IMPROVING THE HOSPITAL MANAGEMENT. ENERGY EFFICIENCY MEASURES.

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Abstract: *Saving energy, a commitment by the EU through the Kyoto Protocol "is arguably the fastest, the most efficient and the cheapest way to reduce the greenhouse gas emissions" (3), and thus improving air quality. It is fair to say that for most of the people, matters such as saving the planet and reducing its costs are not so important. Growing utility price is the main driver for energy efficiency. Energy Performance of Buildings Directive will force us to regularly evaluate and publicly display the energy performance, this giving, transparency, dynamics and the default value of buildings and hospital accreditation in terms of energy. Using energy efficient equipment is vital, but not sufficient. To be effective, hospital buildings should be monitored, managed and controlled to achieve sustainable performance and prevent damage. It is equally important to focus on the use, management and maintenance of the plateau systems, which leads to lower costs and carbon emissions quickly and with little or moderate expenses. Energy consumption and polluting emissions bring about serious economic, political and social problems, both now and for the future generations, the effect of greenhouse gases could have devastating effects on the economies of the world.*

Cuvinte cheie: *audit energetic*
eficienţă energetică
platou tehnic
reabilitare termică

Rezumat: *Economisirea de energie, angajament luat de UE prin Protocolul de la Kyoto „este fără îndoială cea mai rapidă, eficientă şi ieftină metodă de a reduce gazele de emisie cu efect de seră" (3), deci şi îmbunătăţirea calităţii aerului. Corect este să spunem că pentru majoritatea contează mai puţin salvarea planetei şi mai mult reducerea costurilor proprii. Preţul utilităţilor în continuă creştere este principalul impuls pentru a fi eficient energetic. Directiva de performanţă energetică a clădirilor ne va obliga să evaluăm regulat şi să afişăm public performanţa energetică, aceasta conferind, transparenţă, dinamism şi valoare acreditării clădirilor şi implicit al spitalului din punct de vedere energetic. Folosirea echipamentelor eficiente energetic este vitală, dar nu suficientă. Pentru a fi eficiente, clădirile spitalului trebuie monitorizate, conduse şi controlate pentru a realiza performanţe durabile şi pentru a preveni deteriorarea. Este la fel de importantă concentrarea pentru preocuparea, utilizarea, administrarea şi întreţinerea echipamentelor, sistemelor din platoul tehnic, ceea ce conduce la reducerea costurilor şi a emisiilor de carbon rapid şi cu cheltuieli mici sau moderate. Consumul de energie şi emisiile poluante în continuă creştere generează serioase probleme economice, politice şi sociale, atât în prezent, cât şi pentru generaţiile viitoare, efectul gazelor de seră putând avea efecte devastatoare asupra economiilor lumii.*

The hospital provides accommodation conditions, hygiene, nutrition, prevention of nosocomial infections and is responsible by law for the quality of care for observing the conditions of accommodation, hygiene, nutrition according to regulations and prevention of nosocomial infections, approved by the Order of the Minister of Health.

The hospital has a diverse organizational structure: sections with beds for the continuous hospitalization and outpatient, on-call services, emergency services, outpatient surgeries integrated in all medical specialties approved by Order of the Minister of Health, compartment for the prevention and control of nosocomial infections, statistical and informatics department, pharmacy, technical-economic-administrative department (financial-accounting office, administrative services, supply and transportation office, technical office, legal office, RUNOS office (Romanian acronym for Human Resources, Norming, Organisation, Wages), statistics-informatics office, technical plateau.

Considering the growing consumption of energy and implicitly, the increase of emissions, energy reduction and efficiency are thus vital to ensure the sustainable development of a hospital.

The new concept of sustainable development brings about a different approach from the classical one we are used to when it comes about the infrastructure of a hospital. Currently, the building is considered as a body in constant evolution, which in time should be treated, rehabilitated and upgraded to meet the requirements set for a given stage. The analyses and interventions related to energy saving are highly topical in terms of ensuring the adequate comfort conditions.

This is called building energy efficiency. While reducing energy demand, two important goals of sustainable development are accomplished, namely, primary resources economy and the reduction of emissions in the environment.

Increasing energy efficiency can be achieved by several ways, from educating the staff and patients in the spirit of saving, up to upgrading and rehabilitation interventions to

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eliminate heat loss, achieving a comfortable climate inside and ensuring the requirements of quality, safety and security of buildings.

Any improvement activity maintains the building in better shape, prolonging its life and increasing its value. The investments also contribute to large scale to saving primary energy resources and reducing the environmental pollution by emissions inherent to the energy production process.

