

Cities



on power

Audit energetico e prime proposte di intervento per alcune scuole superiori della Provincia di Ravenna

Work package 3: Policy concepts for the promotion of renewable energy in the cities

COP 3.5.5 - Report on Pre-investment measures proposed by Provincia di Ravenna

Project partners

Local and regional authorities:

City of Warsaw (PL)
(Lead Partner)



City of Klagenfurt
(AT)



Province of
Ravenna (IT)



Province of Torino
(IT)



Expert institutions:

Energy conservation
foundation (PL)



Ecopower Stock
Exchange Salzburg (AT)



Research Studios Austria
(AT)



Local Agenda 21 for
Dresden (DE)



Environment Park Turin
(IT)



3 Provincia di Ravenna

- The pre-investment measures in Ravenna

For the Province of Ravenna estimated preliminarily a total volume of the investments of about 1.000.000 € and nr 2 two long term jobs created.

The pre-investments measures consist in the refurbishment of 3 schools to obtain a high level of energy efficiency of the buildings and the installation of 3 large PV plant.

An estimation of the costs is available for 2 of the 3 buildings.

The refurbishments cost 315550.88 € and 363969.20 €, respectively.

The PV plant cost is estimated of 96800.00 € and 22000.00 €, respectively.

For the energy management (assuming that works will be done by an ESCo that take care also of maintenance under a contract per service scheme),

Ravenna expects that 2 job places (long term employment) will be created.

3 Provincia di Ravenna

- La Provincia di Ravenna ha proposto i seguenti pre-investments
 - Istituto Tecnico Agrario Statale (I.T.A.S.) "Luigi Perdisa", Ravenna, Via dell'Agricoltura 5
 - Istituto Professionale di Stato per gli Studi per i Servizi Alberghieri e per la Ristorazione (IPSSAR) "P. Artusi" Riolo Terme (RA), Via Mons. Tarlombani 7
 - Istituto Professionale di Stato Servizi per l'Enogastronomia e l'Ospitalità Alberghiera (IPSEOA) "Pellegrino Artusi" Cervia, Piazzale Artusi 7

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i Servizi Alberghieri e per la Ristorazione (IPSSAR)
"P. Artusi" Riolo Terme (RA), Via Mons. Tarlombani 7



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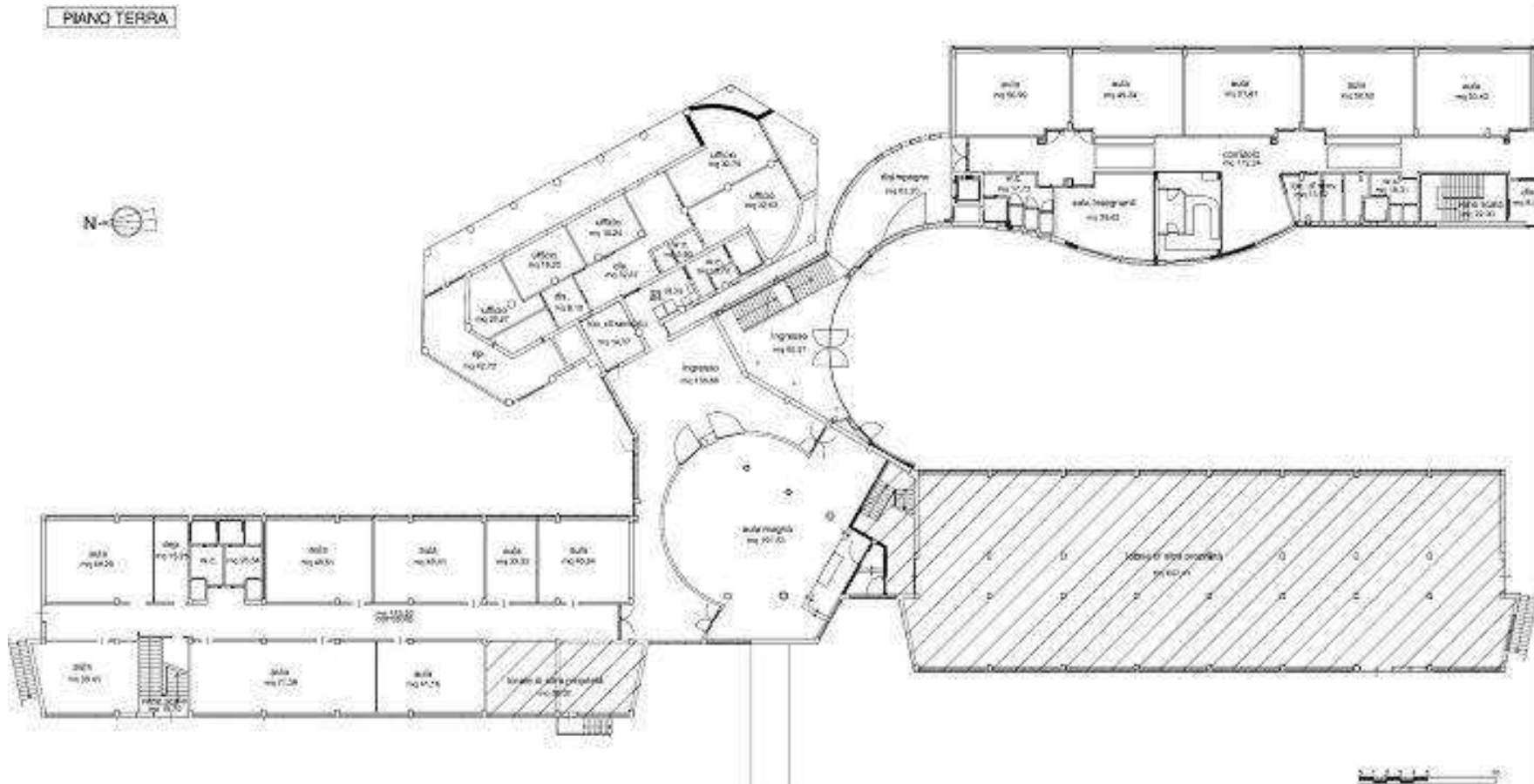


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"P. Artusi" Riolo Terme (RA), Via Mons. Tarlombani 7**



