

# THE Crystal

A Sustainable Cities Initiative  
by Siemens

# The Crystal

The Crystal is a Sustainable Cities Initiative by Siemens exploring how we can create a better future for our cities



# Why the Crystal?

- More than half the world's population lives in urban areas
- Expected to be 70 percent by 2050
- Cities drive growth and generate approximately 80% of global GDP
- Cities account for:
  - two thirds of global energy demand
  - 70 percent of worldwide greenhouse gas emissions
- Cities need to strike a balance between three fundamental goals:
  - Quality of life
  - Economic competitiveness
  - Environmental protection

Hub for dialog and learning

Center where experts, business leaders, decision-makers, students and citizens around the world come together

Place to find solutions to challenges facing cities:

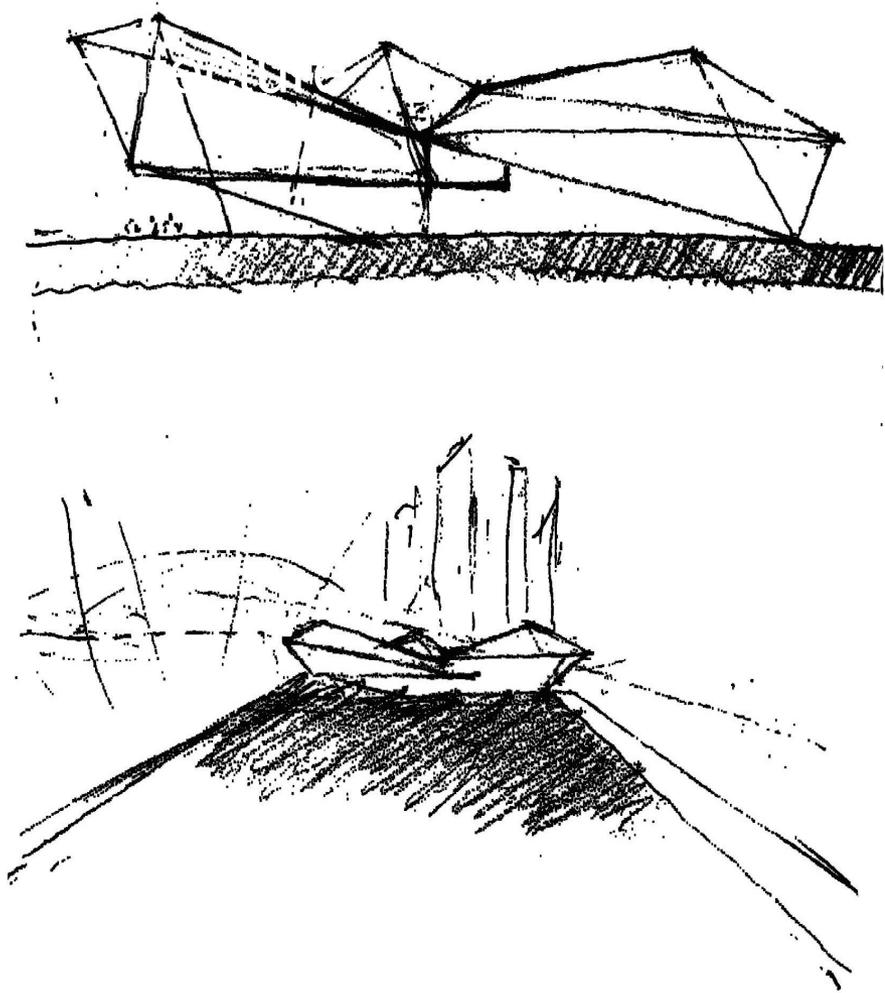
- Urbanization
- Demographic shifts
- Climate change







