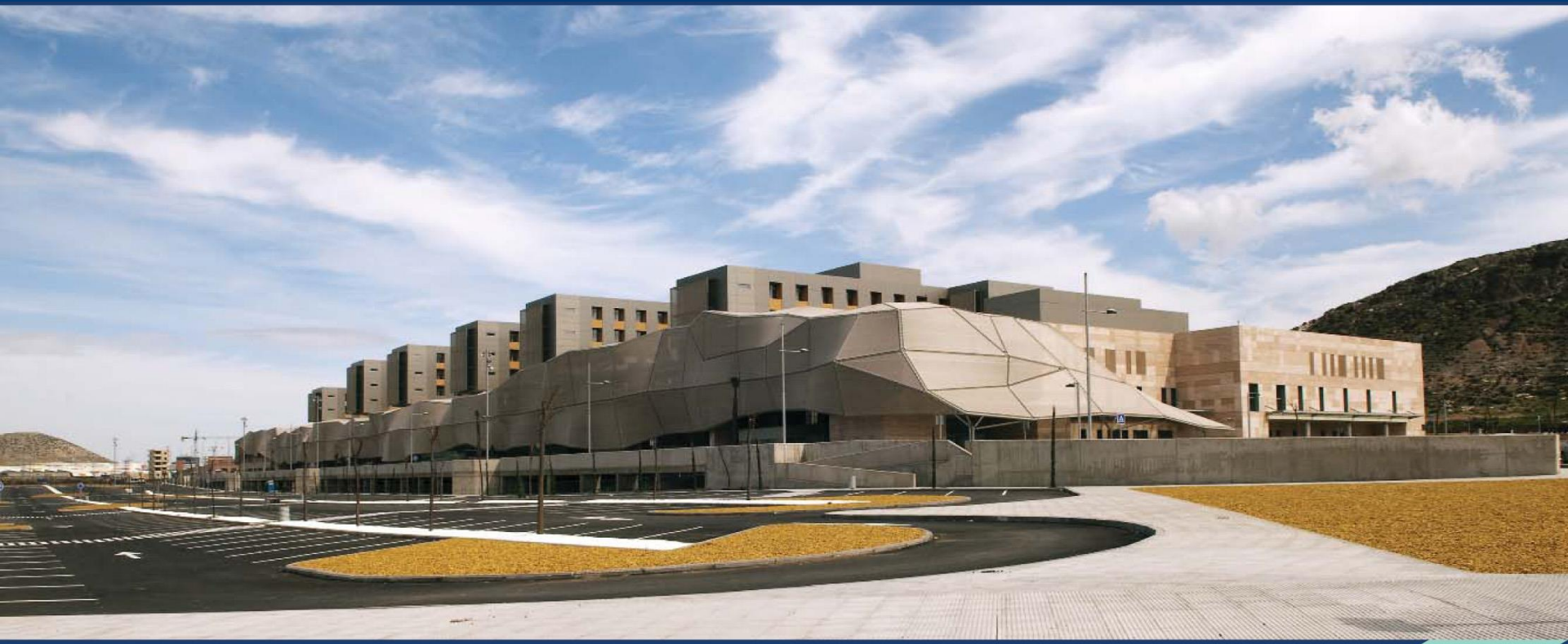
DESIGNING FOR ENVIRONMENTALLY SUSTAINABLE HEALTHCARE:

THE CASE OF THE SANTA LUCIA UNIVERSITY GENERAL HOSPITAL

casa solo arquitectos

"With the vision that 'good architecture is self-sustainable', Santa Lucia is a compelling, integrated, futuristic hospital. Emphasizing quality and effectiveness of patient care, prevention and health promotion, Santa Lucia blends a humanistic design with a complement of climatic design and renewable energy strategies including natural ventilation and extensive daylight. The water reuse and efficiency strategies employed at Santa Lucia offer a roadmap for an integrated approach to water demand reduction and harvesting of on-site resources to offset reliance on municipally treated potable water."

Sustainable Healthcare Architecture (2nd Edition). Robin Guenther and Gail Vittori (eds). Wiley. 2013.



Hospital General Universitario Santa Lucía (2010)
Cartagena - Murcia. España

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EUROPEAN DIRECTIVE 2010/31/UE (EPBD)
Energy Performance of Buildings Directive

zebra2020.eu
epbd-ca.eu

- By 31 December 2020, all newly constructed buildings in the EU should be nearly Zero-Energy Building.
- The energy they consume must come from renewable sources.
- 40% of energy consumption in the EU corresponds to buildings.

Under the new directive, EU states will ensure that, by 31 December 2020, all new buildings must be nearly Zero-Energy Building, and that after 31 December 2018, new buildings that are occupied and owned by public authorities must be nearly Zero-Energy Building.

