

22nd Congress of the International Federation of Hospital Engineering

An example of sustainability:

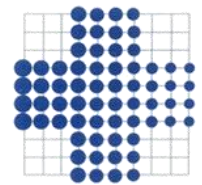
THE NEW ENERGETIC PLANT HOSPITAL UNIVERSITARIO 12 DE OCTUBRE MADRID



**LUIS MOSQUERA
MADERA**

ENGINEERING
MANAGER

PRESIDENT OF
AEIH



Asociación Española de
Ingeniería Hospitalaria

Preliminary data.

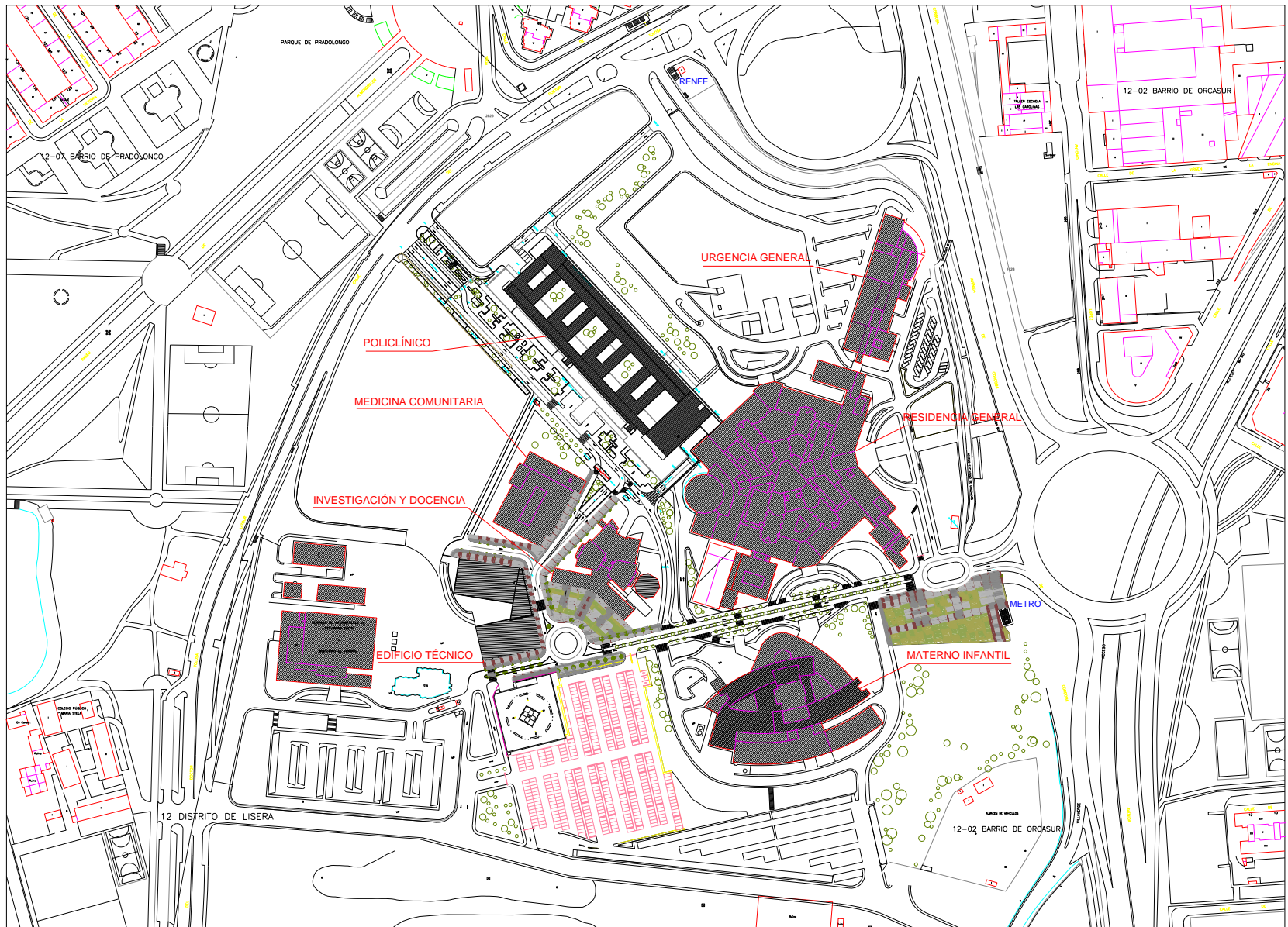


- Opening of the General Hospital in 1973
- Opening of the Paediatric and Obstetric Hospital in 1978
- Preliminary Project for an Outpatient Care Building and a Research Centre in 1999 (rejected)
- Entire Preliminary Project for the rebuilding of the whole Hospital in 2003
- Project for the construction of the Energetic Plant in 2004
- Project for the reform of the Research Centre, end of 2004
- Project for the Outpatients Care Building, end of 2004
- Opening of the new Energetic Plant and Research Centre, October 2006
- Start of the works for the new Outpatients Care Building, October 2006
- Strategic Plan for the rebuilding of the new Hospital, started in May 2008

