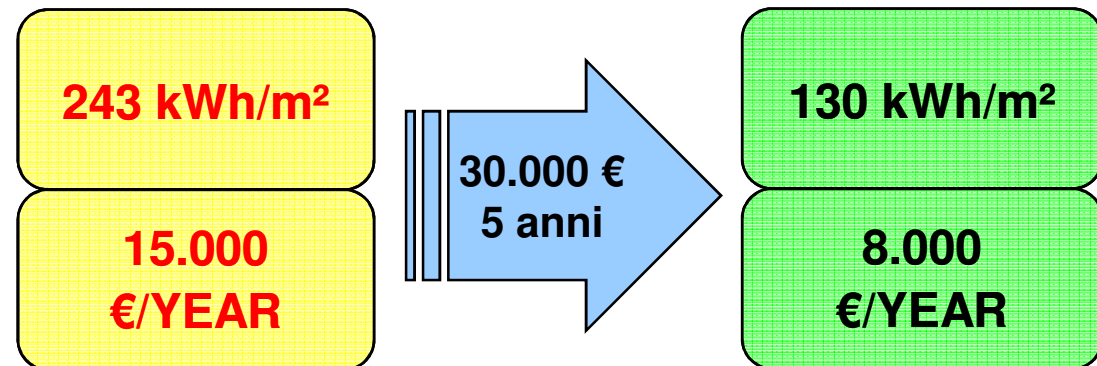
Description	Fuel consumption		Savings	Cost	Payback
	<i>Nm³/year</i>	<i>€/year</i>	<i>€/year</i>	<i>€</i>	<i>years</i>
Initial situation	23.000,00	14.950,00			
Thermostatic valves	20.300,00	13.195,00	1.755,00	7.880,00	4,5
Roof insulation	16.500,00	10.725,00	2.470,00	9.500,00	3,8
Condensing boiler	12.350,00	8.027,50	2.697,50	12.500,00	4,6
Windows replacement	11.040,00	7.176,00	851,50	28.800,00	33,8
Walls external insulation	8.200,00	5.330,00	1.846,00	43.200,00	23,4
Fuel cost (natural gas)	0,65	€/Nm ³			

Achievable performance, payback < 10 years



6. RECOMMENDATIONS ⁽⁵⁾ □

Suggested actions □	Energy performance/class after the action □	Pay-back time (years) □
1) <i>Thermostatic valves installation on all radiators and replacement of the pump</i> □	G □	4,5 □
2) <i>Roof insulation (120 mm polystyrene or equivalent)</i> □	F □	3,8 □
3) <i>Installation of a new condensing boiler and chimney upgrade</i> □	E □	4,6 □
4) <i>Windows replacement</i> □	E □	33 □
5) <u><i>Walls external insulation</i></u> □	D □	23 □



...THANK YOU FOR YOUR ATTENTION