III Congreso EECN
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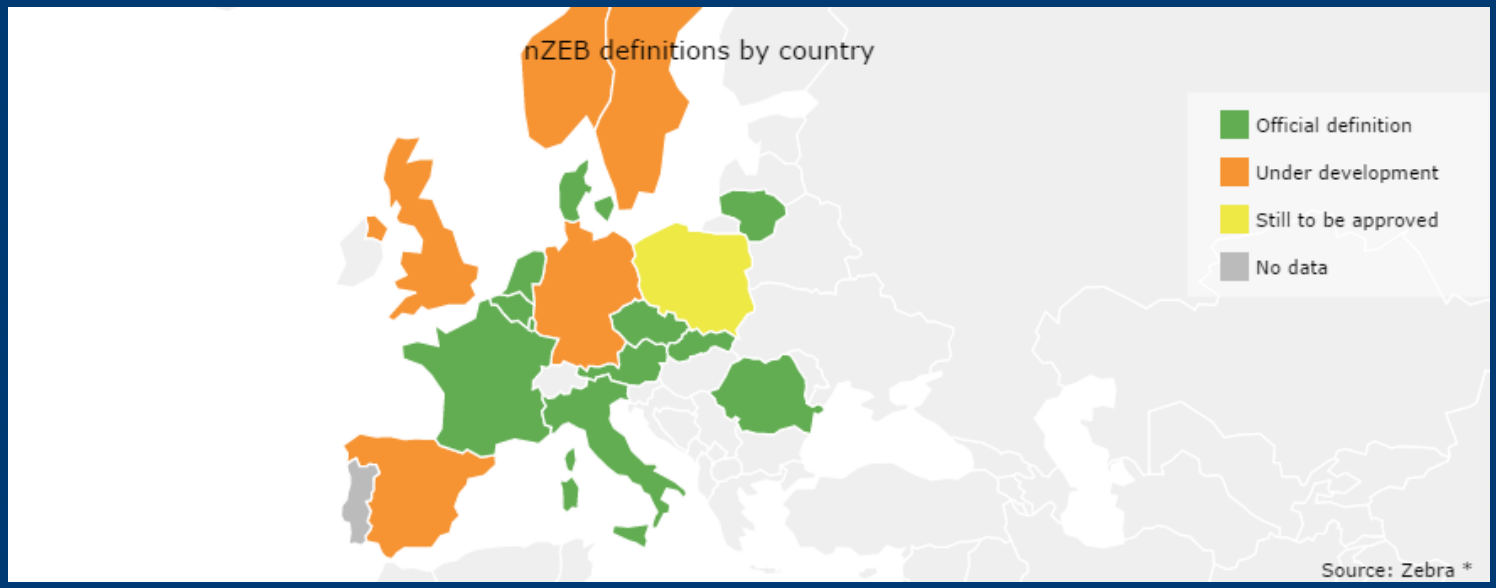
Each Member State of the EU should establish a national definition of nZEB (nearly Zero-Energy Building) according to the characteristics of its real estate stock. And Spain has not yet done so.

In Spain "A definition of nZEBs has not yet been formulated" is mentioned in the last report about progress towards nZEB implementation by Member States. It is also mentioned that a third revision of the Spanish Technical Building Code (the original is since 2006) is planned for 2018. Despite that the second revision was performed in 2013 (DB HE 2013), this only refers to still pending energy efficiency commitments by Directive 2010/31/EU for the "energy saving section“.



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If we take into account the time it requires from the start of a new hospital project until it is completely built, equipped and occupied, this will last between 4 and 8 years depending on the size, country, client and many other variables.

All new projects of hospitals in Europe should be form now be designed following this EPBD, and the national definition of nZEB is.

This situation has to bring all stakeholder to a reflection on how this new hospitals has to be design, because a hospital is not a not a normal building in energy use, it is a huge consumer.

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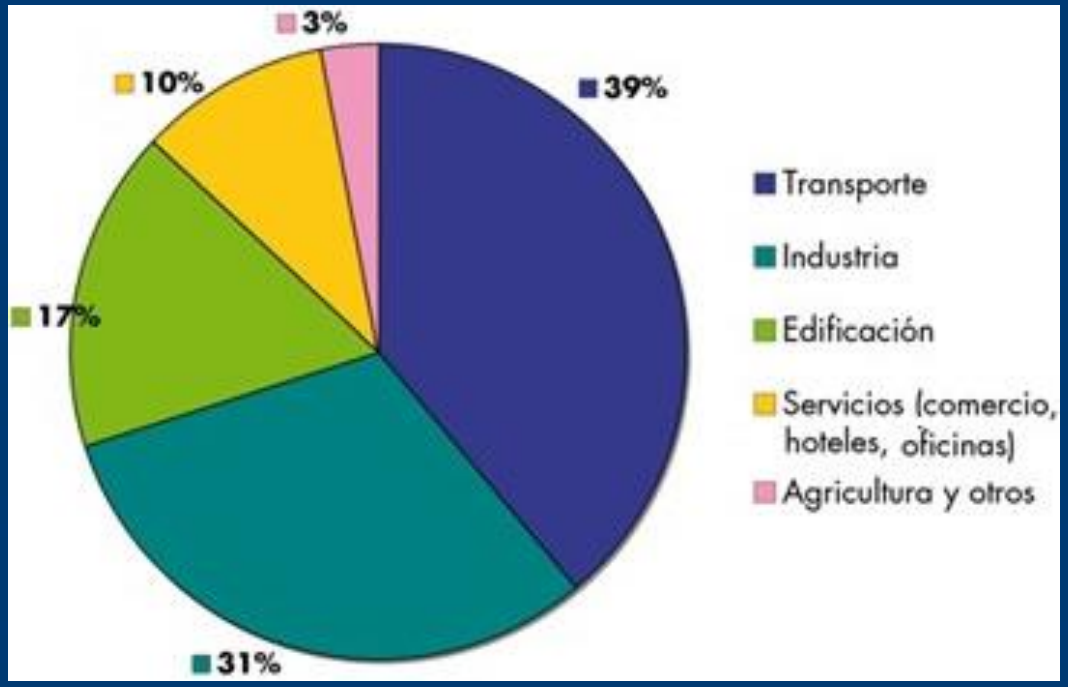
The Hospital is the non-industrial building that consumes the most energy of all