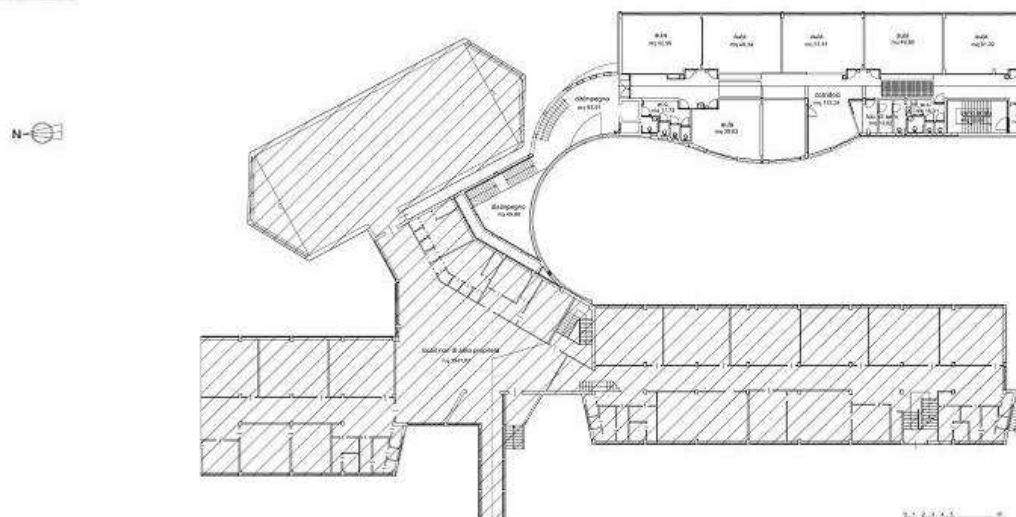
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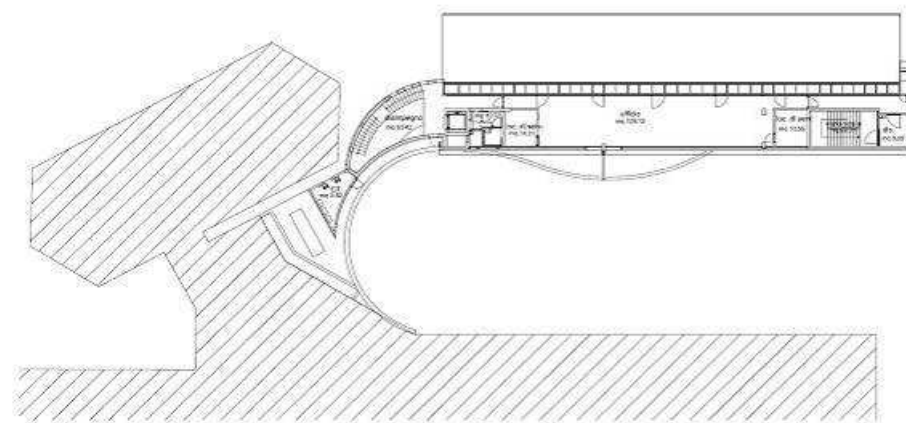
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PIANO PRIMO



PIANO SOTTOTETTO



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- L'edificio è stato completato nel 1966 e successivamente modificato:

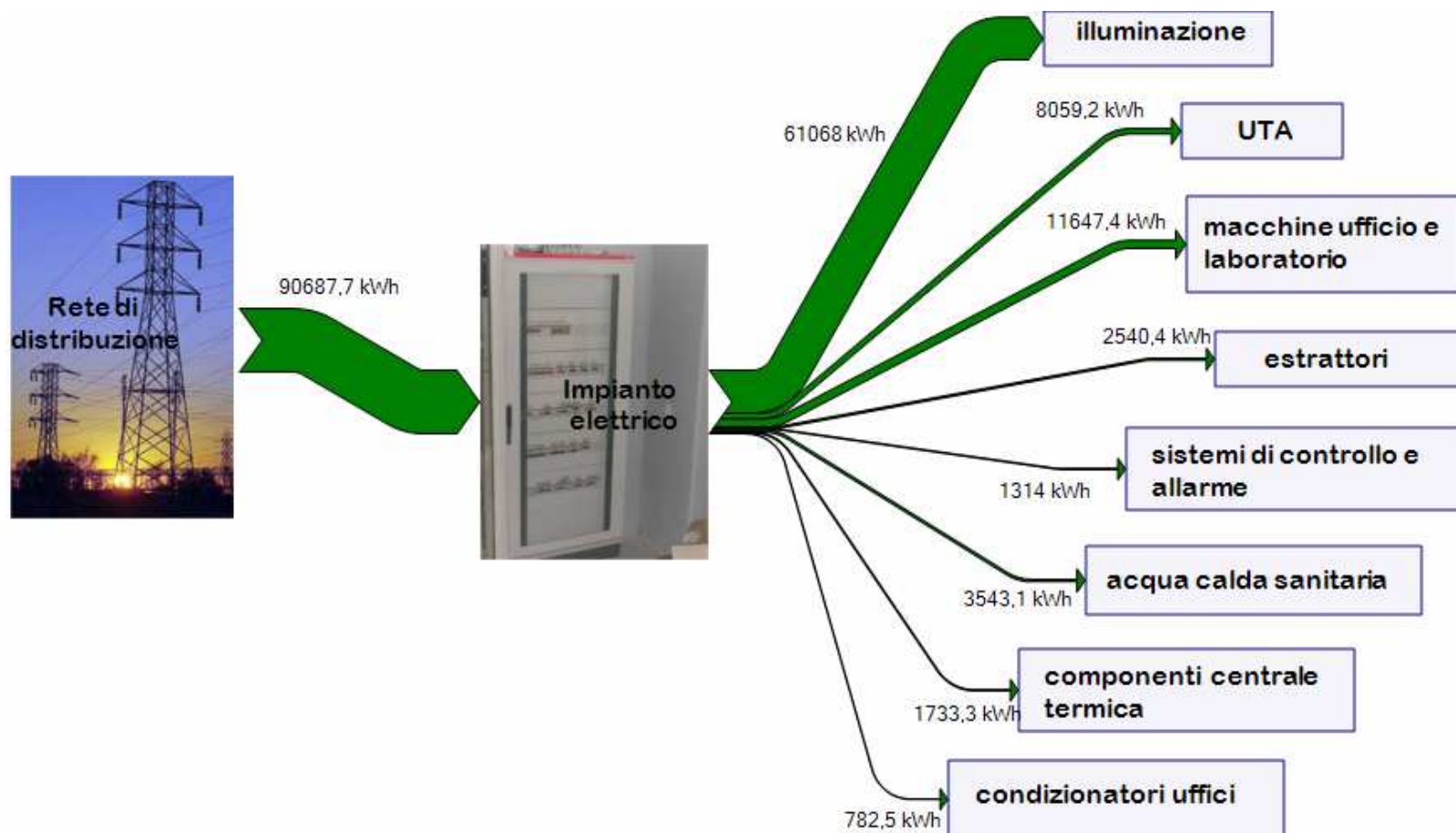
- volume totale 9199,00 m³
- volume riscaldato V 8.531,63 m³
- superficie utile 2842,00 m²
- superficie utile riscaldata Su 2270,79 m²
- superficie disperdente totale S 4251,95 m²
- fattore di forma S/V 0,50

