



# The National Library of France

## Keeping Treasures Safe by Managing Energy Costs

### Solutions for Building Management

#### Results

- Reduced energy consumption by 20% to 25% in four years
- Provided the ability to save energy by turning off air-conditioning units in a single action to benefit from 13 hours of thermal inertia in the buildings
- Assists in maintaining the ambient conditions in over 250 archiving storerooms to keep valuable documents in optimum condition
- Improves the energy performance of the site, thanks to individual management and more fine-tuned scheduled management of the results in reworking contracts with energy suppliers and lowered costs in overconsumption
- Allows permanent shut down of air-conditioning units that were rendered superfluous for the current operation
- Facilitates management of the technical equipment on five remote sites (including 225,000 points on the François-Mitterrand site)

**“The changes we were able to make as a result of using the GE solution have had the greatest impact on the BnF’s total budget.”**

*Yannick Hubert, National Library of France Deputy Manager of the technical facilities*

#### GE’s HMI/SCADA - CIMPPLICITY

provides equipment management and energy performance capabilities at the BnF François-Mitterrand to help management have a positive impact on their bottom line

Located in Paris on the banks of the Seine, the national library of France, Bibliothèque nationale de France (BnF) François Mitterrand, houses some 35 million books and publications for conservation and consultation including old volumes that must under no circumstances be subjected to fluctuations in ambient conditions. Refrigeration units, air-conditioning units, regulators, etc., capable of guaranteeing the application of the proper temperature and relative humidity values that are vital for the conservation of these volumes.

The entire National Library of France system comprises eight physical sites (François-Mitterrand, Richelieu, Louvois, Opéra, Arsenal, Jean-Vilar, Bussy-Saint-Georges and Sablé). The site consists of a building beneath which there are several levels of offices and rooms, with four towers at each corner of the building. The site as a whole covers an area of 335,000 m<sup>2</sup> and every year consumes 50 MWh of energy.



The management of the library looked for a centralized technology solution that would assist them, first and foremost, in monitoring, supervising and managing equipment related to relative humidity, lighting and air-conditioning in buildings. This solution, referred to as GTC (*Gestion Technique Centralisée*) in French, is responsible for the conservation of the books and archives, the comfort of those who work there, and increasingly significant energy savings.

GE's HMI/SCADA - CIMPLICITY was chosen to be the heart of the GTC. Since management included running the installation with the goal of saving energy, CIMPLICITY was a great choice because, by providing energy usage statistics, the software also serves as an excellent lever for implementing long-lasting improvement initiatives.

At present, five of the eight sites are connected (François-Mitterrand, Arsenal, Bussy-Saint-Georges, Richelieu and Sablé). All of these connections use identical functionalities and operating modes. There are currently plans to extend the solution implemented at the François-Mitterrand site to the older site of Richelieu.

### Equal to a small town

Installed at the end of 2005, the CIMPLICITY solution has enabled major energy savings to be made at the BnF François-Mitterrand location. There is a great deal of cost related to energy performance since the site consumes on average the equivalent in power needs of a town of 18,000 inhabitants. The main power demands come from the production of heat and refrigerated water, along with the need for regulating the relative humidity and for lighting.

"Consuming 40% of the total energy used by the BnF, air-conditioning represents a particularly strategic item," said Yannick Hubert, Deputy Manager of Technical Facilities for the BnF François-Mitterrand. "The changes we were able to make as a result of using the GE solution have had the greatest impact on the BnF's total budget."

The BnF's energy supplier, EDF, has a fixed cost based on a maximum "power demand" threshold. Within the scope of this contract, any excess energy consumption by the BnF results in expensive penalties.



Before implementing the GTC solution, the BnF was not able to make a precise estimate of its future consumption and therefore had to regularly pay penalties related to overconsumption.

Now, the BnF is able to continuously monitor the entire installation's electrical consumption in real time at a control room level and to highlight any peaks in consumption that could result in the limits fixed by the EDF contract being exceeded. This enables the BnF to make preventive "offloads" (turn off any non-essential equipment). The team is also able to analyze historical data on consumption that has been collected and recorded by the GTC and use this data to make a precise assessment of the BnF's future consumption. The BnF has therefore been able to renegotiate the various contracts signed with EDF, by adapting them to reflect actual consumption; this has enabled the library to reduce its energy bill and to avoid any more over consumption penalties.

"In the space of four years we have reduced electricity consumption by between 20% and 25% with respect to the air-conditioning units and the heat and cold production," said Giorgio Lipari, GTC Manager. "Controlling the installations via CIMPLICITY allows us, for example, to turn off all 353 air-conditioning units in a single action in order to benefit from 13 hours of thermal inertia in the buildings. What is more, thanks to the programming possibilities, we have been able to permanently shut down certain air-conditioning units that were rendered superfluous for the current operation of the premises."