Energy consumption in Spain by sector

In Spain the consumption of energy of the hospitals is about 6,000 GWh / year which implies a consumption of 2% on the total of the country

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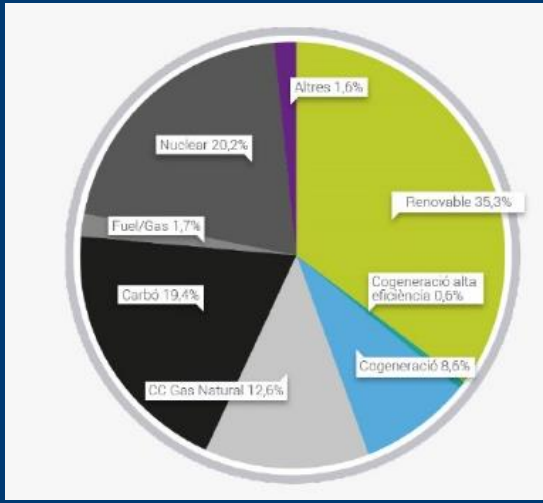
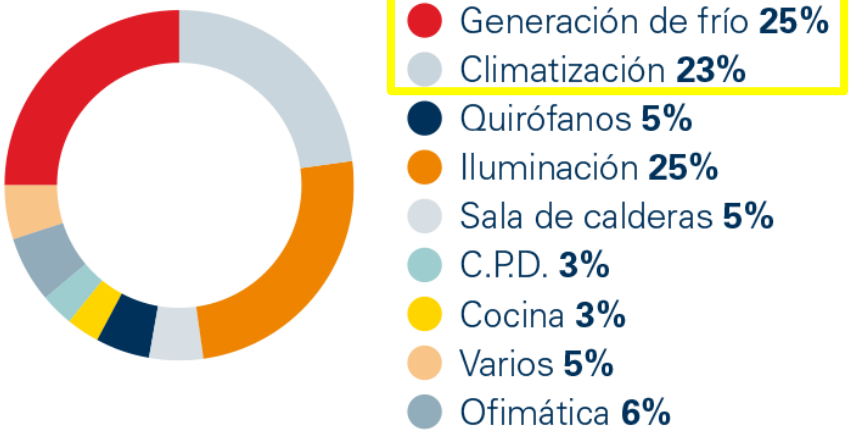
Spanish electricity mix production 2015



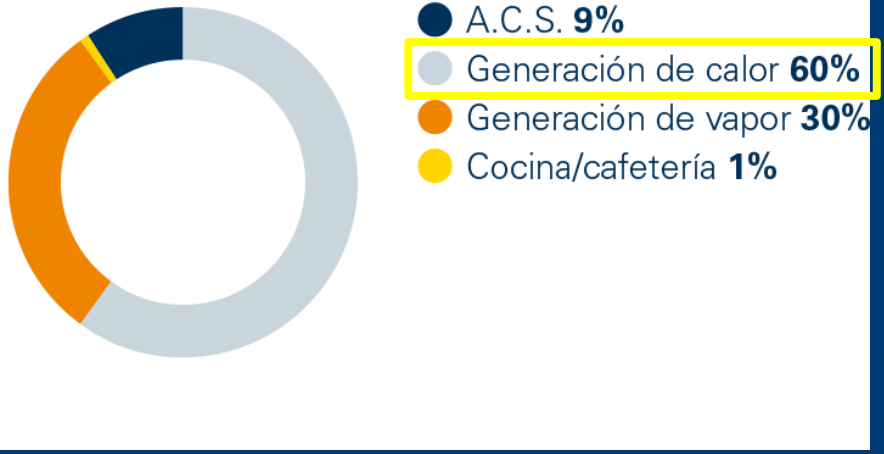
Energy is consumed in hospitals 24hours and 365 days a year, a total of 8760 hours, of use of fossil fuels and electricity produced more than 50% form non renewable surces.

Most of the electrical energy is used cold generation and air conditioning of the building (48%)and thermal energy is used for heat production (60%).

Electrical energy usage



Thermal energy usage



Standard consumptions of a hospital

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- In Span in 2010 the average energy consumption of hospitals was 418kWh/year.sqm

- The Santa Lucia University Hospital of Cartagena consumes 24 Gwh/year which is below 300kWh/year.sqm (210kWh/year.sqm if we consider parking spaces and facilities) Leed Gold

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- The average consumption of a house in Spain is between 8,000 and 12,500kWh depending on what is estimated between 82 and 132kWh / year.sqm

- A standard hospital consumes 4 times more energy than a house per sqm

= 2,300

- A hospital of 600 beds like Cartagena with a ratio of 130m2/bed consumes like 2,300 standard Spanish houses.