3 Provincia di Ravenna: Cities



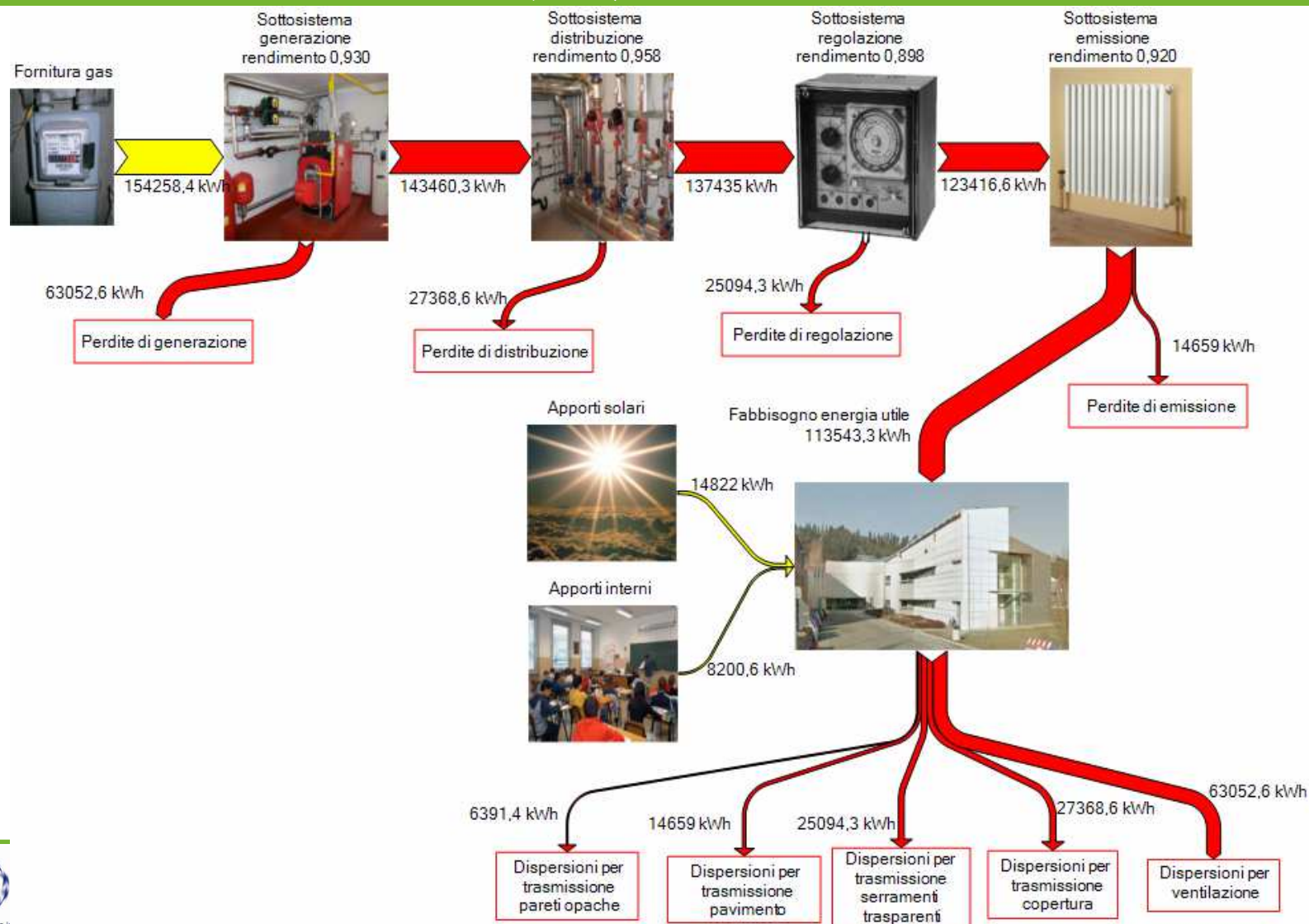
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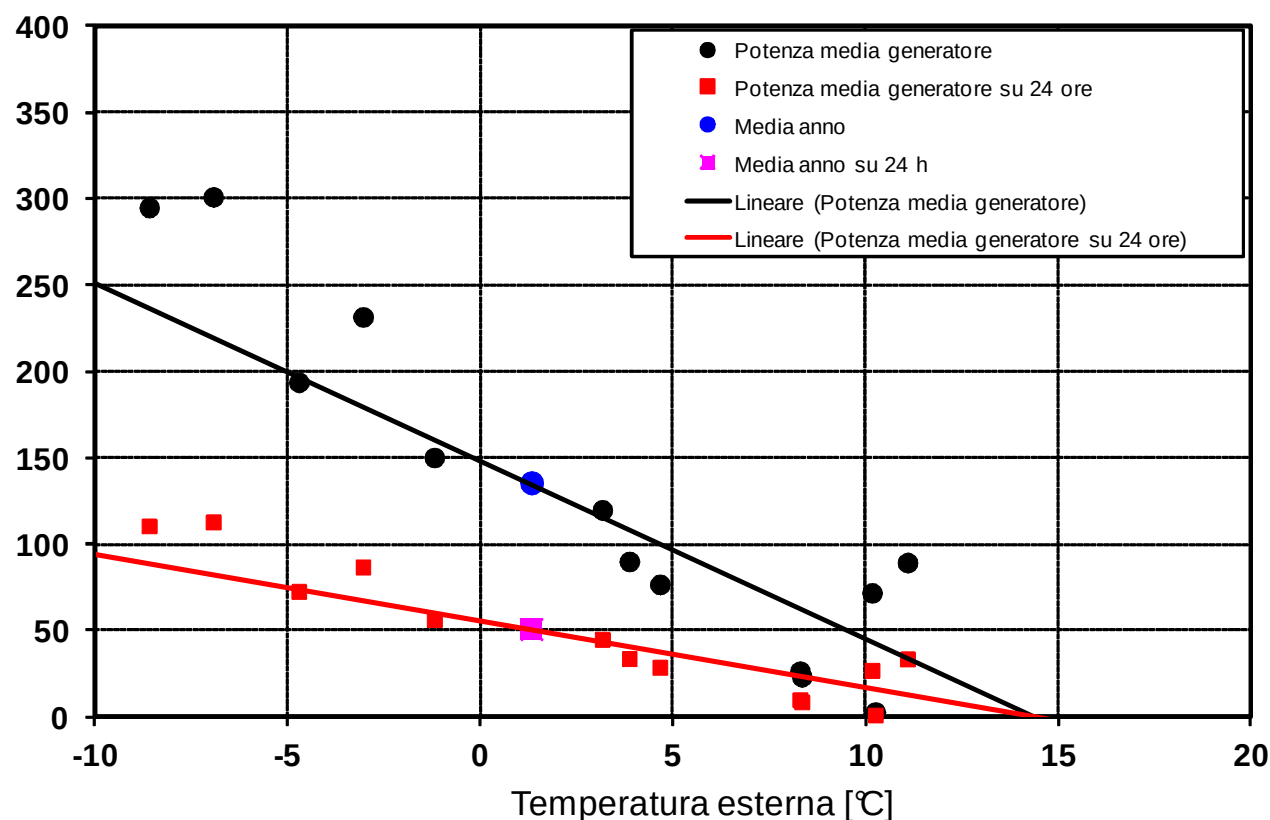
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"P. Artusi" Riolo Terme (RA), Via Mons. Tarlombani 7