"For two years we have not had any problems with over consumption of power," confirms Michel Vial, energy and fluids manager. "This is one of the benefits of the more fine-tuned control of installations using the CIMPLICITY solution. What is more, in 2011, we should be able to bring down even further the contractual power over consumption threshold."

Currently, the ambient conditions in the archiving storerooms are set at 18 °C +/- 1 °C and 50% RH +/- 5%. "We're starting to work on the possibilities of upgrading the control of the temperature and relative humidity ranges," said Yannick Hubert. "This would enable us to reduce still further our energy consumption while continuing to comply with the strict conservation constraints within the storerooms."

### Keeping it cool

CIMPLICITY can help with all needs of the BnF Francois-Mitterrand, from turning off the lights to regulating an air-conditioning unit. What is more, the software offers a link with the financial aspects, such as the cost of power consumption, thereby providing the operator with the means of controlling expenditure more efficiently.

Technicians, technical resource managers, fire officers and external service providers all have access to the CIMPLICITY solution. As for the curators of the various sites, they have a dedicated access in order to be able to control the temperature and relative humidity levels of their storerooms (one storeroom corresponds to one archiving unit). This means that each head curator is able

to monitor the ambient conditions of his storerooms in terms of temperature and humidity levels via a simple web browser.

"With 50 simultaneous accesses, the curators are also able to carry out processing, export or data archiving actions on site and at their convenience," Mr. Lipari said. "Before having this possibility of supervision access, we had to send a printed report every week to each curator for a total of more than 250 storerooms. Every year this represented several tons of paper. Today, local supervision of the energy usage guarantees the transparency of information with regard to the various managers of the remote sites. CIMPLICITY makes it possible both to manage a large quantity of information and to deliver reliable management reports to the curators of the National Library of France."

In the daytime, from 8:30 AM to 8:30 PM, a maintenance agent monitors the alarms on two supervision stations equipped with twin screens, and is ready to send in-house and outsourced teams on-site as and when required.

Outside of these screen monitoring duty times, CIMPLICITY comes into action, with levels of alarm hierarchies per site, according to class (nature of the alarm) and activity. The duty technicians (high-voltage, low-voltage and air-conditioning) then receive a text message on their cellphone and can connect to CIMPLICITY from wherever they may be in order to view, troubleshoot and even control the equipment.

"CIMPLICITY is a programming management tool," Michel Vial explains: "With all of the alarms, it is also a tool for daily use that is capable of processing large quantities of data to enable us to monitor any changes in temperature and relative humidity."

The simplified scheduled programming has made a significant contribution to savings. Among the developments that have been implemented, the in-house teams at the BnF Francois-Mitterrand recently harmonized the cascading of the four refrigeration units (16 MW) in order to stabilize the power demands. The 1,500 fan-coil units of the BnF Francois-Mitterrand site will soon be directly piloted by the GTC system, using a specifically developed software driver. The objective is to optimize comfort and energy performance. The supervisor allows the in-house teams to deploy and apply their own energy cost reduction strategies.

"On the site of the library, the power cabinets have no local controls. Only the centralized technical management (GTC) system can be used to activate the equipment," said Giorgio Lipari, GTC manager. "This is why the GE supervisor must always be operational, no matter what."

Benefiting from high levels of in-house skills, the BnF manages its GTC tool so it can undertake its own developments, as necessary, over time.

In addition, being able to continuously control the status of all technical equipment and their aging and therefore apply a better-

informed maintenance strategy enables the BnF to prolong the life of its equipment. This is a particularly significant benefit given the current economic climate.

“When we tell people that our GTC is up and running and that we are actually using it, they always look surprised! Yet we have the teams, the skills and the resources to optimize the use of our equipment. The BnF François-Mitterrand is, to some extent, a pilot site, in the eyes of both the public sector and the private sector,” said Hubert.

### Continued diligence

In 2009, the H3C consultancy carried out an energy audit of the François-Mitterrand site. H3C employs specialists who are highly qualified in energy audit matters. The company worked on this audit project for more than a year, in close collaboration with the BnF. This collaboration

has enabled extremely sophisticated technical tools to be developed, which in turn have made it possible to produce a model of all the BnF buildings and to measure the energy impact of each and every activity on these buildings.

“The Technical Facilities Management team is committed to constant research into enhancing the comfort of the buildings’ occupants, reducing power consumption and optimizing the maintenance of the installations,” explains Cyril Cachat, in charge of the audit. “The BnF benefits from centralized technical management that is adapted to the site and is extremely well-run. Used daily, this tool offers exceptional site supervision in real time, and facilitates site operation.”

“Producing this model and using the results from it would not have been possible if the GTC implementation had not offered the performance provided by the GE solution,” stated Yannick Hubert.

### About GE

GE (NYSE: GE) is the world’s Digital Industrial Company, transforming industry with software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the “GE Store,” through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry.

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