
“Above the clouds”
Julien Grange

London, 07:30am.

Average daily footfall:

3.7 mio de personnes

Tokyo, 07:30am.

City population:

38 mio de personnes

Bishwa Ijtema Special Train,
Tongi, Bangladesh.

Annual Muslim gathering,
attendance:

2-3 mio de personnes

Mong Kok neihbourhood, Hong Kong

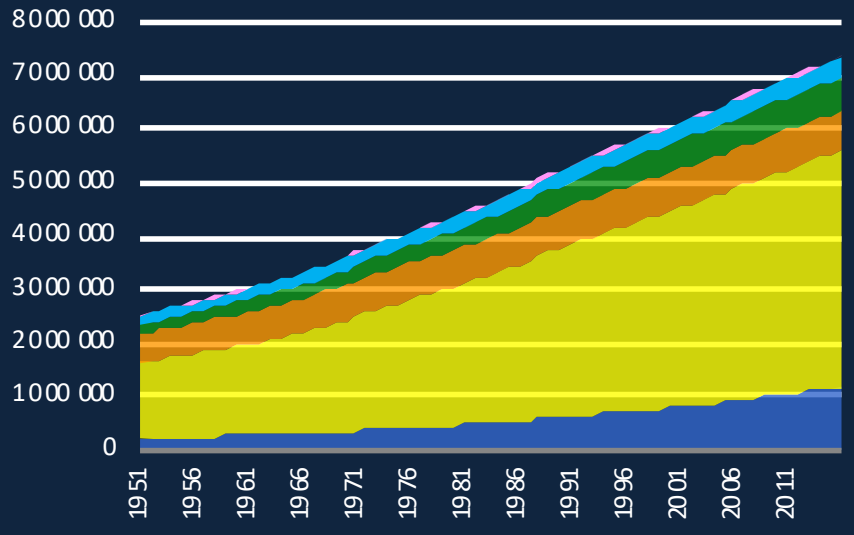
People per sq.km.:

130’000 personnes

Demography

Is the World population going to grow indefinitely?

World Population by Continent, 1950-2015

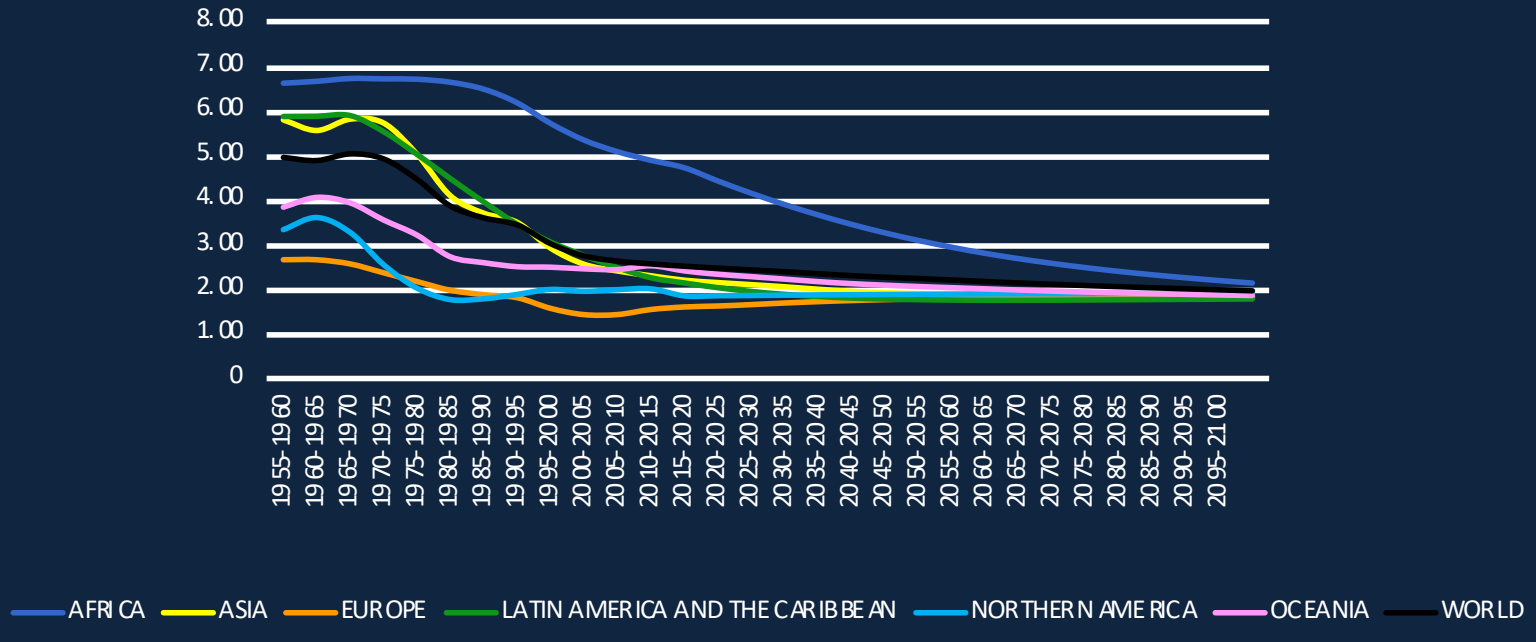


2019

7.7 billion

people

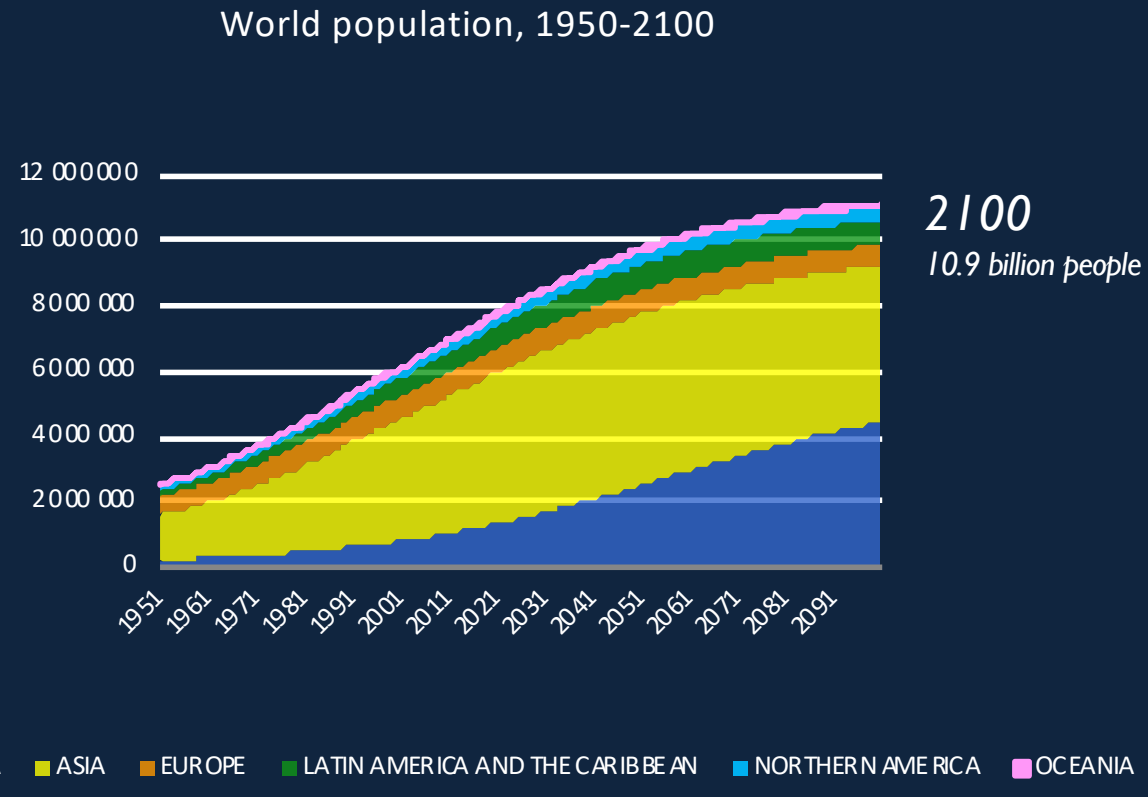
Source: UN World Population Prospects 2019, Total fertility (TFR)..


Total Fertility Rate (TFR) per continent, 1950-2100
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0
1955-1960
1960-1965
1965-1970
1970-1975
1975-1980
1980-1985
1985-1990
1990-1995
1995-2000
2000-2005
2005-2010
2010-2015
2015-2020
2020-2025
2025-2030
2030-2035
2035-2040
2040-2045
2045-2050
2050-2055
2055-2060
2060-2065
2065-2070
2070-2075
2075-2080
2080-2085
2085-2090
2090-2095
2095-2100
AFRICA
ASIA
EUROPE
LATIN AMERICA AND THE CARIBBEAN
NORTHERN AMERICA
OCEANIA
WORLD

Reasons for a lowering TFR

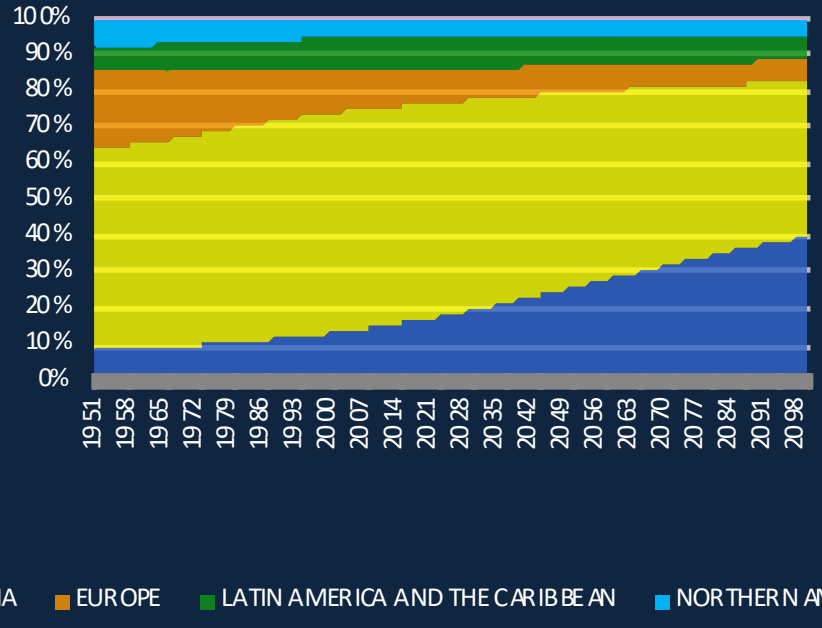
Increased access to reproductive health clinics and programmes *(Family planning centres, contraceptives, etc.), gives women and couples greater control on the size of their family;*

Better access to education for women*, they get married later in life, tendency to have less kids.*


World population, 1950-2100
12 000000
10 000000
8000 000
6000 000
4000 000
2000 000
0
1951
1961
1971
1981
1991
2001
2011
2021
2031
2041
2051
2061
2071
2081
2091
2100
10.9 billion people
AFRICA
ASIA
EUROPE
LATIN AMERICA AND THE CARIBBEAN
NORTHERN AMERICA
OCEANIA

World population (%) per continent, 1950-2100

Europe
from 22% in 1950
to 10% in 2018
to 6% in 2100



Afrique
from 9% in 1950
to 17% in 2018
to 40% in 2100

Is the World population going to grow indefinitely?

FALSE

In 2100, it will stagnate around **10.9 billion** people.

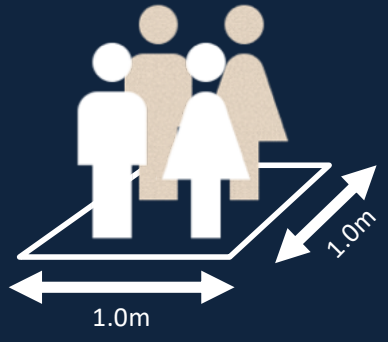
Land use

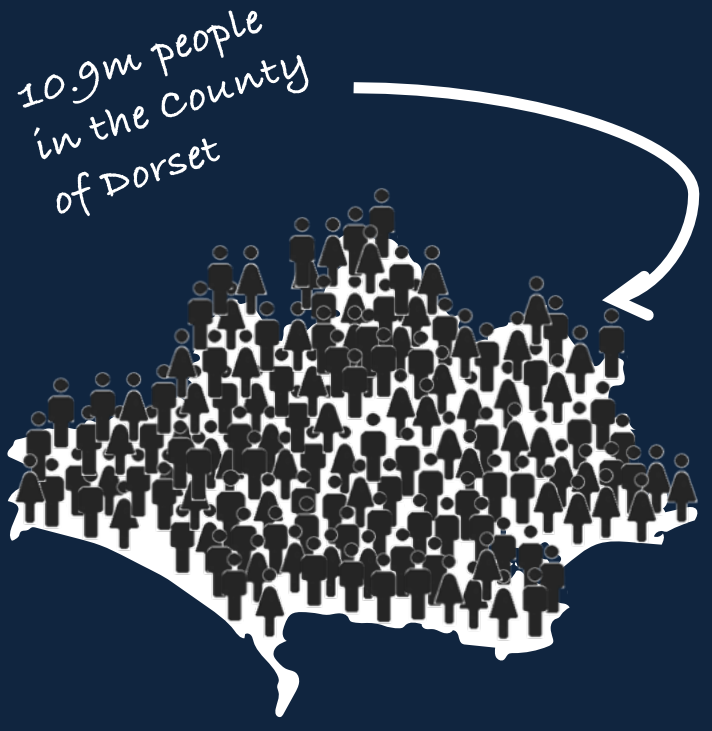
Are we going to have enough space for 10.9 billion people?

