Mohammed bin Rashid Space Centre

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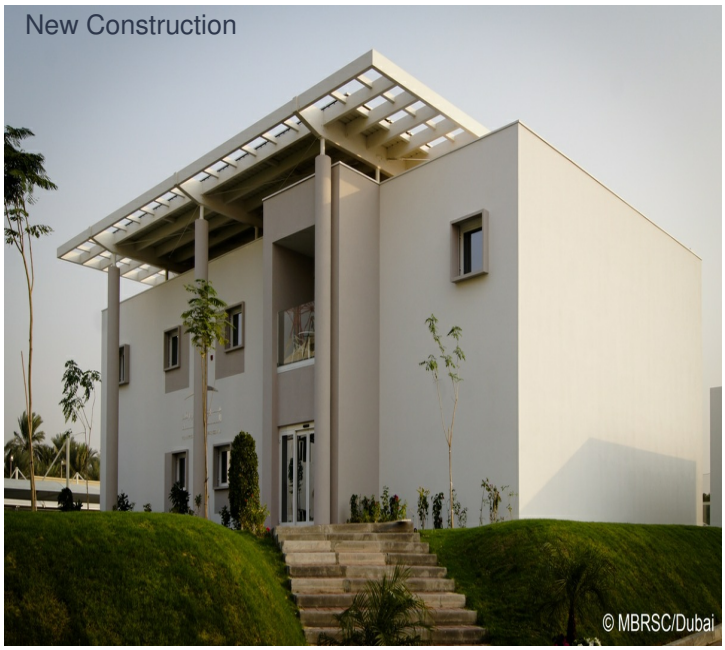

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< 50 A
51 à 90 B
91 à 150 C
151 à 230 D
231 à 330 E
331 à 450 F
> 450 G

Building Type : Office building < 28m
Construction Year : 2016
Delivery year : 2016
Address 1 - street : 21183 DUBAI, United Arab Emirates
Climate zone : [BWh] Subtropical dry arid

Net Floor Area : 411 m^2
Construction/refurbishment cost : 1 000 000 €
Number of Work station : 1 Work station
Cost/m2 : 2433.09 €/m^2

General information

Baptized "UAE's first sustainable autonomous house", this new office building in Dubai, was realized in 2016 as a pioneering “pilot project” for MBRSC, a governmental research body. It is the first one to obtain the certification by the Passive House Institute in extreme climatic conditions in the Arabic Area. Apart of extreme insulating performances and high energy efficient MEP systems, a 40 kWp photovoltaic field and a 25 kWh electric storage system are able to feed all the building's needs. Intensive monitoring is running to investigate real behaviour.
The design choice to use a prefab European timber platform frame technology made it possible to realize it in less than 100 days.3 different cooling systems have been installed for research purposes: supply air cooling or dehumidifying, recirculated air cooling and floor cooling (avoided in UAE, as current technology is unable to deal with condensation phenomena), with the possibility to couple them to get the best results in terms of efficiency and comfort

See more details about this project

http://www.passivhausprojekte.de/index.php?lang=en#d_5065
http://www.casettaepartners.it/en/portfolio/passive-house-a-dubai.php

Stakeholders

Stakeholders

Function : Designer
Casetta & Partners

http://www.casettaepartners.it/en/
The architectural design, the thermal envelope design and the airtightness design, the bioclimatic analysis, the MEP design and the PHPP calculation systems, as well as the "project management" and the site and work supervision has been carried out by the

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Function : Thermal consultancy agency
University of Bergamo

https://en.unibg.it/
The department of "Turbomachinery and Energy Systems" of the University of Bergamo with the lead of prof. Ing. Antonio Perdichizzi and ing. Giuseppe Franchini led transient analysis in dynamic state, on which basis the MEP systems in the building were siz

Energy

Energy consumption

Primary energy need : 143,00 kWhpe/m^2.year
Primary energy need for standard building :300,00 kWhpe/m^2.year
Calculation method : Other
CEEB : 0.0002
Breakdown for energy consumption : Calculations according to PHPP:
143 kWh/m²a - the primary energy is for all energy services in the entire building (cooling, domestic hot water, household electricity and auxiliary electricity)
Cooling and dehumidition demand: 50 kWh/(m²a)
Cooling load: 9,7 W/m²

