

The background of the slide is a photograph of a building facade, heavily overlaid with a green grid pattern. The grid consists of numerous thin, white lines that form a series of rectangles of varying sizes, creating a complex, architectural-looking texture. The overall color scheme is dominated by shades of green, from light to dark. A thin white horizontal line is positioned near the top of the slide, just above the main title.

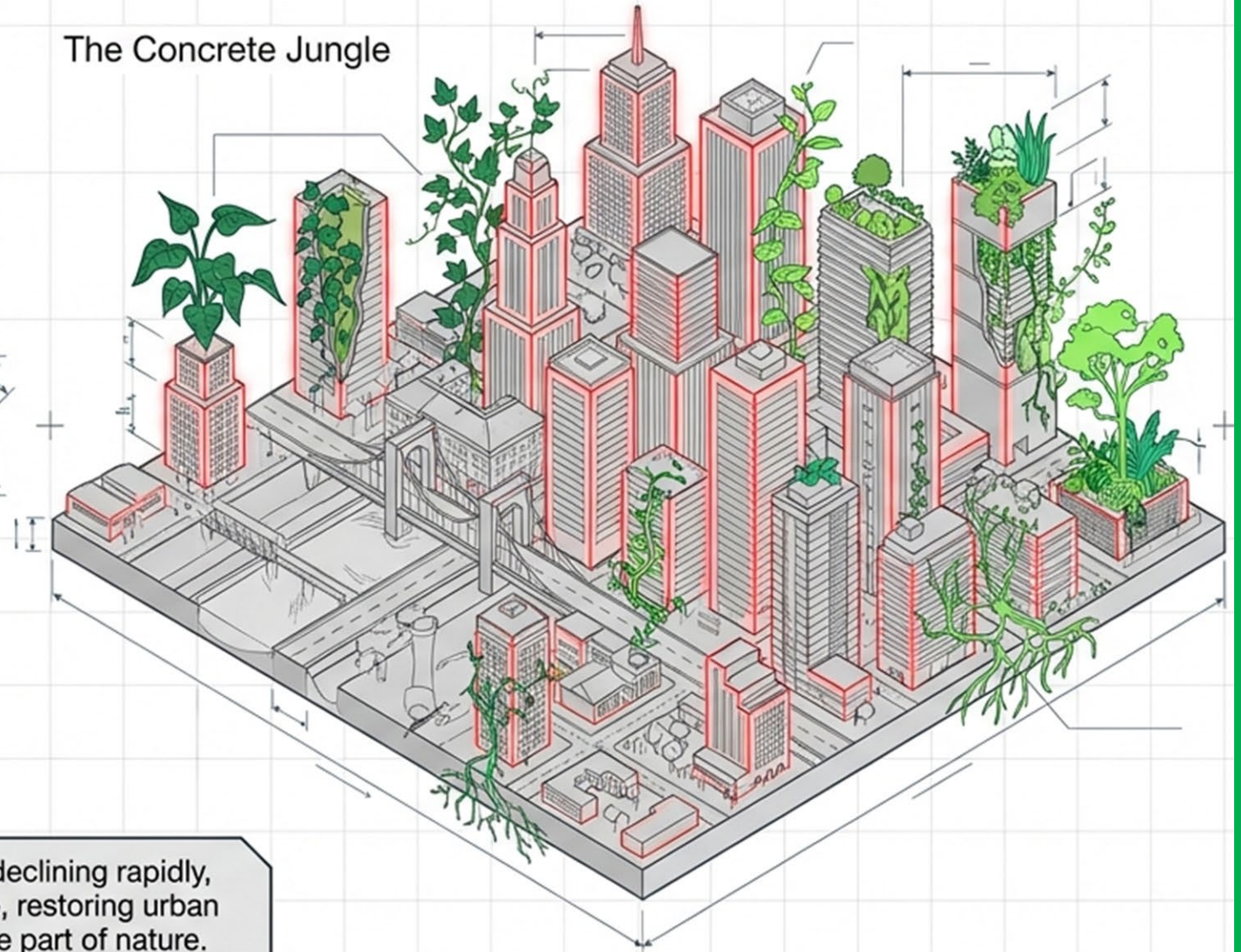
Green Facades

Macro-to-micro zoom

70%
of the global
population in cities
by 2050

(UN forecast)