OTIS

Maximum recommended space per person for the utilisation of lifts

4 ppl / m²






East Coast of the United States
Population of coastal states
112 million people


Banks of the Nile & Middle East
Population of Egypt and the Middle East:
500 million people

71% of total surface area

Oceans

362m km² / 510m km²

7% of land area

Cropland

10m km² / 148m km²

27% of land area

Livestock

40m km² / 148m km²

19% of land area

Barren land

28m km² / 148m km²

8% of land area

Shrub

12m km² / 148m km²

26% of land area

Forests

38m km² / 148m km²

1% of land area

Freshwater

1.6m km² / 148m km²

10% of land area

Glaciers

14m km² / 148m km²

1% of land area

Built-up area

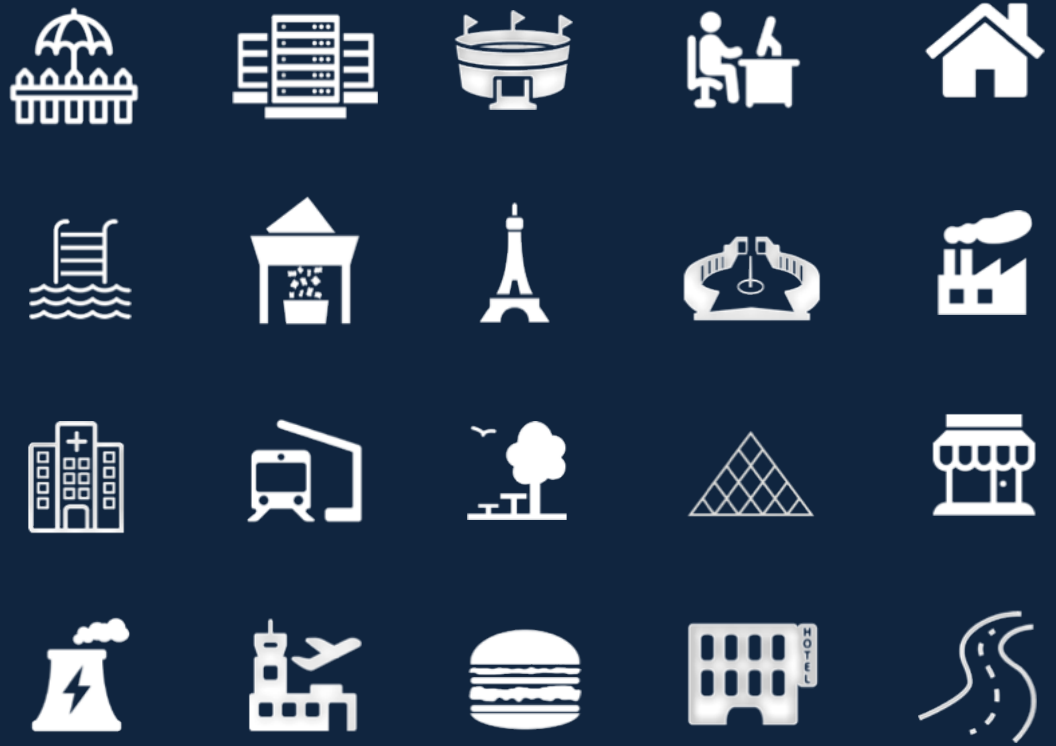
1.6m km² / 148m km²

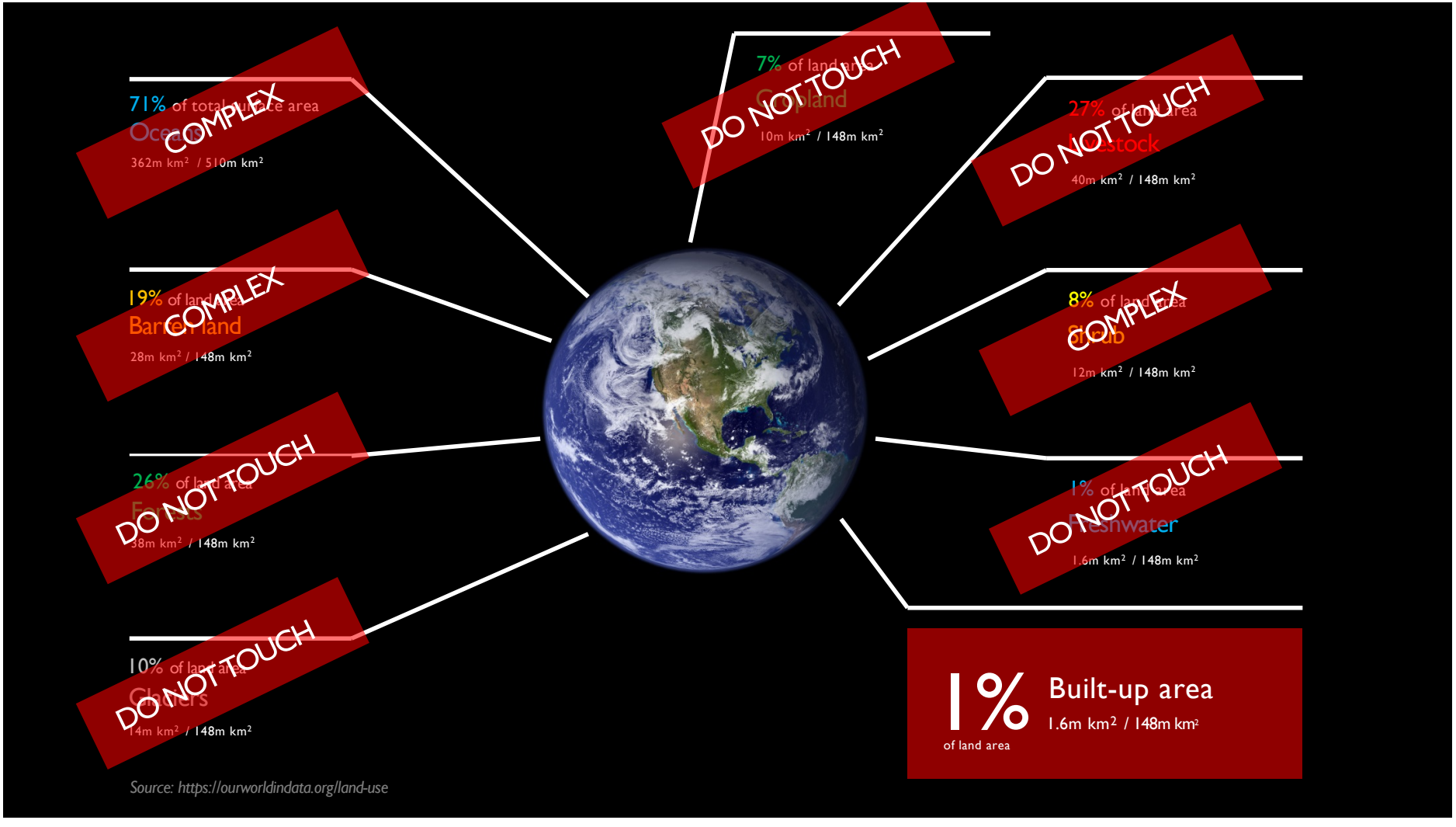
Source: https://ourworldindata.org/land-use

Built-up area

1%
of land area

1.6
m km²



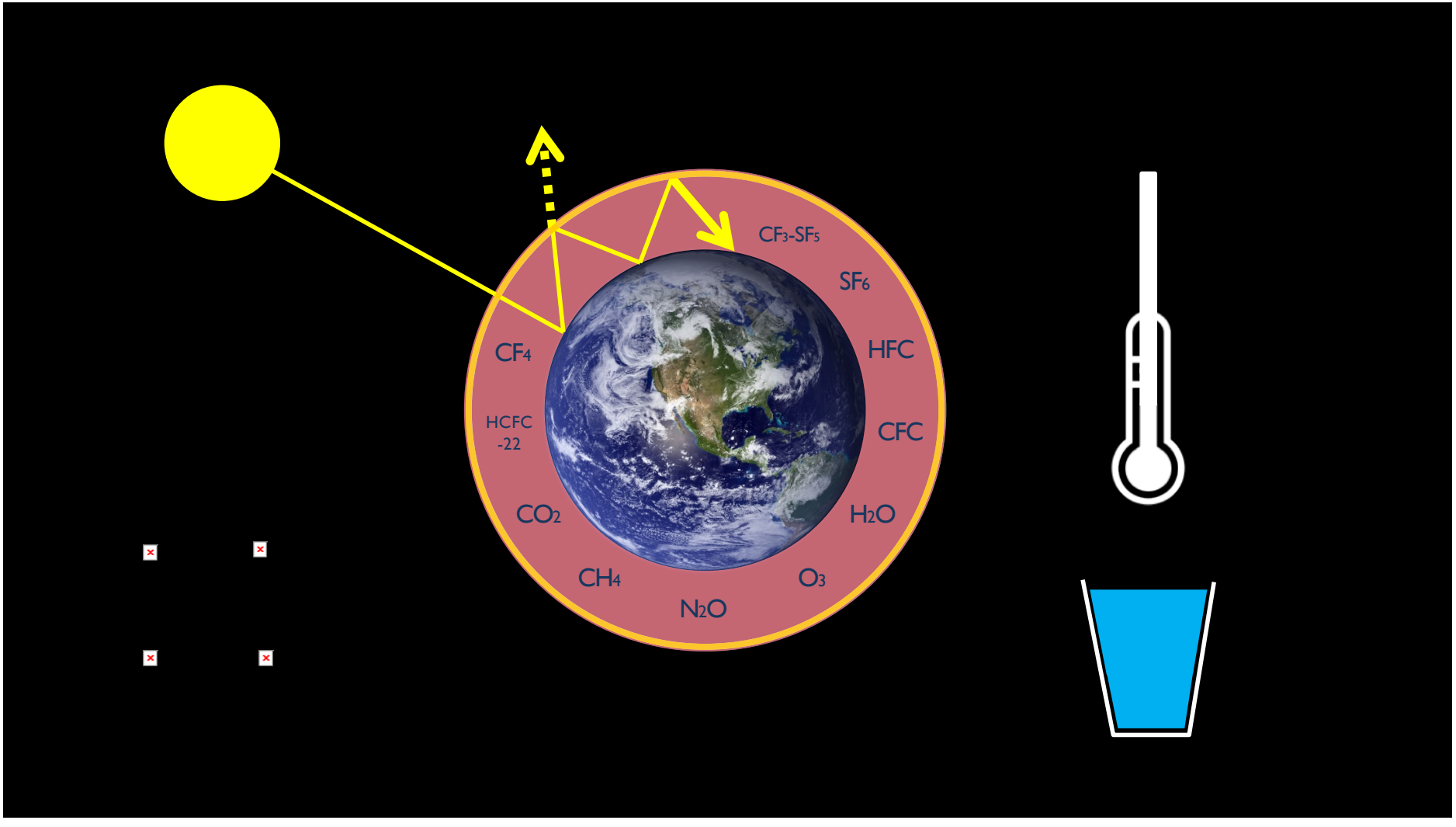

71% of total surface area
Oceans
362m km² / 510m km²
COMPLEX
19% of land area
Barren land
28m km² / 148m km²
COMPLEX
26% of land area
Forests
38m km² / 148m km²
DO NOT TOUCH
10% of land area
Glaciers
14m km² / 148m km²
DO NOT TOUCH
7% of land use
Cropland
10m km² / 148m km²
DO NOT TOUCH
27% of land area
Livestock
40m km² / 148m km²
DO NOT TOUCH
8% of land area
Shrub
12m km² / 148m km²
COMPLEX
1% of land area
Freshwater
1.6m km² / 148m km²
DO NOT TOUCH
1%
of land area
Built-up area
1.6m km² / 148m km²
Source: https://ourworldindata.org/land-use

Population density

UK (2019) x 1.3
World (2019) x 1.4

2019 (UK)	**2019 (World)**	**2100 (World)**
67.5 million inhabitants	7.7 billion inhabitants	10.9 billion inhabitants
12,916 km2 built-up area	1.6 mio km2 built-up area	1.6 mio km2 built-up area
5,226 *inhabitants per built-up km2*	4,813 *inhabitants per built-up km2*	6,812 *inhabitants per built-up km2*

Climatic migration


CF_3-SF_5
SF_6
HFC
CFC
H_2O
O_3
N_2O
CH_4
CO_2
HCFC
-22
CF_4

The picture can't be displayed.

Climatic migration

Floods in Kerala, India (Aug.18)

Displaced population:

1.5m people

The picture can't be displayed.

Climatic migration

Wild fires in California (Nov.18)

Displaced population:

150,000 people

The picture can't be displayed.

Climatic migration

Idai Typhoon, Mozambique (Mar.19)

Displaced population:

140,000 people

Climatic migration

2200

The picture can't be displayed.

**Source: https://choices.climatecentral.org/#13/40.7698/-73.9348?compare=temperatures&carbon-end-yr=2100&scenario-a=warming-4&scenario-b=warming-2*

South Florida, USA.