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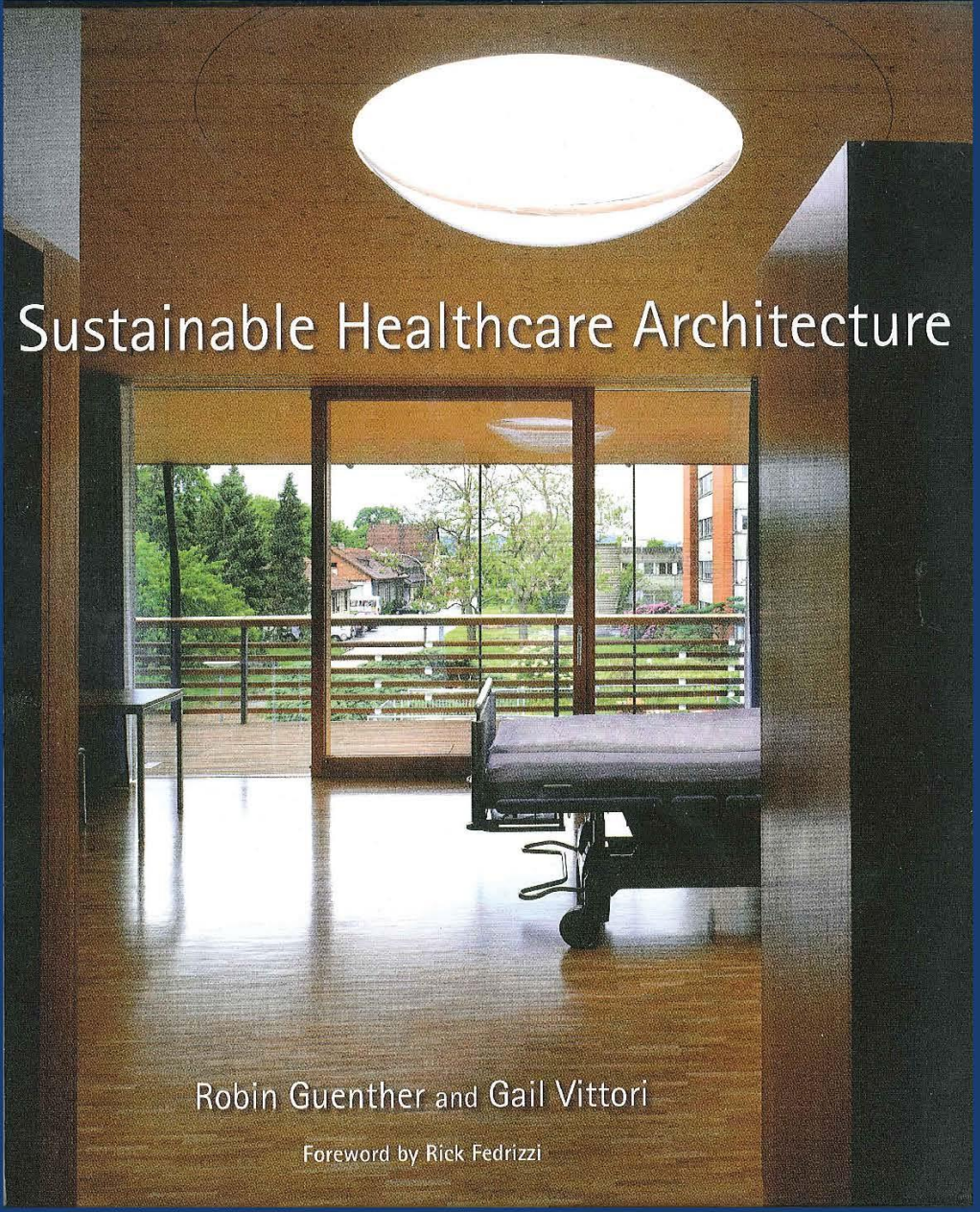

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Building a Greener World: Director: Gail Vittori

By HILARY HYLTON / AUSTIN Friday, Apr. 27, 2007

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Gail Vittori
Mathew Mahon for TIME

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With an estimated $200 billion in U.S. health-care construction planned for the next decade, how hospitals are built and operated will have a huge impact on the environment. And Gail Vittori means to have an impact on those hospitals. With her husband Pliny Fisk III, Vittori is co-director of the Center for Maximum Potential Building Systems, a nonprofit design center in Austin, Texas. MaxPot, as it's known, advises institutions of all kinds--from a homeless shelter in Austin to the Pentagon as it rebuilt after Sept. 11--on how to adopt environmentally sound materials and practices. But Vittori and Fisk have a special focus on health care. Two years ago, Vittori led a committee that devised the Green Guide for Health Care, a 360-page "design tool kit" that suggests steps that hospitals and other facilities can take to reduce hazardous chemicals and adopt green practices everywhere from the cafeteria to the housekeeping department.

"We have a long way to go to clean up what's really an unhealthy set of materials," she says. The guide, which can be downloaded at www.gghc.org is currently the basis for more than 100 pilot projects at health-care facilities across the U.S. The California health-care giant Kaiser-Permanente has just decided to adopt Green Guide principles at its new Modesto medical center.

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Case Study 33: Santa Lucia University General Hospital

Cartagena, Spain

OWNER: GISCARMSA, SAU

PROJECT TEAM:

Architect: CASA Solo Arquitectos SLP

MEP Engineer: JG Ingenieros Consultores de Proyectos SA

Civil and Structural Engineer: NB 35 SL

General Contractor: UTE Hospital Cartagena (FCC + Intersa)

TYPE: New Acute-Care Hospital

SIZE: 1,231,058 sq. ft. (114,369 sq. m)

EUI: 66.6 kBtu/sq. ft./yr (210 kWh/sq. m/yr)

PROGRAM DESCRIPTION: 630-bed teaching hospital, with complete medical services and community amenities including sports facilities, retail and leisure

COMPLETED: 2010

RECOGNITION: "@Aslan" 2011 award from the Asociacion de Proveedores de Sistemas de Red y Telecomunicaciones (Association of Suppliers of Network and Telecommunication Systems) for "cases of innovative success in Public Administrations and Agencies."