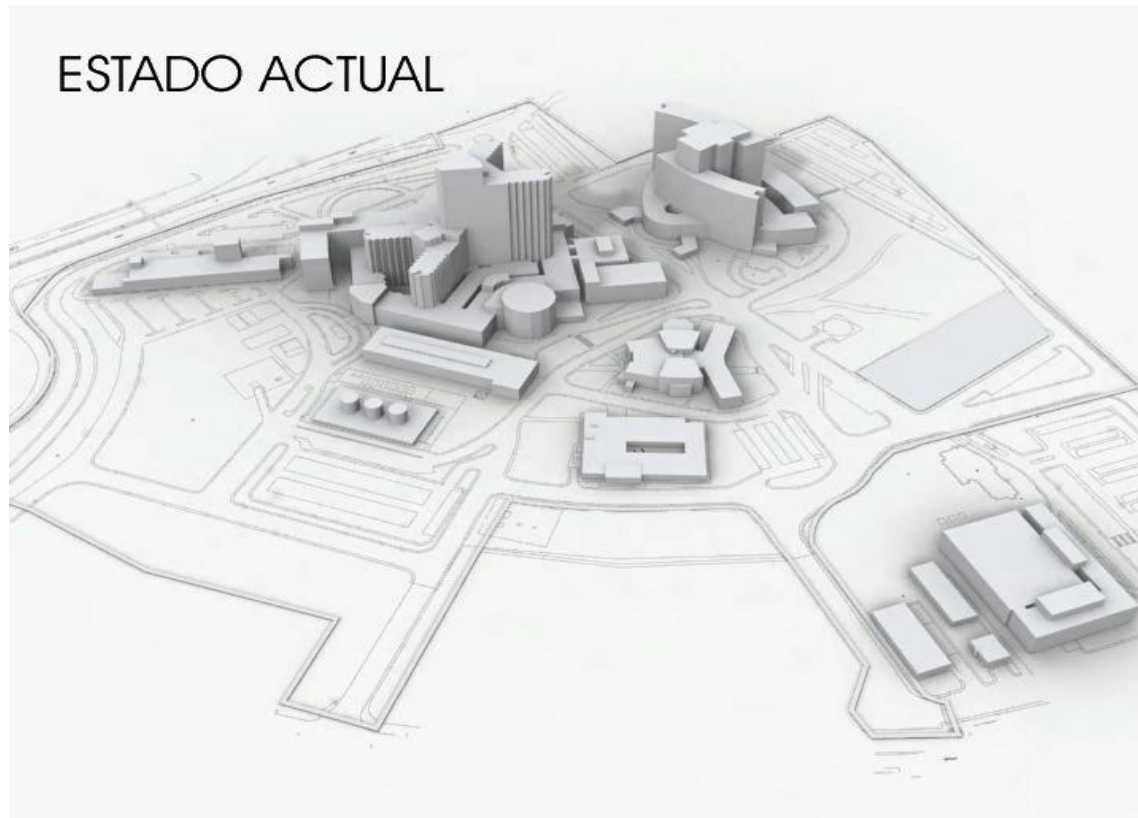
THE BUILDINGS. ACTUAL STATE

BUILDINGS	SURFACE (m²)
General Hospital	79.900
General Emergencies	5.660
Obstetric and Paediatric Hospital	42.750
Learning and Research Centre	4.650
Community Medicine	2.250
Geriatric Building	3.500
Radiotherapy	3.525
Energetic Plant	5.300
Joint Passages	4.050
TOTAL	151.585

The current situation of the plot



Preliminary layout