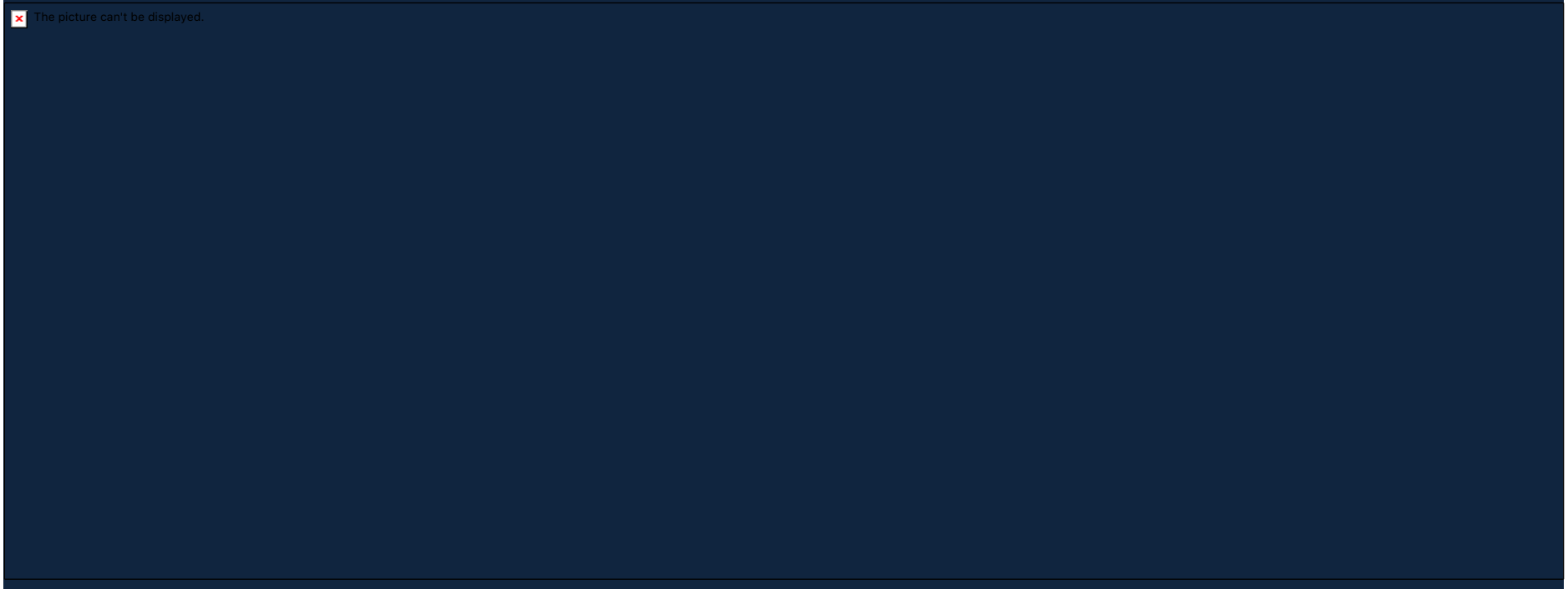
Climatic migration

2200

Amsterdam, Netherlands

Climatic migration

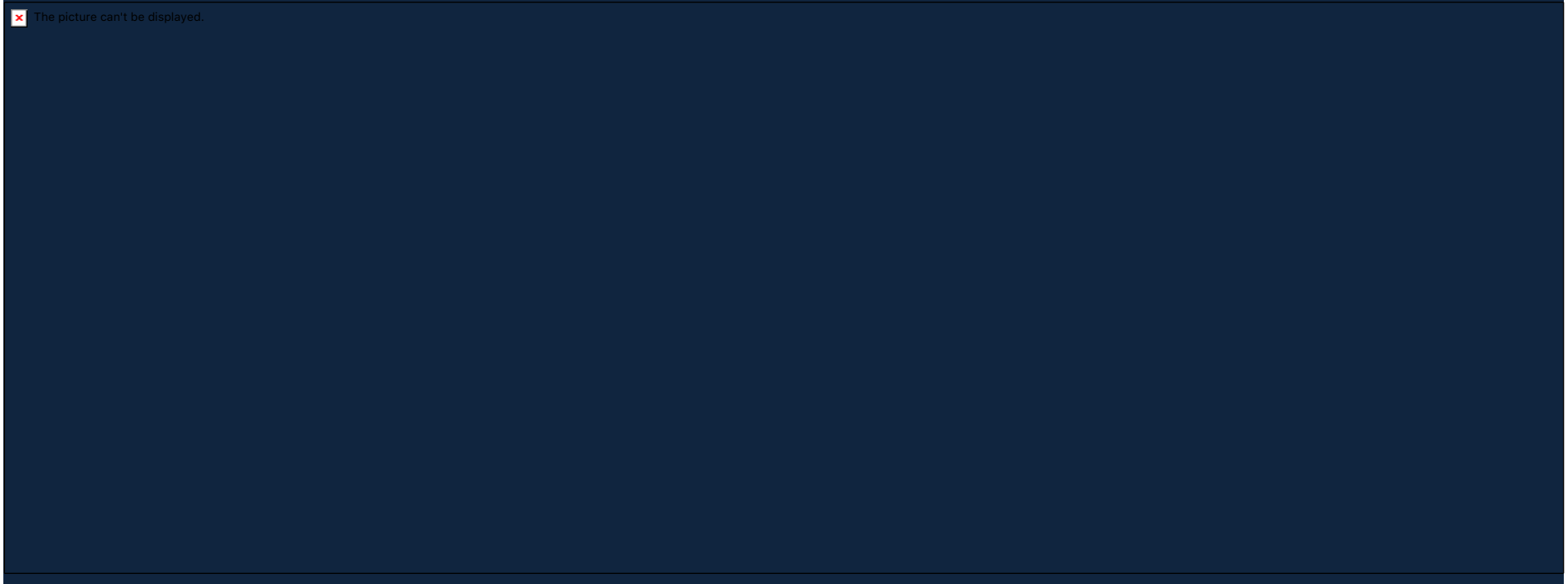
2200



South Vietnam

Climatic migration

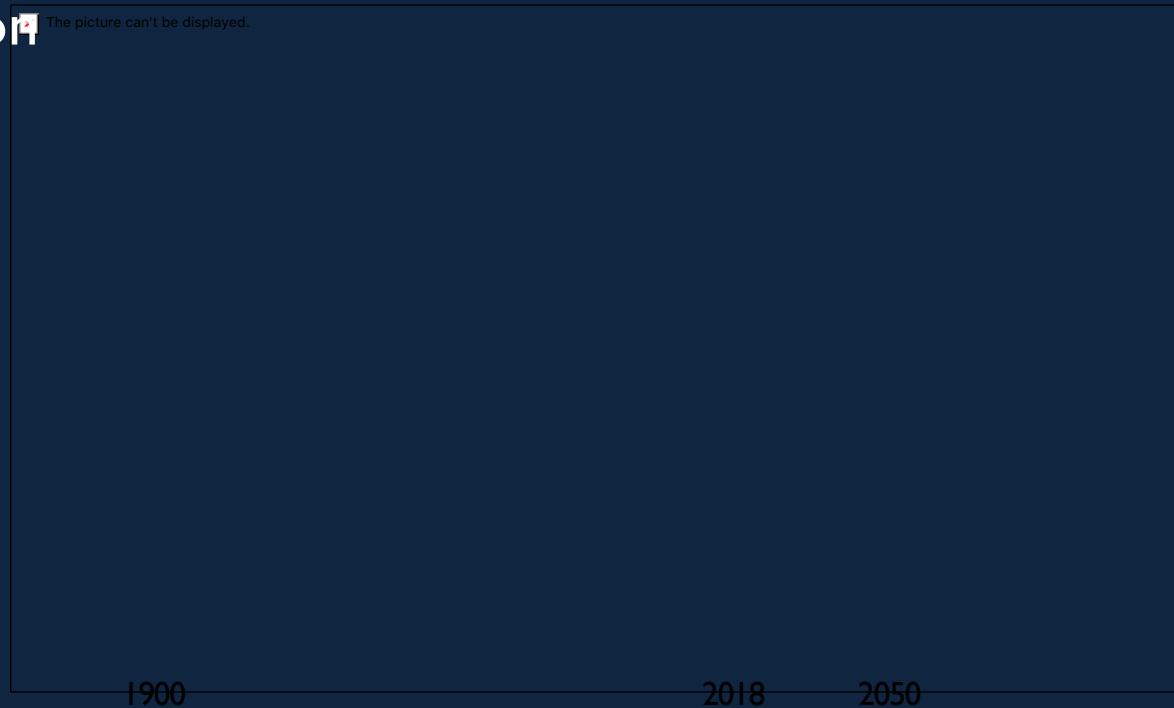
2200



London, UK.

Urbanisation

Urbanisation



*Source: http://data.worldbank.org/data-catalog/world-development-indicators

Urbanisation

2019

**Source: UN, World Urbanization Prospects, 2018.*

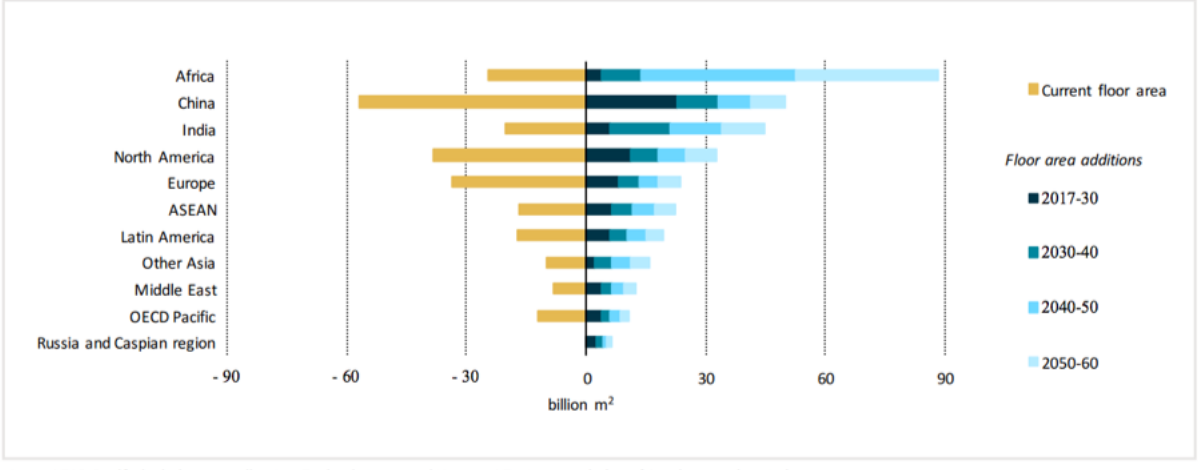
Urbanisation

2100

**Source: Socioeconomic Pathways and Regional Distribution of the World's 101 Largest Cities, Global Cities Institute, University of Toronto, 2014.*

Urbanisation

FIGURE 3 Floor area additions to 2060 by key regions



Notes: OECD Pacific includes Australia, New Zealand, Japan and Korea; ASEAN = Association of Southeast Asian Nations.
Source: IEA (2017), Energy Technology Perspectives 2017, IEA/OECD, Paris, www.iea.org/etp

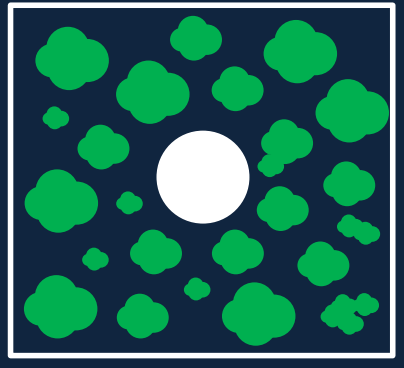
Densification

A

Urban Sprawl

B

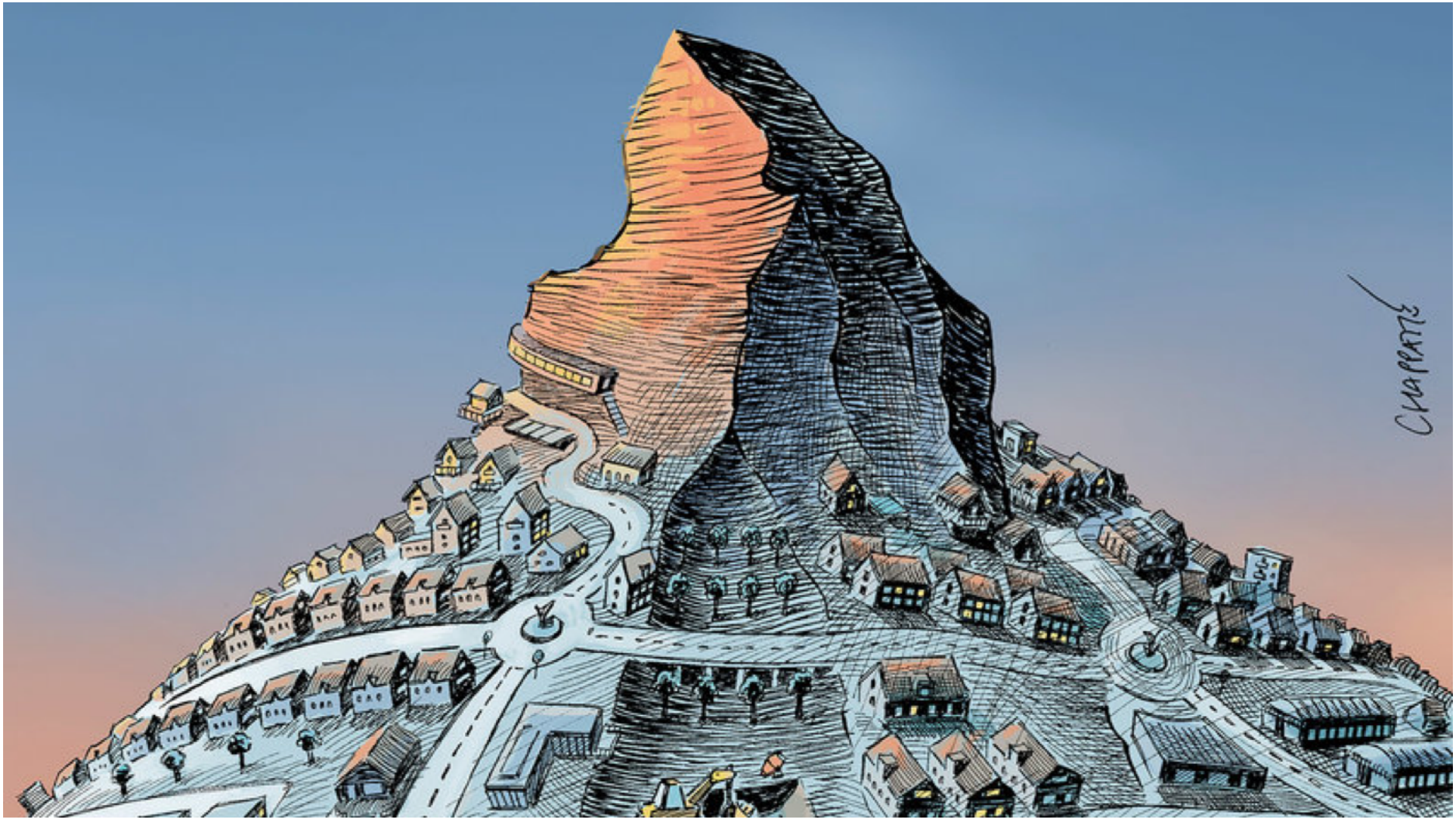
Densification



A

Urban Sprawl

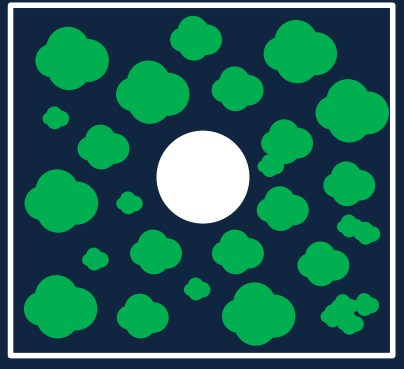
- Encroachment on Nature;
- Isolation of poorly connected neighbourhoods, lack of employment opportunities and social interactions;
- Energy and resources transportation less efficient.



B

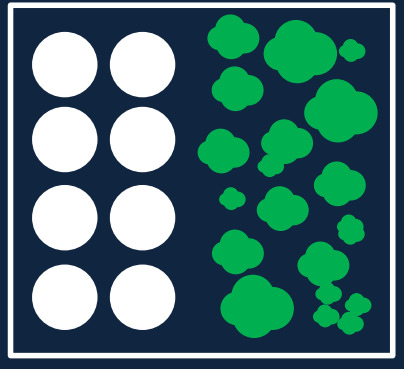
Densification

- Leaves more space to Nature;
- Greater proportion of population in close proximity to employment opportunities and social interactions;
- Energy and resources transportation more efficient;



