



WORDS RASHIQ FATAAR PHOTOGRAPHS DENNIS GUICHARD AND QNCC

A STATEMENT ON fundamental change

The first of its kind in the world, the US LEED gold-certified Qatar National Convention Centre stands as a beacon for the greener ambitions of this tiny Gulf nation as it transitions from a carbon-based economy to one that is knowledge-based. But is this enough for a country with the world's largest carbon footprint?



Shaded entrance to rear of convention centre looking over bridge walkway that links it to the Qatar Science and Technology Park (all part of the Qatar Foundation).

In December 2012, when the world descended on the Qatari capital of Doha for the United Nations Conference on Climate Change (COP18/CMP8), they were met by more than just a convention centre, but by a building which signals the green ambitions of a nation which happens to have the world's highest carbon emissions per capita.

Opened in December 2011, the Qatar National Convention Centre (QNCC) was conceptualised and designed with a focus on sustainability. It is currently touted to be one of the world's "greenest convention centres", since the building is the only convention centre to be built according to gold certification standards on Leadership in Energy and Environment Design (LEED). The LEED rating system is endorsed by the US Green

Building Council (USGBC) and assesses the design, construction and operation of buildings.

The sustainability merits includes water efficiency, wastewater drainage efficiency, energy efficiency and the integration of renewable energy systems. The benefit is that the building is approximately 32% more efficient compared to a similarly designed building.

"Sustainability was our focus when developing the construction plans. The building operates efficiently with over 3 500 m² of solar panels that provide 12.5% of QNCC's energy needs while still offering the latest in communication," says engineer Saad Al Muhannadi, vice president of Capital Projects at Qatar Foundation.

The project was commissioned by the Qatar Foundation in 2003 and born out of the vision of her Highness Sheikha Moza bint Nasser, the chairperson of the Foundation, who "saw the opening of a world-class venue to host world's best thought-provoking research and knowledge-based conferences and exhibitions, to bring together the world's best minds to one venue".

The massive 177 000 m² site comprises a vast project and is located within the 2 500 acre Qatar Foundation campus. It includes a 40 000 m² exhibition hall, which can be partitioned into nine separate halls, an outdoor exhibition area of 3 100 m², a 4 000 seat conference hall, a 2 300 seat lyric style

THE SIDRA TREE: A SYMBOLIC ICON

With roots that reach deep into the earth, fruit and flowers that nourish and leaves that heal, the Sidra became a beacon of comfort in the harsh desert environment, allowing life to flourish. The Sidra also provided shade and shelter to travelers and scholars, who would escape the desert heat, gather together and share knowledge. Over time, the Sidra came to represent nourishment, strength and courage, as well as learning and growth. In the hearts and the minds of the people of Qatar, the Sidra tree exemplifies perseverance, solidarity and determination.

Source: Qatar Foundation

theatre, 52 meeting rooms and 13 hospitality and VIP lounges. The complex can host meetings for 10 people to conferences for 10 000 people, as it did during COP18.

"Its sheer size, sensational spaces over three levels and high-tech solutions will undoubtedly set new standards for international competition, placing Doha in the lead," adds Saad.

THE SIDRA TREE DESIGN

Renowned Japanese architect Arata Isozaki took inspiration from Qatar's beloved icon, the Sidra tree, which is deeply rooted in the Qatari culture.

According to the Qatar Foundation, "in the Qatari culture, the Sidra tree is the iconic symbol of the country's heritage (and) has grown in the deserts of Qatar for generations". It also features as the logo for the Qatar Foundation.

The result is a spectacular facade resembling two intertwined Sidra trees, 250 metres wide and

reaching up 30 metres to support an exterior canopy framing and dominating the gateway to the complex.

The scale of the building was echoed by Kali Taylor, president of Student Energy and a delegate at COP18: "It is absolutely massive! It is the largest convention centre I have ever seen in my life, but I found it quite easy to manoeuvre once I got my bearings. There was also a lot of natural light that was appealing."

CHALLENGES

Sourcing the required green materials locally to construct the QNCC proved to be a major project in itself, and in the end the majority had to be imported from elsewhere. The associated cost and additional carbon emissions due to the required shipping of materials were considered to be necessary in achieving the LEED gold certification. This challenge may present itself as an economic opportunity for local suppliers to adopt greener methods in producing materials to support LEED

The QNCC car park has its *mashrabiya* shade facade that helps reduce heat load from direct sunlight but allows free movement of air

NUTSHELL

Location Qatar Foundation, Doha, Qatar

Cost US\$1.2 billion

Size 177 000 m²

Spaces Exhibition halls (40 000 m²), 52 meeting rooms, conference hall (4 000 seats), theatre (2 300 seats), parking (3 200 cars, 43 coaches, 59 taxis)

Start construction 2006

End Construction 2009

Opening date December 2011





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certification for projects in the Gulf region.

The construction of the iconic Sidra tree structure posed another challenge, and required Belgian steelwork specialist Victor Buyck, in addition to the structural engineers Buro Happold, to oversee the complex construction process from start to finish.

WATER

With an annual rainfall average of approximately 80 mm a year – one of the lowest globally – Qatar faces the risk of severe water shortages for its growing population. With the goal of reducing the usage of potable water, the QNCC has employed a number of initiatives to improve water efficiency.

The use of drinking water for landscape irrigation is eliminated by collecting, filtering and treating greywater on site, and treated greywater is routed to water closets.