Working Plan: Step 0

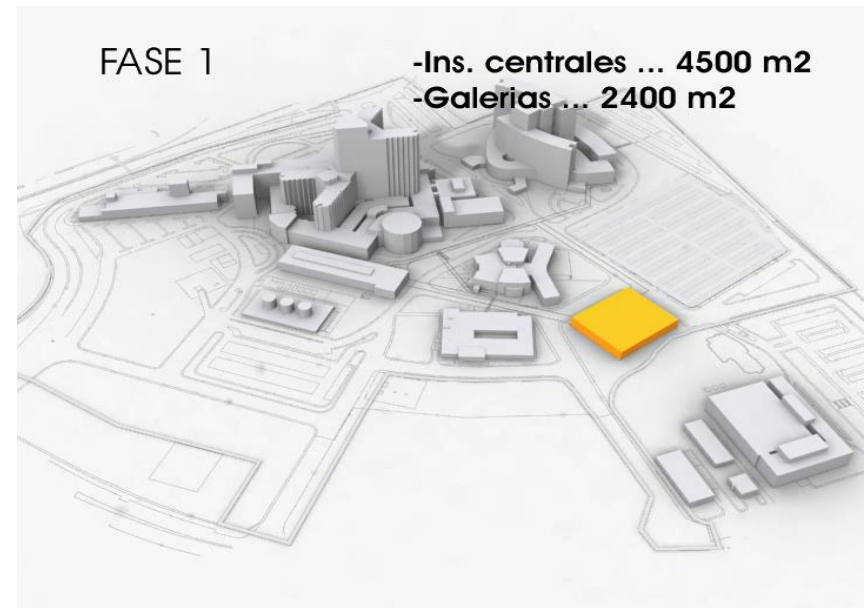
- Construction of 800 parking spaces
- Construction of a new Heliport
- Construction of the new Energetic Plant
- Reform of the Research Centre

Period:

18 months

Budget

27,000,000 €



Working Plan: Step I

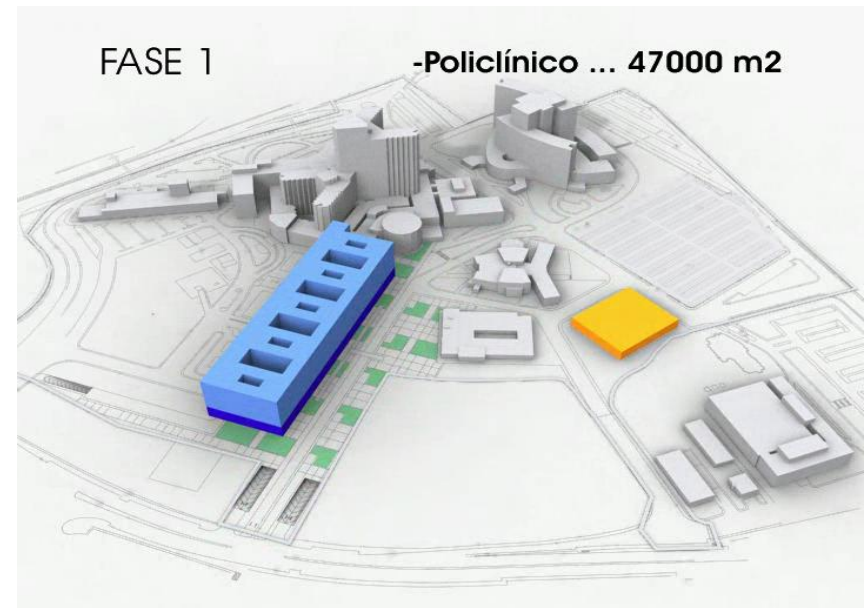
- Construction of the Outpatients Care Building
- Construction of 1,000 parking spaces