Understanding by the hospital's manager of the way of functioning of a building, both in terms of construction and in terms of equipment and facilities they serve, is essential to identify strategies to be adopted for its energy rehabilitation.

In order to achieve the objective of ensuring sufficient energy for the optimal use of the medical activity, of ensuring patient safety, reducing the risk of accidents and related financial penalties, a hospital manager must consider the following: the maintenance policy of the technical plateau is a key factor for ensuring a secure energy performance, legal limitations faced by hospitals (regulations, standards, directives, contracts etc.), cost limitations that hospitals have to face under great economic pressure and the rising costs of the medical care, staff shortages (due to low wages, poor standardization, lack of vacancies), safety of patients and carers (open buildings, subject to all kinds of security issues).

For the energy rehabilitation strategy of a building, the manager should take into consideration providing the inside comfort, health and safety conditions for all its holders.

Energy audit means "identify and quantify the leaks (consumptions) of energy that occur in a particular physical unit (building, installation etc.)".(1) The energy audit must establish both the inputs of electricity, gas, steam and the way in which they are used for lighting, heating and other requirements of the hospital and especially, for the technical plateau and the effective ways for saving energy and reducing the investment costs due to energy conservation. Energy audit concerns: thermal expertise – through which the thermal features are set (construction elements and installations) and energy consumption to meet the normal operating requirements, "energy certificate, which is based on energy expertise and establishes the energy quality of the construction"(4) and the solutions for reducing energy consumption in buildings.

In the current crisis conditions, imposing energy efficiency in hospitals is a positive factor, the thermal rehabilitation of the hospital buildings being done by taking bold decisions and setting goals on short, medium and long-term involving: replacing the existing woodwork with insulating joinery, building envelope, replacing the old heating installations with modern performance systems, water consumption management (water metering entries in hospital, the use of modern valves, which eliminate water waste by uncontrolled installations, the use of economizers to reduce tap water consumption by 20 - 30%).

The main role of a hospital building is "to ensure the patients and the staff a healthy, pleasant and comfortable environment, as less dependent on the external conditions, especially the weather and acoustic ones".(2) In order to satisfy these requirements, the architectural appearance – the aesthetic or the environmental classification - directly related to energy consumption, is as important as the conditions of safety and stability to mechanical actions. The energy used in the operation of hospital buildings is intended to achieve a healthy and comfortable indoor environment, namely the heating in winter and cooling in the warm period of the year, lighting and ventilation, domestic hot water, cooking, cleaning and washing the linen and clothes of patients, carers and patients' hygiene.

Until the energy crisis, during which the environment quality assurance represented exclusively the issue of facilities and the indoor environmental quality was seen as a relationship directly related to energy consumption, reducing energy consumption resulted in lower life and comfort conditions. New research focused on identifying strategies and means to address energy issues and more recently, those of environment offered by the concept of sustainable development has shown that through an interdisciplinary, multi-criteria approach of buildings functioning, a good quality comfortable and healthy indoor environment is entirely possible with low power consumption.

Having in view the objectives set for the management of a modern and efficient technical plateau, the requirements of a healthy and comfortable indoor environment, the hospital's manager should take into account and search for solutions and identify the resources to apply those measures to lead in time to the accomplishment of the administering and functioning indicators through:

Thermal rehabilitation of the buildings

a) Action and solutions for an efficient heat supply

The solutions to increase energy efficiency, both regarding the heat distribution system, as well as at the end user, refer to the thermal energy preparation and distribution system and to the central heating system. One of the solutions determined by reducing the need for heat is the installation in each building of substations for the small consumers.

The solution is superior through the advantages the local (decentralized) heating system has to the centralized heating system namely: high efficiency heat transfer, greater satisfaction regarding the thermal comfort requirements of consumers, increased automation, easy installation and rapid reduction of heat loss through extinction of the outdoor distribution networks, the thermal damages affect an area that is less served, lower operating costs, less specialized maintenance and the compact design allows its placement in small spaces.

The compact thermal stations are compact, modern systems, supplying with heat the hospital buildings, installed in a room at the basis of the building; they are part of the modern solutions for heat supply of buildings and are generally practiced in the developed countries. It may be said that the thermal stations are mini compact heat units for a small group of customers within one or maximum two buildings serving the hospital.

