FUTURES OF URBAN LIVING

ARCOLOGY

A CITY IN ONE BUILDING

Rethinking the relationship between architecture, density and the natural environment.

HORIZONTAL / VERTICAL / INTEGRATED

A conceptual exploration

A Biophilic Megacity in 1 Building

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Author Manus Heunis (Professional Architect)



What is arcology?

A high-density urban system that brings the functions of a city into a deliberately integrated architectural and ecological structure.

ARCHITECTURE + ECOLOGY = ARCOLOGY

One interconnected urban ecosystem.

Rather than spreading homes, workplaces, services and infrastructure across a conventional city, arcology concentrates them into a compact, connected environment.

WORK | PLAY | LIVE - IN 1 INTEGRATED HABITAT

HIGH DENSITY

More people and activities within a smaller land footprint.

MIXED-USE BY DESIGN

Homes, work, education, healthcare, retail and recreation are interwoven.

ECOLOGICAL PERFORMANCE

Energy, water, food, waste and biodiversity are treated as connected systems.

The ambition: reduce dependence on external networks and lower the environmental impact of daily life.

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The city as a connected landscape

A broad, interconnected megastructure can organize multiple neighborhoods and urban functions across a shared footprint.



HORIZONTAL ARCOLOGY

A network of places, not a single tower.

Connected districts Residential, commercial, hospitality and civic functions linked by sheltered routes.

Shared infrastructure Centralised energy, water, waste and mobility networks.

Landscape within the city Courtyards, planted roofs, green corridors and productive gardens.

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The city as a vertical ecosystem

A single supertall structure could stack urban districts, infrastructure and green spaces into one continuous vertical environment.



HYPOTHETICAL CONCEPT

2,800 m

Proposed conceptual height

1,000 m

Proposed conceptual width at base

For scale

Burj Khalifa / 828 m

The 2,800 m concept is approximately 3.4 times the height of the Burj Khalifa (formerly known as Burj Dubai).

Illustrative vision — not a built or technically validated project.

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Design the building as a living Eco System

Arcology depends on the performance of its connected systems — not simply on its form or height.

ENERGY

On-site renewables, storage, demand management and efficient building envelopes.

WATER

Rainwater capture, greywater recycling, treatment and carefully managed reuse.

FOOD

Urban agriculture, controlled-environment growing and local food distribution.

MOBILITY

Walkable internal districts, high-capacity lifts and low-carbon connections beyond the structure.

MATERIALS & WASTE

Durable low-carbon materials, repair, reuse, recycling and recovery systems.

NATURE

Daylight, planted habitats, biodiversity corridors and climate-responsive public spaces.

The goal is to close resource loops wherever practical — while recognising that a megastructure will still rely on external supply chains and wider city networks.

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A compelling vision — with serious questions

Arcology is a design proposition, not a guarantee of sustainability. Its success would depend on measurable whole-life performance.

POTENTIAL BENEFITS

Land efficiency Concentrating development may limit outward urban expansion.

Shorter daily journeys Co-locating homes, jobs and services can reduce travel demand.

Shared systems Integrated infrastructure may improve resource efficiency.

A new public realm Vertical and horizontal landscapes can bring nature into dense urban life.

KEY CHALLENGES

Engineering & safety Wind, structure, fire strategy, evacuation and vertical transport.

Human wellbeing Daylight, access to nature, privacy, community and legibility.

Resource reality Embodied carbon, construction logistics, food and energy demand.

Governance & resilience Affordability, ownership, maintenance and emergency continuity.

A true arcology must demonstrate that its total environmental footprint is lower — from construction through decades of operation.

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A vertical city needs a layered escape strategy

A 2,800 m arcology needs layered protection, staged relocation and independent escape options; evacuation cannot rely on stairs to ground level or external rescue alone.

1 / PREVENT & CONTAIN

Compartmentation Create fire- and smoke-resisting zones with protected shafts, lobbies and transfer levels.

Detection & suppression Provide addressable alarms, voice alerts, sprinklers and monitored fire controls.

Smoke control Pressurise stairs and lobbies; extract smoke independently and use fire-rated construction.



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2 / REFUGE & VERTICAL ZONING

Refuge floors Provide protected refuge / transfer levels at intervals set by evacuation modelling.

Safe holding Provide backup power, communications, water, sanitation and assisted-evacuation support.

Redundant routes Provide remote protected stairs, evacuation lifts and secure links between zones.



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06 / FIRE & EMERGENCY EVACUATION

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3 / EVACUATE & RESPOND

Phased evacuation Clear the fire zone and adjacent floors first; expand by zone under central command.

Evacuation lifts Use protected high velocity lifts for managed evacuation, including people with reduced mobility.

Deployable Emergency Evacuation Pods (DEEPs) Concept only: 50–100-person parachute pods; feasibility, wind and landing safety remain unproven.





DESIGN PRINCIPLE / Pods are speculative and supplementary — never a substitute for protected refuge, stairs, evacuation lifts and fire-service response.

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Distributed heliports for convenient access

Selected roofs could become aviation nodes for transfers, medical emergency-response teams and essential supplies — subject to strict wind, approach and operating limits.