Period:

30 months

Budget

85,000,000 €



Working Plan: Step II

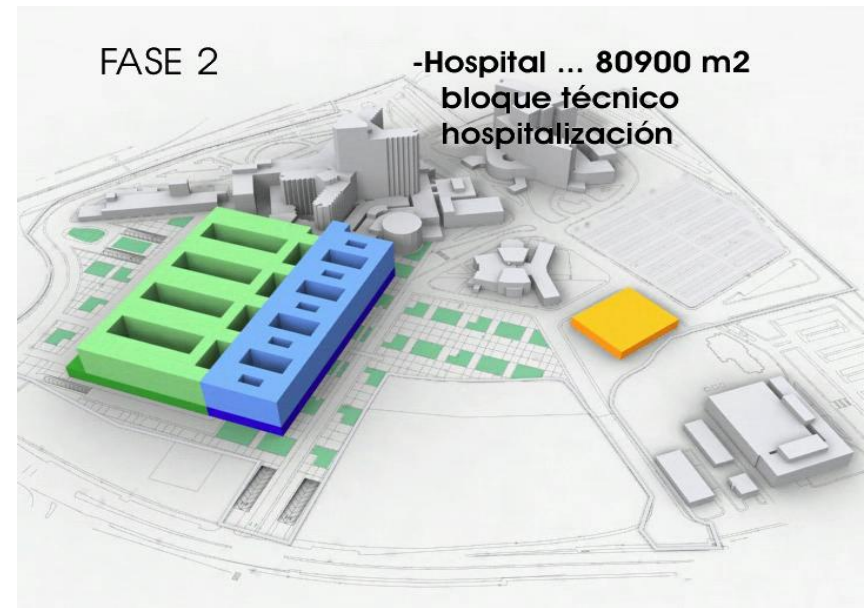
- Construction of the new Hospital
- Construction of 1,500 parking spaces

Period:

36 months

Budget

120,000,000 €



Working Plan: Step III

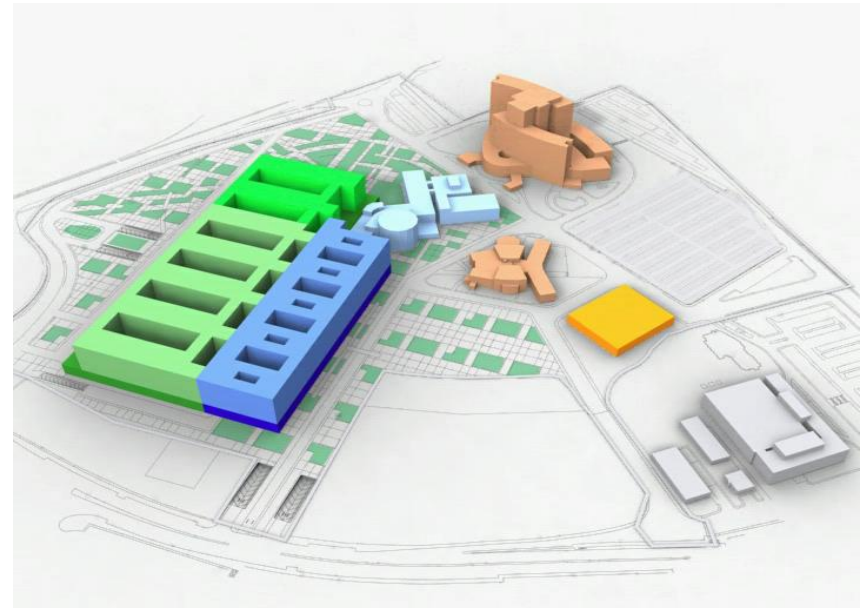
- Extension of the new Hospital
- Demolition of the old General Hospital