B

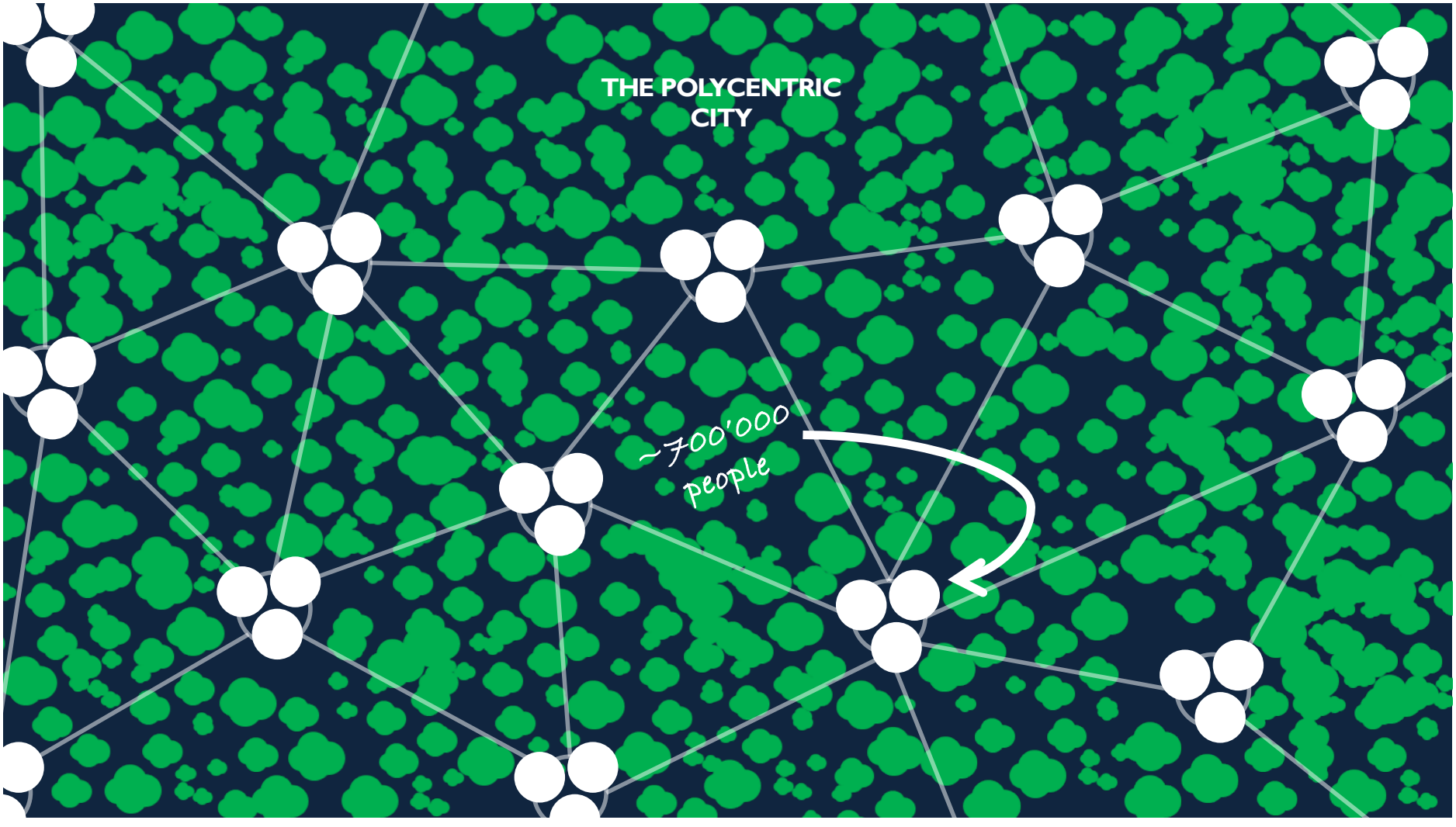
Densification



The Zoning Trap:

Not to denature certain neighbourhoods, we too often pick ‘zones’ to build tall. Problems:

1. 1. Humans do not get the intended better connection to Nature;
2. 2. These clusters of tall buildings become undesirable because of their enormous scale, it is the beginning of ’ghettoisation’ that we wanted to avoid to begin with;


THE POLYCENTRIC CITY
~700'000 people

Skyscrapers

MULTIPLEX

TwentyTwo, London (2019)

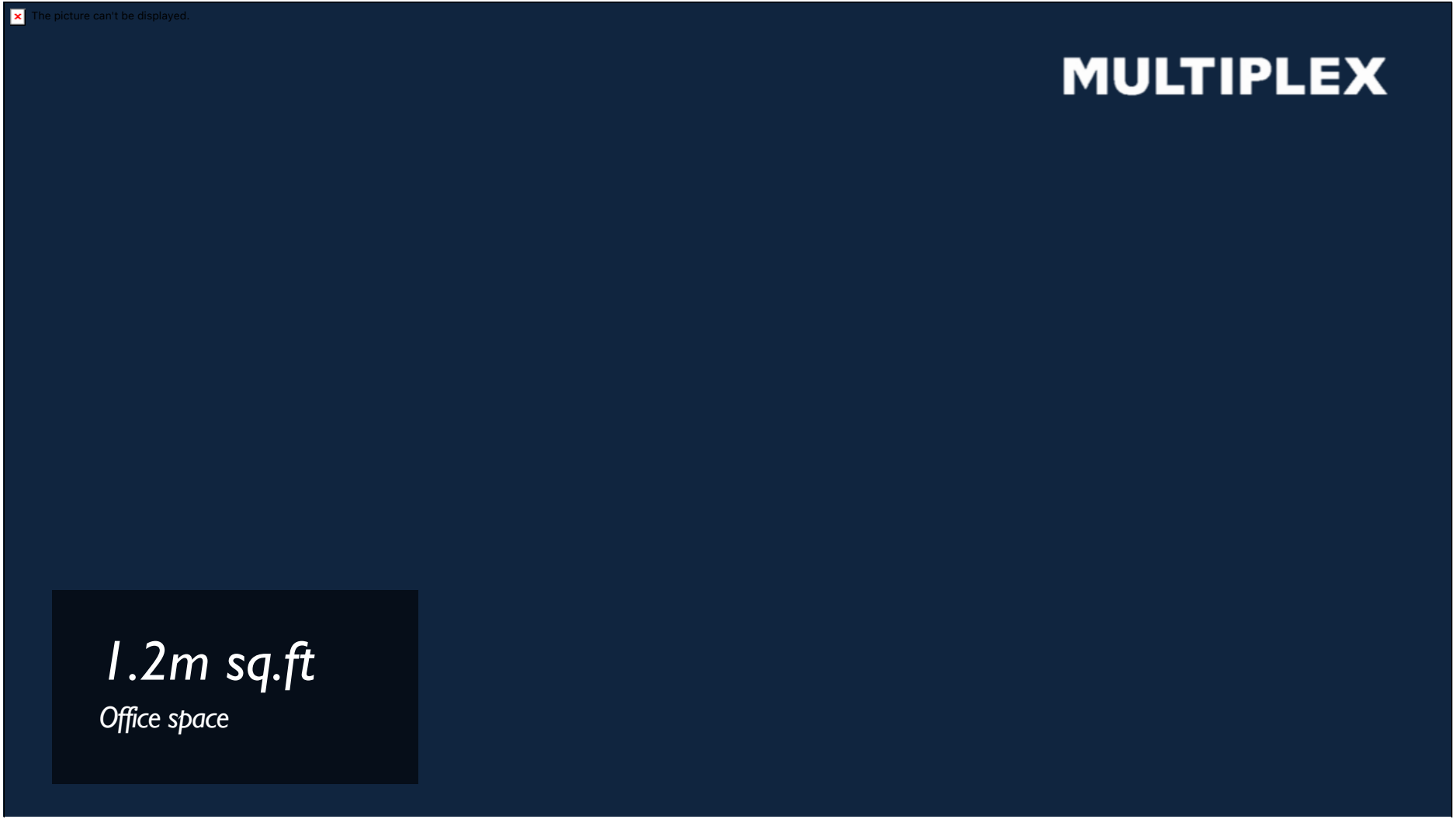
Architectural height:

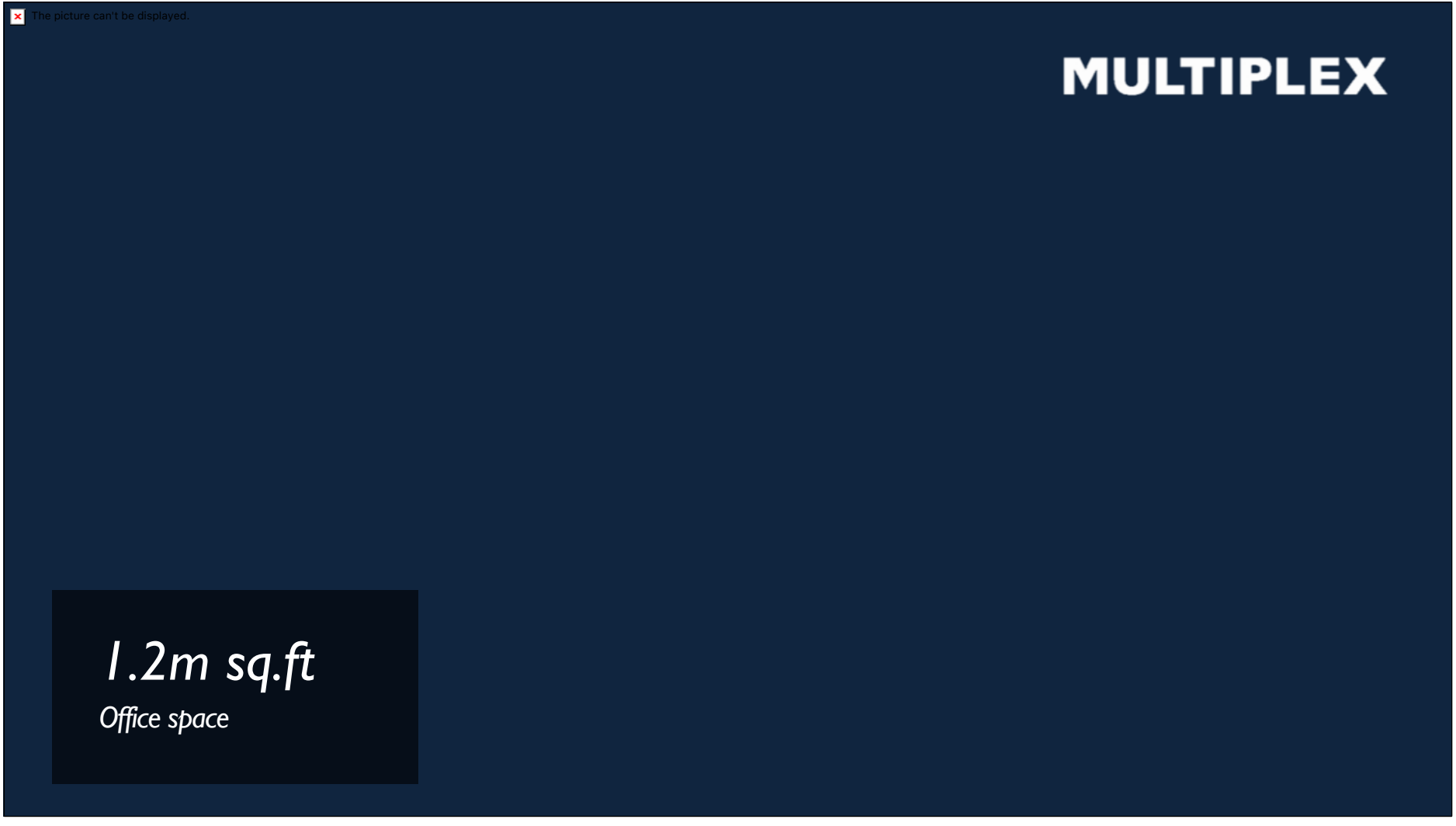
278m, 62 stories.


MULTIPLEX

The picture can't be displayed.

