Thermochemical Power Group

Master Degree in InnovativeTechnologies in Energy Efficient Buildings for Russian & Armenian Universities and Stakeholders

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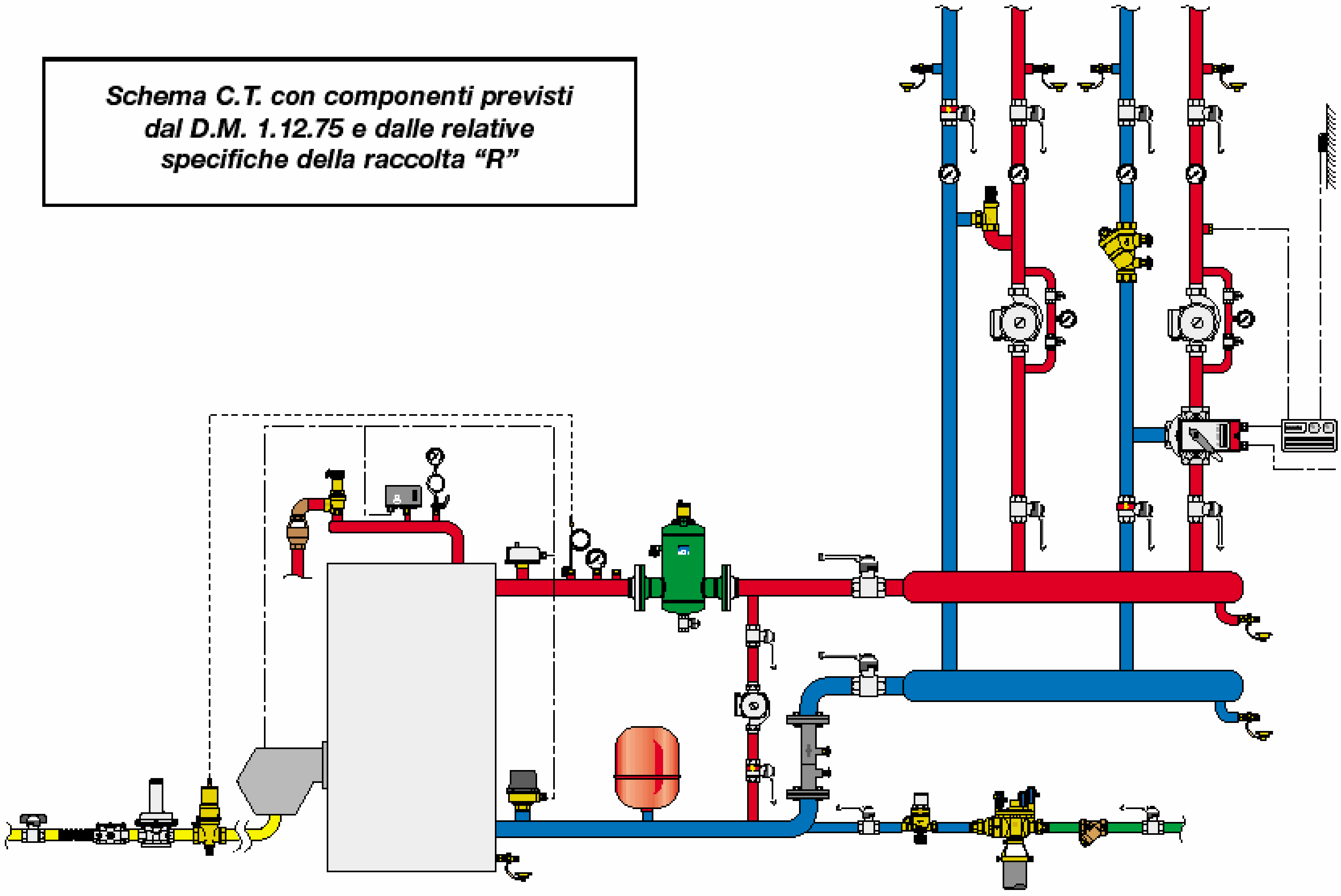
MARUEEB

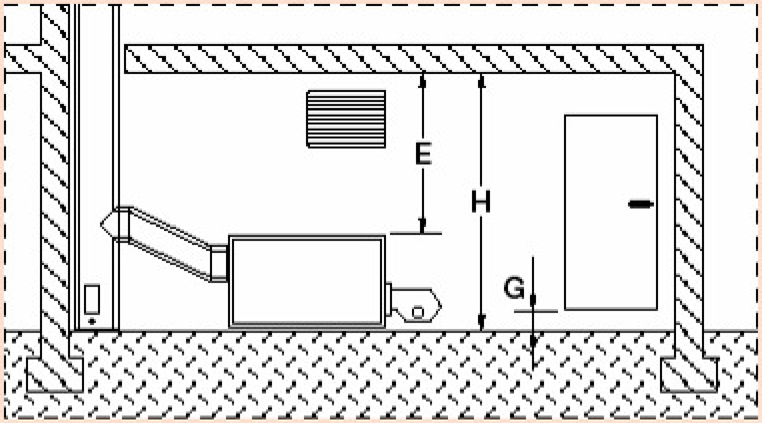
Biomass plants

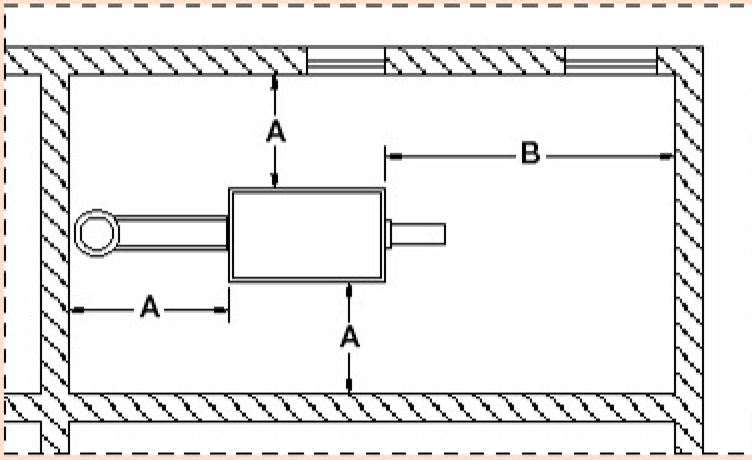
Conventional thermal generation

Schema C.T. con componenti previsti dal D.M. 1.12.75 e dalle relative specifiche della raccolta "R"