BIOME: Temperate Semi-Arid

CLIMATE ZONE: Steppe

ANNUAL PRECIPITATION: 13 in. (339 mm)

Figure 8.107 Santa Lucia University General Hospital.
Source: Copyright © Joachin Zamora

KEY SUSTAINABILITY INDICATORS

- *Climatic/Bioregional Design:* Building orientation, architecturally integrated external openings and double-skin facade introduce natural ventilation and temper solar heat gain
- *Energy Responsive Facade:* Extensive taut fabric mesh brise-soleil and orientation-specific shading solutions reduce heat gain on facades and roofs
- *Rainwater Harvesting:* For landscape irrigation, toilet flushing, and outside cleaning operations
- *Reclaimed Water Reuse:* Toilets flushed with collected/filtered greywater from washbasins, showers, sinks
- *Water Use Reduction:* Indoor water conserving fixtures include automatic sensor taps in showers and washbasins; dual flush toilets; low-flow showerheads
- *Innovative Energy Distribution:* Chilled beams and displacement ventilation in administrative and inpatient areas
- *Natural Ventilation:* In inpatient units
- *Renewable Energy:* 400 solar thermal panels generate 65 percent of sanitary hot water; grid-connected photovoltaics with installed output of 341,200 Btu (100,000 W) peak
- *Low Embodied Energy:* Locally sourced stone, aggregates
- *Civic Function:* Indoor pool, gym, outdoor running track for staff and general public use

Source: Sustainable Healthcare Architecture – Second Edition
Robin Guenter / Gail Vittori – Ed. Wiley (USA)

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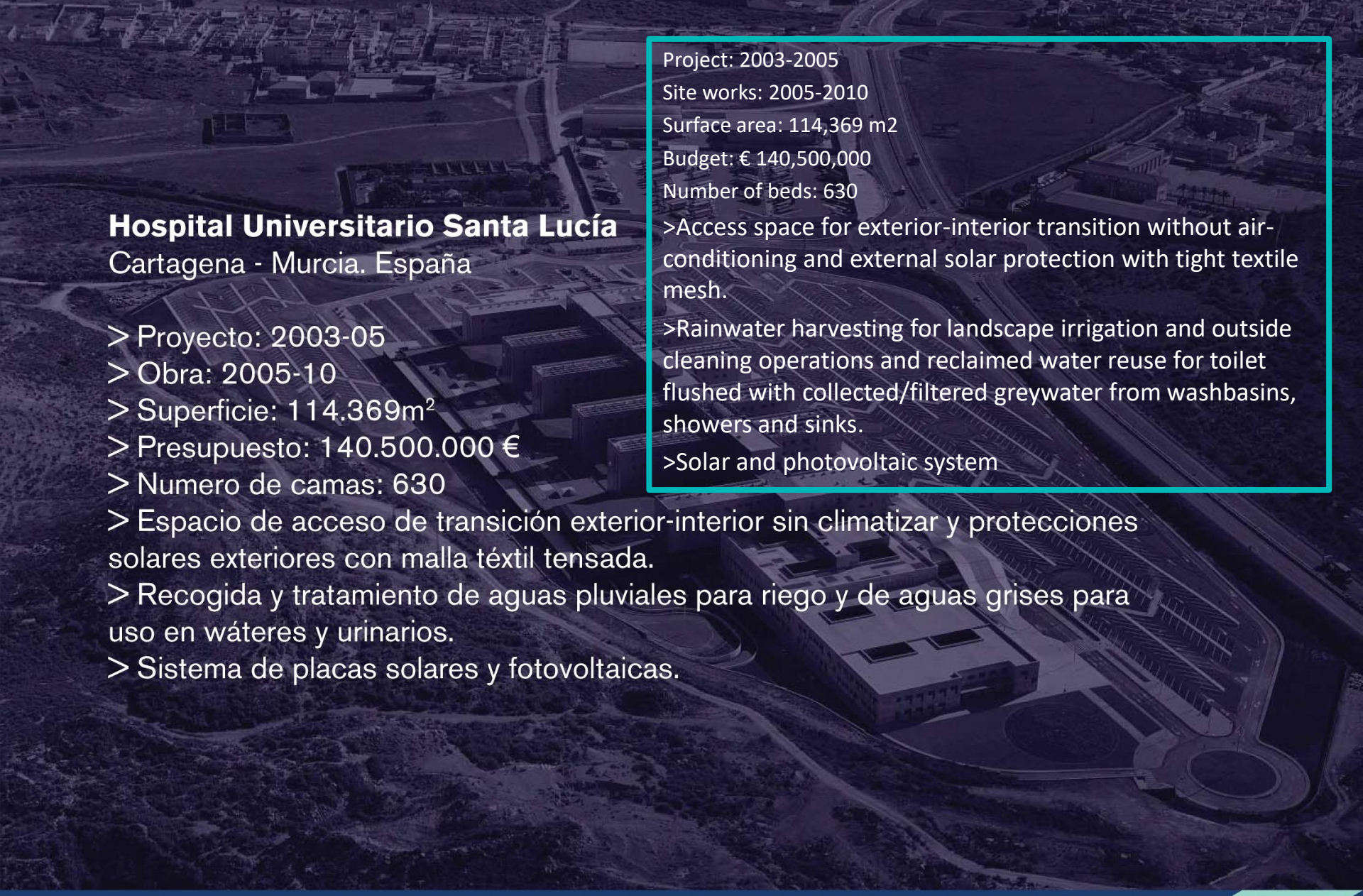

Hospital Universitario Santa Lucía

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> Proyecto: 2003-05
> Obra: 2005-10
> Superficie: 114.369m²
> Presupuesto: 140.500.000 €
> Numero de camas: 630
> Espacio de acceso de transición exterior-interior sin climatizar y protecciones solares exteriores con malla téxtil tensada.
> Recogida y tratamiento de aguas pluviales para riego y de aguas grises para uso en wáteres y urinarios.
> Sistema de placas solares y fotovoltaicas.