MULTIPLEX


The picture can't be displayed.
MULTIPLEX
1.2m sq.ft
Office space


The picture can't be displayed.
MULTIPLEX
1.2m sq.ft
Office space


MULTIPLEX
A Gym
Level 25
Image cou


MULTIPLEX
A Viewing Gallery
Level 58


MULTIPLEX
BT
citi
© Jason Hawkes


MULTIPLEX
jasonhawkes.com


MULTIPLEX
© Jason Hawkes


MULTIPLEX


MULTIPLEX


MULTIPLEX

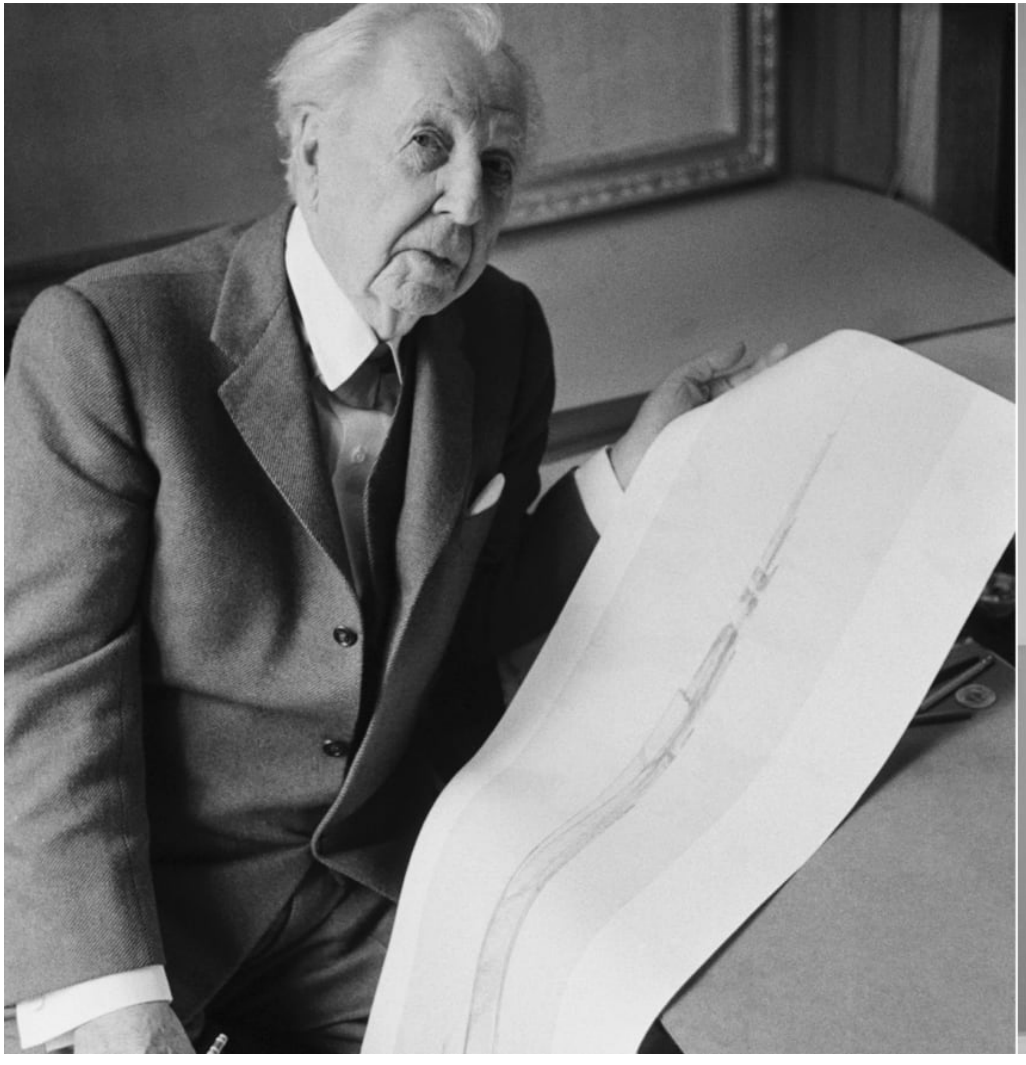
The 1st skyscraper

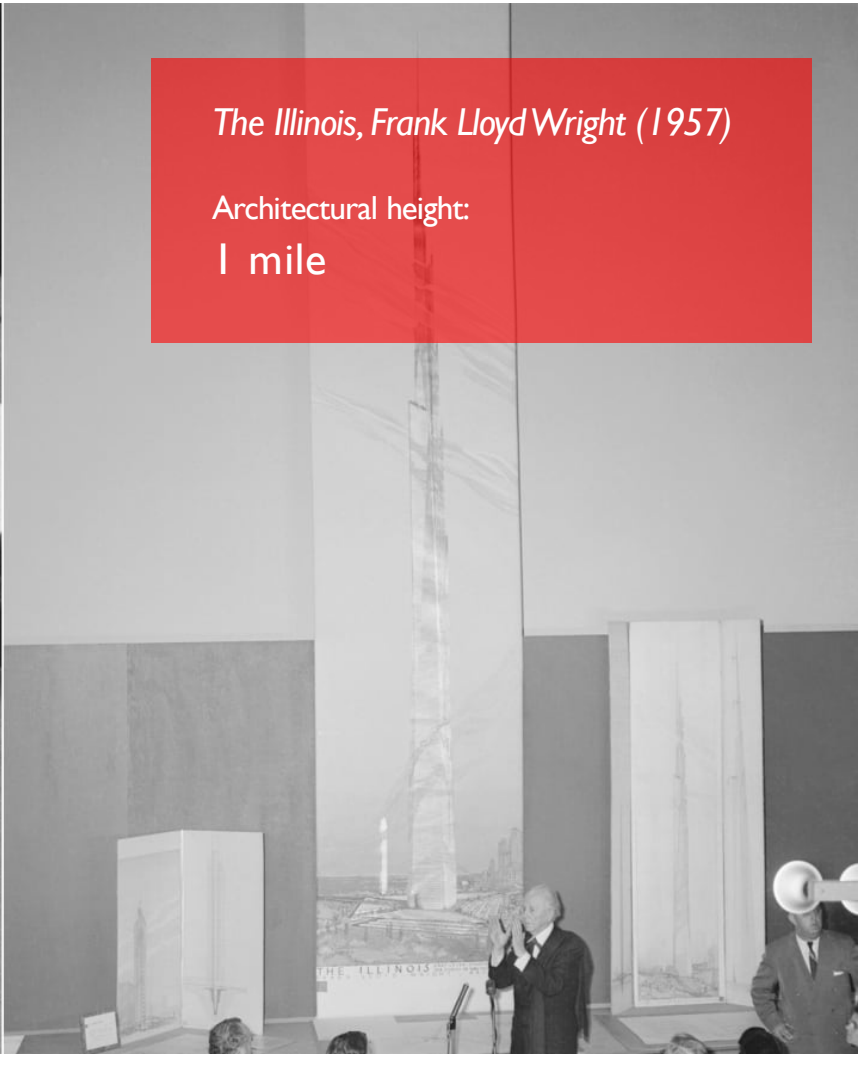
- The Home Insurance Building, Chicago

Year: **1885**
Height: **55m (10 stories)**

Architect: **William Le Baron Jenney**

"The first building in the World to use steel in its structure".





The Illinois, Frank Lloyd Wright (1957)

Architectural height:

1 mile

The tallest buildings in the World

1km

*Under construction
*Completed

One World Trade Center	Lotte World Tower	Ping An Finance Center	Makkah Royal Clock Tower	Shanghai Tower	Merdeka PNB118	Burj Khalifa	Kingdom Tower
541m (94 stories) 2014	554m (123 stories) 2017	599m (115 stories) 2017	601m (120 stories) 2012	632m (128 stories) 2015	644m (118 stoties) 2021	828m (163 stories) 2010	1'000m (167 stories) 2021
New York	*Seoul*	*Shenzhen*	*Mecca*	*Shanghai*	*Kuala Lumpur*	*Dubai*	*Jeddah*


One World Trade Center, NYC (2014)
Architectural height:
541 m.

Lotte World Tower, Séoul (2017)

Architectural height:

554 m.


Shanghai Tower, Shanghai (2015)
Architectural height:
632 m.

Merdeka PNB118, Kuala Lumpur (2021)

Architectural height:
644 m.

Burj Khalifa, Dubai (2010)

Architectural height:

828 m.

Kingdom Tower, Jeddah (2021)

Architectural height:
1’000 m.

The structure


The Egyptian Pyramids (2'560 BCE)
Height of the Giza Pyramid:
139m

The Sun Pyramid, Mexico
(1'000 BCE)

Height:
66m

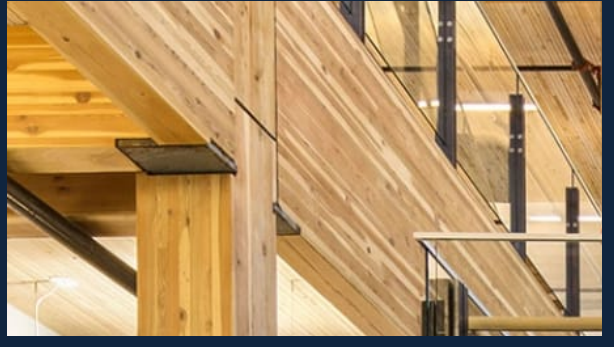
Nouvelle utilisation des matériaux

◄ Reinforced concrete
Reinforcement bars

Reinforced concrete
Steel fibre ►

◄ Structure
Steel

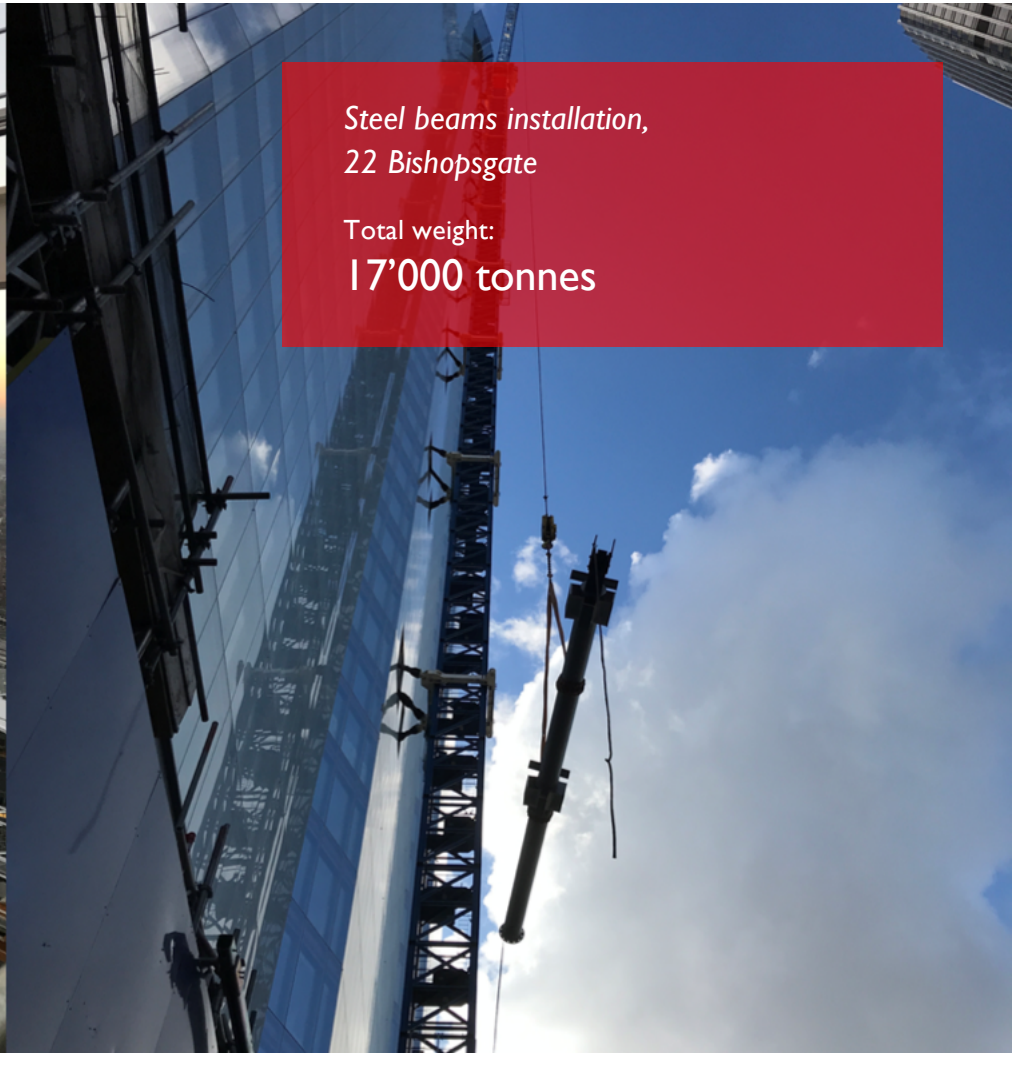
Structure
Mass timber ►



Concrete pouring, 22 Bishopsgate

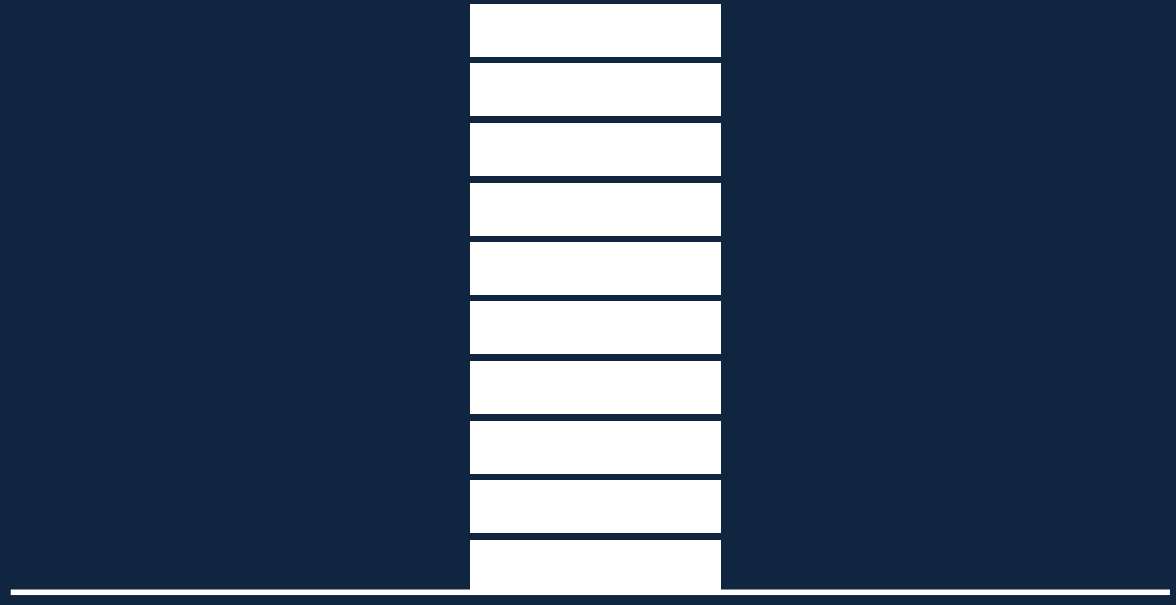
Total volume:

56,600m^3



Steel beams installation,
22 Bishopsgate

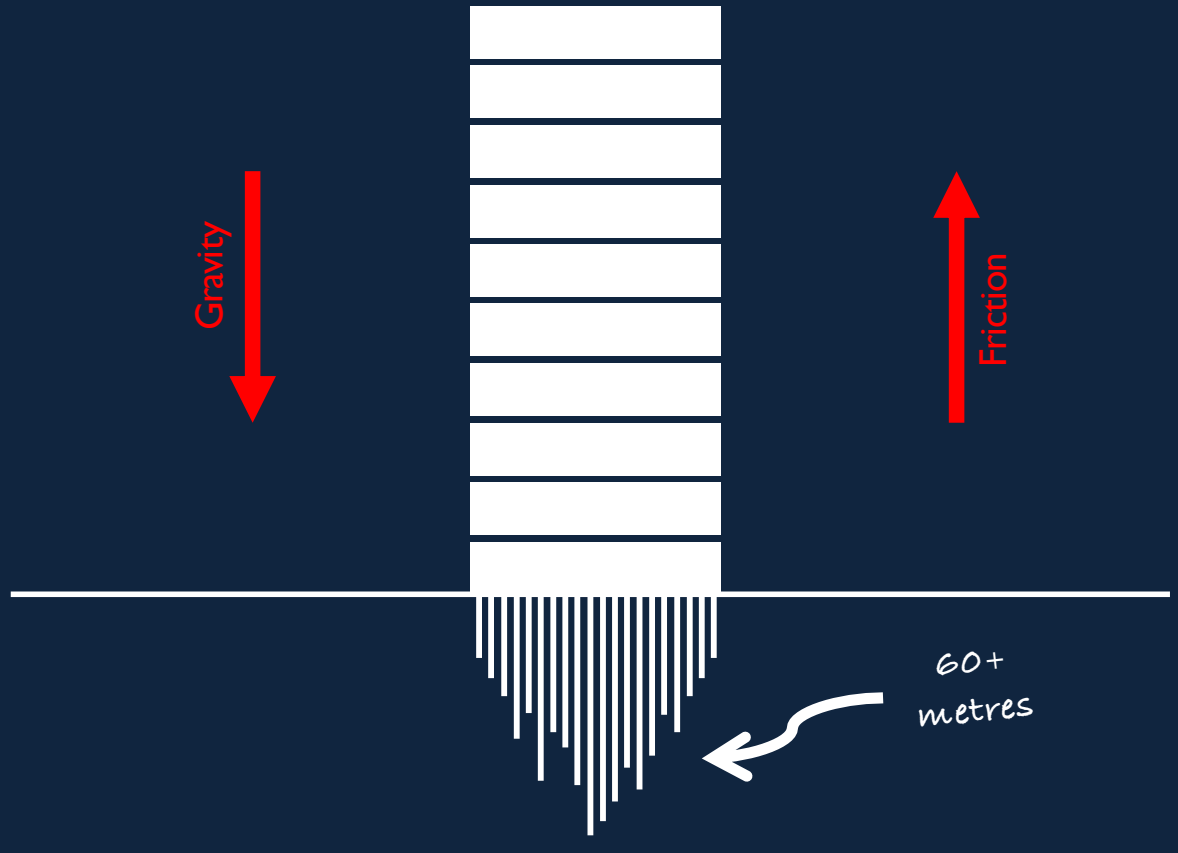
Total weight:
17’000 tonnes

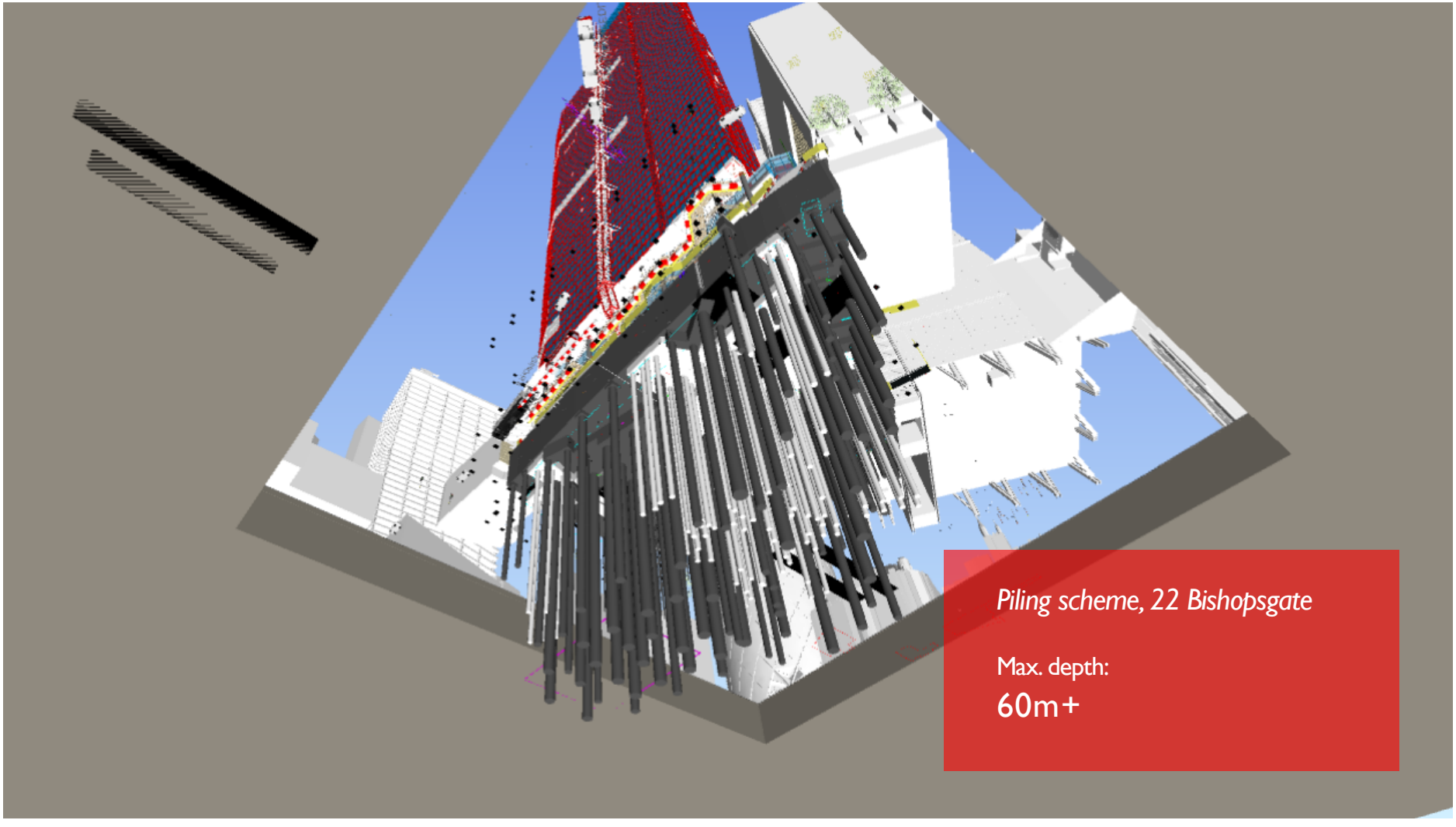


The foundations


Gravity

Pile foundations





Piling scheme, 22 Bishopsgate

Max. depth:

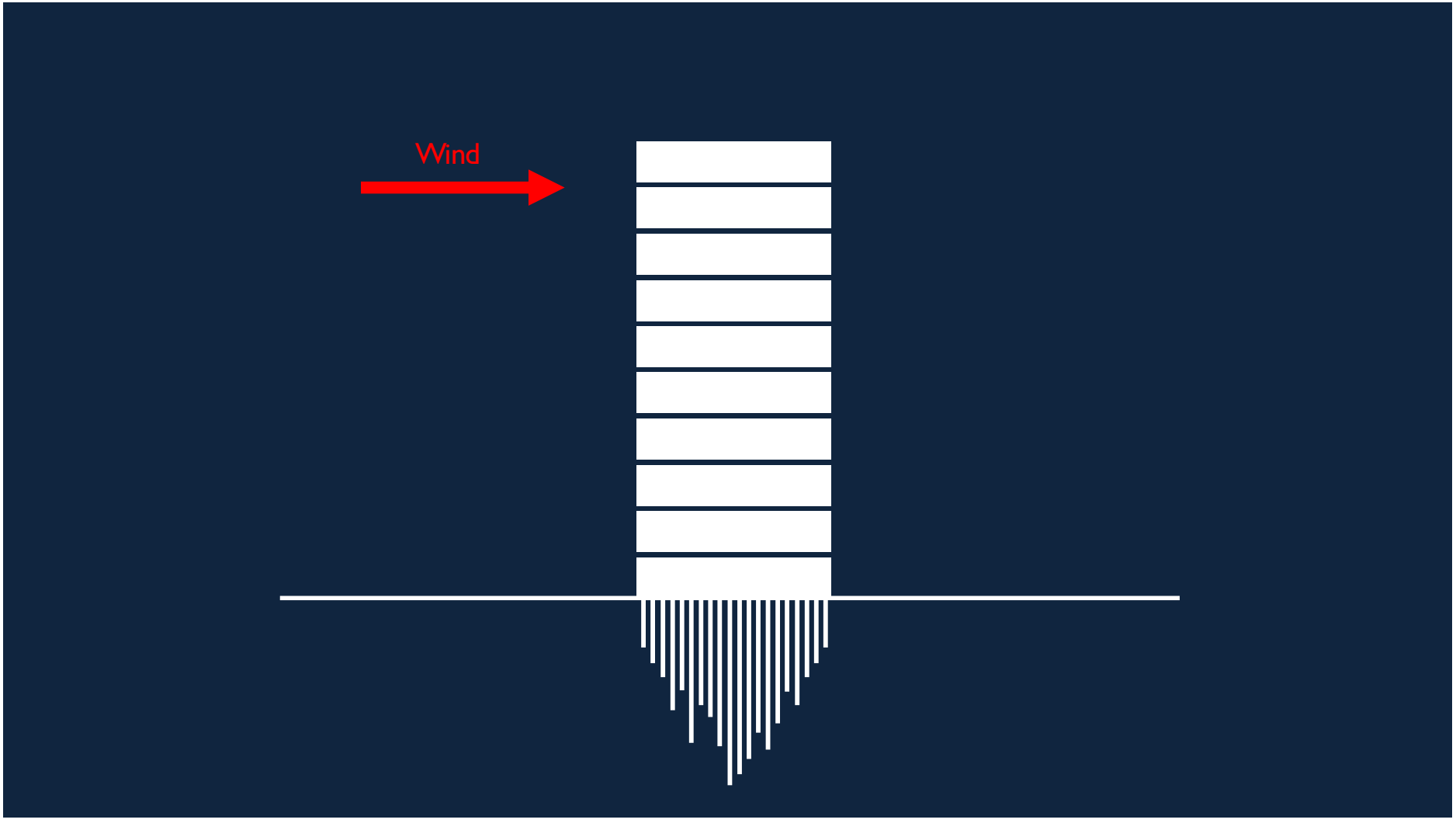
60m+

Piling scheme, 22 Bishopsgate

Max. depth:

60m+

The Wind


Wind

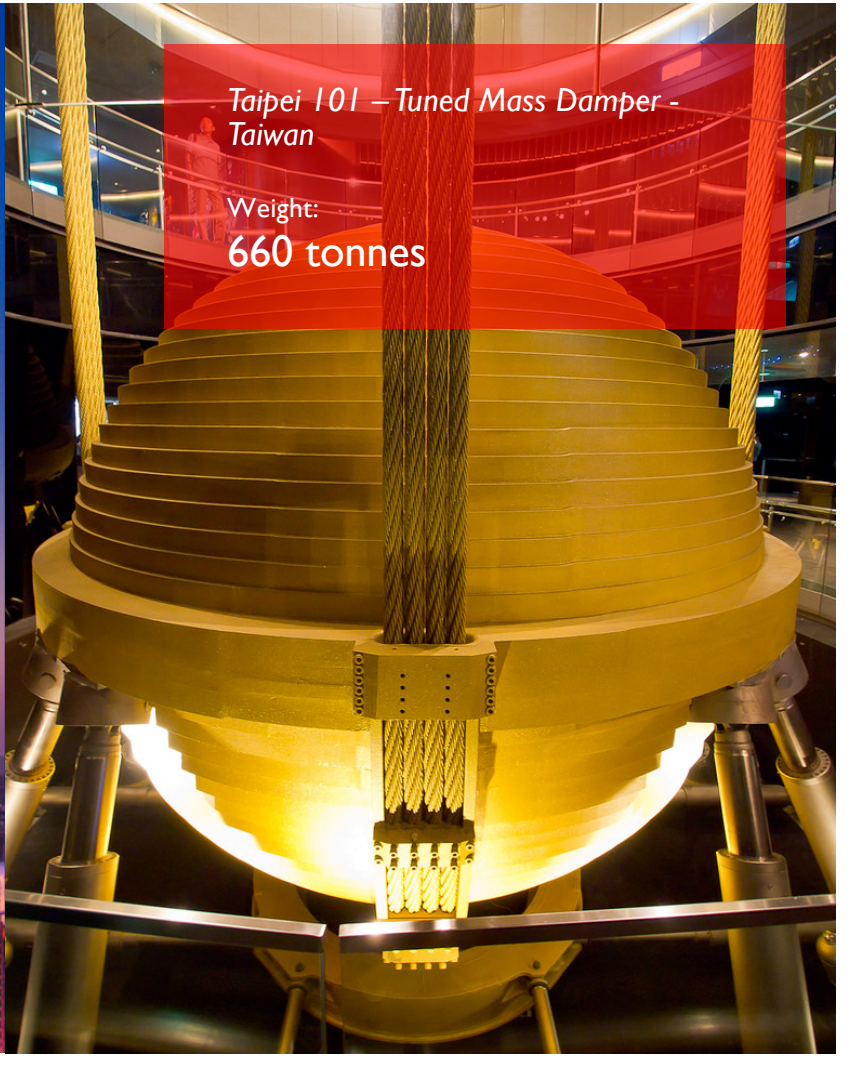
Shanghai Tower (632m – 2015)
Aerodynamic design

432 Park Avenue, NYC (426m – 2015)

No façade on plantroom floors.

Number of openings:

5 x 2 stories

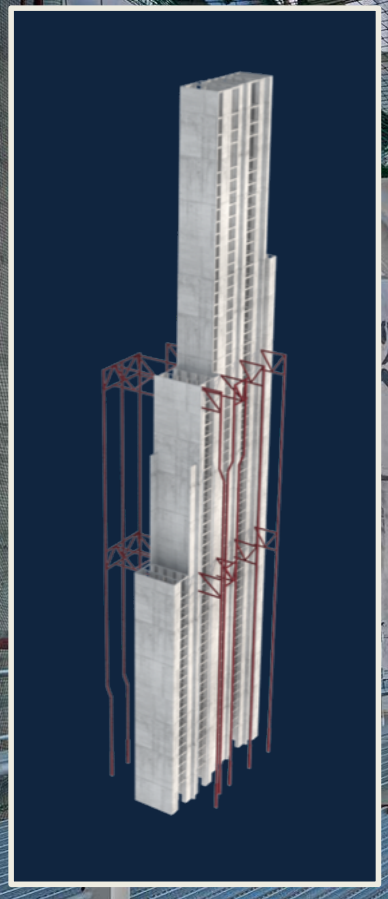


Taipei 101 – Tuned Mass Damper - Taiwan

Weight:

660 tonnes

(INSERT VIDEO TAIPEI 101 DAMPER)



Steel outriggers

22 Bishopsgate

Number:

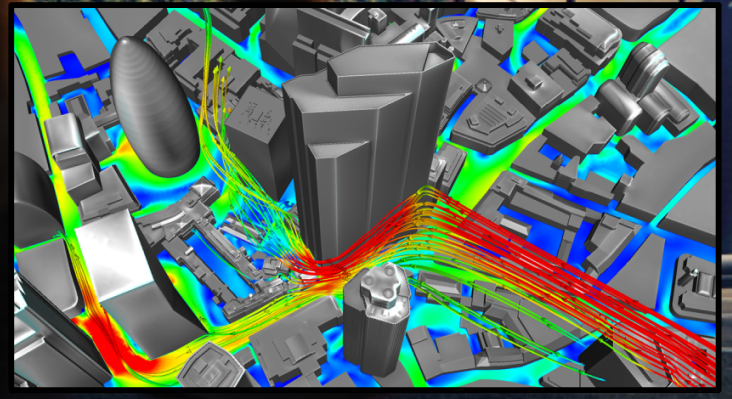
16

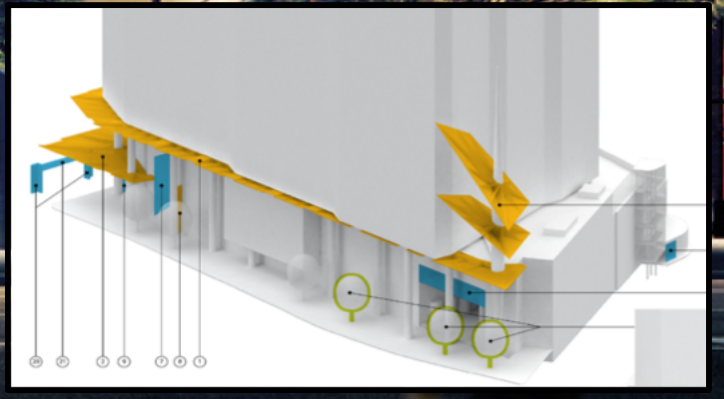
Concrete Wind Canopies

22 Bishopsgate

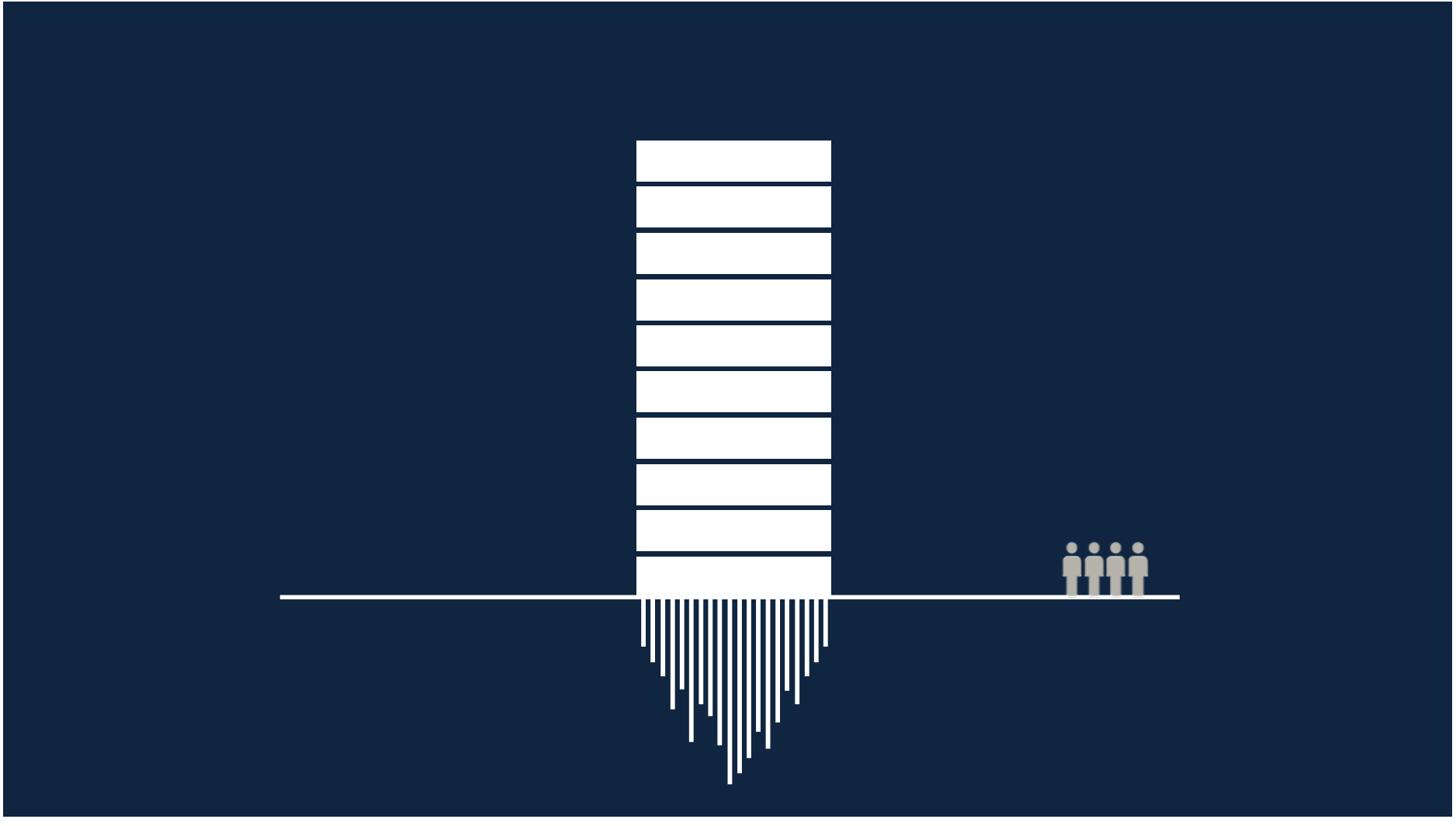
Number:

59 (L01M + L03)





Vertical Transportation



◄ *1853*

Elisha Otis demonstrating his safety system at *The New York World's Fair*.

