**Soluzioni di Control Strategy per Demo Spagnolo**

**Assumptions:**

Max thermal demand = 620 kWth ()

Areas SF= 648 mq ()

Pthermal input ORC = 472 kWth ()

Pthermal output ORC = 387 kWth ()

Pthermal available from the Biomass (BM) to fulfill the thermal requirements (not the ORC) =

1. **BM= 500kWth**

SUMMER

**DNI > DNIset 🡪 ORC on; Else ORC off.**

DNIset evaluation: the procedure is the same for all the similar strategies (odd numbers)

In order to supply the max thermal demand: - = 233 kWth ()

Considering the nominal power of the BM, the power available from the BM to run the ORC is:

500 kWth - = 267 kWth

In order to keep the ORC on the thermal gap required from the solar filed is: – 267 kWth= 205 kWth

Therefore the DNI required (assuming solar efficiency = 0.7) is: 205 kWth /(0.7\*) = **450 W/mq = DNIset**

WINTER

ORC always ON during the working time of the working days.

BM+SF following heat demand

1. **BM= 500kWth**

SUMMER

**ORC ON when DNI > DNI set; else ORC OFF**

DNIset evaluation: the procedure is the same for all the similar strategies (even numbers)

Therefore the DNI required (assuming solar efficiency = 0.7) is: 472 kWth /(0.7\*) = **1040 W/mq = DNIset**

BM + SF (rest of the SF power) used for cooling purposes

WINTER

ORC always OFF

1. **BM= 400kWth**

SUMMER

**DNI > DNIset 🡪 ORC on; Else ORC off.**

In order to supply the max thermal demand: - = 233 kWth ()

Considering the nominal power of the BM, the power available from the BM to run the ORC is:

400 kWth - = 167 kWth

In order to keep the ORC on the thermal gap required from the solar filed is: – 167 kWth= 305 kWth

Therefore the DNI required (assuming solar efficiency = 0.7) is: 305 kWth /(0.7\*) **= 672 W/mq = DNIset**

WINTER

ORC always ON during the working time of the working days.

BM+SF following heat demand

1. **BM= 400kWth**

SUMMER

ORC ON when DNI > DNI set; else ORC OFF

Therefore the DNI required (assuming solar efficiency = 0.7) is: 472 kWth /(0.7\*) = **1040 W/mq = DNIset**

BM + SF (rest of the SF power) used for cooling purposes

WINTER

ORC always OFF

1. **BM= 250kWth**

SUMMER

DNI > DNIset 🡪 ORC on; Else ORC off.

In order to supply the max thermal demand: - = 233 kWth ()

Considering the nominal power of the BM, the power available from the BM to run the ORC is:

250 kWth - = 17 kWth

In order to keep the ORC on the thermal gap required from the solar filed is: – 17 kWth= 455 kWth

Therefore the DNI required (assuming solar efficiency = 0.7) is: 455 kWth /(0.7\*) = **1003 W/mq = DNIset**

WINTER

ORC always ON during the working time of the working days.

BM+SF following heat demand

1. **BM= 280kWth**

SUMMER

ORC ON when DNI > DNI set; else ORC OFF

Therefore the DNI required (assuming solar efficiency = 0.7) is: 472 kWth /(0.7\*) = **1040 W/mq = DNIset**

BM + SF (rest of the SF power) used for cooling purposes

WINTER

ORC always OFF