

Integrated building management system for the Ali Bin Hamad Al Attiya Arena in Qatar

# Precise control for resource-efficient and sustainable building operation

The Global Sustainability Assessment System (GSAS) is the first performance-based system in the Middle East and North Africa region developed to assess and evaluate the sustainability of buildings and infrastructure. The main objective is to create a sustainable building stock which minimizes environmental impact, reduces resource consumption and, at the same time, considers the local needs and environmental conditions of the region. The Ali Bin Hamad Al Attiya Arena for sports and other events is listed with a high 4-star rating. As the automation level of the building management system, Beckhoff technology plays an important role in the implementation.

Up to 7,700 spectators can attend major events such as e.g. table tennis tournaments at the Ali Bin Hamad Al Attiya Arena in Doha.



The GSAS utilizes an integrated life-cycle approach to assess the building stock, which takes into account both the design as well as the operating phase. A flexible building management system which integrates all building control and monitoring functions was essential in order to fulfill the requirements. Lsys Technologies Integrator was awarded the contract to implement the building management system, video surveillance as well as an integrated building and security platform. The system integrator chose PC-based control technology from Beckhoff as the automation level of the building management system.

### Flexible control of a complex system

The building management system uses 29 Control Panels to visualize the more than 3,500 physical signals and 15,000 communication variables captured. The supervision level processes approximately 45,000 variables (alarms, parameters, etc.) that are forwarded directly from roughly 30 CX-series Embedded PCs installed at the venue. 15,000 of these variables are also processed in the integrated security management system platform that is installed in the arena. The building management system provides the control and monitoring interfaces via Modbus, RS485, BACnet, EIB and potential-free contacts, if required, also for third-party systems. These systems include sound and audio-visual systems, sanitary facilities, chillers and cooling towers, lighting control, photovoltaic solar systems and electricity meters.

According to the Lsys experts, the openness and flexibility of the Beckhoff technology combined with their own expertise provided excellent project results. As much functionality as possible has been integrated into the automation level in order to optimally utilize the physical signals and variables from the communication protocols in the operating processes. The CX-series Embedded PCs consisting of a total of nine CX5020s, 14 CX8090s and six CX9020s handle this task. According to Lsys, the compactness and flexibility of the Beckhoff Bus Terminal system – with nearly 500 installed Bus Terminals – combined with the comprehensive functionality of the TwinCAT automation software were key characteristics that enabled components for diverse signals to be added or positioned between the panels at any time without major work overhead.

As the system supports a wide range of fieldbus signals and protocols, Lsys did not have to worry about whether and how the signals needed to be integrated into the Beckhoff system. According to Lsys, this enabled the engineers to focus on their core expertise. As a result, numerous variables are seamlessly integrated, processed and provided on the monitoring level. For example, data is transferred via Modbus RTU from the energy meters and generators, via Modbus TCP/IP from the solar modules inverters, via BACnet MS/TP from the HVAC controllers and also via BACnet IP from the fire alarm panels and the cooling system management system. A TCP/IP client was implemented on one of the controllers for the purpose of transferring selected variables to the IPTV system. All real-time clocks in the controllers are synchronized with a local NTP (Network Time Protocol) server.

### Two operating modes have been implemented

One of the most interesting details of the multi-purpose arena is that it is capable of serving as a venue for more than just traditional sporting events. Instead, it can also be transformed into an ice rink. The facility operators can change the operating mode from normal operation to ice rink operation sim-



A total of 29 CX-series Embedded PCs (here: CX5020) enable precisely controlled building operation.

Simply by switching operating modes, the arena can transform into an ice rink.



## The multi-purpose arena

The Ali Bin Hamad Al Attiya Arena is situated in the Al Sadd district of Doha, Qatar. It belongs to the Al Sadd Sports Club, Qatar's most successful sports club with 67 official football championships. The arena is also used for the Al Sadd handball team, a.o. The total floor area is 16,000 m<sup>2</sup>; the total covered surface is 54,000 m<sup>2</sup>. The arena has space for up to 7,700 spectators.

ply by pressing a button. When functioning as an ice rink, the control system changes the operating mode of the HVAC systems to produce cold and hot water for the different layers of the ice surface. The system is programmed to operate completely autonomously, which simplifies the complex process and frees the operators of the arena from monitoring tasks. The operators are informed about the status and alarms at all times.

More information:

[www.lysys.com](http://www.lysys.com)

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