Conventional thermal generation





Distanze minime richieste

A = 0,60 m

B = 1,30 m

E = 1,00 m

G = 0,20 m

H = 2,50 m

Superfici di aerazione minime richieste

S = 1/30 della superficie in pianta del locale fino a 1.000.000 kcal/h

S = 1/20 della superficie in pianta del locale oltre 1.000.000 kcal/h

Con un minimo di:

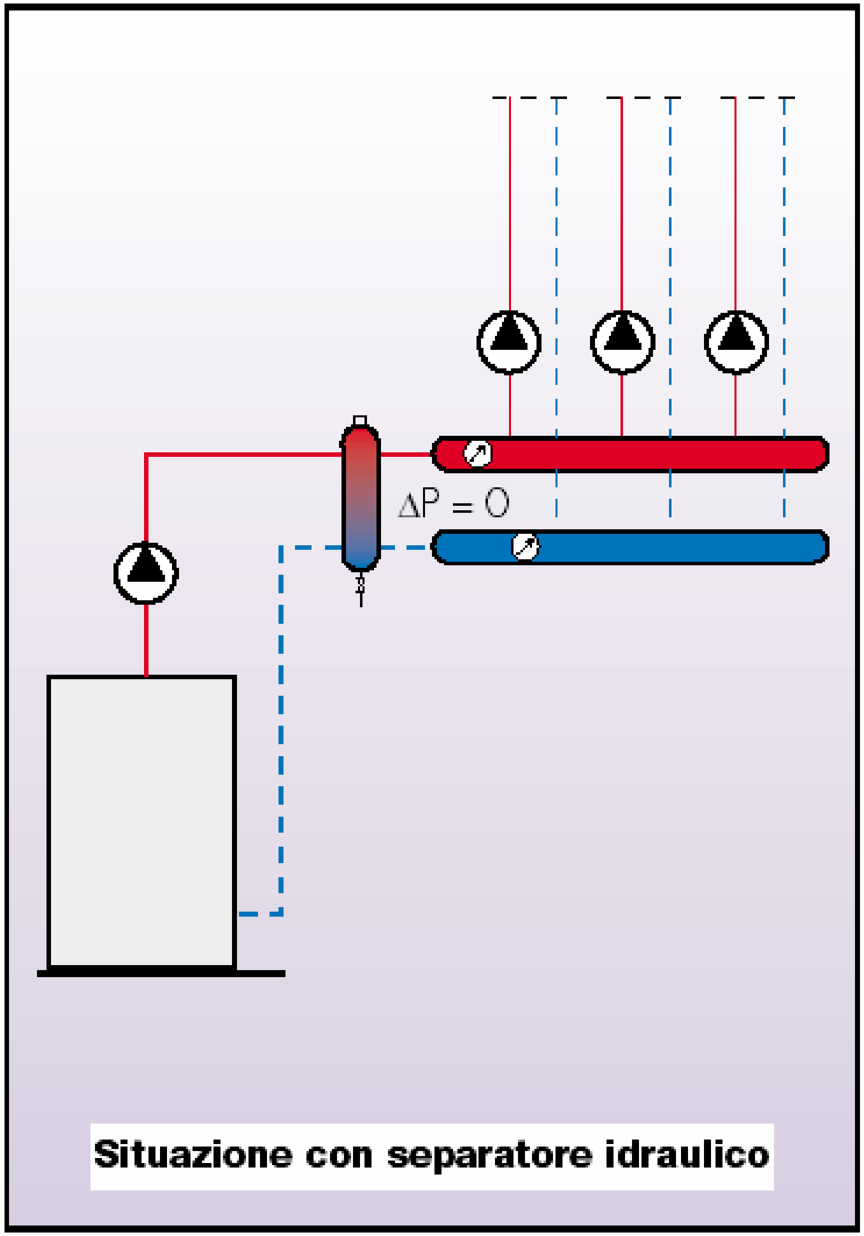
S = 0,50 mq fino a 500.000 kcal/h

S = 0,75 mq da 500.000 a 750.000 kcal/h

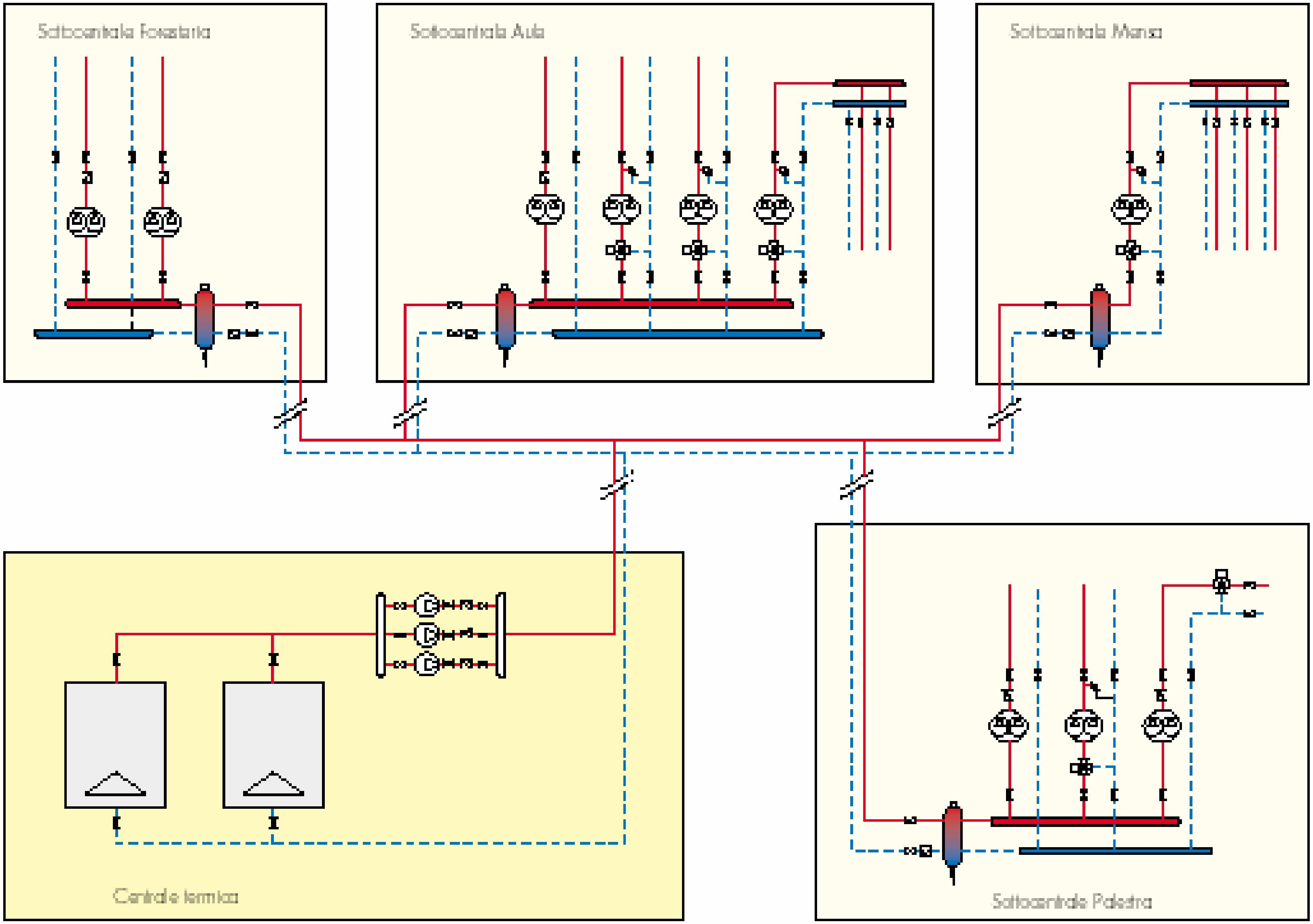
S = 1,00 mq oltre 750.000 kcal/h

Adempimenti richiesti per il locale caldaia con combustibili liquidi

Connection with “hydraulic separator”

