

HEALTH CARE



"Thanks to knowing better where our energy is used and how it is used we managed to draw an optimal energy efficiency road map which cleared funds that helped us concentrate on our main objective – to treat patients and save lives."

Giovanni Semprini, Facility Manager

Effective, energy-efficient technologies and practices reduce HVAC-related energy costs while enhancing infection control. Decisions regarding the HVAC system—for new construction and existing buildings—are most effective when undertaken as part of a facility-wide energy management program.

Hospitals maintain high ventilation rates to lessen the risk of microbial contamination. Because requirements for outdoor air are substantial, HVAC can account for nearly half of a hospital's total energy use. Hospitals can, however, achieve substantial energy savings and meet the demands of infection control.

Customer Profile

The focus of this case study is a hospital in central Italy. The hospital is public with 480 beds in total. Because the facility operates only on funds generated by

services provided, hospital administration was seeking ways to decrease overall operating costs. The hospital's old, inefficient HVAC system provided many opportunities for saving energy and energy costs. In order to pay for needed improvements, the facility sought the help of Inspiring Software.

Customer needs

The hospital in question covers 39000 square metres and employs around 985 permanent staff working a three-shift system. Annually the facility spends about € 1.9 million on electricity.

After several discussions with the hospital's facility manager and their team it was estimated that an energy efficiency investment which achieves energy consumption reduction of 5% was a realistic project.

Additional to energy consumption reduction it was agreed that it was also necessary to optimize the hospital's HVAC system state and operation.

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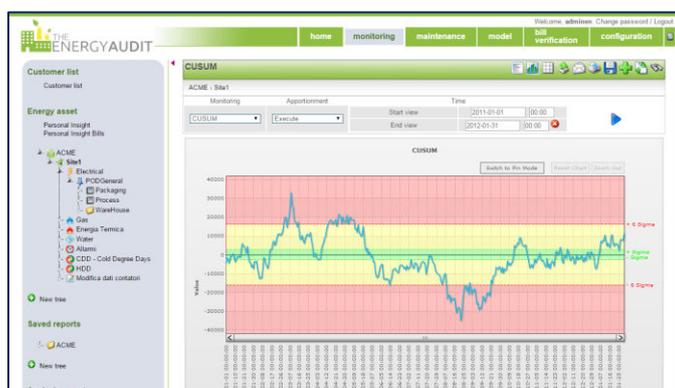
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The Energy Audit's solution

First, in order to reduce initial investments and get fast and measurable results, the Energy Audit analysed historical energy-related data so as to identify opportunities for savings and identify the exact measures necessary to tackle those opportunities. The ENERGY ANALYSIS PLATFORM was used for this stage of the project.

Parallel to our energy data analysis we installed the CONSUMPTION MONITORING software so as to collect real-time consumption data.



CUSUM Control Charts

Having previously collected 16 months of 15' historical data from the main existing meter at the hospital, the Energy Audit gathered additional equipment, process and energy driver data and started modelling the energy consumption of the HVAC system. The main energy drivers which we identified were temperatures and degree days.

This approach allowed to understand and predict the consumption of every major piece of equipment in the HVAC system. The Energy Audit was thus able to identify all energy waste and inefficiency in the historical data and set up an automated control of energy consumption.

Energy modelling also helped us to identify key savings opportunities. For example, fans that moved cool air through the system were determined to be a key problem since they were running continuously at 100 percent.

Once consumption and costs were predicted, our customer used CUSUM control charts, provided by the TARGET CONTROL software, to control consumption on an on-going basis. In addition to that we connected the hospital's BMS to the software platform in order to feed real-time energy driver data.

As a result of the above analysis and system setup it was possible to:

- Assess **air-flow requirements** for different hospital areas, reducing use of 100 % outside air in non-medical spaces (i.e., offices and storage areas) which resulted in reductions in energy necessary for ventilation;
- Calibrate, check, and adjust **thermostats** to accurately heat and cool different building zones;
- Correct any **HVAC** systems that were in **conflict** by heating and cooling an area simultaneously as well as reduce HVAC use when areas were unoccupied or in low use (and therefore were subject to lower indoor air quality and temperature requirements). This was possible by employing an energy efficient scheduling which is based on an energy model;
- For non-critical spaces with lower ventilation requirements (such as medical-office floors), to switch to a variable air volume system by installing variable frequency drives on all motors. This reduced power use in fans by **32%** because unlike constant air volume systems, variable systems modulate airflow based on the demands of the space being served;
- Know, verify and control the **return** on every energy efficiency action.

Those are just some of the interventions we pointed out and which were carried out. The total final energy consumption reduction was 12% which is more than double what the hospital expected.

Because of the success of the project the hospital decided to install the Energy Audit's HVAC live diagnostic application for plant failure interception.

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