Period:

36 months

Budget

75,000,000 €



The old Power Plant



Data of the Project



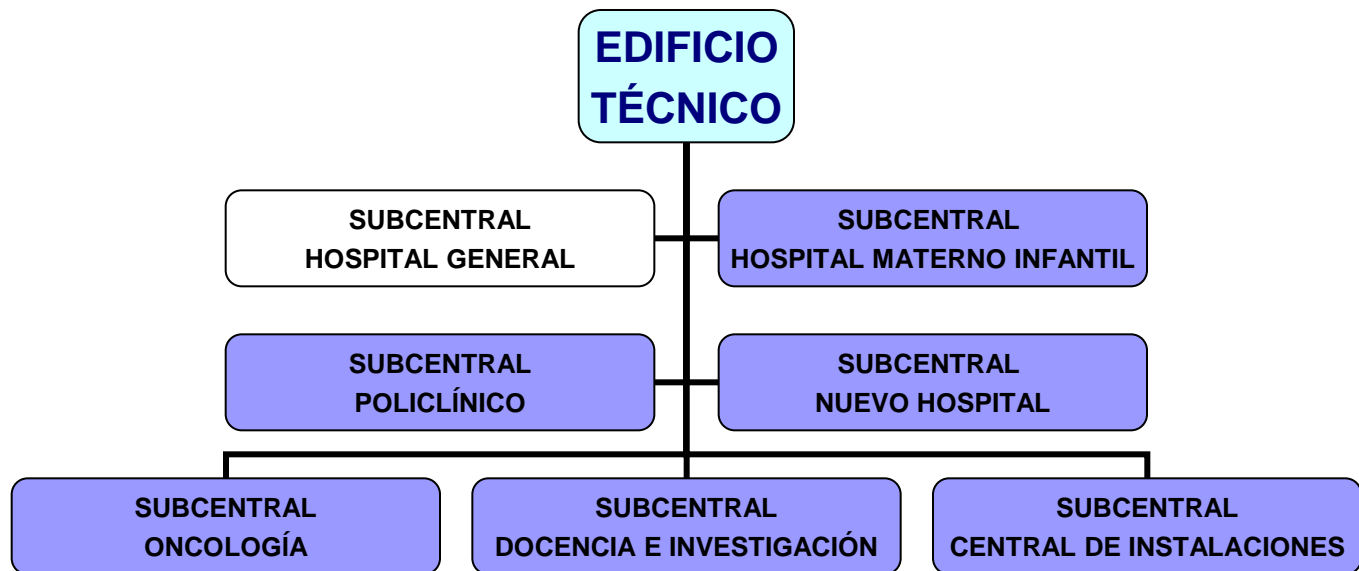
- INVESTMENT: 25,750,000 €
- SURFACE: 8,200 m²
- PERIOD: 18 months