Firma energetica, potenza [kW]



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i Servizi Alberghieri e per la Ristorazione (IPSSAR)
"P. Artusi" Riolo Terme (RA), Via Mons. Tarlombani 7

- Proposals:

1. Rationalization of the electrical plant
2. Replacement of existing fixtures with LED lamps
3. Replacement of the electric motors of the fans
4. Inverter for the fans
5. Thermal insulation of the roof
6. New windows
7. Replacement of the boiler with a new condensing generator
8. PV plant

The parameters used as the basis for cost-benefit analysis are as follows:

- electricity cost 0.22 €/kWh
- penalty for excessive consumption of reactive energy: 0,0323 €/kVARh
- natural gas cost: 0,90 €/Sm³
- reference interest rate: 5%
- inflation rate: 1.5%
- drift of the energy costs: 2%
- access to incentive mechanisms currently in force

3 Provincia di Ravenna: Cities



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	Energy saving (kWh/y)	Energy saving (toe/y)	Cost (€)	PBT (years)	ROE 8/10/20 years (%)	IRR 8/10/20 years (%)
electrical plant			850.00	1.1		
LED lamps	42175.00		104110.00	2.2	217/277/491	47/49/50
Fan motors	1931.94		290.00	0.7		
Fan inverters	33091.44		39571.20	5.4	-49/-39/-2	-9/-4/+5
thermal insulation	33815.00		50799.68	28.7	-57/-49/-17	-12/-7/+3
windows	29425.50		83070.00	53.3*	-43/-38/0	-10/-6/+5
boiler	25315.00		35000	24.3	-53/-44/+2	-11/-6/+5
PV plant	27317.40		96800.00	9		11.7

PBT: Pay Back Time – ROE: Return On Equity (15-20% good) –
IRR: Internal rate of return (10% acceptable) - *Calculations with incentives.



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3 Provincia di Ravenna: **Cities** on power

Istituto Tecnico Agrario Statale (ITAS) "Luigi Perdisa", Ravenna, Via dell'Agricoltura 5