Project: 2003-2005
Site works: 2005-2010
Surface area: 114,369 m2
Budget: € 140,500,000
Number of beds: 630

>Access space for exterior-interior transition without air-conditioning and external solar protection with tight textile mesh.

>Rainwater harvesting for landscape irrigation and outside cleaning operations and reclaimed water reuse for toilet flushed with collected/filtered greywater from washbasins, showers and sinks.

>Solar and photovoltaic system

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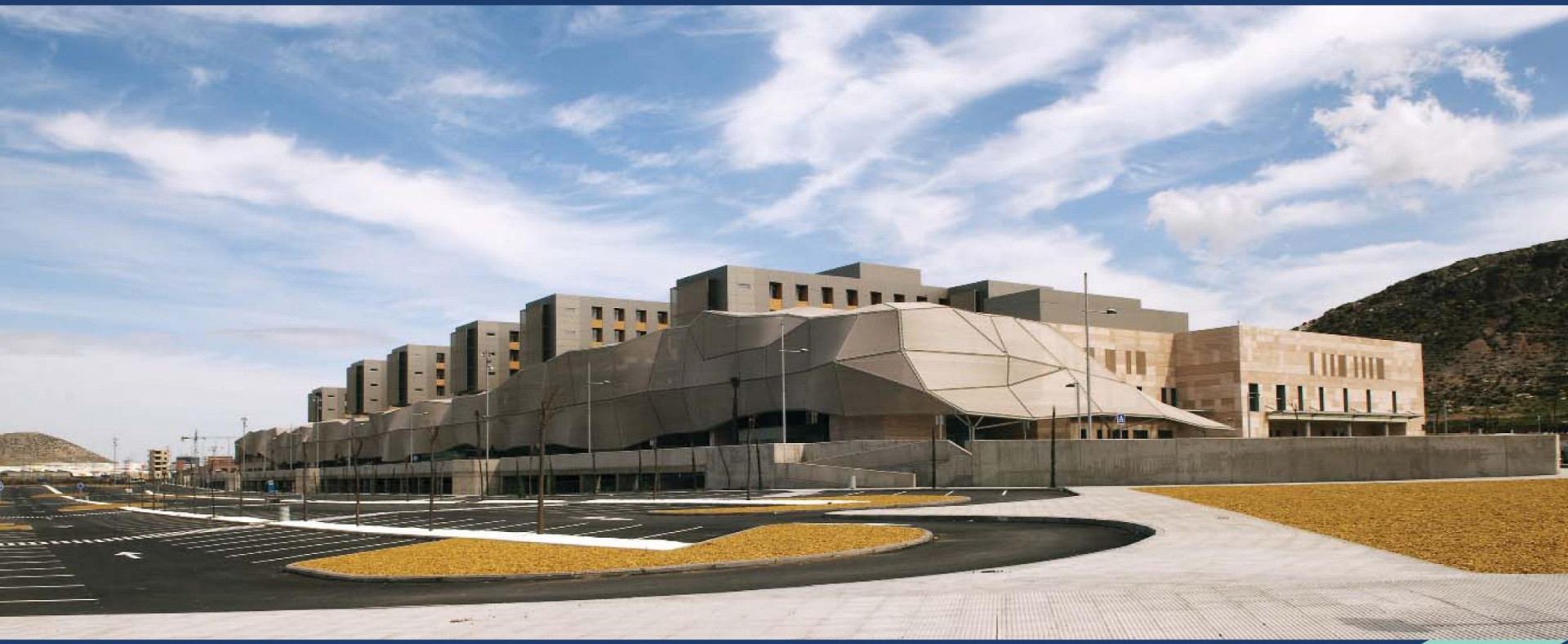

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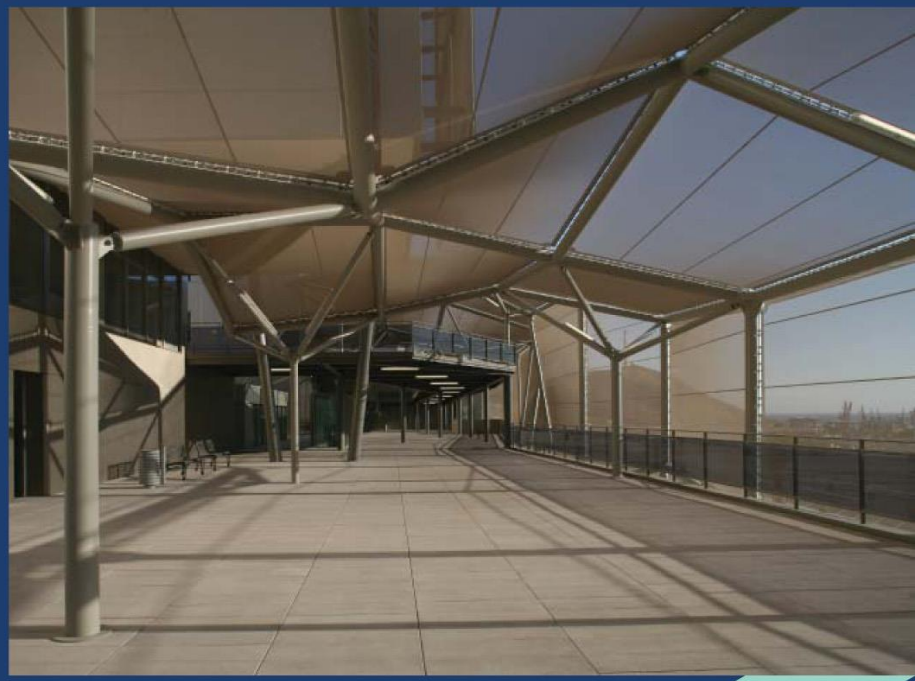