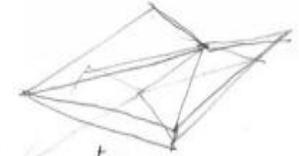
# Architectural Vision



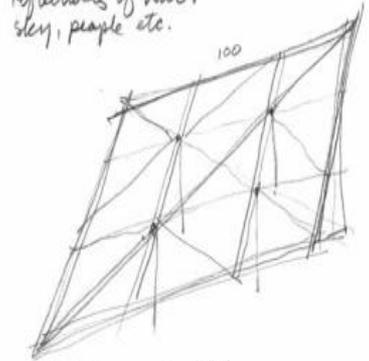
*Crystalline Sculptural form*



*Angular geometry catches the light*



*Reflections of water, sky, people etc.*



*modular construction  
prefabrication in factory  
speedy erection*

- An exciting and iconic form
- A set of Crystalline forms
- Concept of a Pavilion building



# The Building



Corporate Crystal

Exhibition Crystal

Office  
Meeting spaces  
Auditorium  
Café & Restaurant

Interactive Exhibition  
Classroom  
Shop

# The Crystal

## Building Facts and Targets

1

Dimensions 18 meters high, 45 meters wide and 88 meters long

2

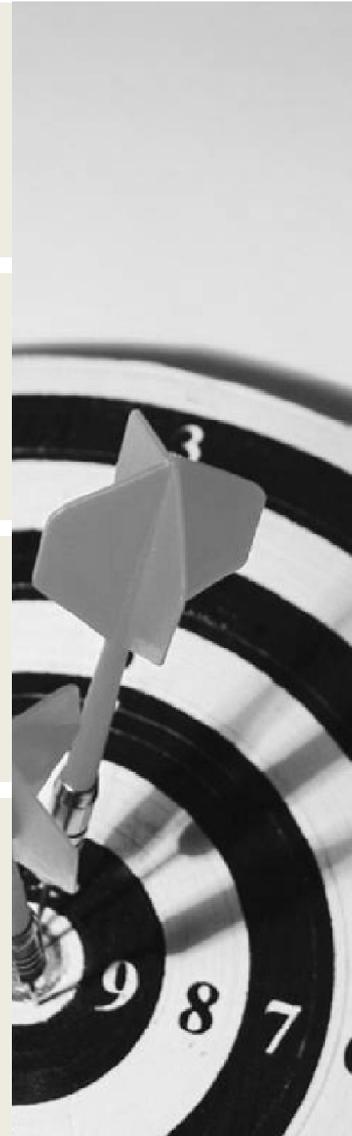
Construction work started in January 2011, completed in July 2012

3

Designed to be the first building in the world to have the highest certification both according to BREEAM Outstanding and LEED Platinum.