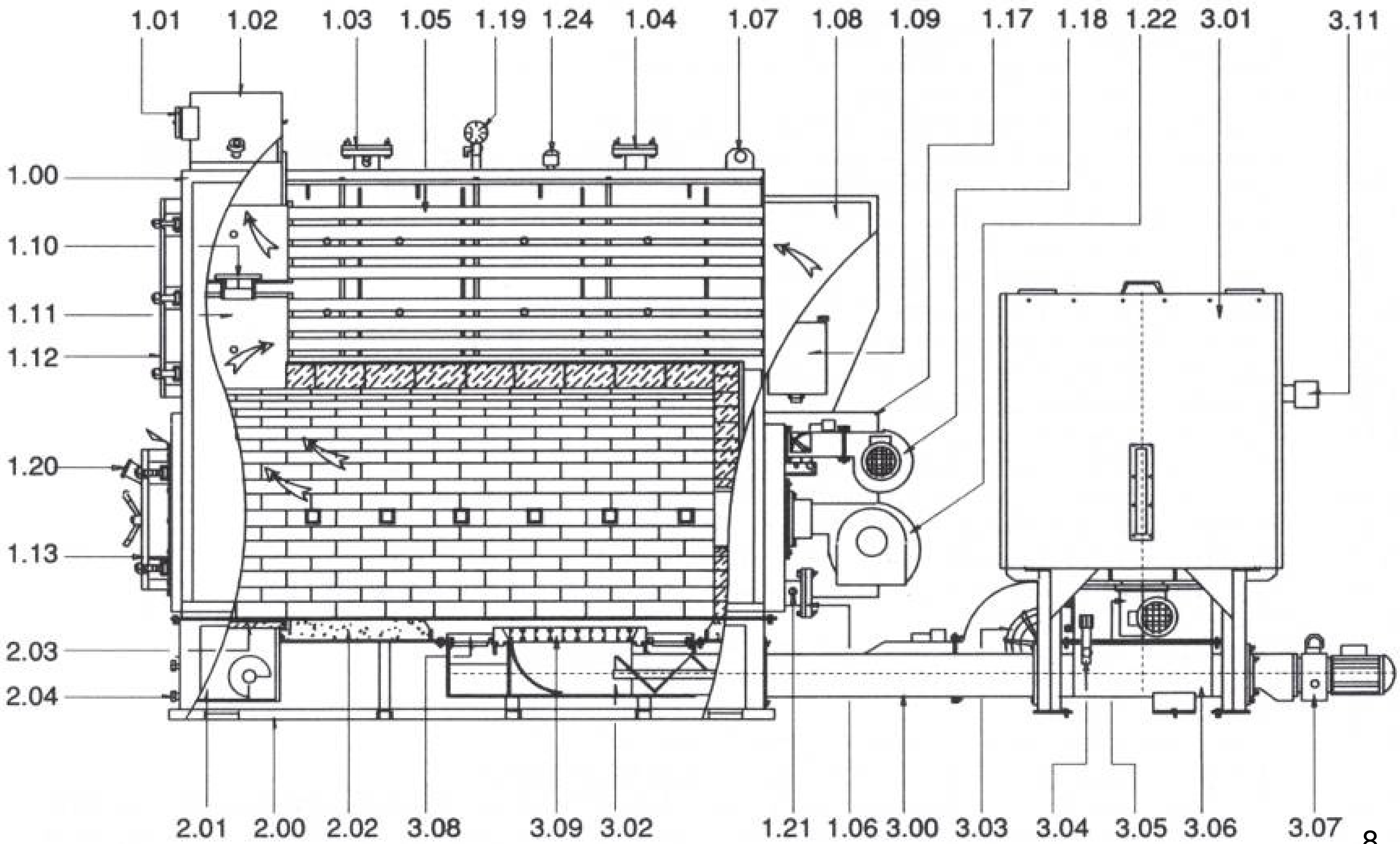


District heating network

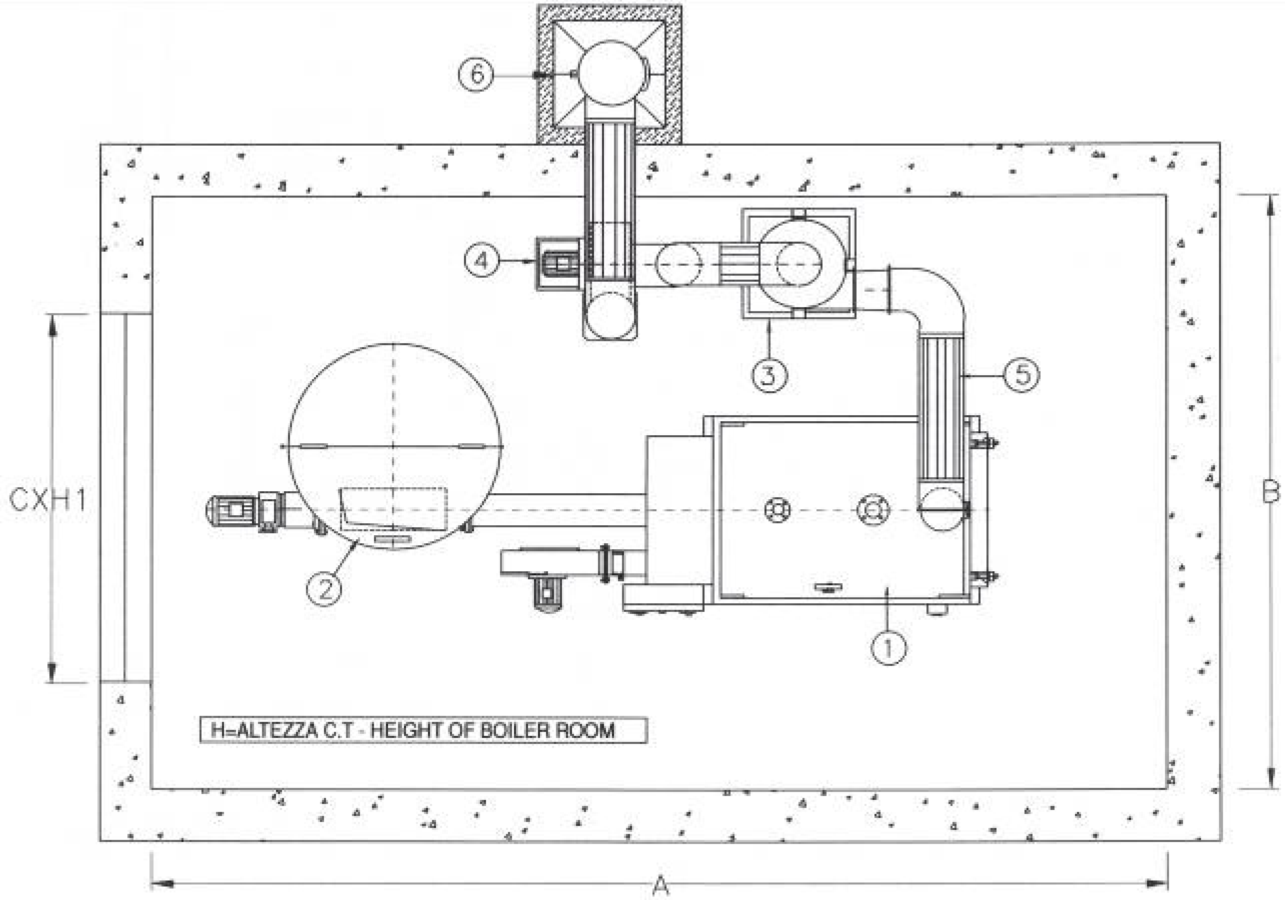


Biomass thermal generation

Biomass thermal generation



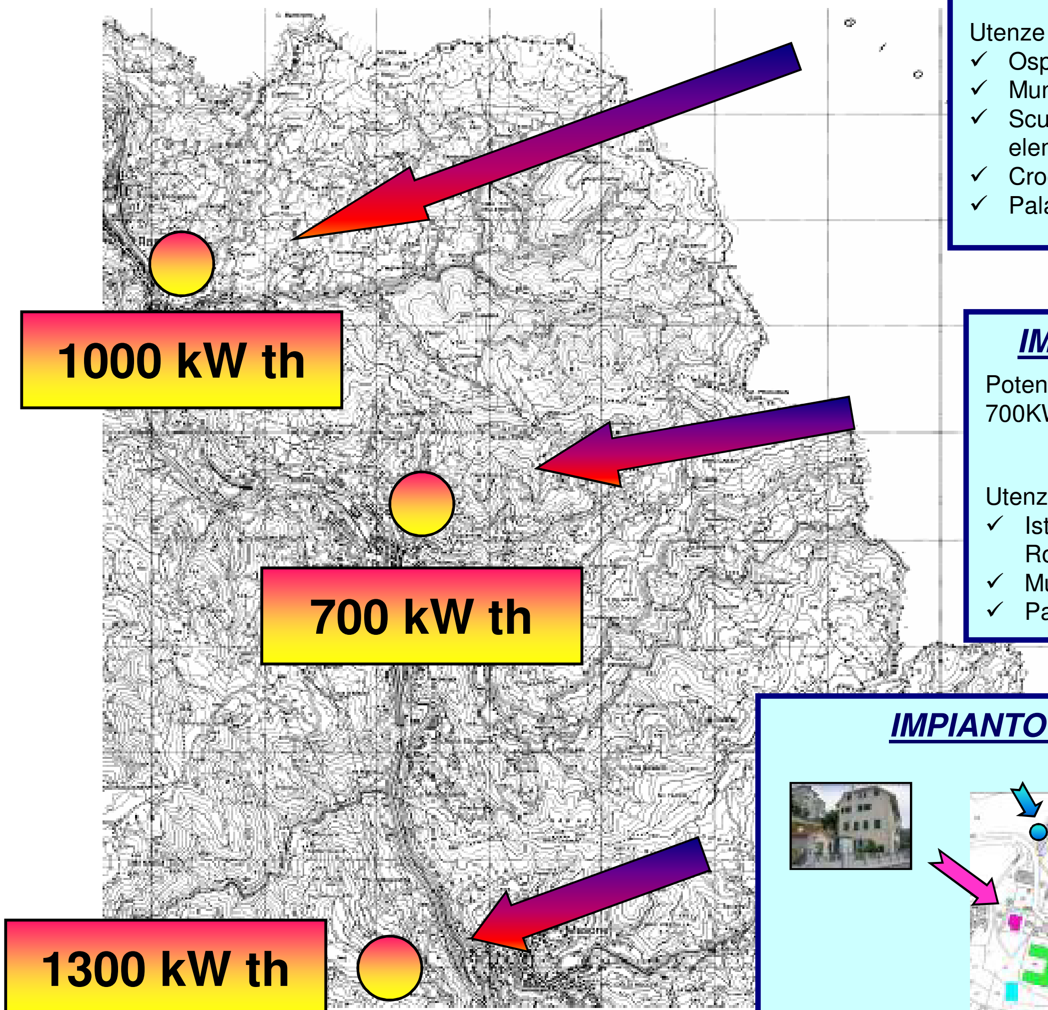
Biomass thermal generation



MC=METRI CUBI CONTENITORE - CUBIC METRE OF CONTAINER

	MOD.	35–40	45–50	60–70	80	100	120	140	160	200	250	300
DIMENSIONI (mm)	A	6350	6800	7000	7400	7400	7800	7800	8300	9500	10000	10600
	B	4000	4300	4500	5000	5200	5500	5500	5500	6000	6000	6000
	C	1600	1800	2000	2400	2400	2600	2600	2600	2600	2600	2600
	H	3800	4000	4100	4100	4100	4200	4600	4600	5000	5200	5200
	H1	2800	2900	2900	2900	2900	2900	2900	2900	3200	3200	3200
	MC	1.25	1.25	4	4	4	8	8	8	8	8	8