**Istituto Tecnico Agrario Statale (ITAS) "Luigi
Perdisa", Ravenna, Via dell'Agricoltura 5**

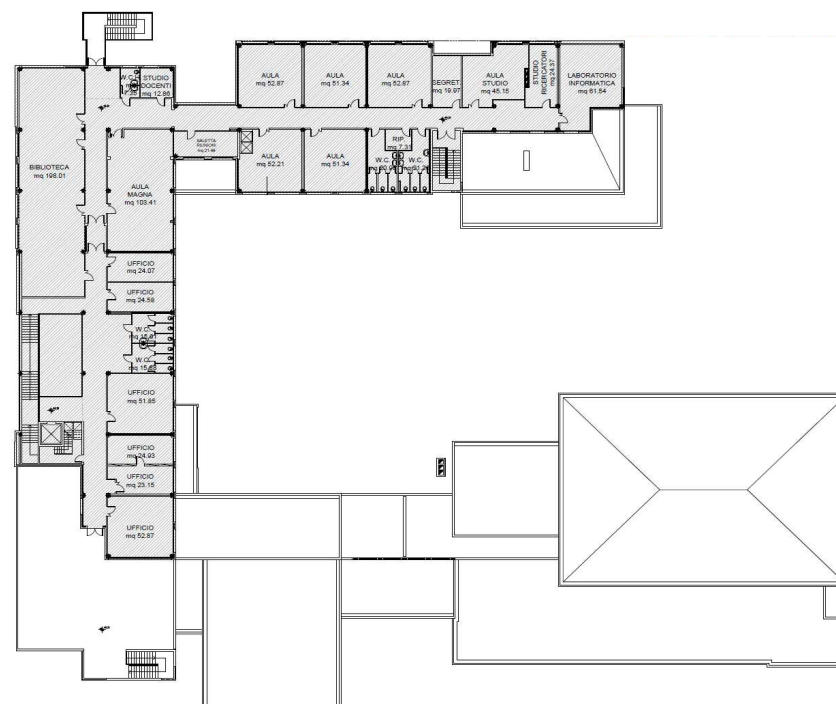
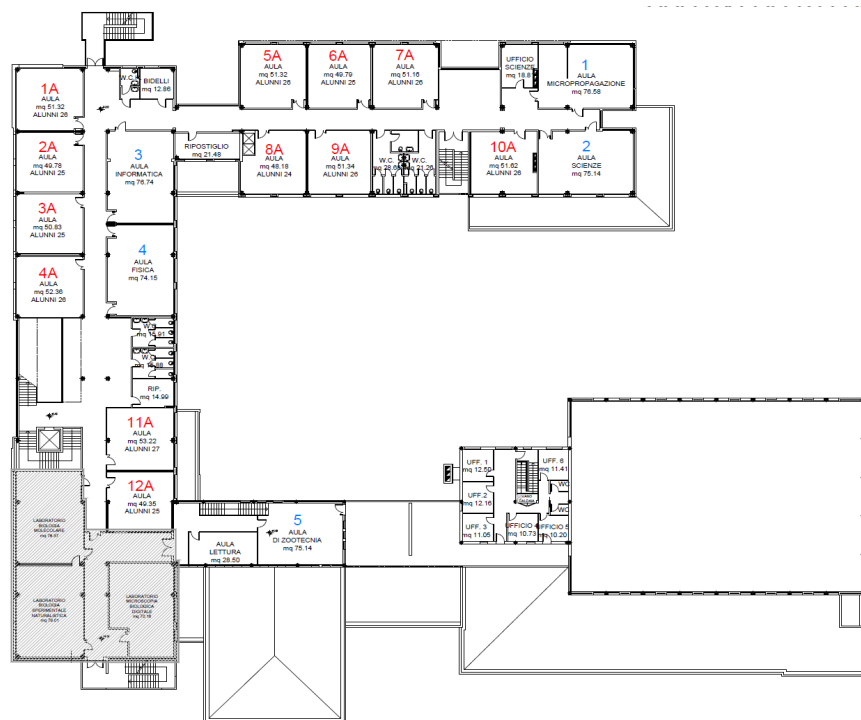


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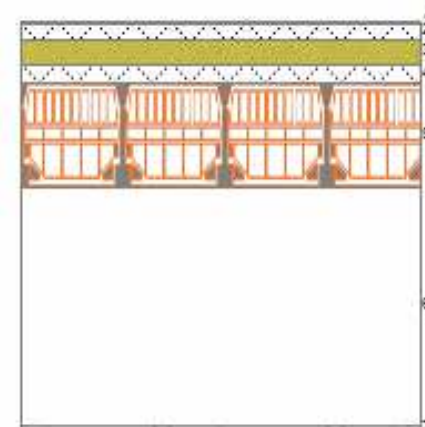
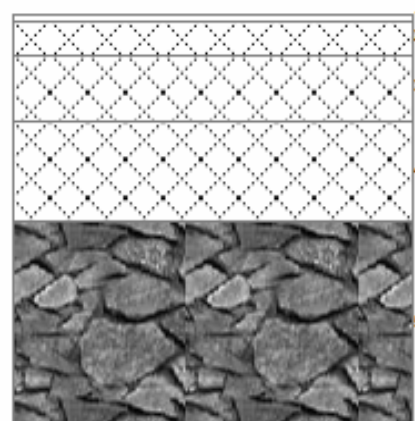
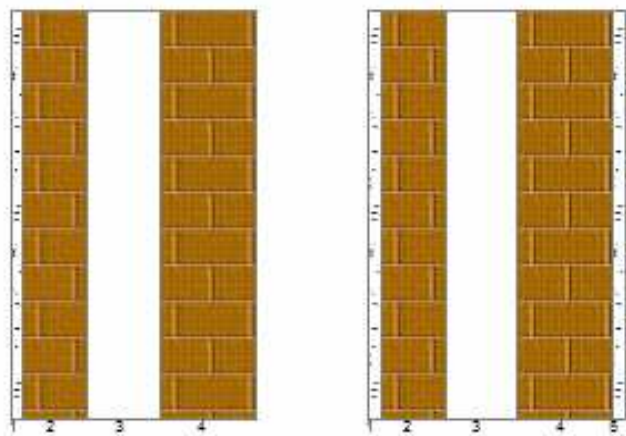


3 Provincia di Ravenna: Cities on power

Istituto Tecnico Agrario Statale (ITAS) "Luigi Perdisa", Ravenna, Via dell'Agricoltura 5