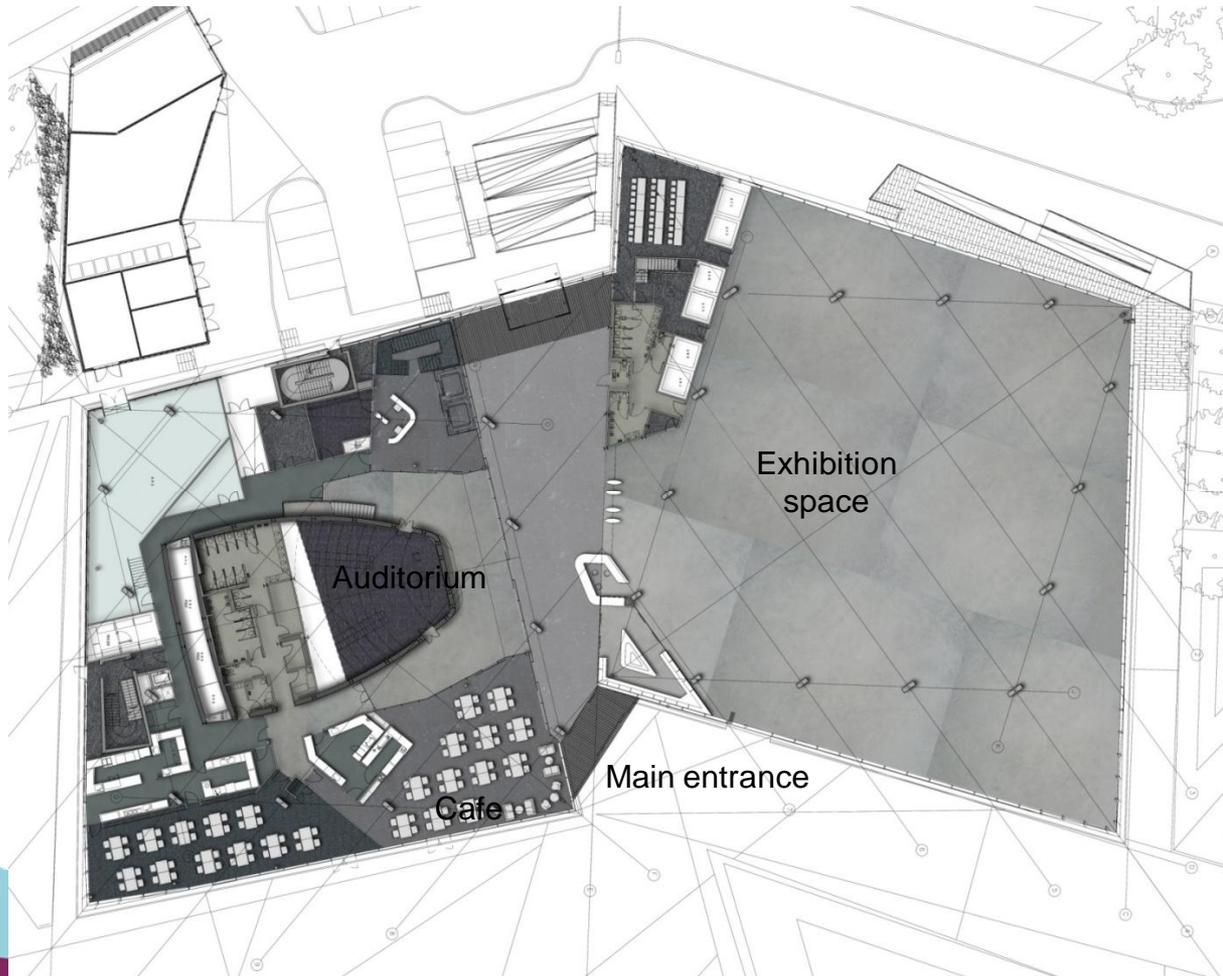
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Sophisticated and integrated active and passive design elements make it one of the most sustainable buildings in the world.



# The Crystal

One building with two parts



## Key figures

- Whole building 6920 m<sup>2</sup>, thereof corporate areas 4098 m<sup>2</sup> and exhibition and street 2221 m<sup>2</sup>
- Auditorium 270 seats
- Office 160 desks
- Expected visitors: 100,000 p.a.
- Designed to be the first building in the world to have the highest certification both according to BREEAM (Outstanding) and LEED (Platinum).

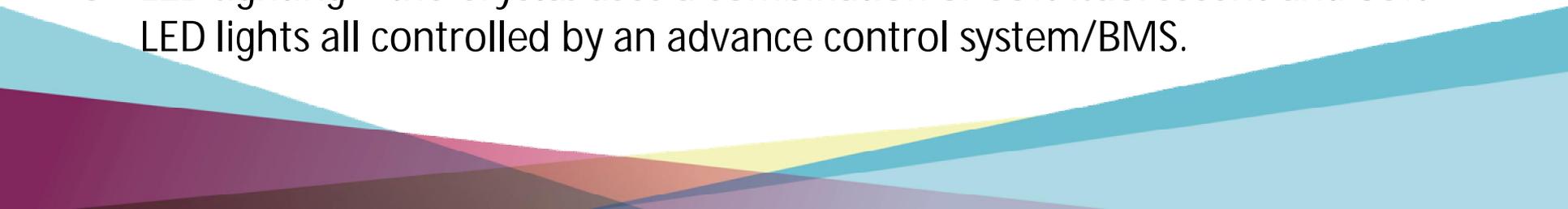
# The Crystal

## Passive design elements

1. Façade – highly insulated, 64% opaque, airtight and self shading.
  2. Daylight – almost every area in the building has access to natural daylight designed to minimise need for artificial light. Where needed artificial lighting is controlled by joint motion and light sensors.
  3. Natural ventilation – controlled by the BMS, sensing air quality, temperature (internal and external) along with wind speed. A dual mode functionality is provided when vents shut.
  4. Landscape features – a critical balance of recycled, water permeable and green coverage.
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# The Crystal