Facilities of the new Energetic Plant

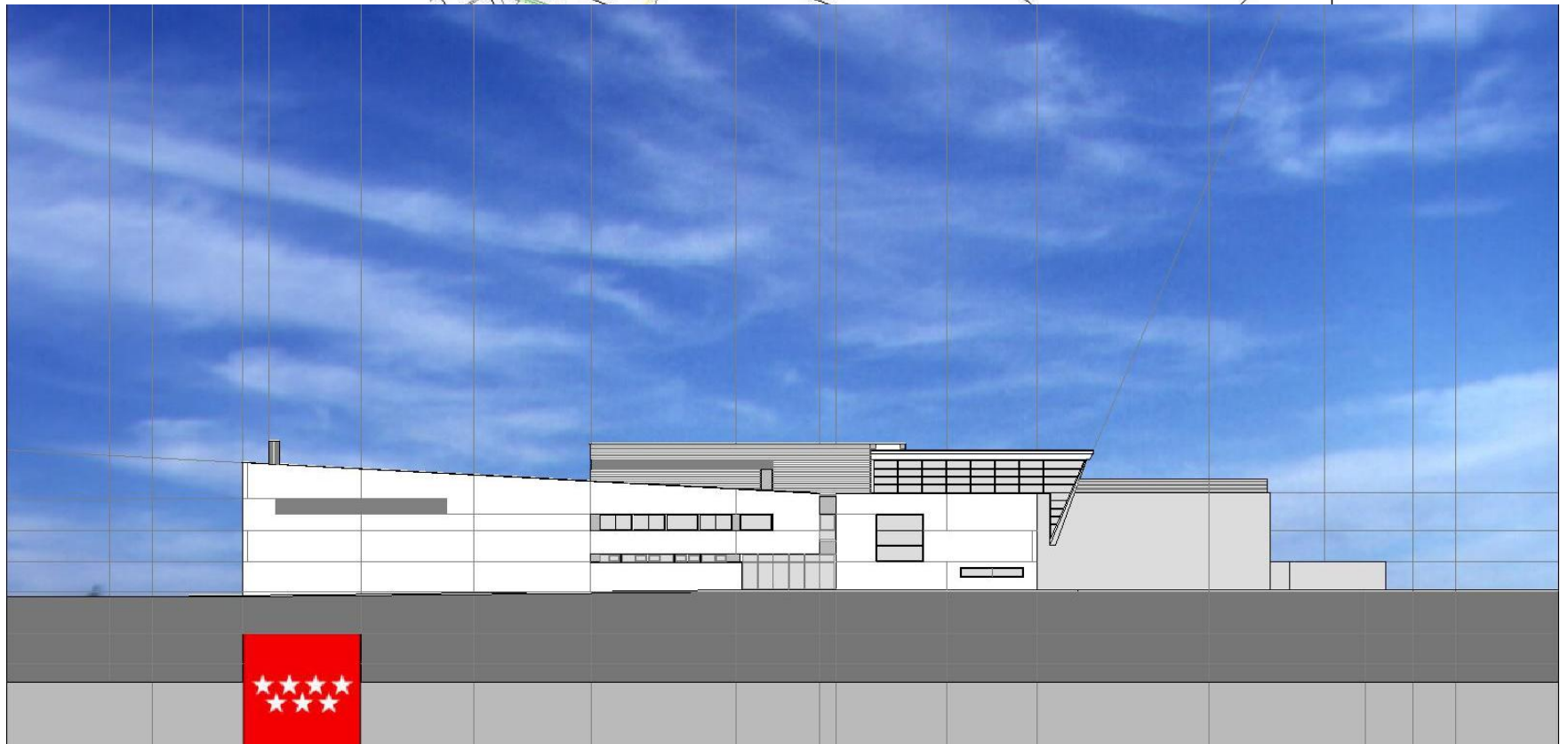


- Sanitary water storage and water for fire fighting
- Pumping and water distribution
- Production and distribution of thermal energy
- Production and distribution of frigorific energy
- Production and distribution of steam
- Transformation and generation of emergency electricity for the power plant
- High voltage electricity connection and distribution

Energetic Distribution



The Building



Some anecdotal data of the new Energetic Plant of the Hospital “12 de Octubre”

- Heating capacity installed enough for supplying more than 3,000 familiar houses of about 100 m²
- Equivalent chilling capacity to more than 9,000 domestic air conditioning devices.
- Electric power installed enough for supplying a village of about 20,000 inhabitants.