Trust in the vertical transportation system increases *(nicknames the vertical railways)*, it is the beginning of the modern elevator.

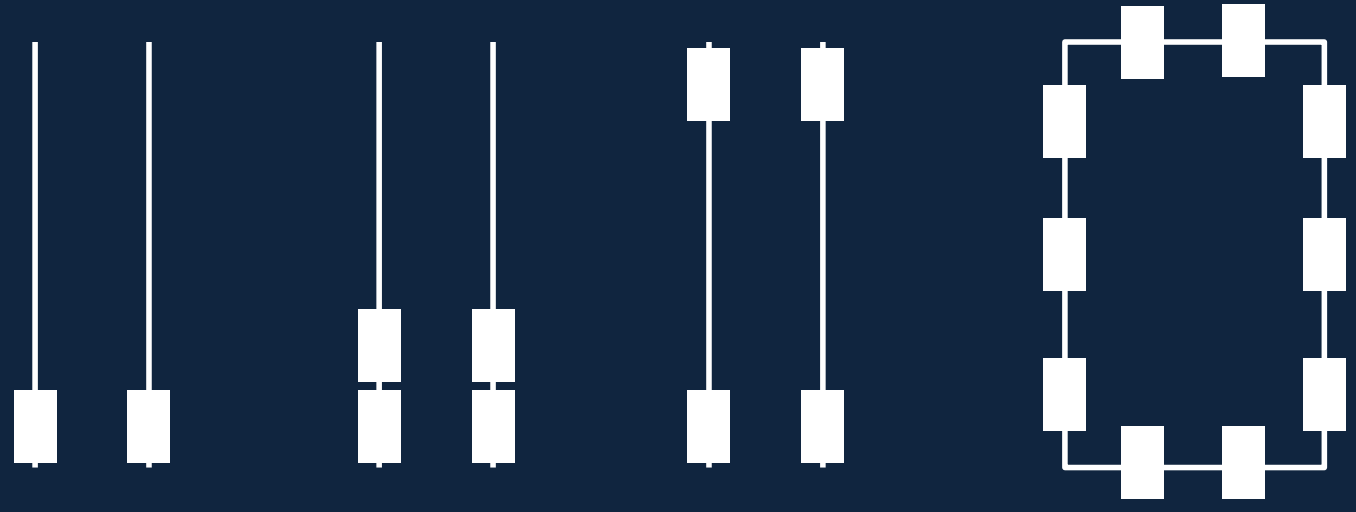
1856 ►

Installation of the World's 1st passenger elevator in a department store in New York. Developers begin to understand that they can now build taller than the traditional 5-7 story building.

'The UltraRope' de Kone

Carbon fibre cable,
allows a lift shaft height of up to:

1'000 mètres



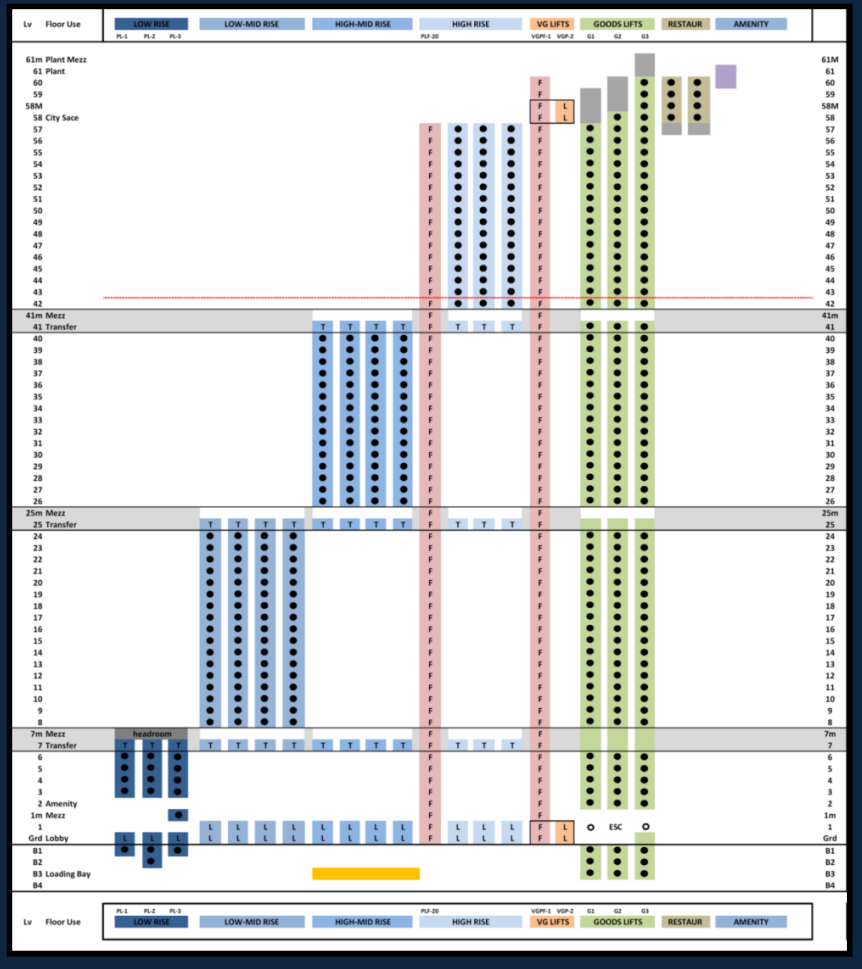
Standard

Double-decker

TWIN

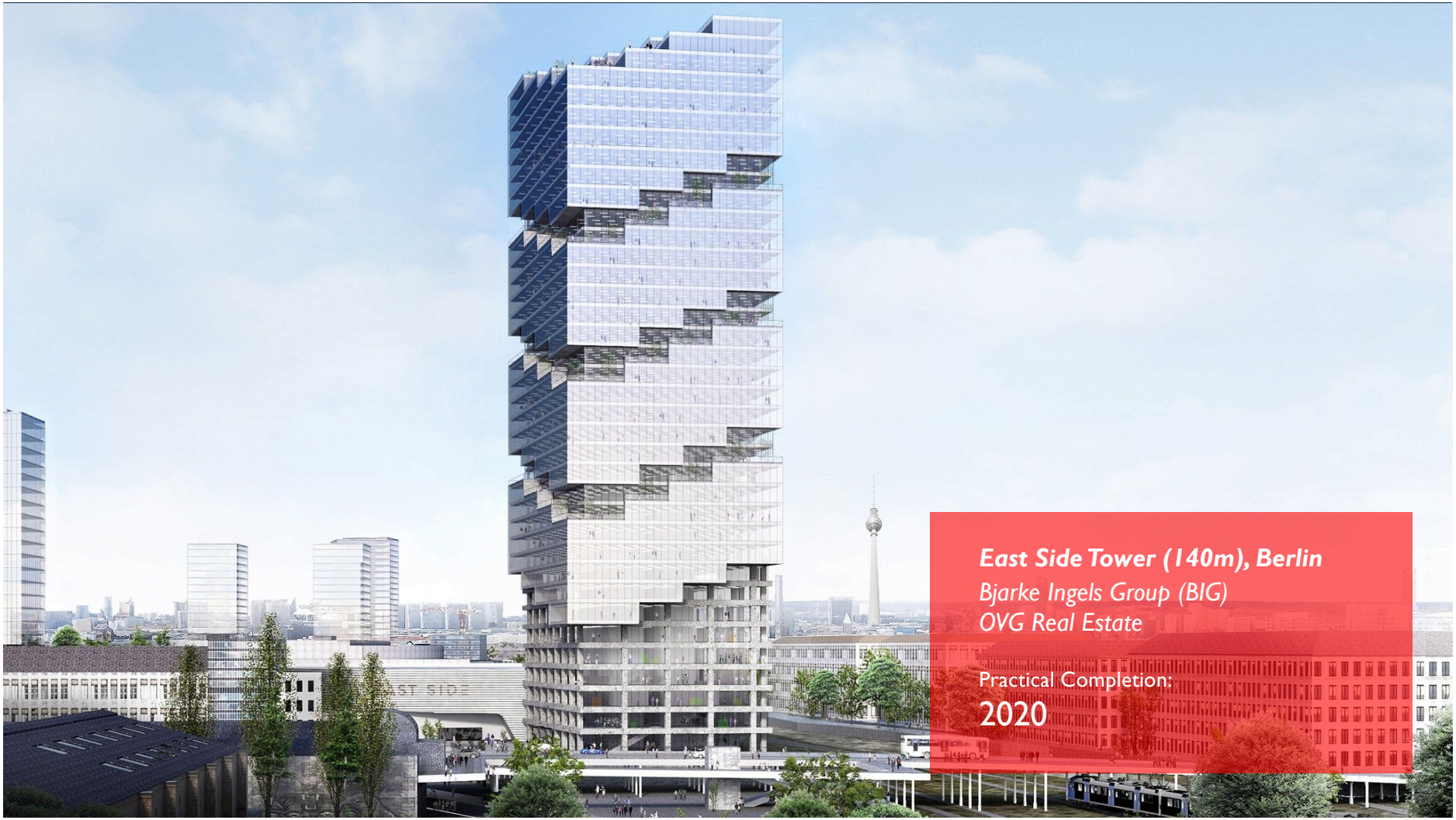
MULTI (ropeless)

(INSERT VIDEO MULTI)



53no lifts
10 escalators
35no lifts in main core
24no lifts are double decker

8.0 m/s (30 km/h) ▶



East Side Tower (140m), Berlin

Bjarke Ingels Group (BIG)

OVG Real Estate

Practical Completion:

2020

The Skybridge


Mindtown Center (Washington)
SHoP Architects
Practical Completion:
2018


American Copper Building (NYC)
SHoP Architects
Practical Completion:
2017

Marina Bay Sands (Singapur)
Moshe Safdie

Practical Completion:

2010

WILLIAM / KAVEN

The Broadway Plan (Portland)
William Kaven

Practical Competion:

Proposal

Raffles City Chongqing (Chongqing)

Moshe Safdie

Practical Completion:

2020

Site Logistics


22 Bishopsgate
Avg number of workers per day:
1’200

22 Bishopsgate

Avg number of deliveries per day:

15 - 25

22 Bishopsgate

Avg number of 600 litre bins emptied per day:

100

22 Bishopsgate

Avg number of steel beams/columns installed per day:

10 - 20

Concrete pouring, 22 Bishopsgate

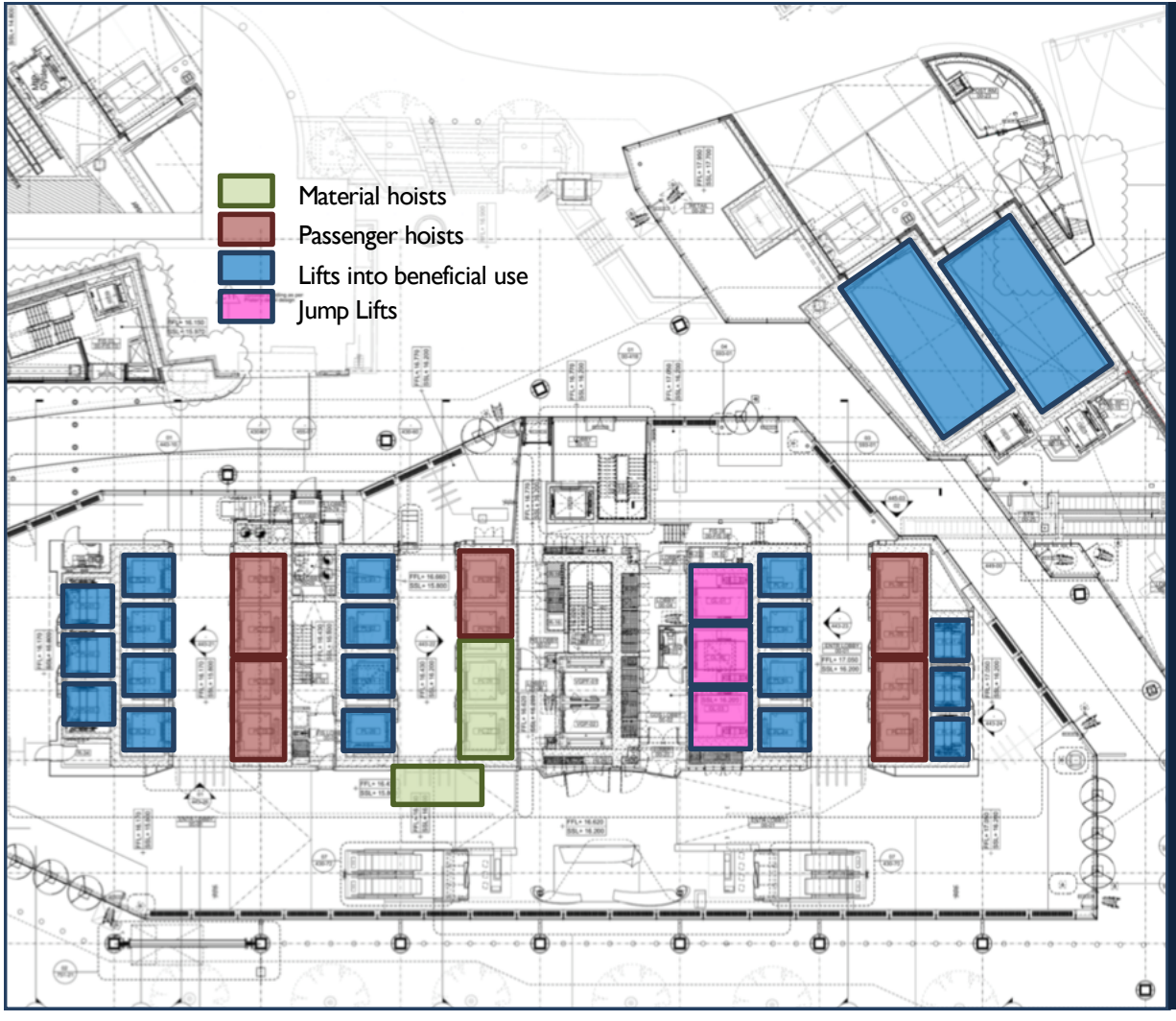
Avg volume poured per day:

$70m^3$

22 Bishopsgate

Avg number of façade panels installed per day:

15 - 25



Lifting infrastructure;

3 Jump Lifts

5 passenger hoists

2 material hoists

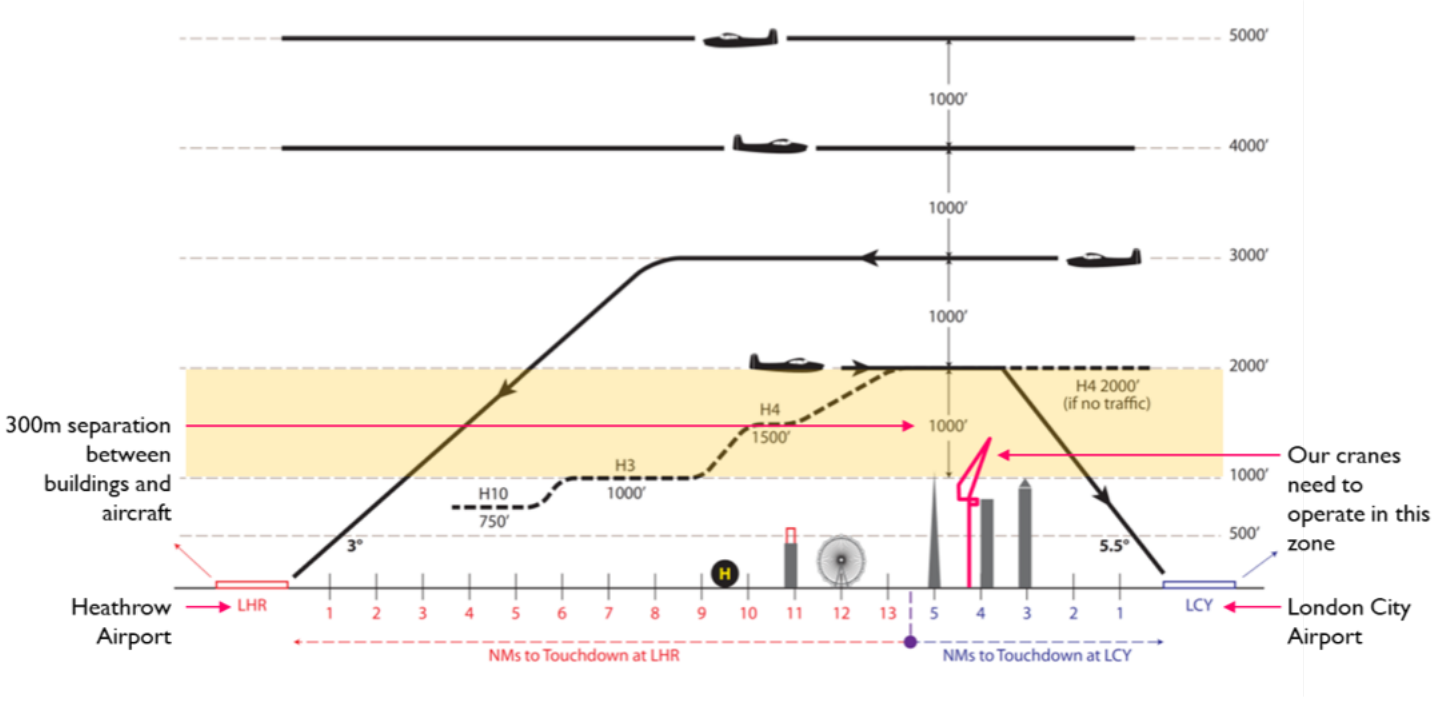
18 passenger lifts into beneficial use

2 vehicle lifts into beneficial use

(INSERT VIDEO MOVEMENT STRATEGIES VIDEO)


TC2
TC3
TC1
TC6
TC4
22 Bishopsgate
Number of tower cranes simultaneously:
5

TC4a breaching airspace



THE JUMPING TRIO – Spare the Hook

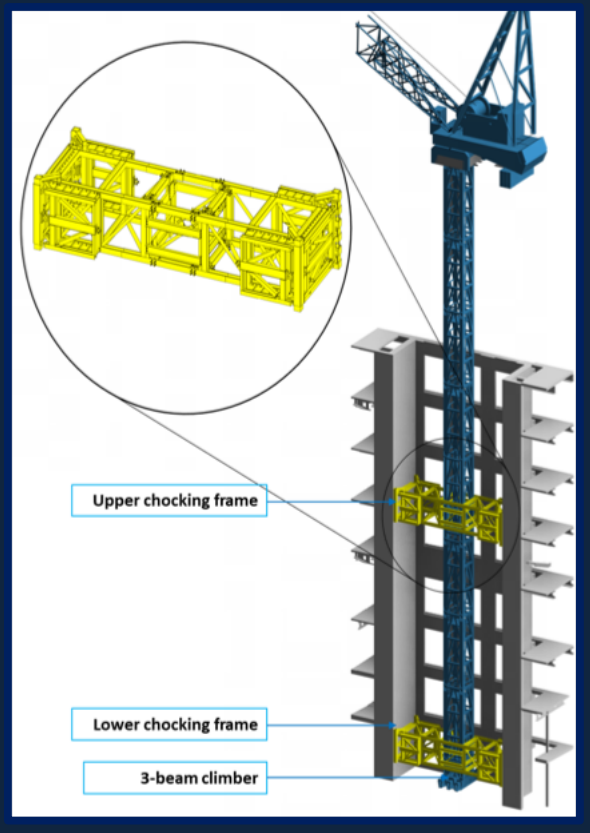
The Jumpform Rig

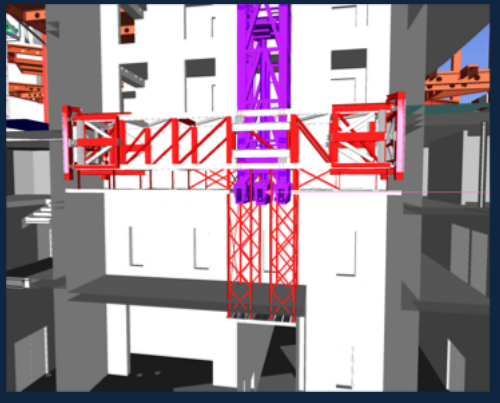
(INSERT VIDEO M-TECH)

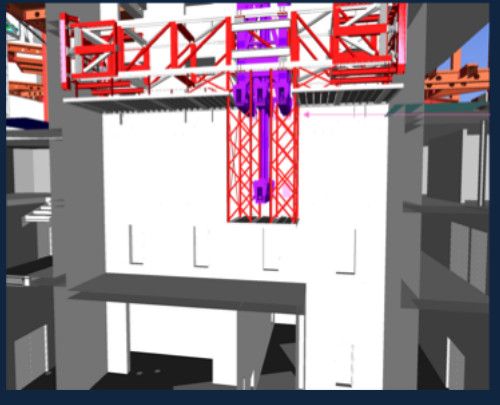
The Jumping Lifts

(INSERT VIDEO JUMP LIFTS OTIS)

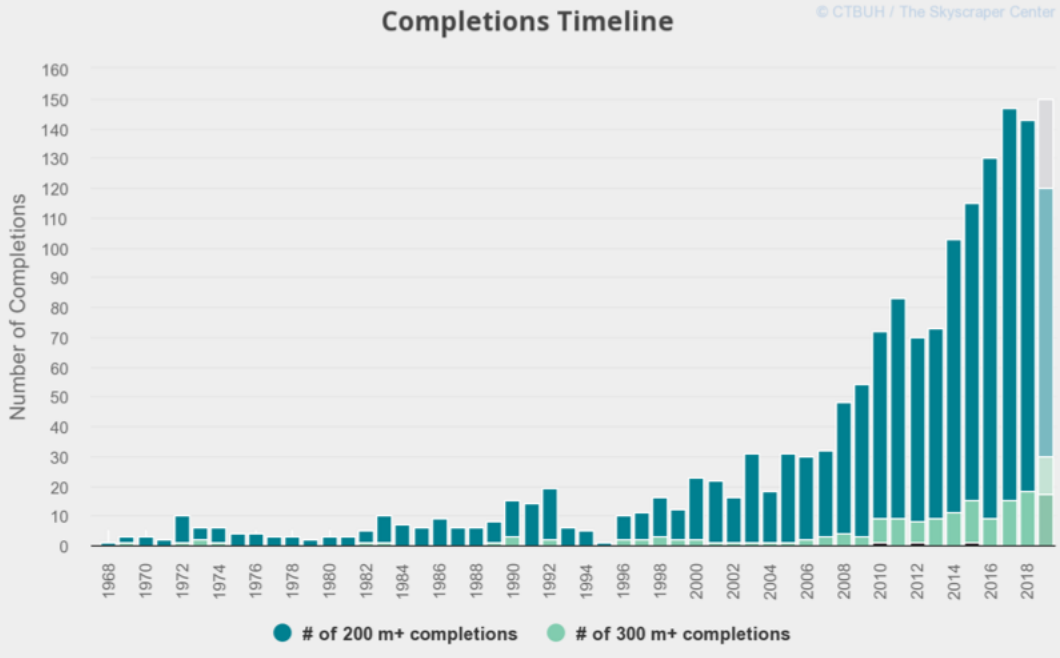
The Jumping Cranes

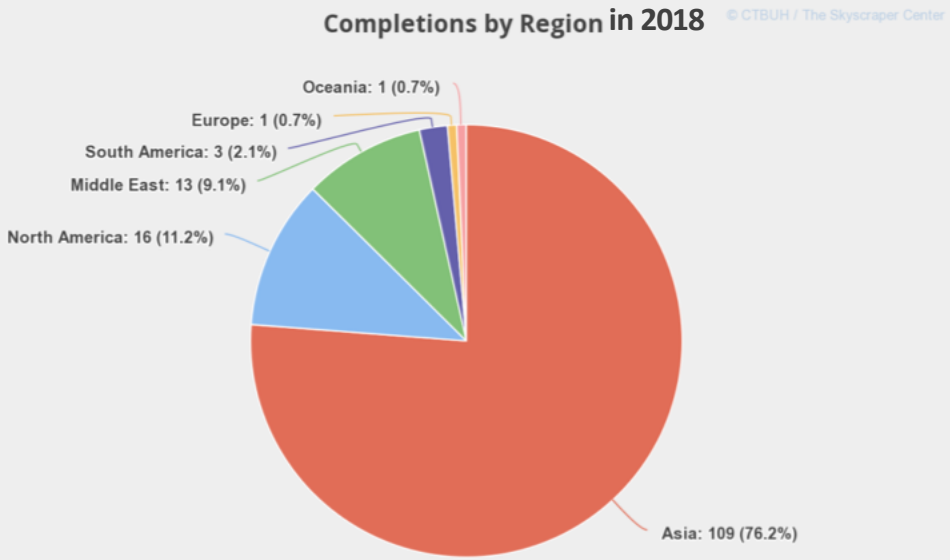


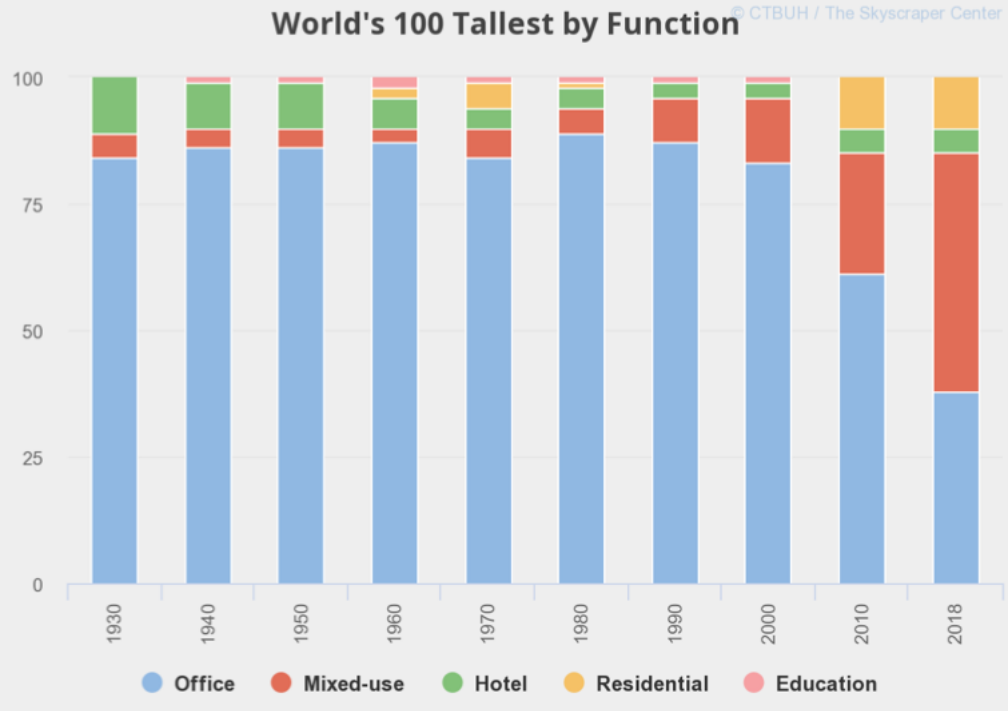




Around the World


Completions Timeline
© CTBUH / The Skyscraper Center
Number of Completions
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
# of 200 m+ completions
# of 300 m+ completions


Completions by Region in 2018
© CTBUH / The Skyscraper Center
Oceania: 1 (0.7%)
Europe: 1 (0.7%)
South America: 3 (2.1%)
Middle East: 13 (9.1%)
North America: 16 (11.2%)
Asia: 109 (76.2%)


World's 100 Tallest by Function
© CTBUH / The Skyscraper Center
100
75
50
25
0
1930
1940
1950
1960
1970
1980
1990
2000
2010
2018
Office
Mixed-use
Hotel
Residential
Education