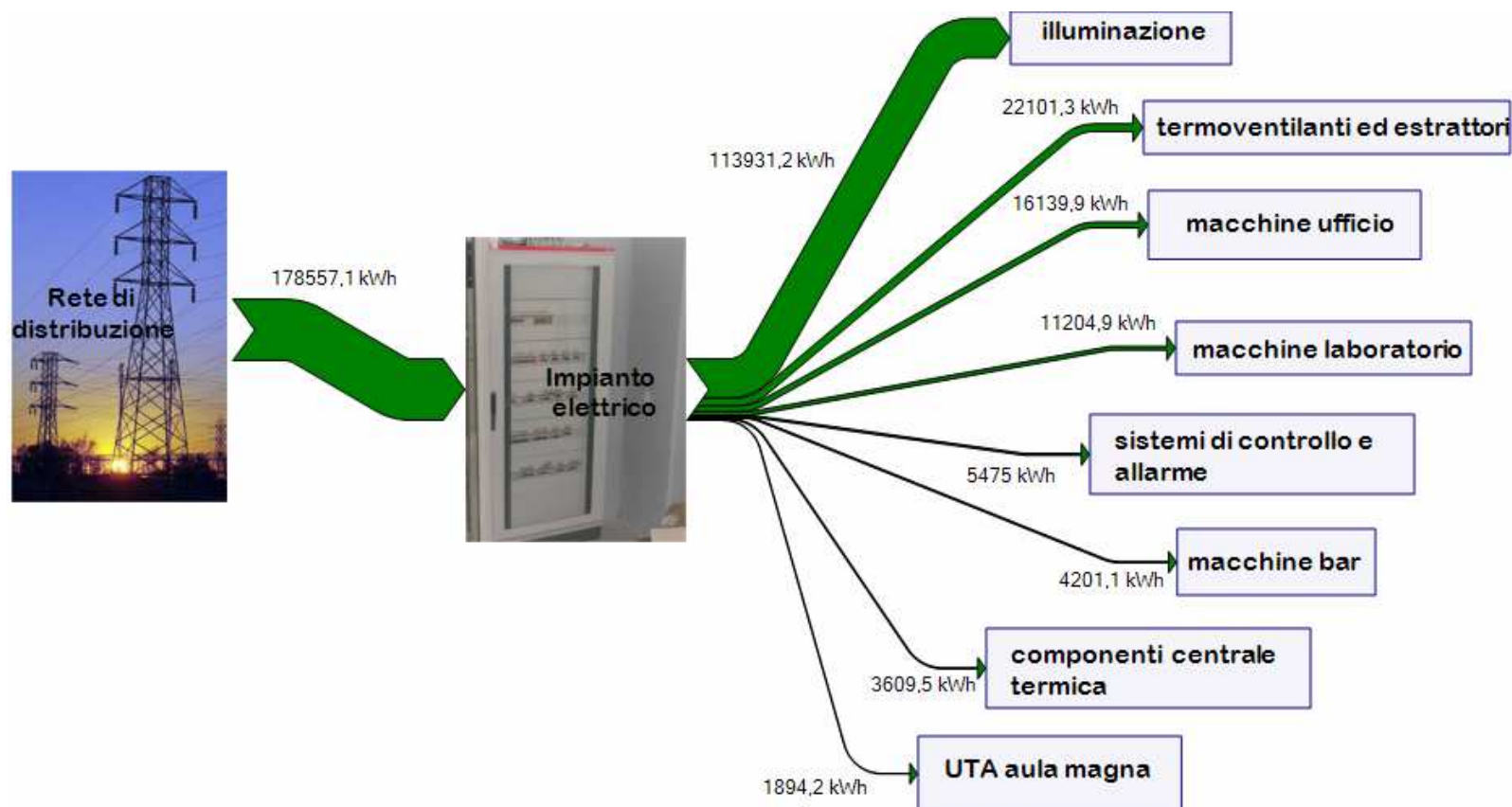
- L'edificio è stato completato nel 1994:

- volume totale V 40.471 m³
- superficie utile S_u 7.436 m²
- superficie disperdente totale S 15.534,02 m²
- fattore di forma S/V 0,384



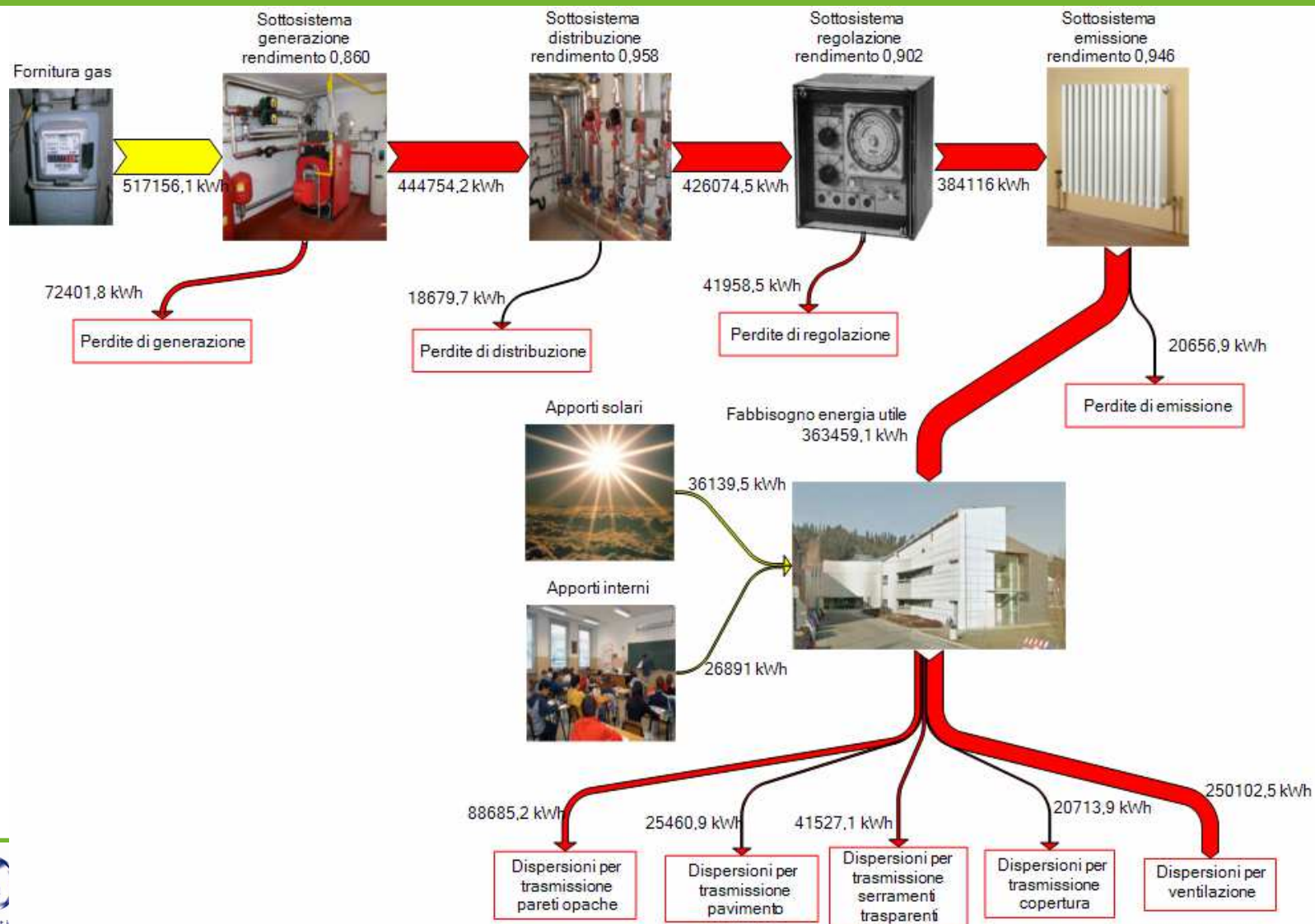
3 Provincia di Ravenna: **Cities** *on power*