A high-efficiency drip irrigation system, which applies water directly to the roots of the plants, results in the use of 30%-50% less water than a typical irrigation system. The irrigation system is further enhanced with a central control, allowing the QNCC to adjust water supply based on evaporation rate of the plants.

SUSTAINABILITY FEATURES

- Full colour LED lighting in the exhibition halls (no metal halide)
- Specially designed roof with 3 676 m² of solar panels
- Wireless convention management system
- Highly efficient water fixtures reducing use of potable water
- A grey water system which conserves and recycles water
- Automated shade devices to shade exterior window walls
- Zone-based air control systems to reduce energy consumption
- Occupancy sensors
- Carbon dioxide monitors

01. Photovoltaic panels positioned on the roof

02. QNCC hall



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Also incorporated are water sprays with high efficiency nozzles used to reduce overspray and provide uniform water distribution, and reduced-flow water fixtures used to cut down on potable water usage within the building by over 40%.

The reduced-flow water fixtures also achieve greater wastewater drainage efficiency in the water closets. In total, the building reduces by 50% its sanitary wastewater drainage and, as a result, also the wastewater generated within the building.

LOWERING ENERGY USAGE

To lower the electricity demand and minimise energy usage, the building includes integrated energy savings methods through the design of the physical building, as well as that of the heating, ventilation, and air conditioning (HVAC) systems, and lighting.

The walls, ceilings and windows of all spaces are built to ensure maximum insulation of the exterior of the building. The lighting scheme for the project was developed by Light + Design Associates based in the UK, who were tasked with lighting the internal spaces of the building, as well as ensuring that the exterior of the building was illuminated to create an architectural icon for the city.

The exhibition halls were fitted with energy-efficient colour LED lighting, and skylights in the roof provide natural lighting, which reduces the energy consumption due to artificial lighting and creates a more pleasing ambience for users.

The lighting design includes controls that balance the use of the skylights with the lighting system, based on the activities taking place in the relevant room or space.

Several HVAC design elements minimise energy usage within the building, e.g. the usage of a variable air volume (VAV) distribution system for meeting rooms and administrative spaces. Automated shelter devices are provided to shade the east and west



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elevations of the exterior window walls from the direct sun, thus reducing the air conditioning requirement.

A SOLAR FUTURE?

The specially-designed roof includes 3 676 m² of photovoltaic solar panels that occupy 7 080 m² of the roof area, and is expected to provide 12.5% of the centre's energy needs. The roof's impressive solar energy system annually produces 1 225 MWh of electricity and offsets 1 140 tons of carbon emissions.

During COP18, Qatari officials revealed the country's ambitions to move towards solar energy. According to Fahad Bin Mohammed Al-Attiya, chairman of the Preparatory Committee of COP18, "by 2018, (in) Qatar, 16% of the electricity will come from solar power", to be achieved by constructing a 1 800 MW solar plant.

FROM CARBON TO KNOWLEDGE ECONOMY

The contribution of the QNCC to the transition from a carbon-based to a knowledge-based economy is best symbolised by its location within Qatar Foundation's campus grounds. The complex now houses six American universities, one British university, one French university, the Qatari university, and the Qatar Science and Technology Park.

As one of the richest countries in the world, Qatar has big plans for its "post-hydrocarbon economy, replacing oil and gas with science and education as primary wealth-creating assets".

"One of the reasons for locating the QNCC in Qatar Foundation was for it to become the focal point for a new global hub of ideas and innovation," explains Adam Mather-Brown, general manager of the QNCC.

Qatar's goal is to "achieve one of the most dynamic knowledge-based economies in the world, one that is dominated by information and technology, innovation and entrepreneurship," he adds.



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01. Entrance walkways connecting the car park to the conference centre

02. "Maman" stands in the lobby of the QNCC. It is a bronze cast of the French-Canadian sculptor Louise Bourgeois' most famous work. She named it after her mother.

A STEP TOWARDS A GREEN FUTURE

Whether the greener ambitions of a nation with both the world's highest GDP per capita and the highest greenhouse gas emissions per capita, is truly the start of a new era or just a fad, is yet to be determined.

While this iconic project may have captured the world's attention, the real opportunity lies in the potential transformation of the built environment in Qatar, to one where green and sustainable building practices are applied as the norm.

In the meanwhile, the construction of the QNCC is a step in the right direction, and a meaningful move towards the knowledge-based economy to which the country aspires. ●

SOURCEBOOK

Developer Qatar Foundation www.qf.org.qa

Design architect Arata Isozaki www.isoazaki.co.jp

Executive architects Halcrow Yolles/ RHWL, UK (conference centre), Burns and McDonnell, Inc. US (exhibition centre), WS Atkins and Partners, UK (main car park)

Project management ASTAD <http://astad.qa>

Construction management KEO International Consultants and ASTAD

Contractors Baytur Insaat Tahhut A.S., Turkey (conference centre), Victor Buyck Steel Construction Sdn. Bhd., Malaysia (Sidra tree structure), Eversendai Engineering Qatar W.L.L., Qatar (exhibition centre) Midmac – Six Construct J.V., Qatar (exhibition centre), MAN Enterprises (main car park)

Project management Astad Project Management KEO International Consultants

Structural engineers Buro Happold www.burohappold.com

Operator AEG Ogden www.aegworldwide.com

Lighting design Light + Design Associates www.lightanddesign.co.uk