## Active design elements

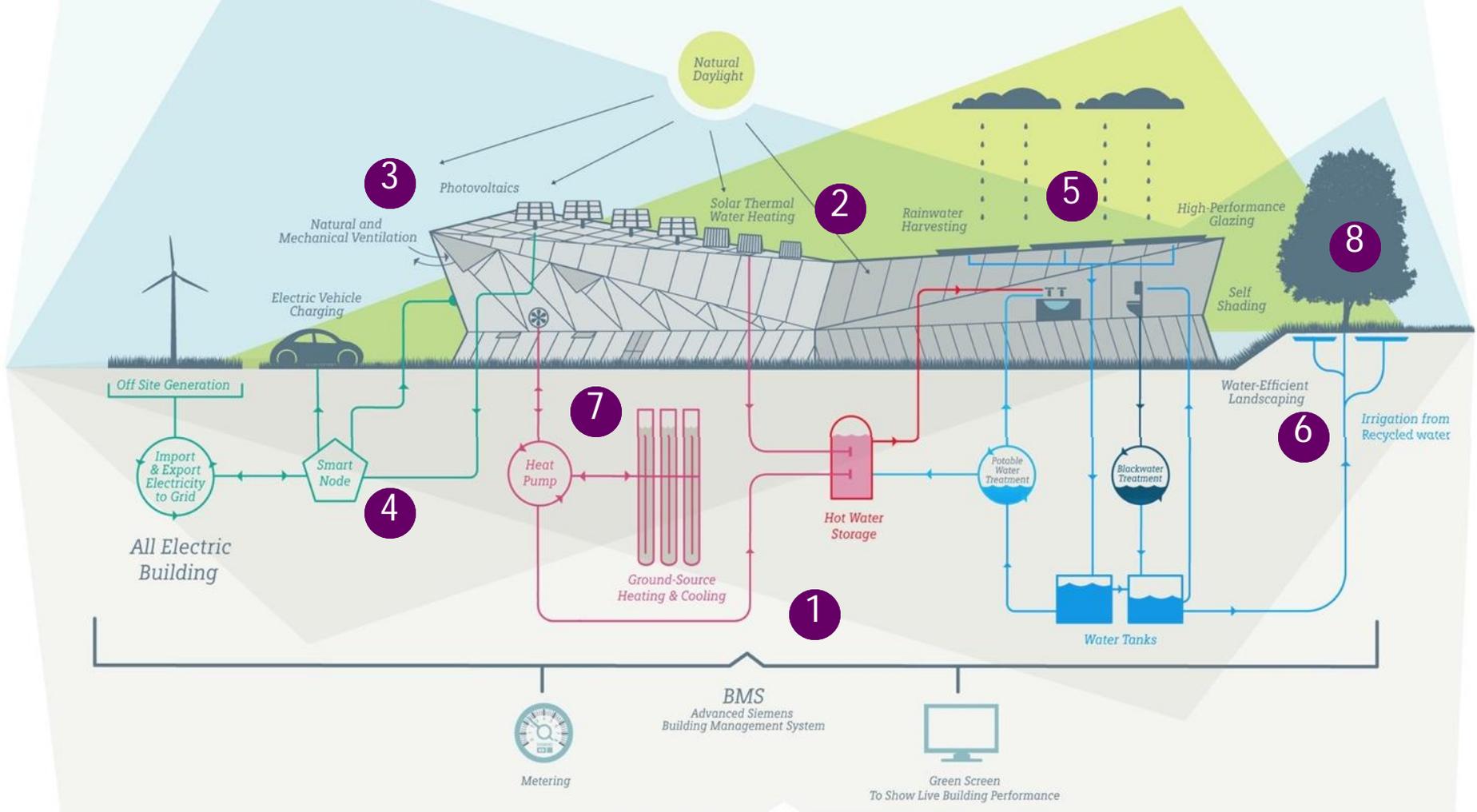
1. Photovoltaics – 1,580 sqm on the roof spread over SE, SW, NE and NW orientations with the ability to generate 256 MWhr/yr. Siemens inverters provide 98% efficiency.
  2. GSHP – 160 no. piles under the building 21m deep plus 36 no. bore holes outside the building 150m deep. This provides for heating and cooling within the building via perimeter heating and chilled beams at high level.
  3. Solar thermal – 84% of the buildings hot water is supplied via a combination of GSHP and solar thermal. 17 sqm of solar thermal collectors produce 13 MWhr/yr of solar thermal heat.
  4. Heat recovery – in the winter thermal wheels recover 60% of the heat energy rather than letting it escape from the building.
  5. LED lighting – the Crystal uses a combination of 65% fluorescent and 35% LED lights all controlled by an advance control system/BMS.
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# The Crystal