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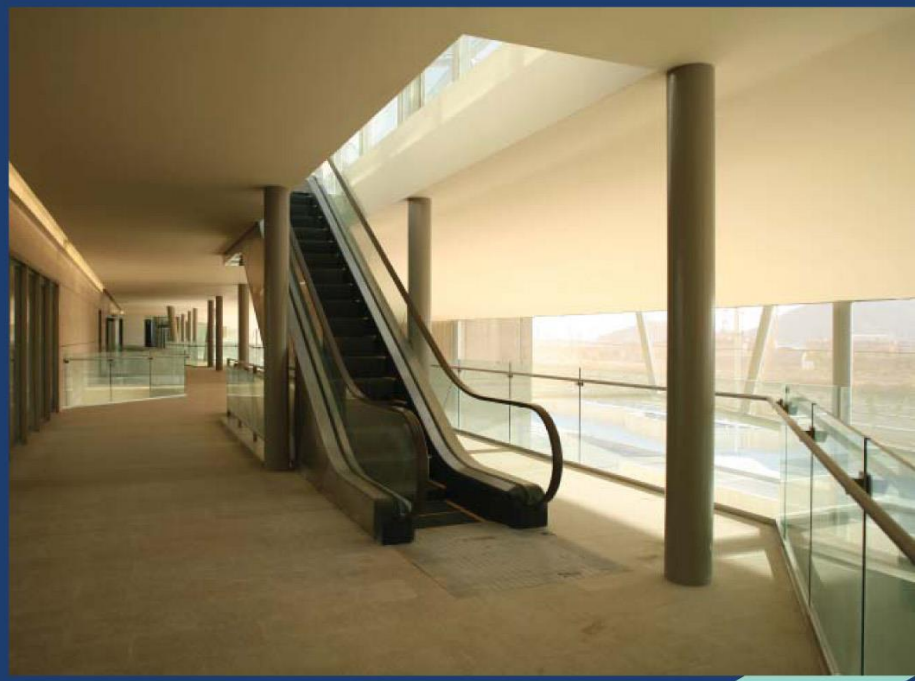

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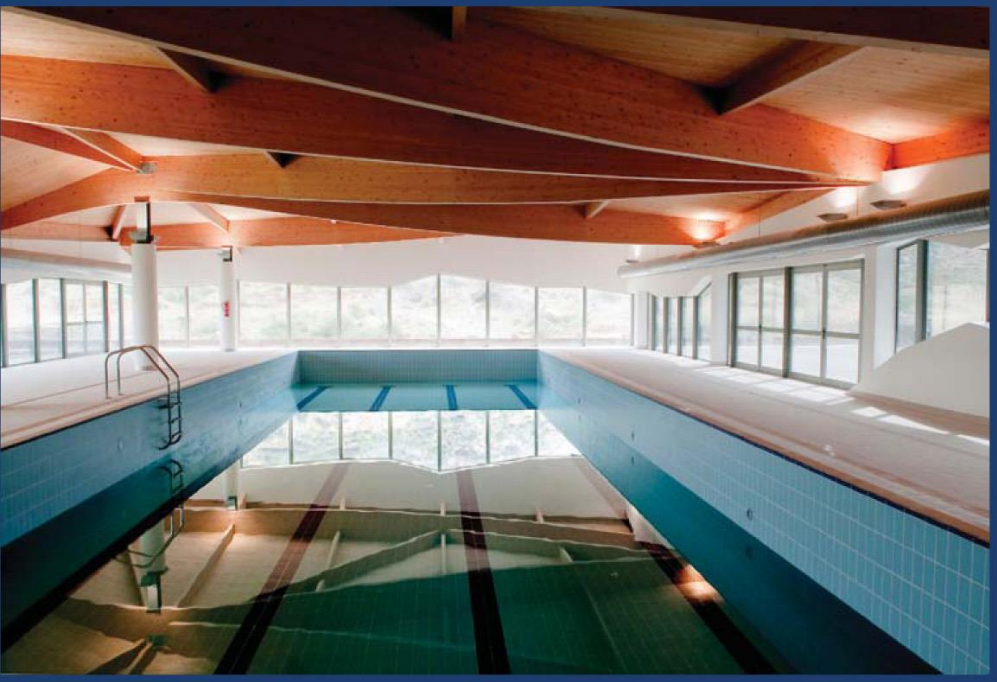