Regarding the solutions to increase energy efficiency of central heating systems in buildings, it is aimed at increasing the efficiency of thermal energy use and they mainly consist of cleaning chemical and corrosion protection of the heating system and the hydro and thermal balance inside the system. The hydraulic balancing aims to properly allocate the heat flows in the system and to reduce heat waste. Regarding the rehabilitation and modernization works of hospital buildings and installations, changing and restoring the heating system may take place, adopting some schemes of distribution that allow the individualization of collective heating.

Such a scheme includes the main distribution pipelines located in the basement (lower distribution), supplied by the central heating system of the building, vertical columns, turn-return pipes located in the stairwell, surface-mounted or in specially designed housings; the columns supply the inner installations of each floor of the building by means of a connection piece in which insulating taps and heating meter can be found, horizontal distribution at each floor, supplying the heating systems provided with thermostat valves.

b) Solutions for increasing energy efficiency at the level of building envelope

The building – the enclosure and the technical energy subsystems - should be investigated and diagnosed, both globally and by components in order to establish the optimal package of technical and economic measures meant to modernization in terms of energy, to reduce energy consumption, keeping the heat in the building and bringing the building at the standards and requirements of comfort.

Following the increasing demands on the thermal protection of buildings, there appeared a number of new related solutions and technologies. Some of the solutions studied and promoted, especially for the new buildings, where the energy performance expectations are continuously growing, can be also used on the occasion of the thermal and energy modernization of the existing buildings.

Regarding the supplementation of the thermal insulation of building elements that make up the existing building envelope and the improvement of the details, it is recommended to pay attention to the provision of appropriate materials for additional thermal insulation with the corresponding hygro-thermal characteristics with a view to achieve a continuity of thermal insulation, additional thermal insulation location, preferably to the outside of the building elements, providing a suitable thermal stability for both winter conditions and for the summer, providing suitable coatings on the inside and on the outside to provide water impermeability water and permeability to water vapour, adopting optimal economic solutions, avoiding materials consumption and the excessive costs.

The main criteria, requirements and performance levels in terms of hygro-thermal-energy, which must be considered when choosing solutions to improve the thermal protection by the hospital manager are mainly: providing a superior thermal comfort in winter, improving indoor climate in summer, mainly by increasing the thermal stability by taking steps to reduce the effects of excessive sunshine, by reducing as much as possible the annual heat demand for heating the hospital buildings by reducing the emission of pollutants and CO_2 emissions, by reducing fuel consumption and therefore, the primary energy source (ecological criteria), by substantially reducing the operating costs for heating the buildings of the hospital and by the swift recovery of the expenditure incurred for modernization.

The technical and technological problems arising in the design of the rehabilitation and hygro-thermal-energy works of the existing hospital buildings are very complex, and their correct resolution requires thorough knowledge of construction physics. As a result, rehabilitation and development projects, in particular, the choice of principle solutions and finalizing details will be made by or with the technical assistance of professionals with sound knowledge and expertise in structural design and ventilation.

The manager must consider the consequences, sometimes very serious, in case of adopting solutions and incorrect details, which in some cases, can cause major drawbacks in operation, generating defects sometimes even higher than those existing in the original, uncorrected situation. The rehabilitation and the thermo-technical modernization works have numerous connections and mutual conditioning regarding the building structure, which should be examined very closely. Particular attention should be given to the strict implementation of all provisions of the regulations in force on the fire resistance of all materials referred to in the modernization projects, but primarily regarding the insulating materials.

The specialists in the field mention, for example, that the expanded polystyrene, which is one of the most effective insulation materials, is produced in a number of varieties, some of which are characterized by the inappropriate behaviour to fire: low melting point, release of toxic gases at high temperatures etc. As a result, the use of these types requires certain restrictions and conditions relating, in particular, to the location (outside or inside the building), the composition and thickness of the coating.

Despite the widespread application of the existing technologies already leads to major improvements in the energy efficiency of buildings, it is clear that new concepts and technologies will allow further improvements and will represents new methods to increase performance.

Conclusions:

1. Rehabilitation and upgrading heating and plumbing systems is required primarily for significant energy savings.
2. Thermal rehabilitation of buildings increases the thermal resistance of the building envelope, eliminating condensation phenomena and providing thermal comfort requirements, both in winter and summer.
3. Processes automation of the modernized thermal points, enables the optimum functioning of the installation and its permanent monitoring, thus ensuring a correct answer in real time to the end consumer.
4. Through the careful monitoring of consumption, maintenance becomes intuitive and can be planned and scheduled in a sustainable strategic management, the advantage being that maintenance can be planned and budgeted.
5. Through implementation and widespread deployment of energy efficiency measures, hospital managers have at hand an important “cheap and clean” source of energy.

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