ARCH 633

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ENVIRONMENTAL DESIGN STRATEGIES CASE STUDY

BRIEF OVERVIEW OF BUILDING, LOCATION AND CLIMATE

Status.....Complete
Type.....Mixed-use
Architectural style.....Neo-futurism
Location.....1 Sheikh Mohammed bin Rashid Boulevard, Dubai, United Arab Emirates
Construction started.....6 January 2004
Completed.....Intended: September 2008; Revised: 2 December 2009
Opened.....4 January 2010
Cost.....USD $ 1.5 billion

HEIGHT

Architectural.....828 m (2,717 ft)
Tip.....829.8 m (2,722 ft)
Roof.....828 m (2,717 ft)
Top floor.....584.5 m (1,918 ft) (Level 154)
Observatory.....555.7 m (1,823 ft) (Level 148)

TECHNICAL DETAILS

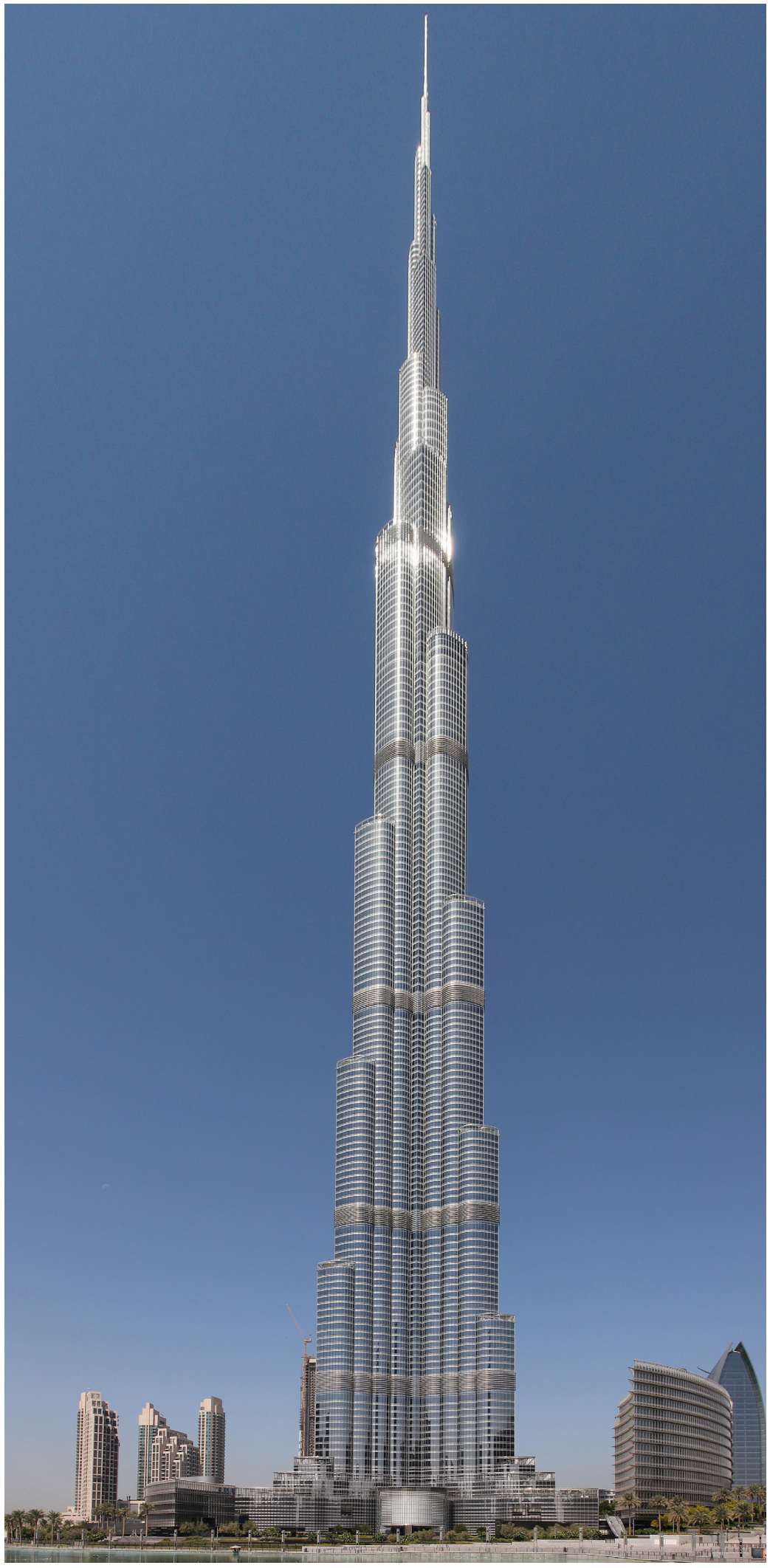
Material.....Glass, steel, aluminium, reinforced concrete