## Active design elements

6. Low voltage – lighting and power distribution boards fitted with power management meters. 53 no. electricity meters in total.
  7. Rainwater harvesting – rain is collected into a 30 cubic metre tank under the street and is treated via filtration and ultraviolet.
  8. Blackwater – this receives the highest level of treatment when recycled by passing through a biological tank with two treatment zones, anoxic and aerobic, and two filters, a membrane filter and a long life carbon filter.
  9. Low flush toilets and low flow taps – less water and less energy used to heat up water from the hot tap.
  10. BMS – the Siemens Desigo system is critical to control all M&E systems. It connects 11,000 no. BMS data points. This system will also be key to proving the building does what has been stated it will do.
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# A Sustainable Building



1. State of the Art Building Management
2. Extensive Use of Natural Light
3. Low Energy Mixed Mode Ventilation
4. Intelligent All Electric Building

5. Rainwater Harvesting and Recycling
6. Black Water Recycling
7. Heating Designed for Maximum Efficiency
8. Multifaceted and Sustainable Landscaping



# The Exhibition



Our Urban Future

ENVIRONMENT

ECONOMICS

QUALITY

40%

# Forces of Change

Shows how demographic change, urbanization and climate change impact all parts of people's lives - from politics and the economy, to quality of life and the environment.





# Creating Cities

Showcases the multi-faceted decision-making, holistic urban planning and monitoring needed when shaping and running our cities.