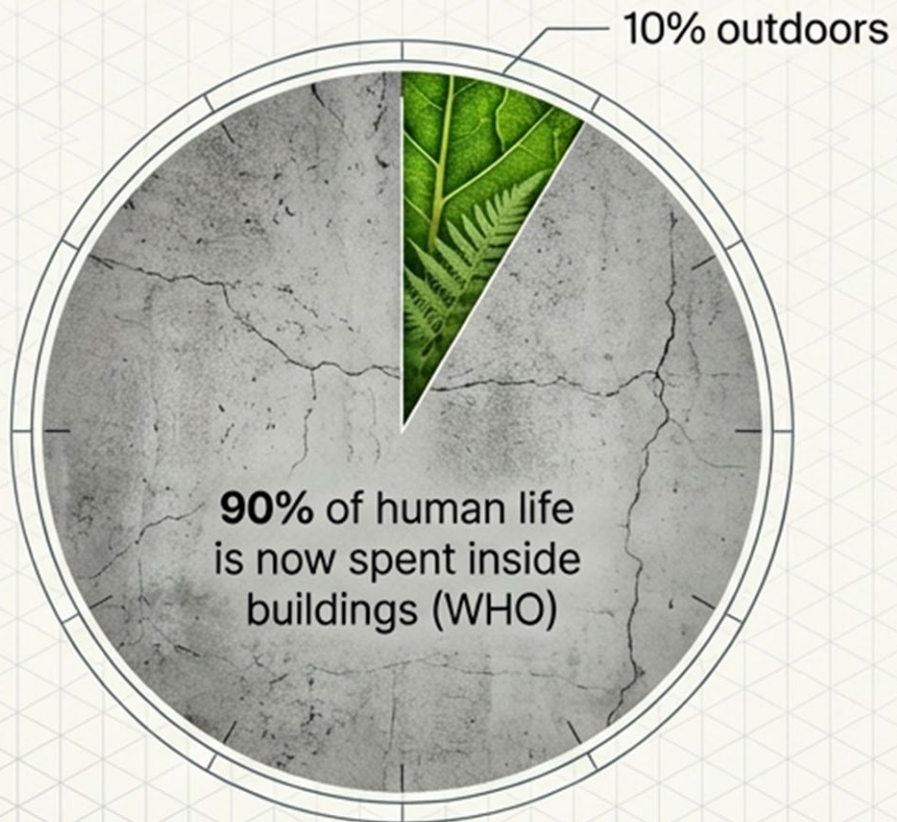
The Concrete Jungle



With ground space at an absolute premium and biodiversity declining rapidly, vertical infrastructure is the final frontier for integrating nature, restoring urban ecology, and mitigating climate impact. The city must become part of nature.

Biophilia

24-Hour Clock

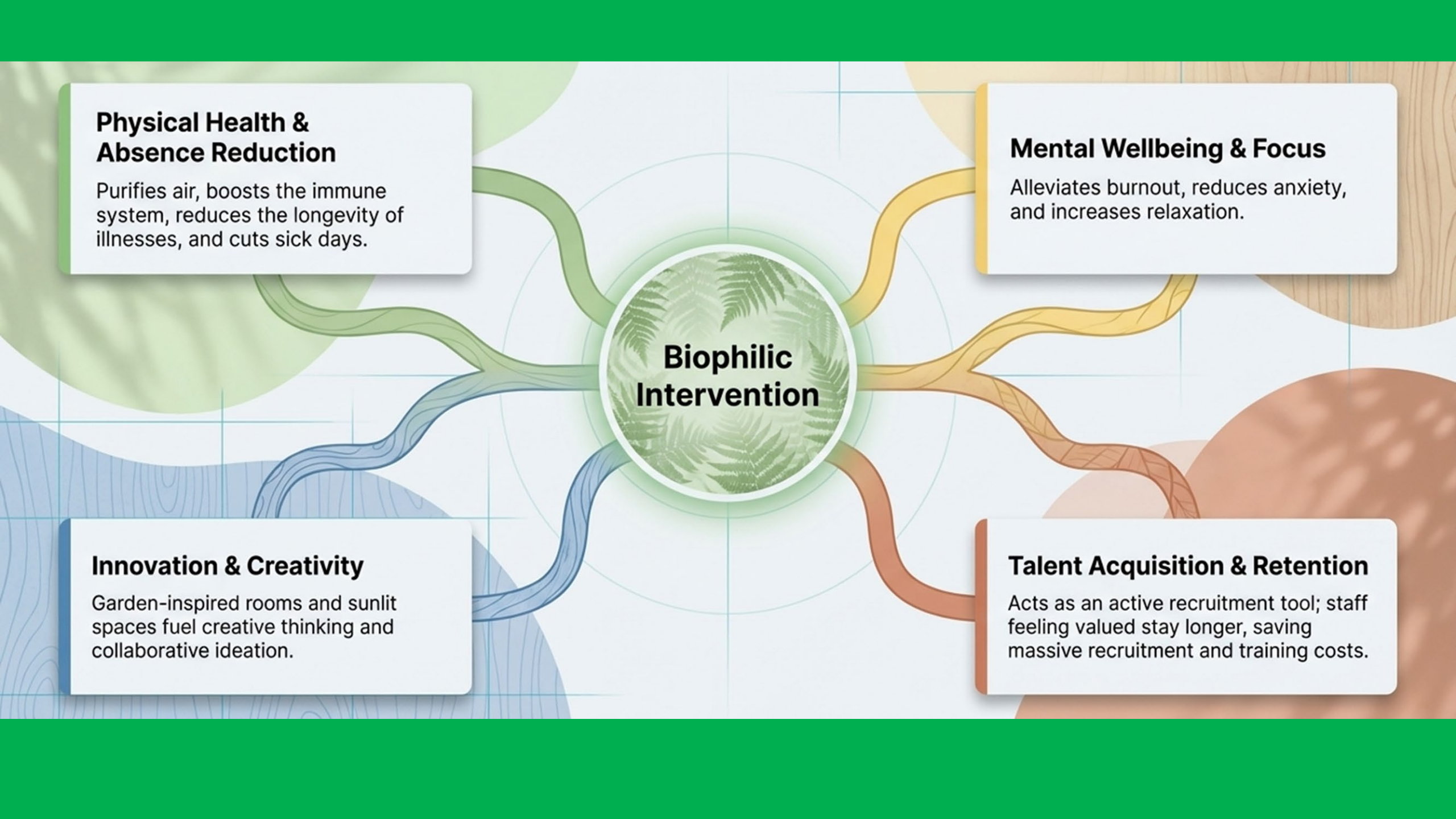


Biophilic design is an architectural and interior design approach that integrates nature - including natural lighting, ventilation, plants, and natural materials—into the built environment

Physical Health & Absence Reduction

Purifies air, boosts the immune system, reduces the longevity of illnesses, and cuts sick days.

Biophilic Intervention



Mental Wellbeing & Focus

Alleviates burnout, reduces anxiety, and increases relaxation.