FLOOR COUNT

163 above ground. 153 usable floors plus 9 maintenance levels (46 spire levels) and 2 below-ground parking levels

CLIMATE

Dubai has a tropical desert climate because of its location within the Northern desert belt. Summers are extremely hot and humid, with an average high around 41 °C (106 °F) and overnight lows around 30 °C (86 °F). Most days are sunny throughout the year. Winters are warm and short with an average high of 23 °C (73 °F) and overnight lows of 14 °C (57 °F). Precipitation, however, has been increasing in the last few decades with accumulated rain reaching 150 mm (5.91 in) per year. The weather in Dubai can bring short and irregular rainfall as is typical for the Middle East. Most of the rainfall occurs in the December to March period. The weather between December and March remains warm and is considered to be the most comfortable climatic conditions of the year.



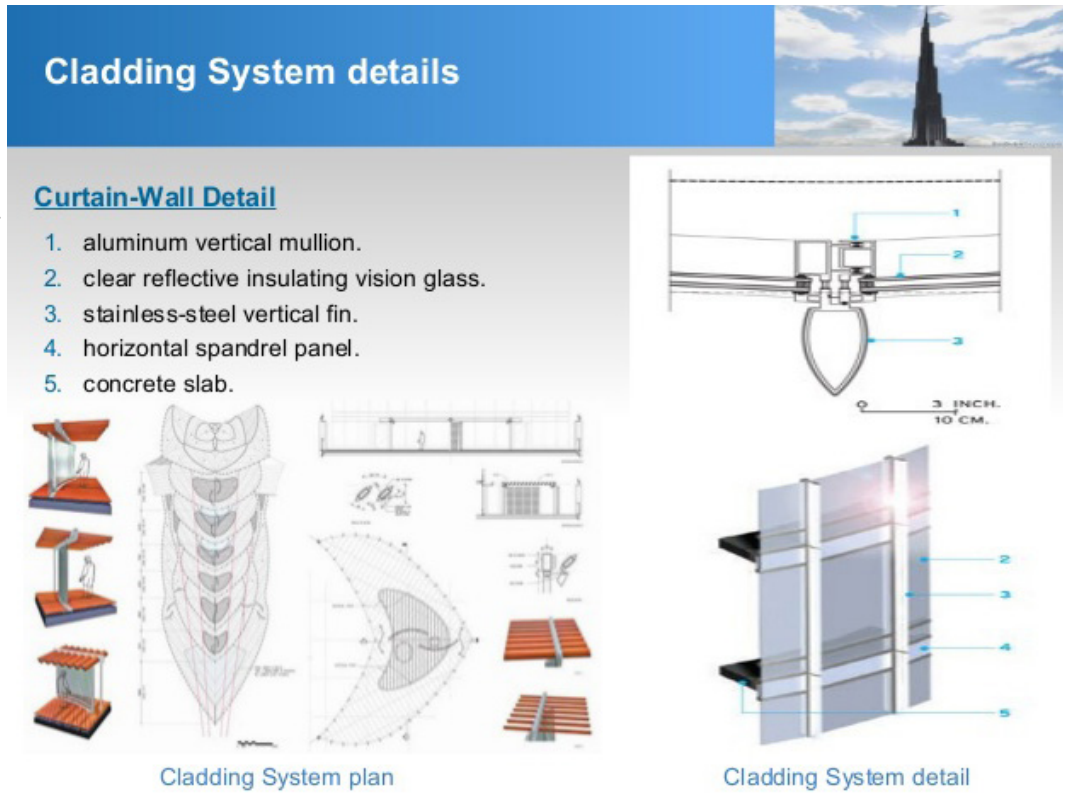
SOLAR/CONDUCTION

The cladding system consists of 142,000 m2 (1,528,000 sq ft) of more than 26,000 reflective glass panels and aluminium and textured stainless steel spandrel panels with vertical tubular fins. The architectural glass provides solar and thermal performance as well as an anti-glare shield for the intense desert sun, extreme desert temperatures and strong winds. In total the glass covers more than 174,000 m2 (1,870,000 sq ft)