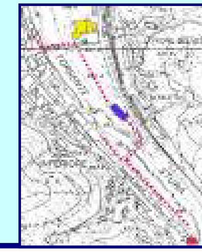
PROGETTO VALLE STURA



IMPIANTO DI ROSSIGLIONE

Potenza nominale caldaia: 1000KW termici

Utenze servite:
- ✓ Ospedale Barigione
- ✓ Municipio-Cinema
- ✓ Scuola media ed elementare
- ✓ Croce Rossa Italiana
- ✓ Palazzina ex Ferriere

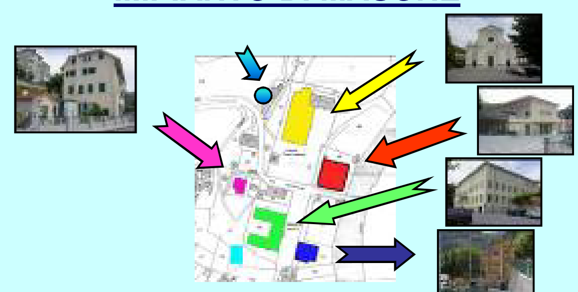


IMPIANTO DI CAMPO LIGURE

Potenza nominale caldaia: 700KW termici

Utenze servite:
- ✓ Istituto scolastico Rosselli
- ✓ Municipio
- ✓ Palazzetto dello sport

IMPIANTO DI MASONE




Comune Cicagna


LIGURIA

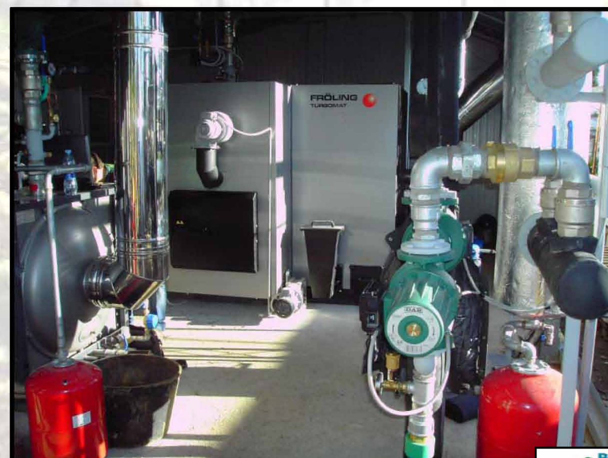
Annual cost due to no maintenance of the forests

225.000.000 €/year

INTERVENTI (1)

Comune di Arenzano (GE) (Andrea Fazio)

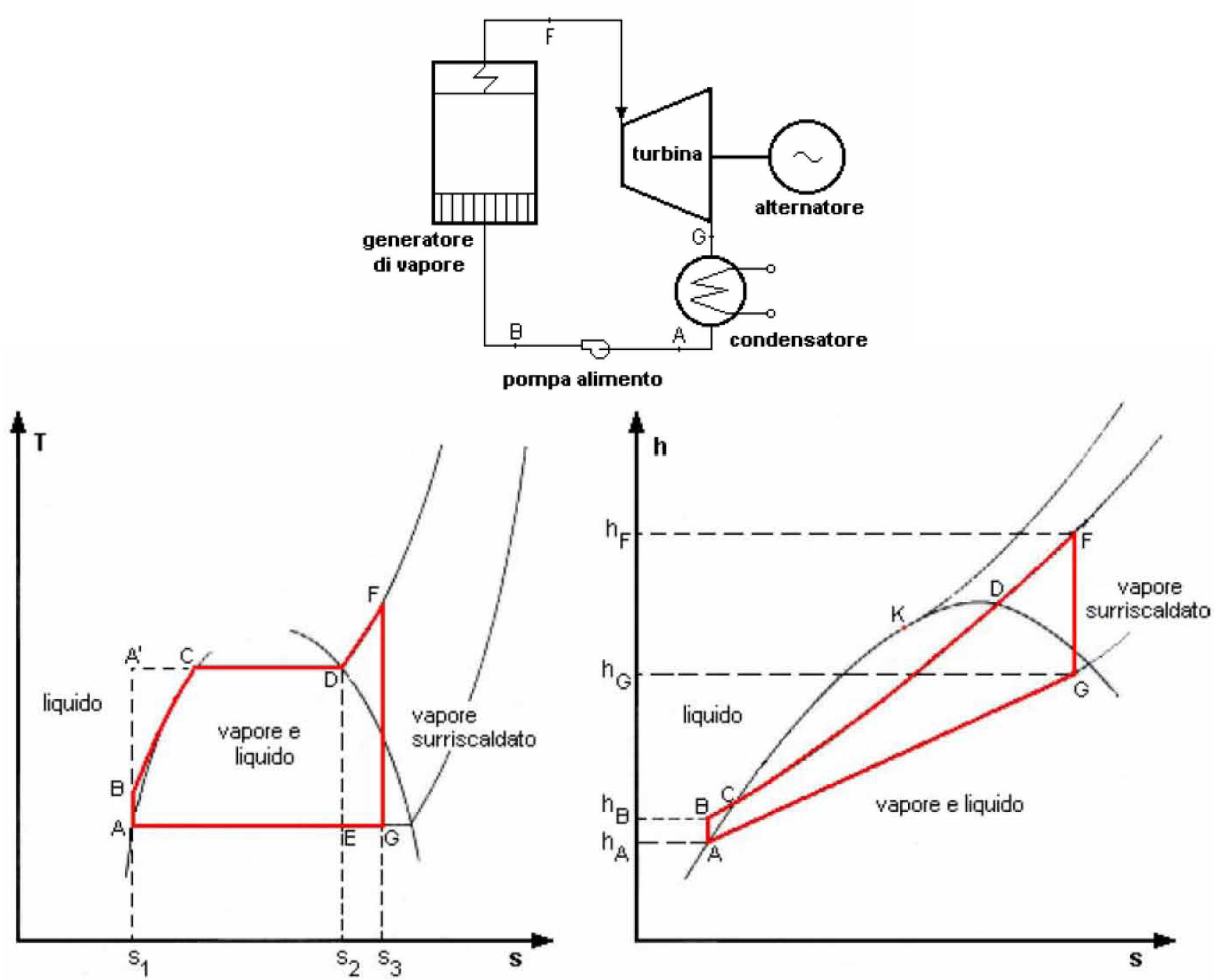
- ✓ **Caldaia FROLING 220 kW**
- ✓ **Sup. interessata serre: 2500 mq**
- ✓ **Accumulo temico: 5000 l**
- ✓ **Volume stoccaggio: 50 mc**
- ✓ **Specie coltivate: orchidee**