Innovation & Creativity

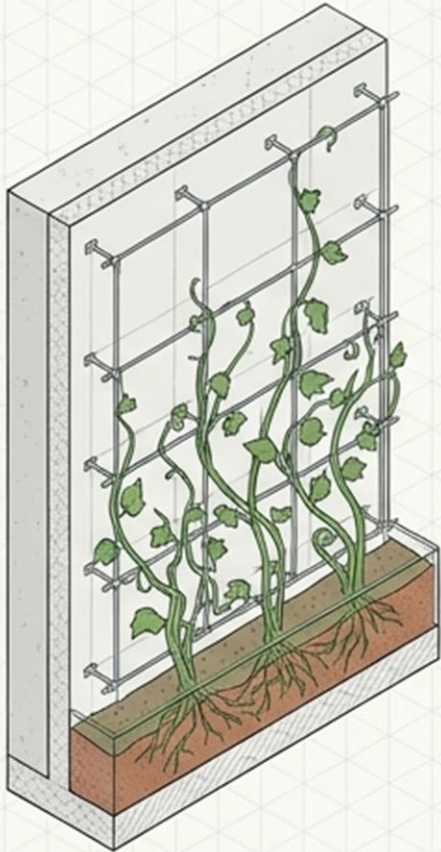
Garden-inspired rooms and sunlit spaces fuel creative thinking and collaborative ideation.

Talent Acquisition & Retention

Acts as an active recruitment tool; staff feeling valued stay longer, saving massive recruitment and training costs.

Types of Vertical Greening

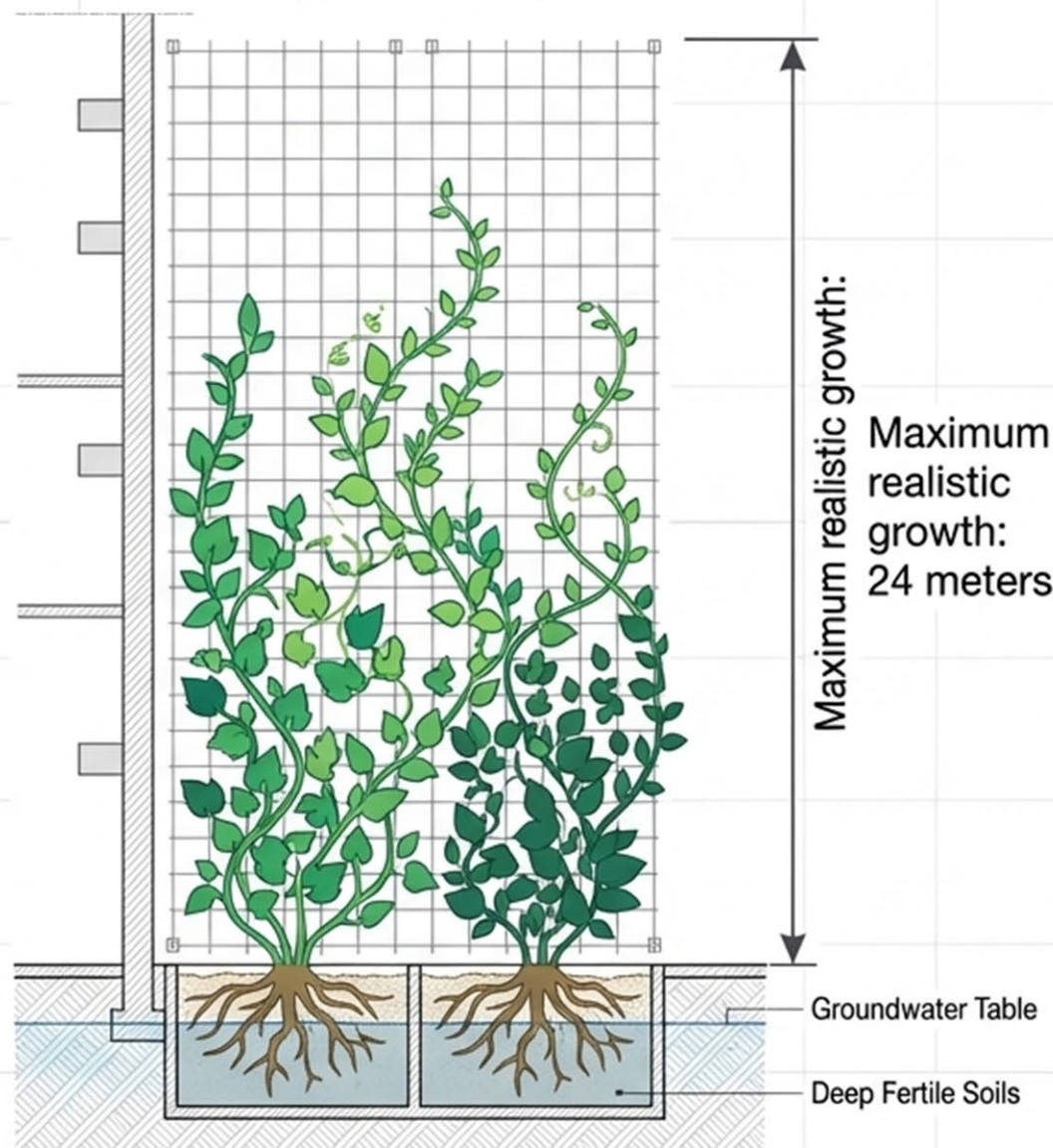
Green Facades (The Climbers)



Extensive Systems:

- Roots remain in soil.
- Plants climb up building fabric or trellis network.

System 1: Ground-rooted green façades



Coverage Speed



3 to 4 meters per year for fast-growing varieties.

Water Source



Utilizes natural groundwater and deep fertile soils; highly drought-resistant once established.

Plant Types



Self-clinging (Ivy), Twining (Honeysuckle), Ramblers (Roses).