High performance glazing with Low E coating: A low-emissivity glass provides Burj Khalifa with enhanced thermal insulation against high ambient temperatures of Dubai.

The outer layer is coated with a thin layer of metal ao that it reflects the UV radiations

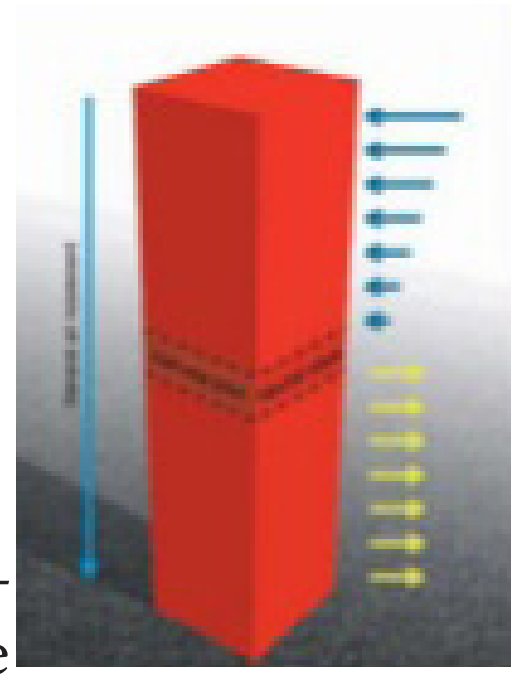
The inner layer is coated with thin layer of silvaer so that it reflects the IR radiations.



VENTILATION

NATURAL VENTILATION SYSTEM

Burj Khalifa has occur the phenomenon as reverse stack effect because the flow of air is downward. The cooler air is more dense is inside the building and wants to drop downward and flow out of the building to its' bottom. The air move from the top to the bottom through the elevator shaft. Each time the elevator door open it will help to produce greater stack effect. This help to reduce the temperature for the whole tower without any cost. Glass panel also serve as a function to reduce the temperature and reduce the usage of the air conditioning,ventilation and dehumidification function. It is a special panel made from two layers which is a thin layer of metal and a thin layer of silver to keep the temperature inside the building cool by reflecting the heat and sunlight.