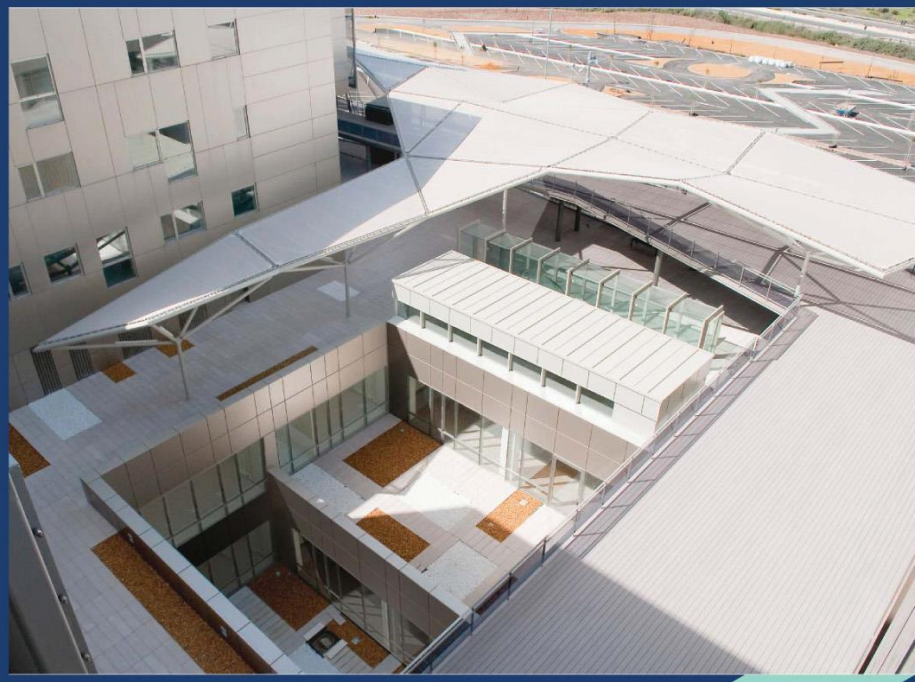

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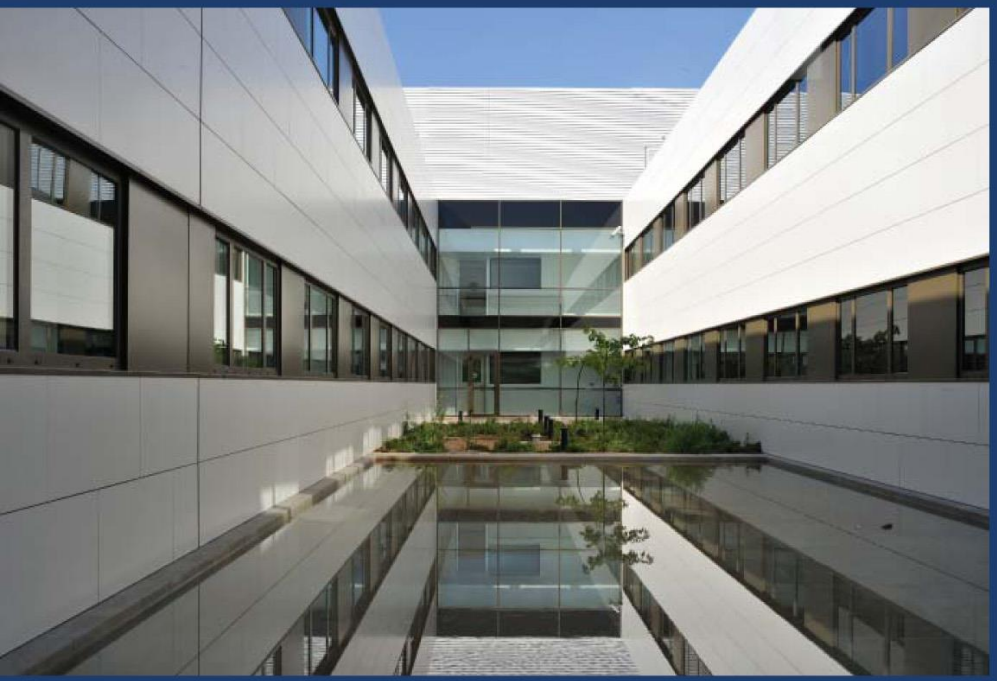

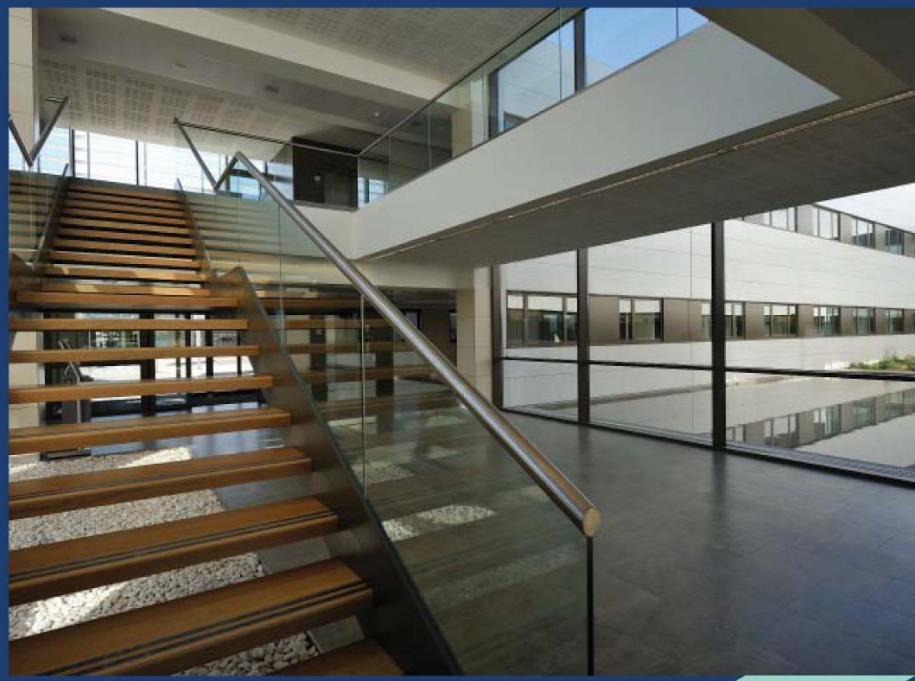

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