Envelope performance

Envelope U-Value : 0,10 W.m^{-2}.K^{-1}
More information :
Exterior wall
Plasterboard (12,5 mm),
mineral fibre insulation (75 mm),
mineral fibre thermal and acoustical insulation (75 mm),
plasterboard (12,5 mm),
timber frame construction with mineral fiber insulation (200 mm),
plasterboard (12,5 mm),
EPS-insulation (180 mm),
exterior rendering
U-value = 0.076 W/(m2K)

Basement floor / floor slab
Flooring, screed (60 mm), XPS-insulation (20 mm), perlite added screed (155 mm), XPS-insulation (225 mm)
U-value = 0.108 W/(m2K)

Roof Flat roof
Sealing sheet (thermoplastic elastomere), XPS-insulation (200 mm), OSB (15 mm), mineral fibre insulation between rafters (280 mm), plasterboard (25 mm)
U-value = 0.076 W/(m2K)

Building Compactness Coefficient : 0,58
Indicator : EN 13829 - n50 » (en 1/h-1)
Air Tightness Value : 0,48

More information

Monitoring results to come soon

Renewables & systems

Systems

Heating system :
- No heating system

Hot water system :
- Heat pump

Cooling system :
- Reversible heat pump
- Fan coil

- Floor cooling

Ventilation system :
- Double flow heat exchanger

Renewable systems :
- Solar photovoltaic

Renewable energy production : 100,00 %
185 kWh/m²a renewable energy is generated (in relation to the projected building footprint)

Solutions enhancing nature free gains :
Limit unwanted external heat gains through appropriate insulation thickness, glazing, shading, airtightness, ventilation with heat recovery. Use of geothermal energy especially for cooling, photovoltaic system with battery storage technology and highly ef

Smart Building

BMS :
Smart management and control system which interacts with the changes of the external heat and humidity.

Environment

Urban environment

This pilot project has been built on a spare plot owned by the customer MBRSC, a governmental research body. Around the building, during the construction phase, greenery has been setup to enhance the "value" of the building itself.

The position itself suffers from weak urban connections (no metropolitan, buses, ecc...), primary because it is already in the "suburbs" of the city. As far as facilities are concerned, the building is close to "Mushrif Park", which is a 1300 acre family-oriented park in Dubai. It is located in the eastern part of the city (near the suburb of Khawaneej), about 16 km (10 mi) from the traditional center of Dubai. The park was created in early 1980 by Dubai Municipality and was hugely expanded and refurbished in 1989.

Moreover, the building is close to the "Al Khawaneej" Walking and Cycling Track. Mainly, it is located in a zone with farm houses.
Land plot area : 1 500,00 m^2
Built-up area : 19,00 %
Green space : 800,00

Products

Product

Passive House Planning Package (PHPP)

Passive House Institute

mail@passiv.de

http://passivehouse.com/
Product category :
The Passive House planning package is an energy balancing tool made up of a series of excel spreadsheets. It is based on International Norms and can be used for all buildings worldwide.

The Passive House Institute is developing the PHPP according to systematic evaluation and comparison with monitoring data and validated building simulation programs such as DYNBIL. Moreover, all the practical experience from building projects is continuously being integrated in the package.

The reliability of the calculation results and ease of use of this planning tool has already been experienced by several thousand users.

To plan this project, the software PHPP and TRNSYS have been used.

Costs

Carbon

GHG emissions

GHG in use :30,00 $KgCO_2/m^2$/year
Methodology used :
CO2 factors GEMIS 4.6 in PHPP, includes cooling, domestic hot water, household electricity and auxiliary electricity

Contest

Reasons for participating in the competition(s)

- Self-sufficient and completely independent of the electricity grid
- Interior temperature ranges from between 22°C and 25°C in all seasons and times
- Energy consumption reduced by 80% compared to existing buildings (700kWhpe/m²a) and 50% compared to Dubai Greenbuilding Regulations (280-300kWh/m²a) thanks to Passive House strategies, smart technical and engineering solutions
- Prefabricated timber frame structure (eco-friendly processed wood)
- Constructed in less than 100 days
- Smart management and control system which interacts with the changes of the external heat and humidity
- Ongoing research (how to transform high humidity to a water source cost effectively, link the project with Dubai's electricity grid)

Building candidate in the category

Energy & Hot Climates

Low Carbon

Health & Comfort

Smart Building

Users' Choice

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