MECHANICAL VENTILATION SYSTEM

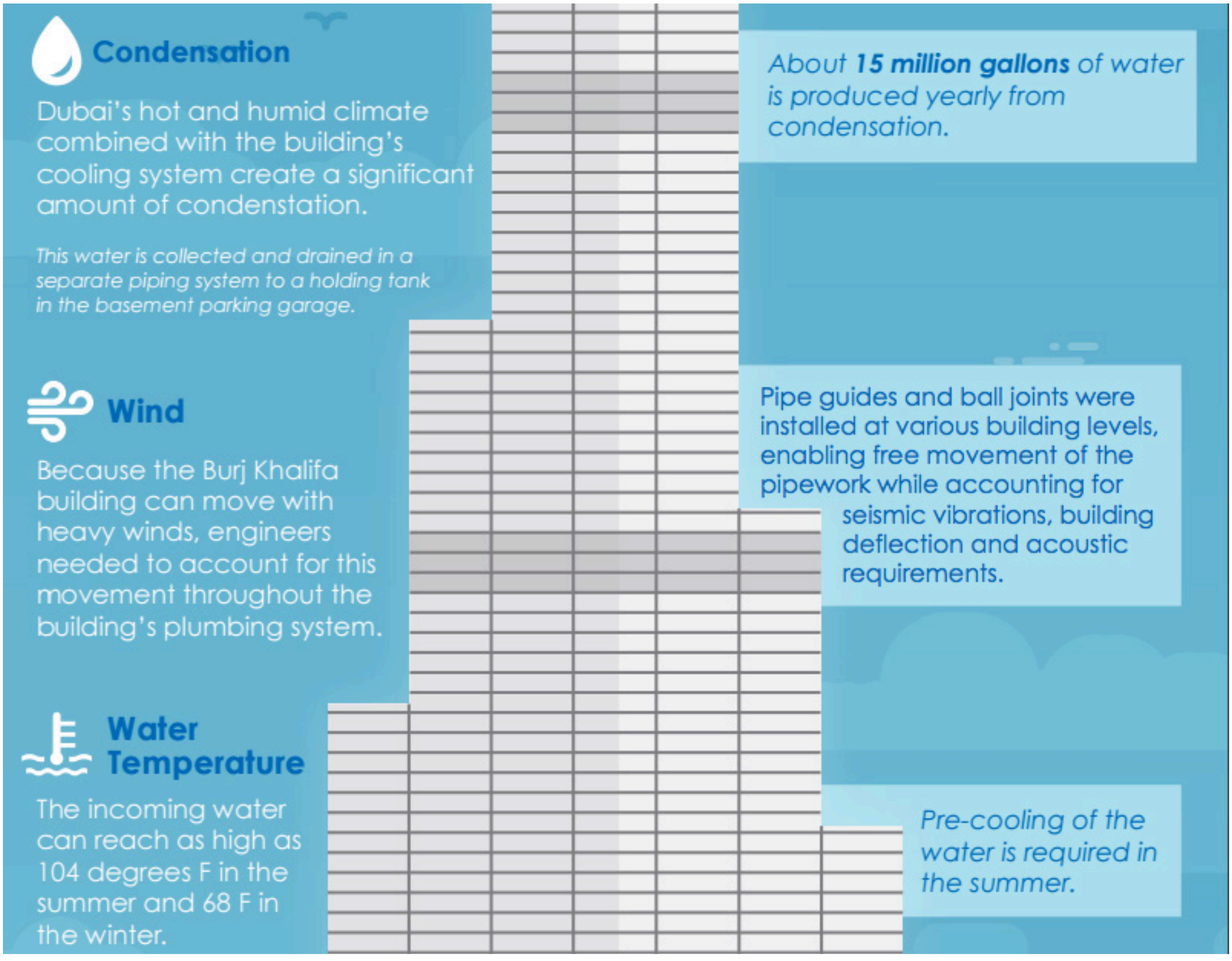
Plate heat exchanger: used for transfer heat between two fluid to reduce the air temperature. Ice-storage cooling system that produces tons of ice slurry during off-peak hours. Using the plate heat exchangers, the ice slurry built up in a tank, store the cooling energy that is later released, through the pipelines to the entire indoor conditioning and tap water systems.

Air handling unit: used to re-condition and circulate air as part of a heating, ventilating and air-conditioning system. improve the air quality of the tower by using the air on the higher level which is clean and cooler air and transfer it to the lower floor.

EVAPORATION

CONDENSATE RECOVERY SYSTEM

Collects water condensate from the air conditioning system and diverts it to an irrigation tank. It provides about 15 million gallons of water per year. This water is used for irrigation of landscape around the Burj. Reduces water related expenses



IF I WAS IN CHARGED I WOULD HAVE CHANGED?...

To reduce indoor air pollutants, I would have increased the openings and windows in a building, ventilate indoor air by allowing outdoor air to flow in building to dilute indoor air and reduce pollutants. An adequate supply of outdoor air is essential to diluting indoor pollutants. In general, increasing rate of outdoor air supplied to the building decreases indoor air problems