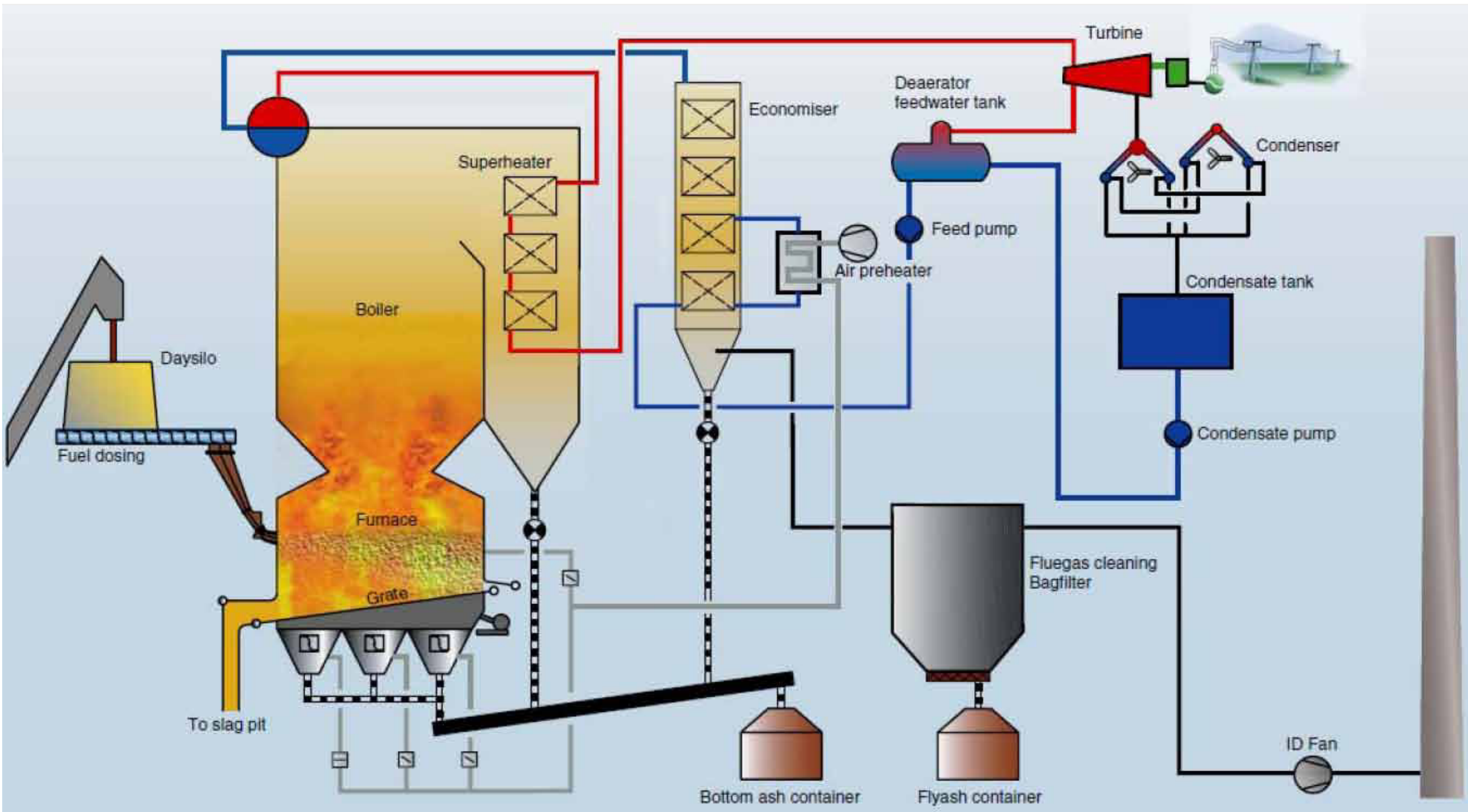
Some cosiderations

- Local population showed initial sceptisism, but later entusiasm for the demonstrated economic savings: requests for connections/installations increased exponentially.
- Biomass cogeneration of heat and power is the viable solution for sustainable energy production.