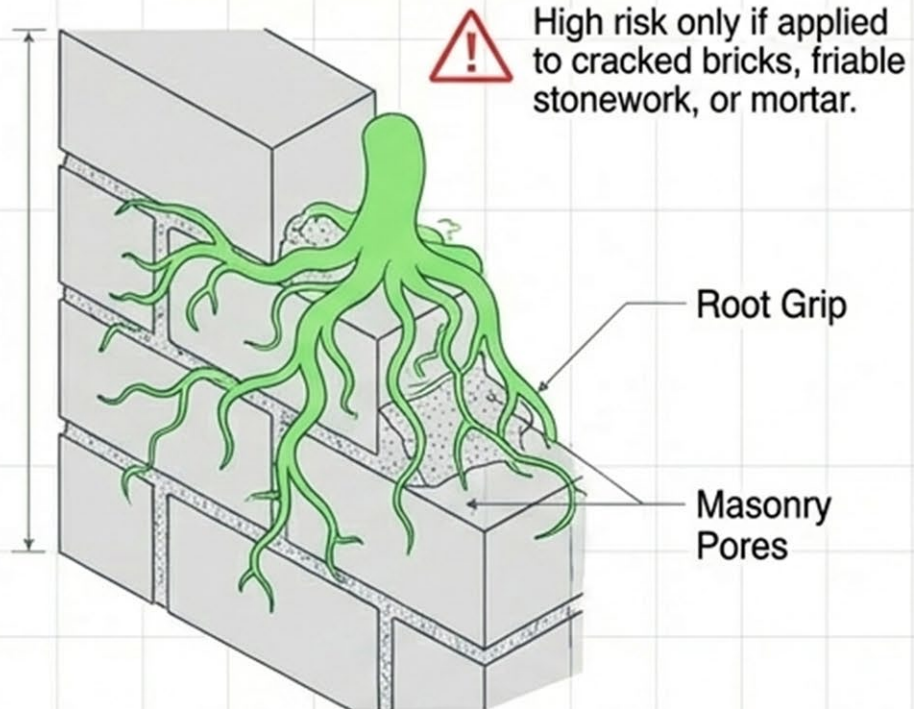
Maintenance Burden



Low-to-medium (bi-annual pruning to prevent self-strangulation and clearing gutters).

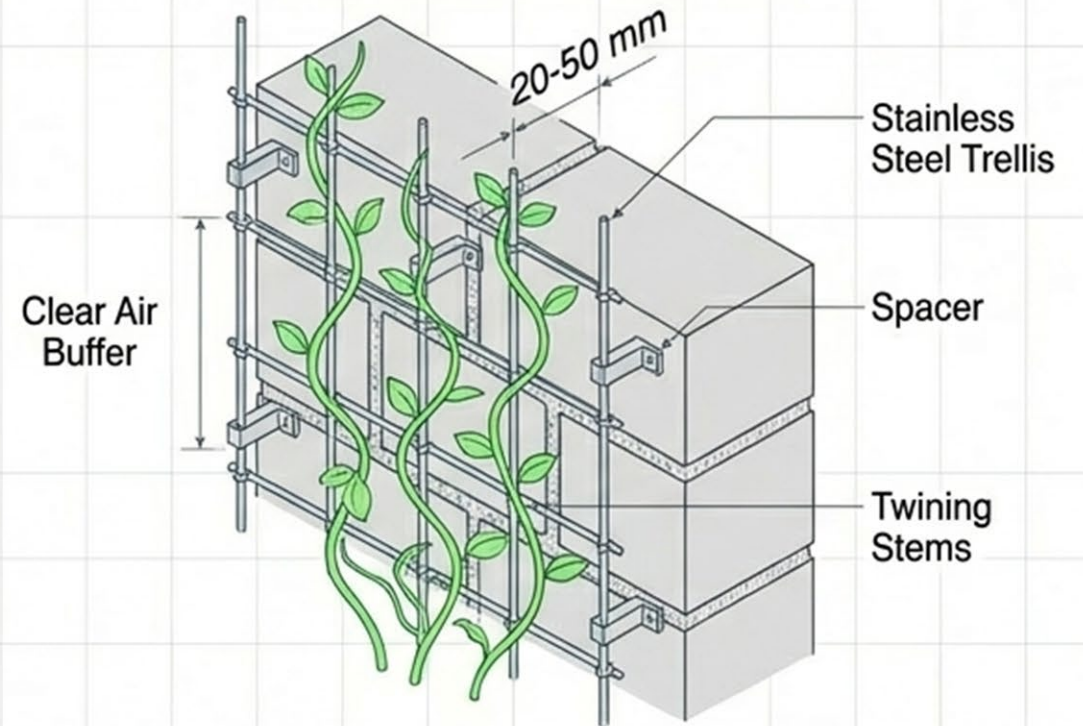
Attachment

Direct Greening



(e.g., *Parthenocissus quinquefolia*)

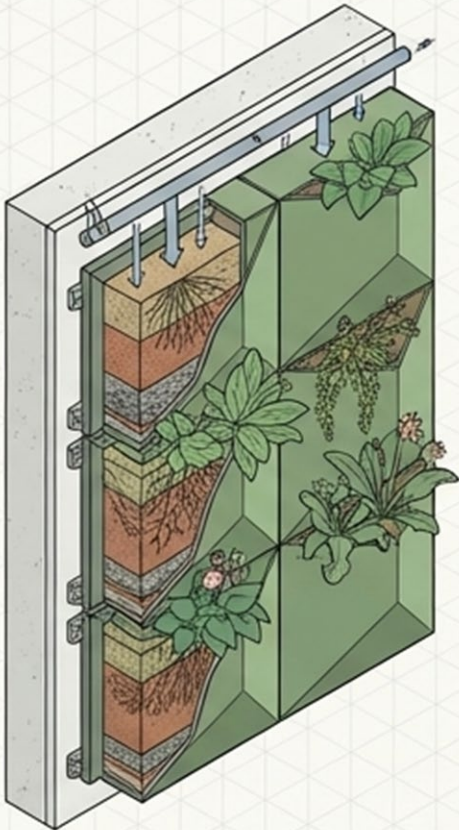
Indirect Greening



(e.g., *Wisteria*, *Lonicera*)