The Facilities in figures (I)

- Installed capacity of 10,500 kW with a production of 14,000 Kg/h of steam at 12 Kg/cm²
- Installed heating capacity of 37,500 kW
- 1,850 kW installed for recovering sensible heat of fumes.
- Chilled water installed capacity of 17,000 kW produced by water-cooled centrifugal compressors.

The Facilities in figures (II)

- 4,700 kW installed for the supply of chilled water produced by air-cooled screw compressors.
- 6 cooling towers with a thermal dissipation capacity of 19,000 kW
- Electric Substation with a total installed capacity of 23 MVA.
- 13,000 kVA of installed capacity in electric transformation 15/20 kV-400 V
- 800 kVA installed in emergency power generation.



The Facilities in figures (III)

- 2,5 millions of litres of sanitary water for consumption.
- 160,000 litres of water for fire fighting.
- 320,000 litres in gas-oil storage.
- High pressure supply of natural gas (6 bar) with an annual disposal of 40 millions of kWh.

Chilled water production



- 8 centrifugal water-cooled compressors of 2,800 kW
- 4 air-cooled screw compressors of 1,100 kW
- Flow and pressure control in drive circuits.
- Automatic system for water conditioning in cooling towers.

Heat production



- 6 hot water boilers of 7,000kW each one.
- 2 steam boilers for a supply of 7,000 kg/h each one.
- Economizers in all boilers.
- Dual-fuel Modulating burners for natural gas and gas-oil.
- Natural gas supply in high pressure



Hydraulic facilities

- Storage water tanks
- Water tanks for fire fighting
- Lack of calcium water tank
- Water pump groups

Electric Facilities



- 15 kV electric cells for connection to the net and distribution in high voltage
- 6 transformers of 2,000 kVAs
- 800 kVAs electricity-generating group
- 10 kVAs UPS
- Low voltage main switchboard



Centralized control

- Heat production
- Steam production
- Thermal Substations
- Hydraulic plant
- Hydraulic plant for fire fighting
- Water cooling production
- Fuel storage



Criteria for facilities design

- *Reliability*

- *Energetic saving*

Energetic saving (I)

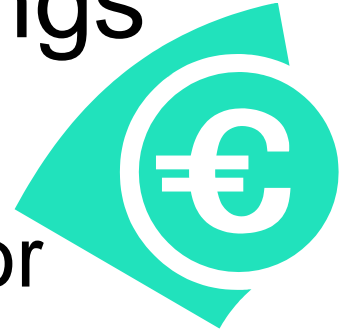


- Hot water production at 90 °C instead of the production an 170 °C in the former Energetic Plant.
- Low temperature and several pass boilers.
- Economizers of about 10% of the boiler power.
- Modulating burners

Energetic saving (II)

- Chilled Water production with high COP machines.
- Capacity regulation of all the compressors means to speed regulation in electrical engines.
- Very good pipe insulation.
- All the water pumping developed with capacity and speed regulation.
- The facilities control system (SCADA) affects to all the Energetic Plant.

Some figures about the savings



- 45% reduction in the expenses for heating and hot water.

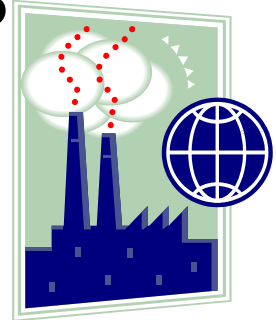
900,000 €

- 93 millions litres less of water

115,000 €

Environmental improvements

- 100% reduction in SO₂ emissions



15,000 kg/year less

- 30 % reduction in CO₂ emissions

2,700,000 kg/year less

Energetic Plant

Hospital Universitario 12 de Octubre



Energetic Plant

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Energetic Plant

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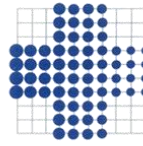


Outpatients Care Building



Current layout





Asociación Española de
Ingeniería Hospitalaria



 Comunidad de Madrid