Conventional biomass congeneration technology: steam cycle



Conventional biomass congeneration technology: steam cycle



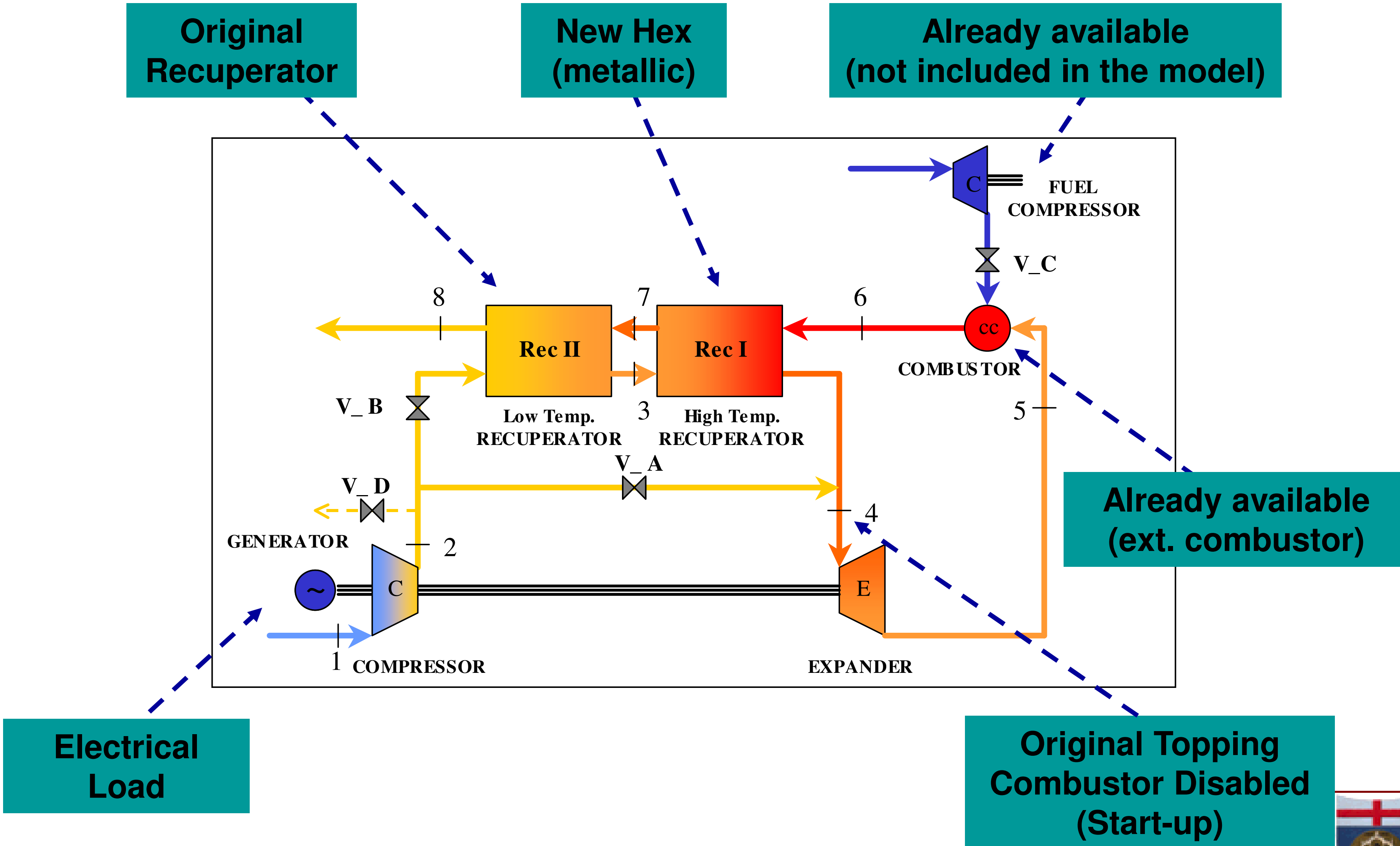
Conventional biomass congeneration technology: steam cycle

- Established technology

BUT

- Limited electrical efficiency (22% LHV basis)
- Biomass collection is a problem for scaling up over 5 MWe

Externally Fired microGasTurbine (EFmGT): plant layout



EFmGT: actual plant

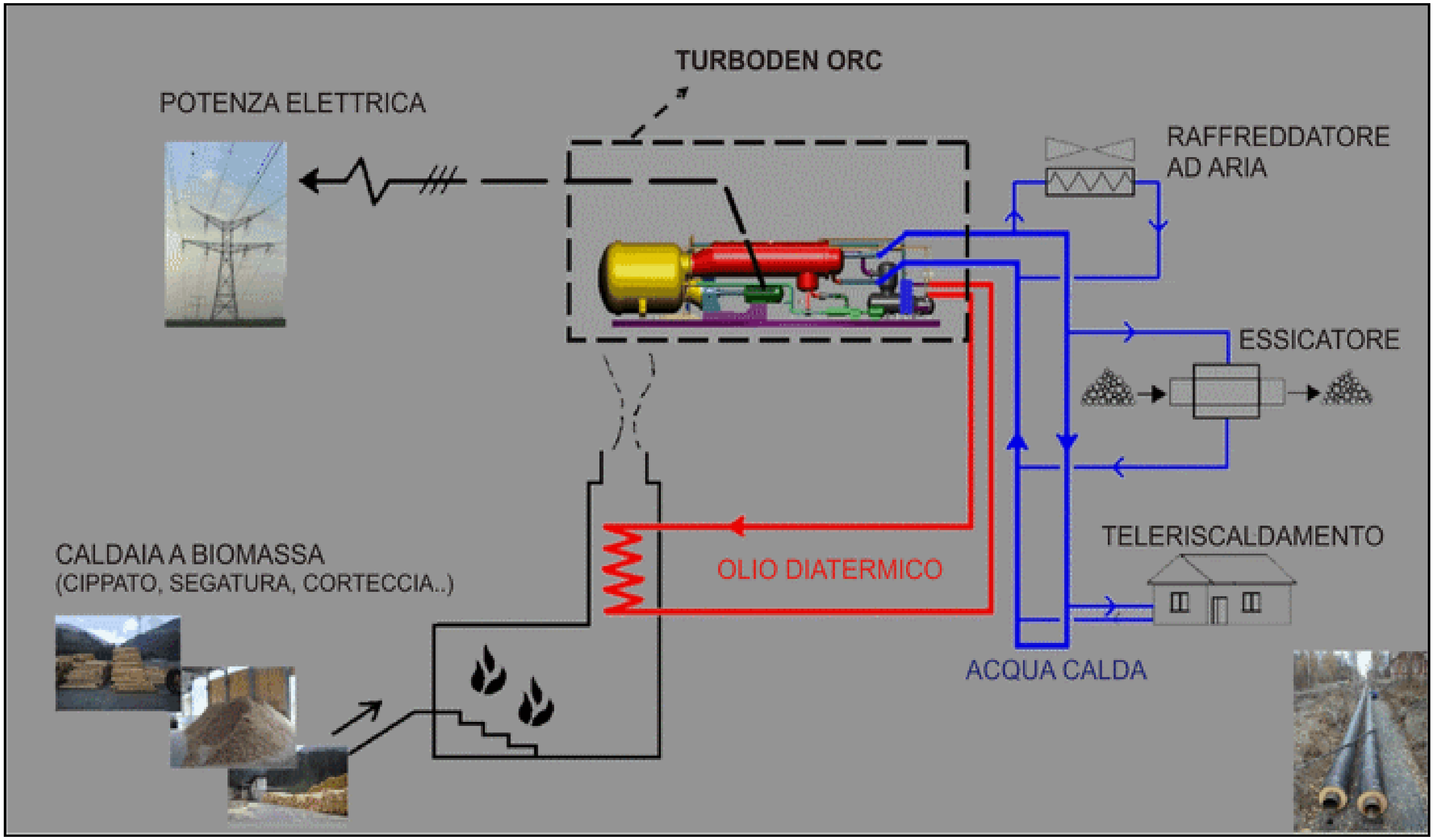
- Potentially high-efficiency technology for solid and gas fuel co-firing BUT technology challenges due to high-T Hex