Types of Vertical Greening

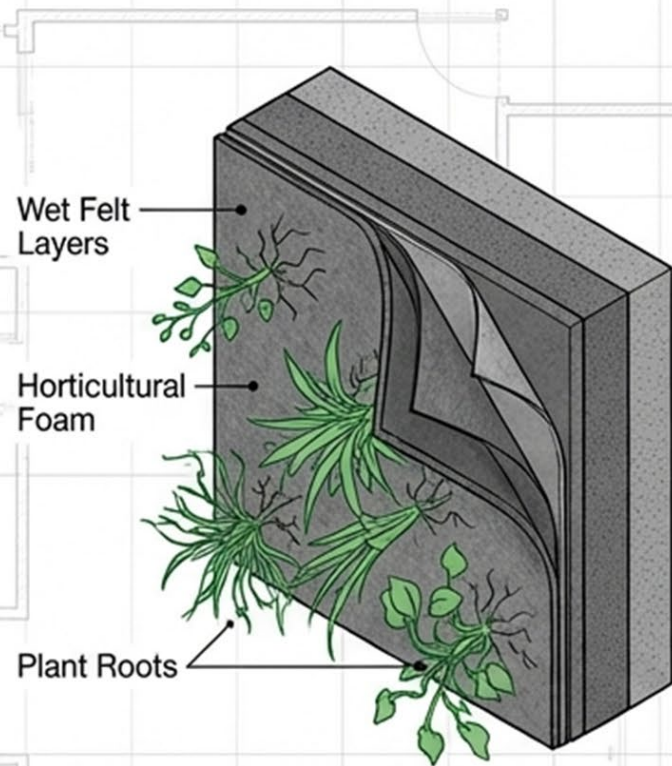
Living Walls (The Engineered)



Intensive Systems:

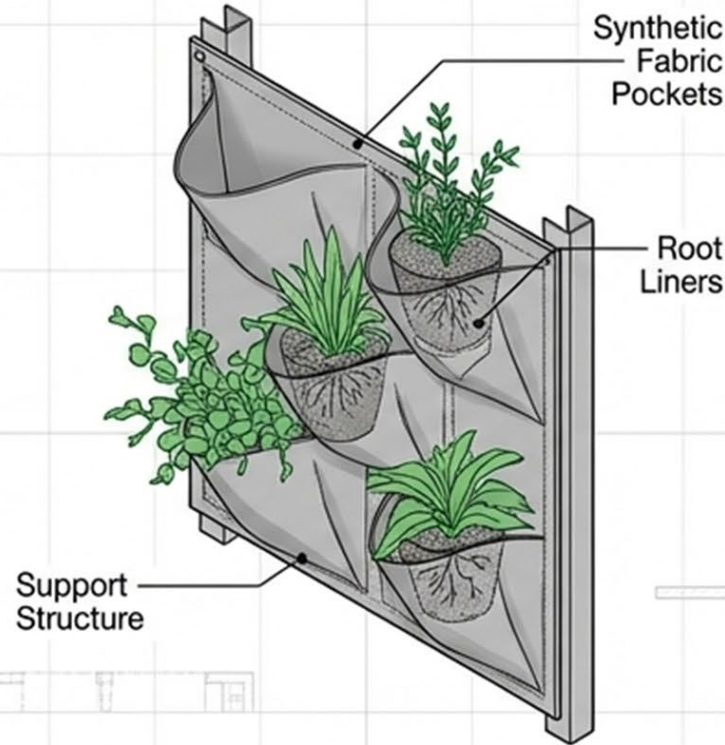
- Plants artificially supported across vertical face.
- Roots housed in containers using hydroponics or lightweight inert substrates.