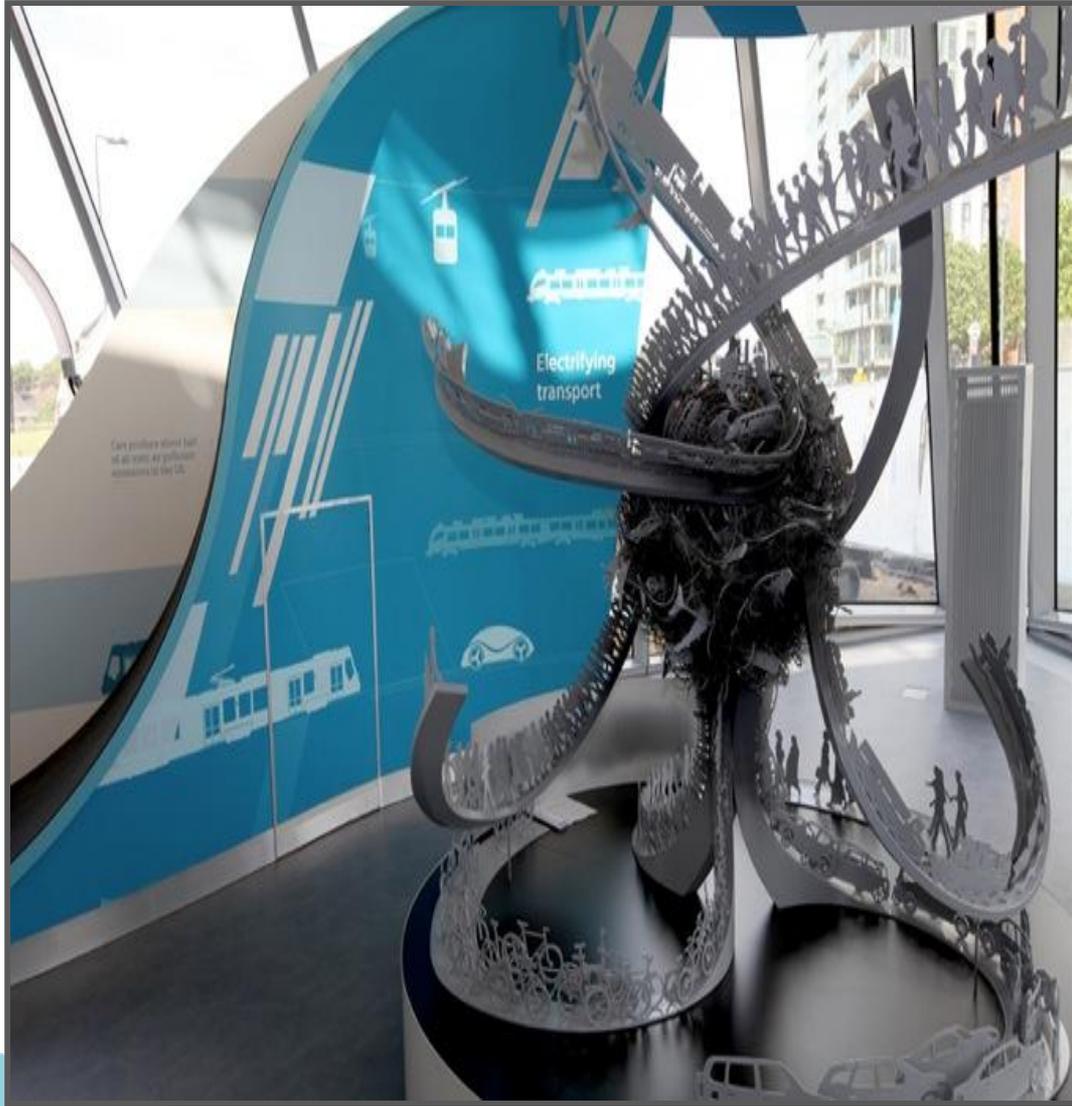
# Smart Buildings

Highlights the high-levels of inefficiencies in most buildings. Offers solutions such as smart buildings, reducing resources, and making buildings more efficient.



## Safe & Sound

Presents the diverse risks in a city and ways these risks can be detected, prevented and responded to in order to make the city more resilient. Focuses on safety and security, including incidents such as crime, access control and fire.



# Keep Moving

Explores the increased need for transport infrastructure as people move to cities. Discusses the significance of road and rail electrification and green transport choices, integrated traffic solutions and e-mobility.



## Water is Life

Focuses on the importance of water as a precious and finite resource. Explores solutions that provide access to drinkable water including rainwater harvesting, waste water recycling, desalination, stopping leaks, reducing water use and improved water management

## Go Electric

Highlights the difficulty of matching energy supply and demand and providing clean energy. Explores the move to a new electricity age. Solutions include decentralised and centralised energy generation, smart grids, energy storage and uptake of renewables.



# Healthy Life

Displays the strain a growing and aging population is putting on healthcare systems. Solutions include keeping healthy, personalising medicine, preventing diseases, reducing costs through efficient processes and infrastructure.



# Clean and Green

Exhibits the pressure that increased waste, pollution and reduced air quality places on our environment. Features ways to improve air quality, waste management and CO2 emissions.



# Future Life

Presents a realistic, positive and possible future in a sustainable city by mid-century, based on the cities of London, New York and



# A Unique Setting for Meetings and Events

- State-of-the-art 270-seat auditorium and 6 meeting rooms
- On site catering and café
- Full conference and seminar program in development