Organic Rankine Cycles

Biomass boiler with diathermic oil

ORC plant 0.5MWe

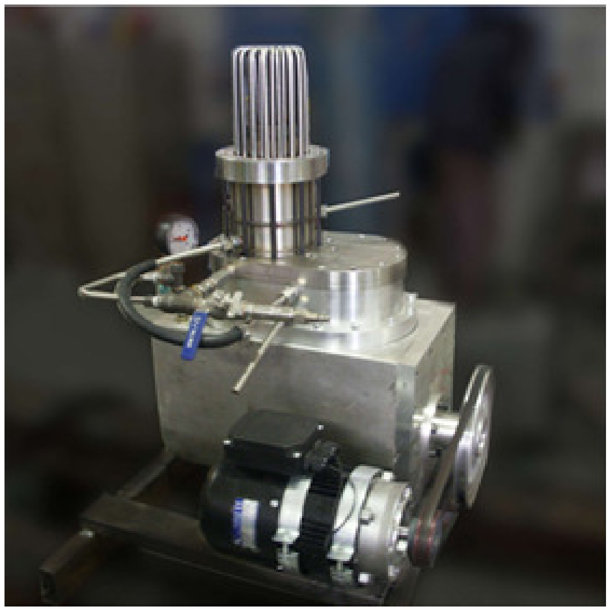
Organic Rankine Cycles



- Small sizes (<1 MWe) at acceptable efficiency (20%) and possible recovery of low-T waste heat BUT significant initial costs.

Stirling engine

Genoastirling s.r.l.

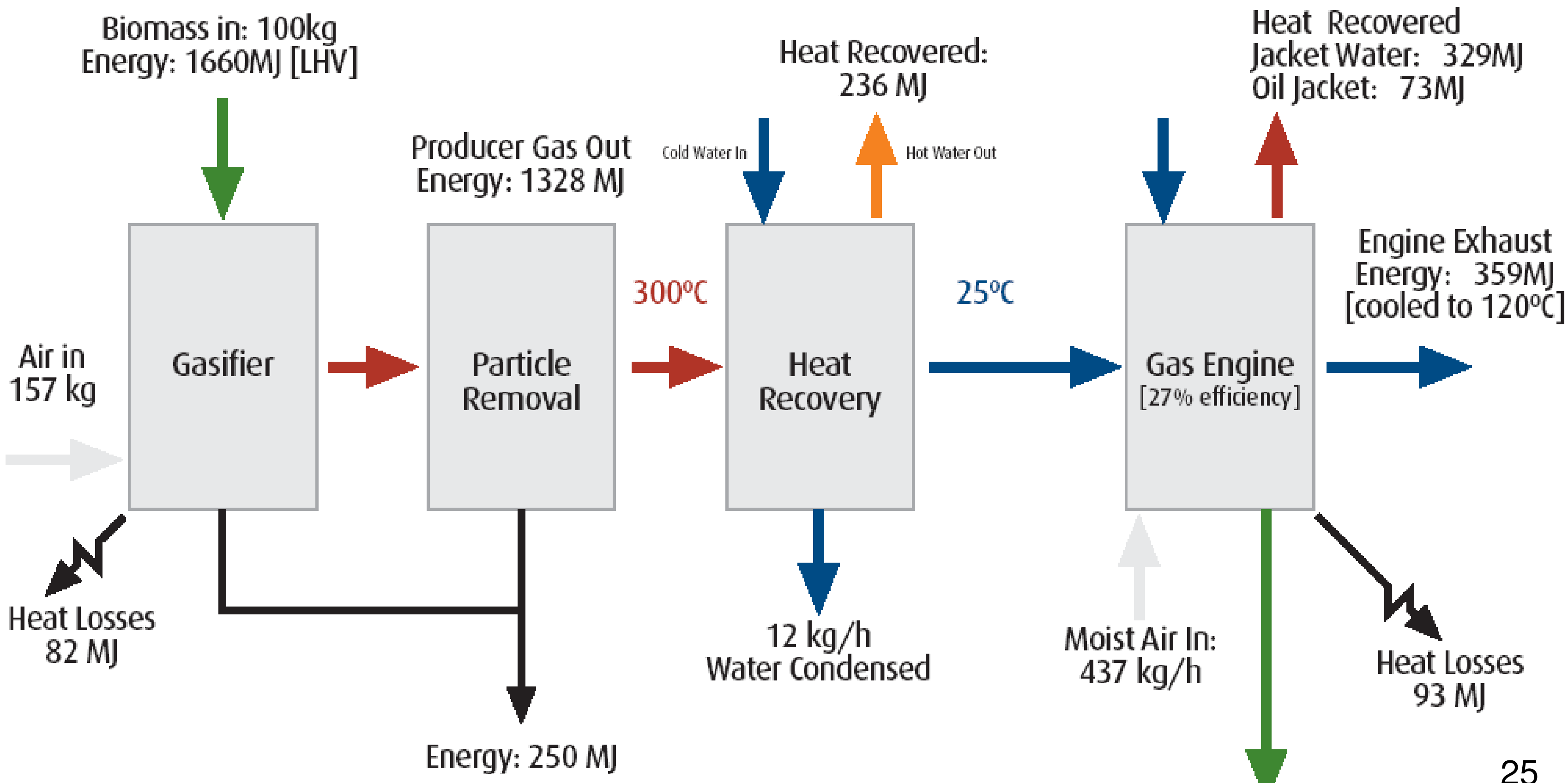


- Micro sizes are possible (1kWe) BUT cost, reliability and maintenance are still an issue.

Biomass gasification

GASSIFICAZIONE

Figure 2. Basic Mass & Energy Balance for a 100 kWe output [Low Efficiency Engine]



Biomass gasification at Genoa University