

Porro is shown. Here again the difference in energy consumption during night hours or daytime is minor. The load profile of the refrigeration unit suggests that two different temperature set points for the unit are in place: one for the night time and weekends, and one for the workdays during day time.

Figure 6 depicts the load profile of the refrigeration unit of Polo Porro. Contrary to the other refrigeration units, this unit appears to modulate with different behavior every day and a clear day / night distinction.

The analysis of the load profiles of the three refrigeration groups shows that only the new unit modulates depending on usage and on the external temperature. The other two units appear to operate regardless of the boundary conditions. This suggests that a thorough analysis of the refrigeration units usage and a subsequent definition and application of an optimized management strategy to the air conditioning of Gradenigo can be the correct approach forward. Possibly following the path traced by the Cellini Clinic and relying on this previous experience to identify and reduce energy waste of Gradenigo and reduce energy spent.

8. CONCLUSIONS

This paper presented the implementation of a real time energy monitoring platform on some hospital facilities part of the Humanitas Group. A brief description of the energy monitoring system and of the monitored sites was provided.

The case study of the Cellini Clinic was presented, where the monitoring platform was successfully applied to help drive the reduction of the facility's electric energy consumption by 27% over 3 years, of which 2,5 covered by monitoring. A brief explanation of the implemented actions was provided as well as of the results achieved. The data collected by the Cellini Clinic monitoring activity put the basis to the creation of an internal library of KPIs and to the definition of a methodology to study the other structures of the Humanitas group.

Analogous structural and functional features to the Cellini Clinic suggest a similar approach to the optimization of energy consumption for the Gradenigo hospital, recently equipped with the monitoring platform, also based in Turin and also part of the Humanitas group. Preliminary analyses of the load profiles show similarities between the behavior of the refrigeration units of Gradenigo and that of the ones of the Cellini Clinic before the optimization actions were implemented, thus targeting possibly similar results in terms energy savings after corrective actions are put in place.

The future steps will be to implement the monitoring platform on other Humanitas group sites to drive the overall decrease of energy demand. Another important goal will be to create a database with reference to each structure's own

historical operation data and KPIs, in order to compare different structures and to verify the evolution of energy performance of the buildings through the years, especially considering the scarce availability of consistent benchmarks in literature for hospital facilities.

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