System 2: The engineered living wall



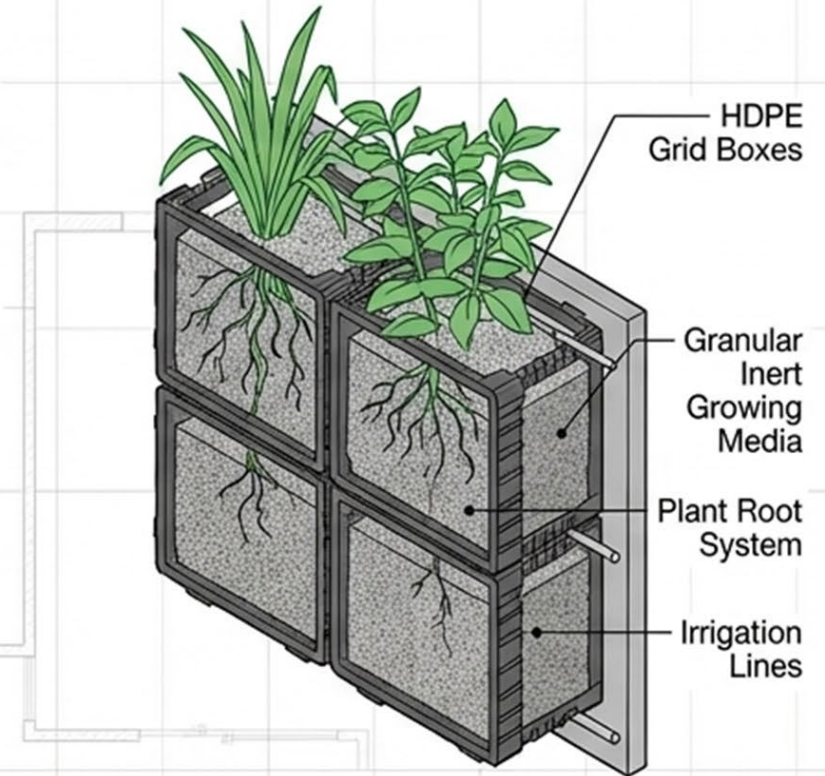
Vegetated Mat

Hydroponic, permanently wet



Hanging Pocket

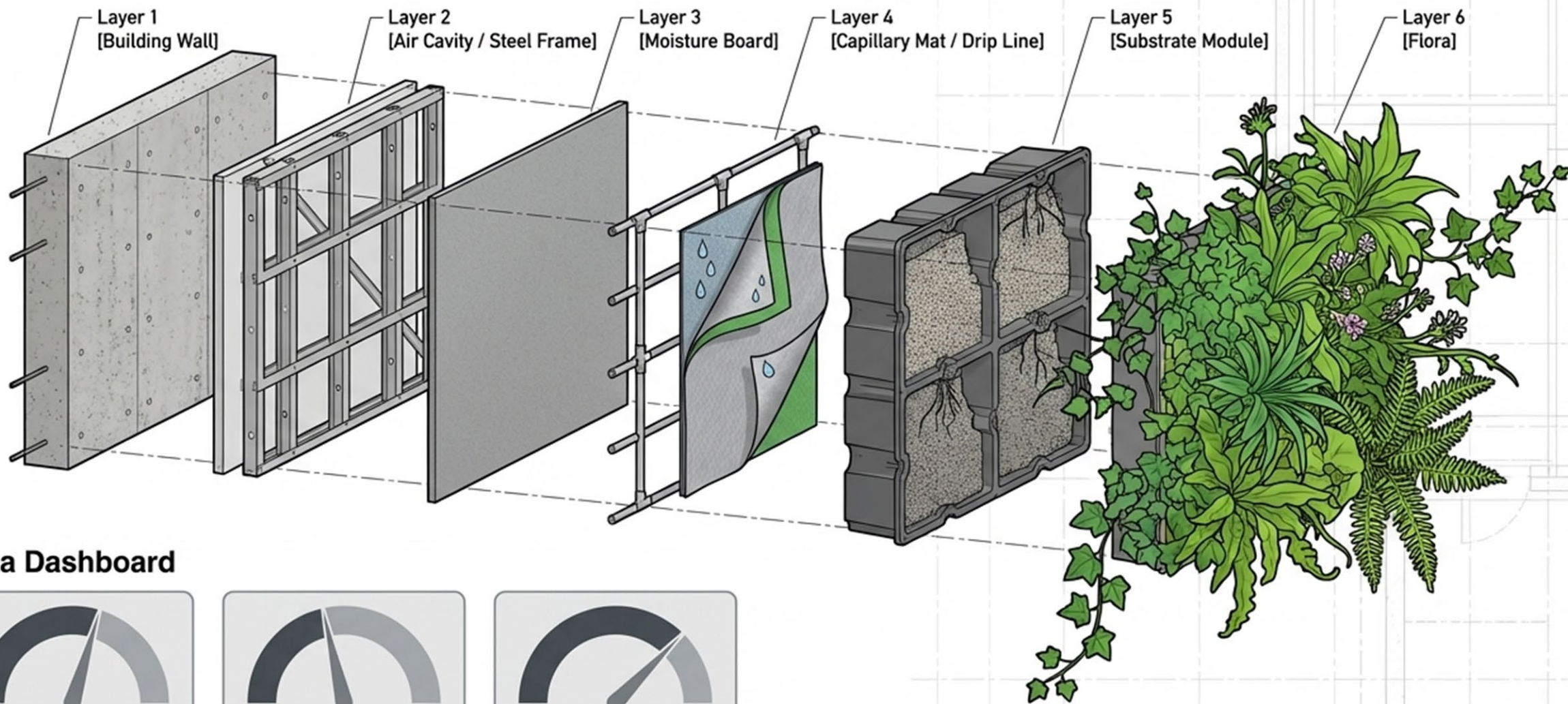
Semi-hydroponic, wet/dry cycles



Modular Wall

Substrate-irrigated, pre-grown

Living walls provide immediate aesthetic impact, but they abandon natural ground resilience. They are entirely dependent on engineered life-support systems to survive.



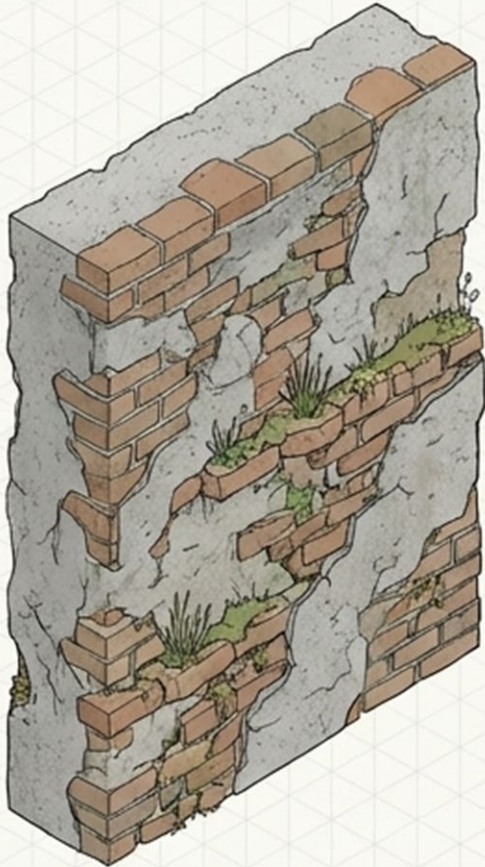
Data Dashboard



Takeaway: The structural engineer must account for immense saturated dead loads, not just the visual footprint.

Types of Vertical Greening

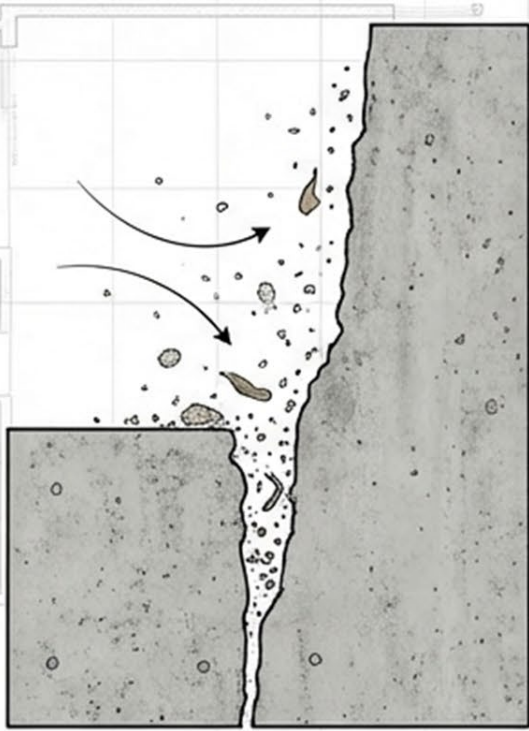
Brown Walls (The Organic)