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3 Provincia di Ravenna: Cities on power

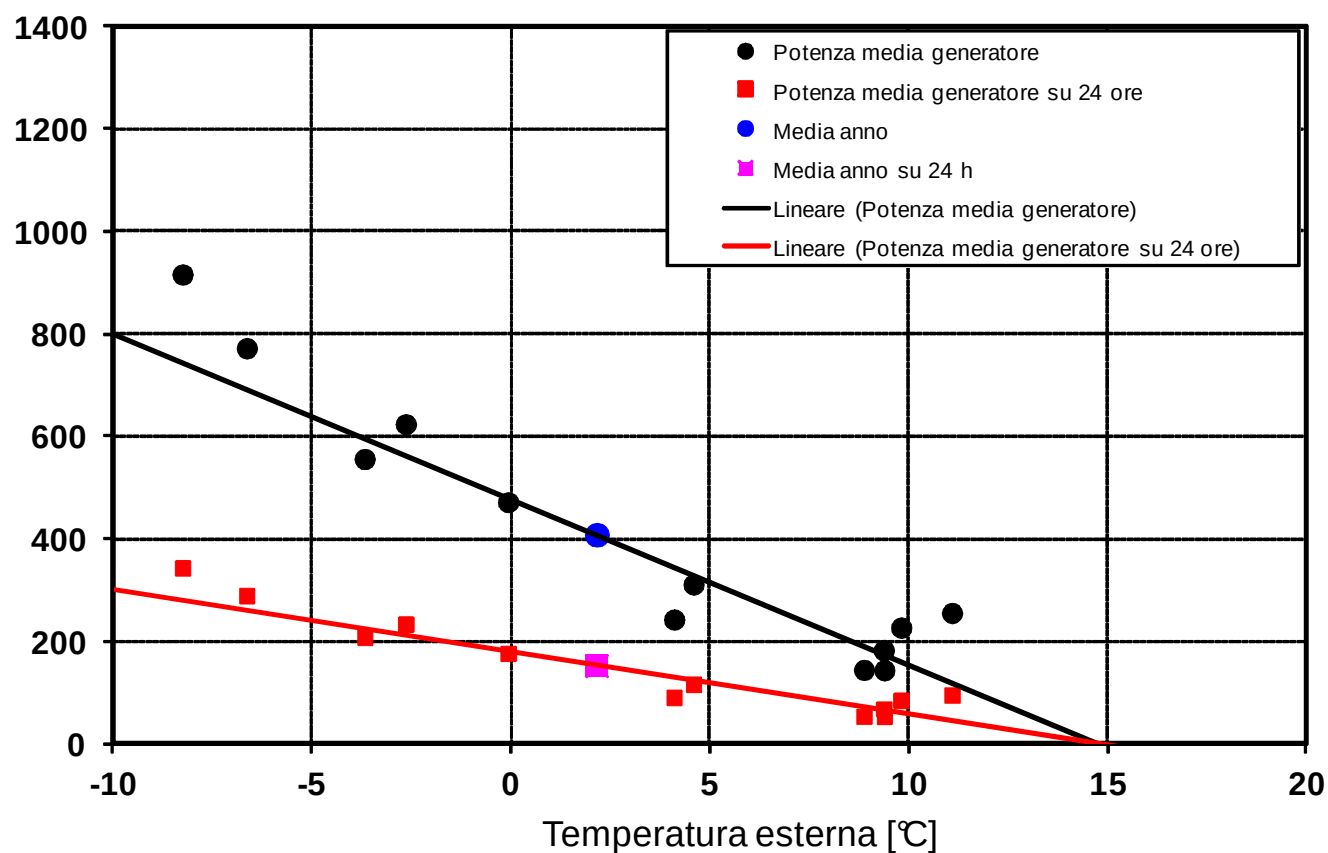
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3 Provincia di Ravenna: Cities on power

Istituto Tecnico Agrario Statale (ITAS) "Luigi Perdisa", Ravenna, Via dell'Agricoltura 5

Firma energetica, potenza [kW]



3 Provincia di Ravenna: Cities on power

Istituto Tecnico Agrario Statale (ITAS) "Luigi Perdisa", Ravenna, Via dell'Agricoltura 5

- Proposals:

1. Rationalization of the electrical plant
2. Replacement of existing fixtures with LED lamps
3. Improved efficiency of building-plant system
 - a. thermal insulation of vertical opaque walls
 - b. replacement of the boiler with a new condensing generator and installation of thermostatic valves on individual radiators

The parameters used as the basis for cost-benefit analysis are as follows:

- electricity cost 0.22 €/kWh
- penalty for excessive consumption of reactive energy: 1926.82 €/year
- natural gas cost: 0,90 €/Sm³
- reference interest rate: 5%
- inflation rate: 1.5%
- drift of the energy costs: 2%
- access to incentive mechanisms currently in force

3 Provincia di Ravenna: Cities on power

Istituto Tecnico Agrario Statale (ITAS) "Luigi Perdisa", Ravenna, Via dell'Agricoltura 5

	Energy saving (kWh)	Energy saving (toe)	Cost (€)	PBT (year)	ROE 8/10/20 years (%)	IRR 8/10/20 years (%)
electrical plant	4463.64	1.12	1750.00	0.90		
LED lamps	69245.50	17.31	235027.00	3.00	132/175/331	32/34/36
thermal insulation	95999.70	8.25	90500.00	9.00	-32/-18/32	-4/1/9
boiler	61221.00	5.26	36.418.60	7.30	8/29/109	7/11/16
PV plant	6208.50		22000.00	9		11.7

PBT: Pay Back Time

ROE: Return On Equity (15-20% good)

IRR: Internal rate of return (10% acceptable)

Calculations without incentives.