1 / DISTRIBUTED LANDING DECKS

Selected roof levels Place purpose-designed heliports on selected intermediate and upper roofs.

Aviation clearances Keep approach / departure paths clear of towers, cranes and antennas.

Wind & turbulence Model wind, rotor downwash, turbulence and visibility at each level.



DESIGN PRINCIPLE / Heliports supplement — but never replace — protected internal refuge, stair and evacuation-lift systems.

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2 / SAFE OPERATIONS

Dedicated facilities Mark landing and safety areas; provide lighting, drainage and passenger routes.

Fire & rescue Provide aviation firefighting, rescue access and emergency shut-offs.

Protected access Link decks to protected stairs, lifts, waiting and medical areas.

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3 / EMERGENCY ROLE

Medical response Enable urgent patient transfers, teams and essential supplies.

Incident support Support incident command and inspection when conditions permit.

Not mass evacuation Not mass evacuation: smoke, heat, high wind or restricted airspace can prevent flights.

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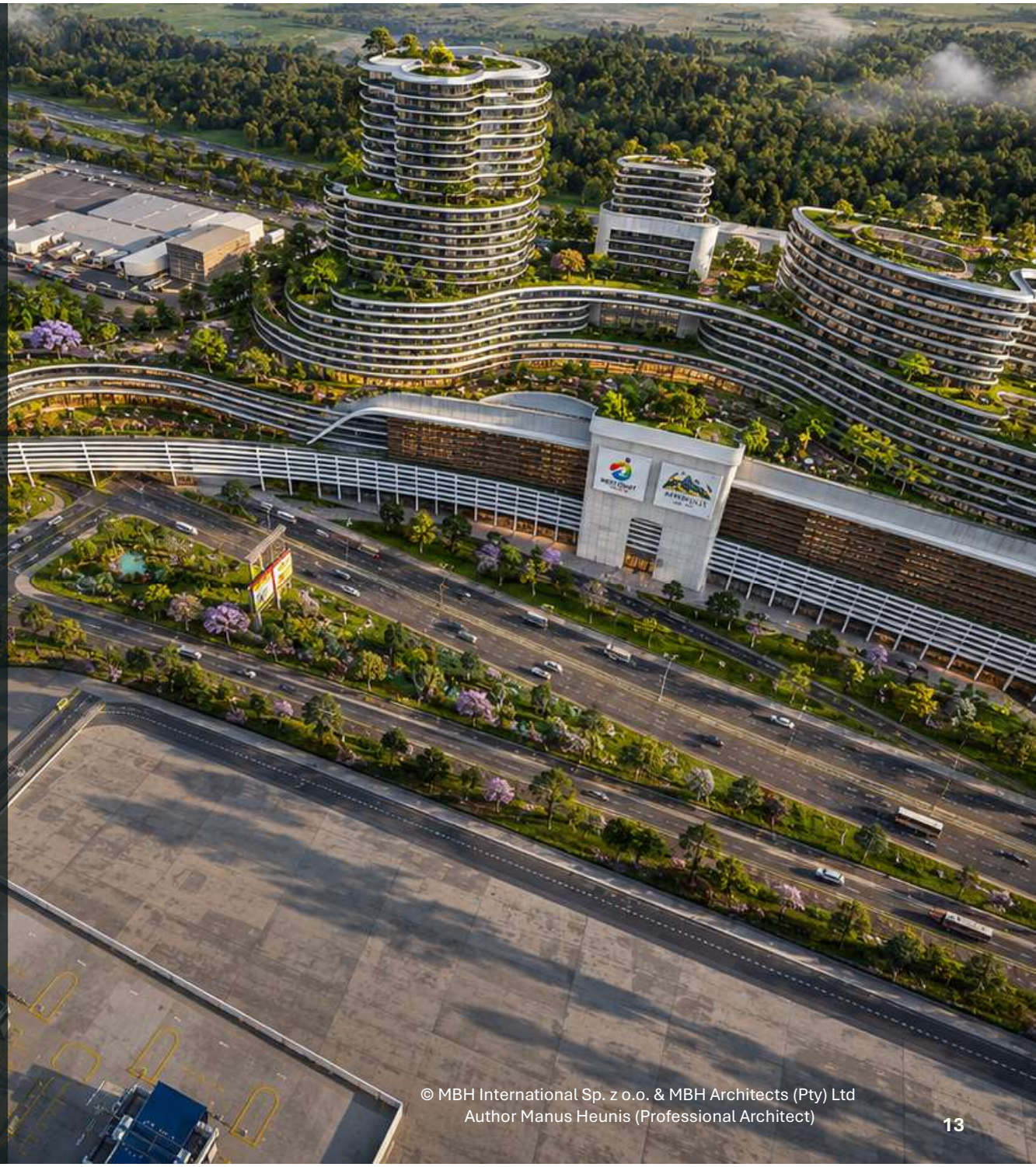
THE BIG IDEA

Not just a building. A complete urban habitat.

Whether arranged horizontally across a landscape or vertically as a 2,800-metre megastructure, arcology asks a fundamental question:

Can we design the city as one integrated system — where human activity and natural processes support one another?



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