Zero-infrastructure Systems:

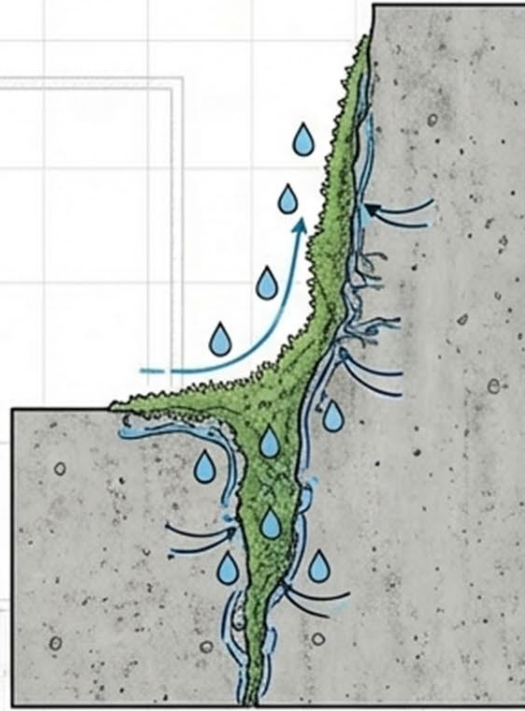
- Man-made walls designed to mimic nature.
- Wild plants and mosses allowed to colonise crevices naturally.

System 3: Brown walls and the urban cliff hypothesis



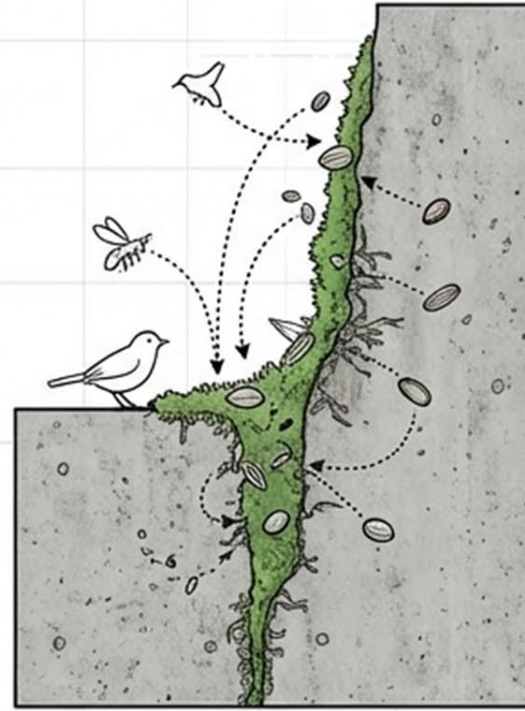
1. Accumulation

Windblown dust and animal gather in joints and crevices.



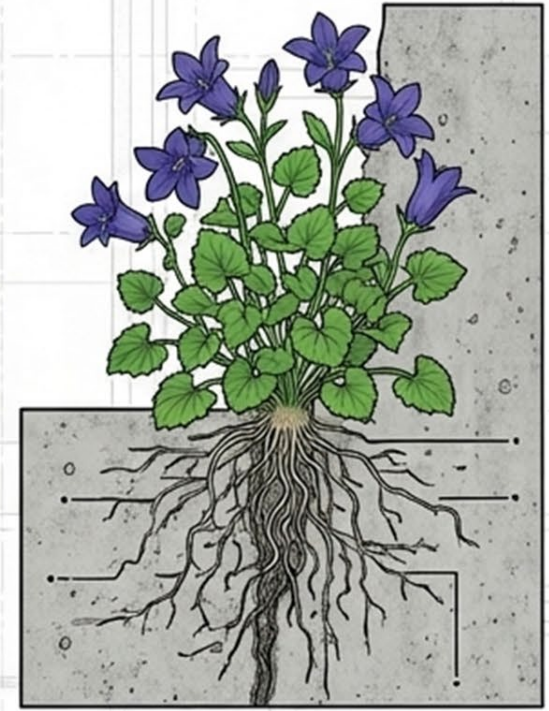
2. Moisture Retention

Mosses form, preserving a micro-layer of hydration.



3. Seeding

Birds and pollinators deposit randomly scattered seeds.