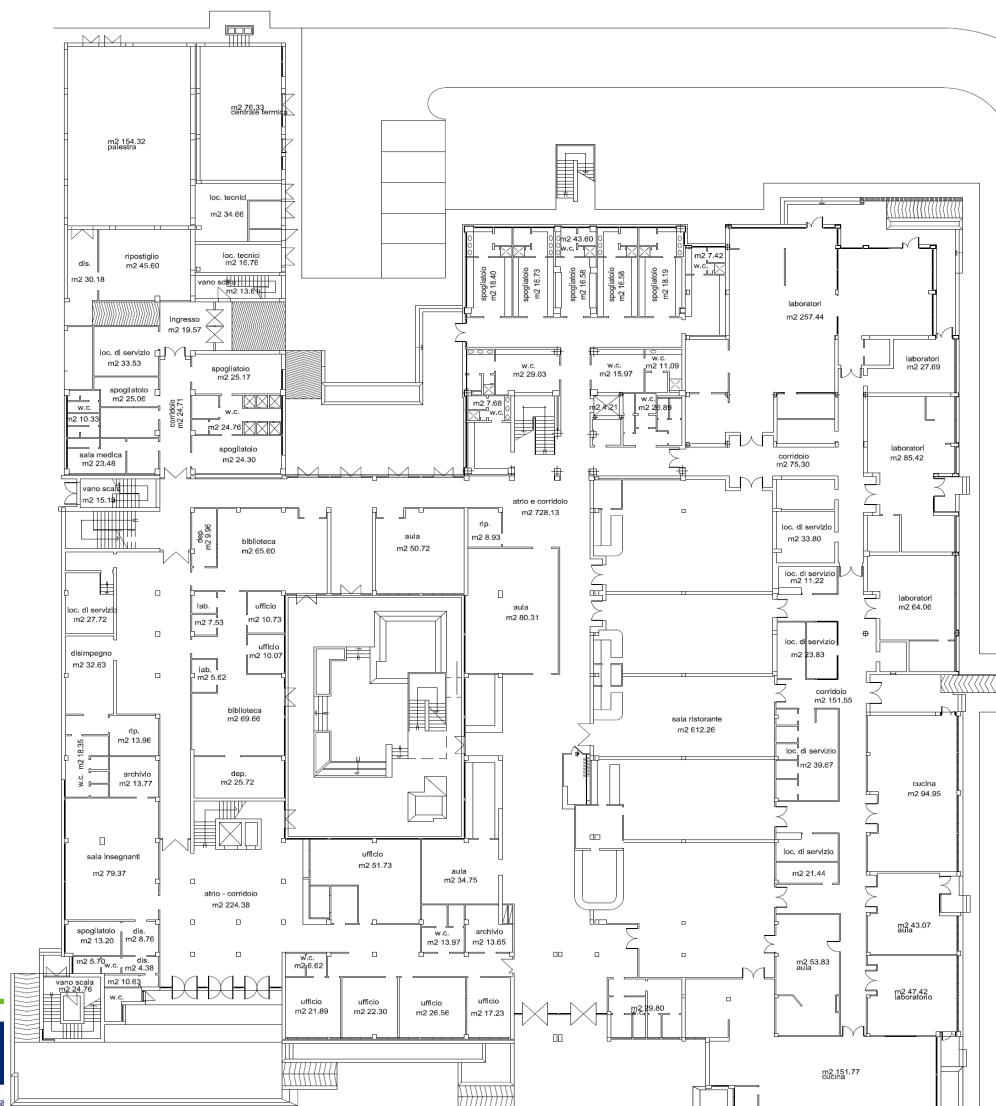
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dell'Istituto Professionale di Stato Servizi per
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"Pellegrino Artusi" Cervia, Piazzale Artusi 7

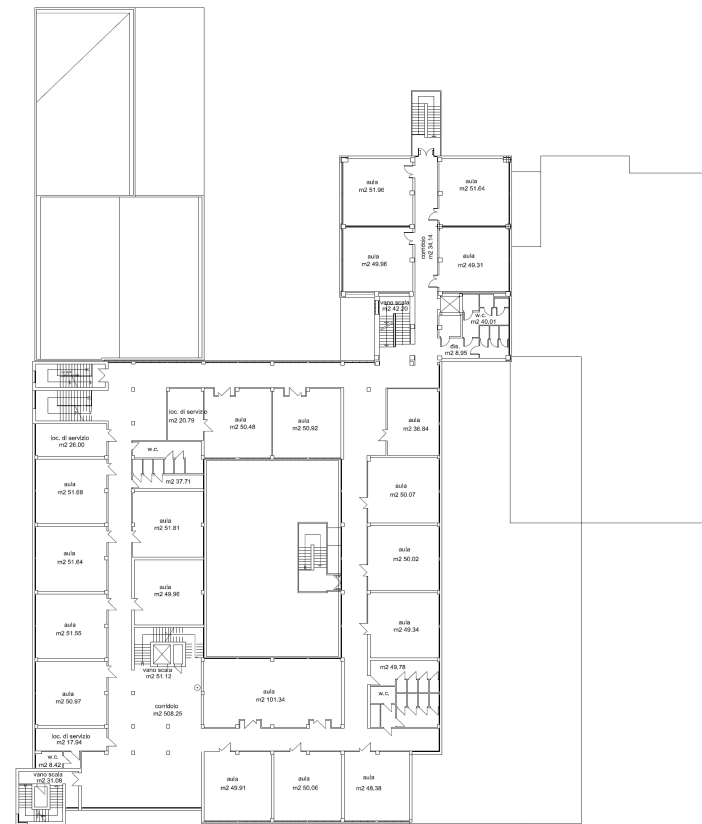


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Cities **on power**



3 Provincia di Ravenna: Cities on power

dell'Istituto Professionale di Stato Servizi per
l'Enogastronomia e l'Ospitalità Alberghiera (IPSEOA)
"Pellegrino Artusi" Cervia, Piazzale Artusi 7

- L'edificio è stato completato nel 1995:

- volume totale 36.445,26 m³
- superficie utile Su 8.221,37 m²
- superficie disperdente totale S 14.312,69 m²
- fattore di forma S/V 0,39