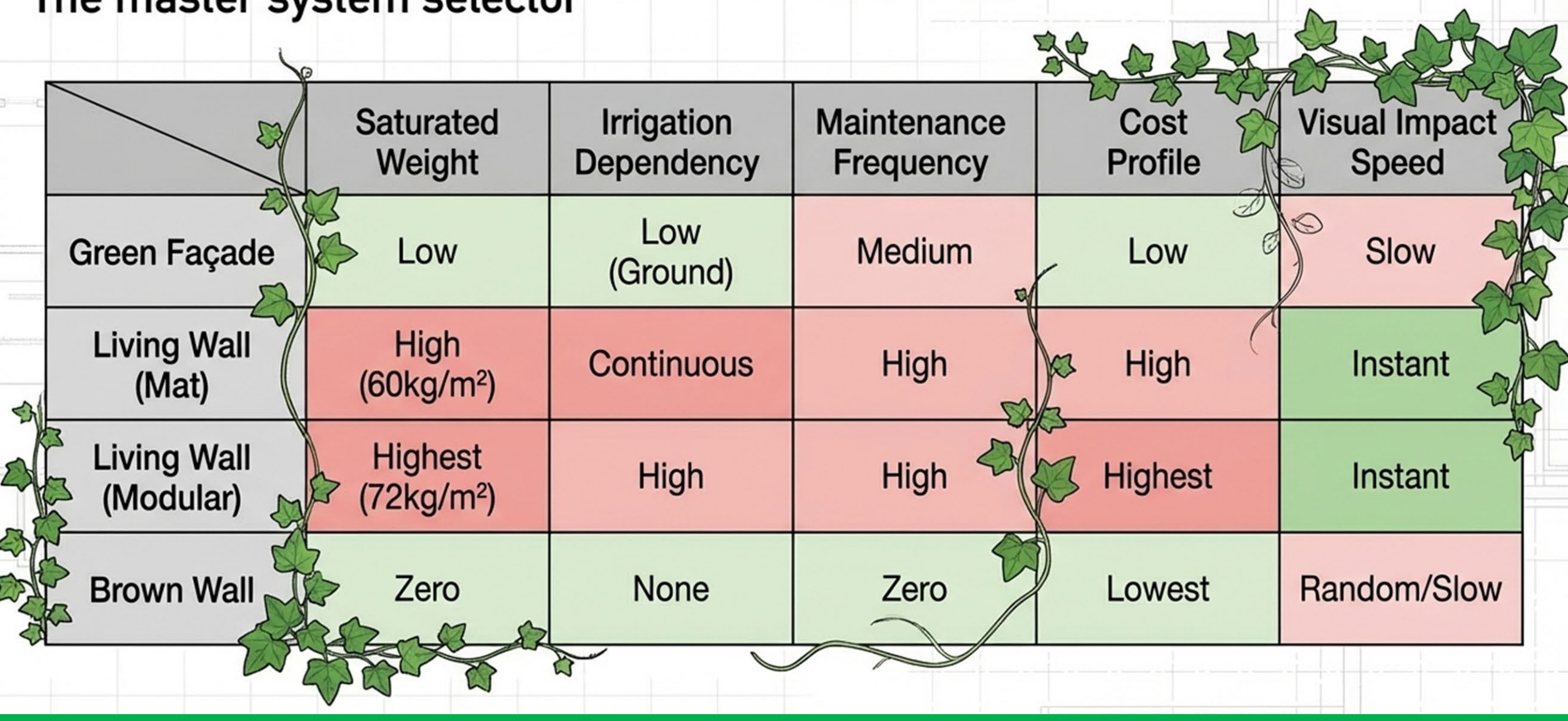


4. Colonization

Hardy cliff ecology species establish root holds.

Based on Larson's Cliff Ecology, man-made walls share the microclimatic properties of natural cliffs. Designing for spontaneous urban ecology is the lowest-cost, zero-weight landscaping method available.

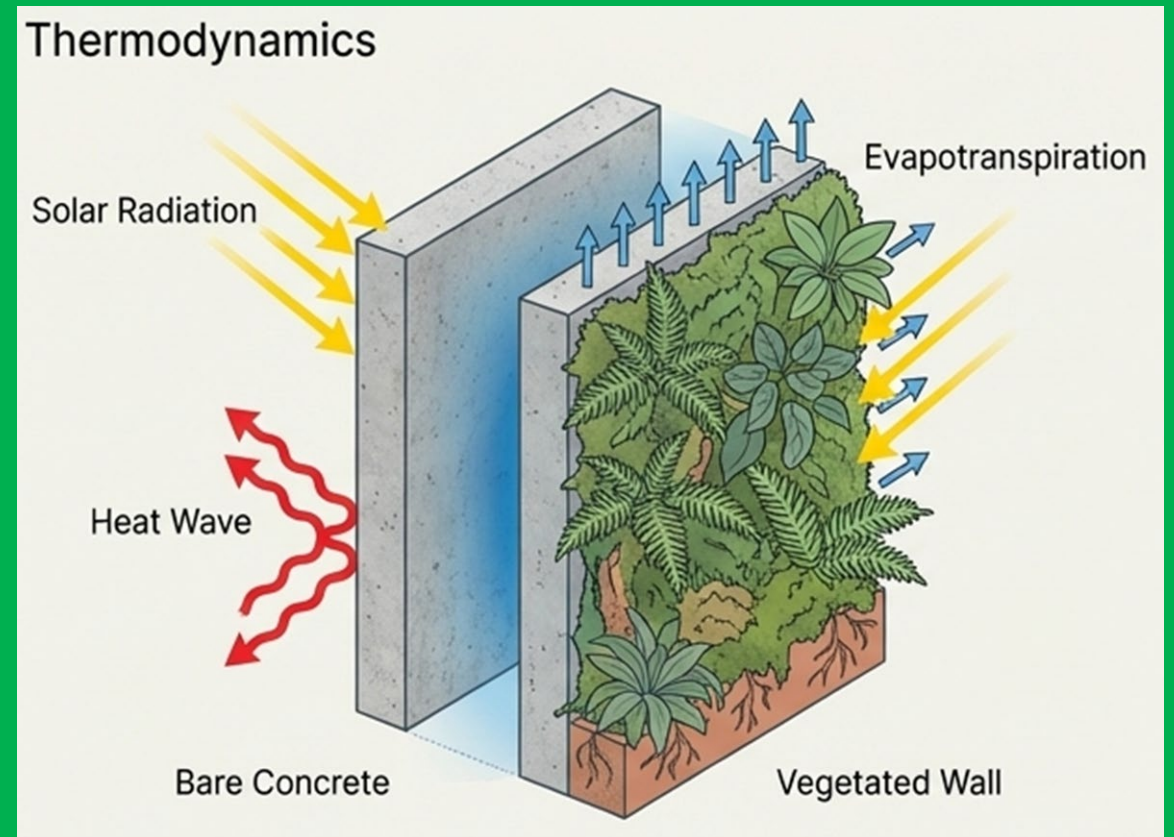
The master system selector



	Saturated Weight	Irrigation Dependency	Maintenance Frequency	Cost Profile	Visual Impact Speed
Green Façade	Low	Low (Ground)	Medium	Low	Slow
Living Wall (Mat)	High (60kg/m ²)	Continuous	High	High	Instant
Living Wall (Modular)	Highest (72kg/m ²)	High	High	Highest	Instant
Brown Wall	Zero	None	Zero	Lowest	Random/Slow

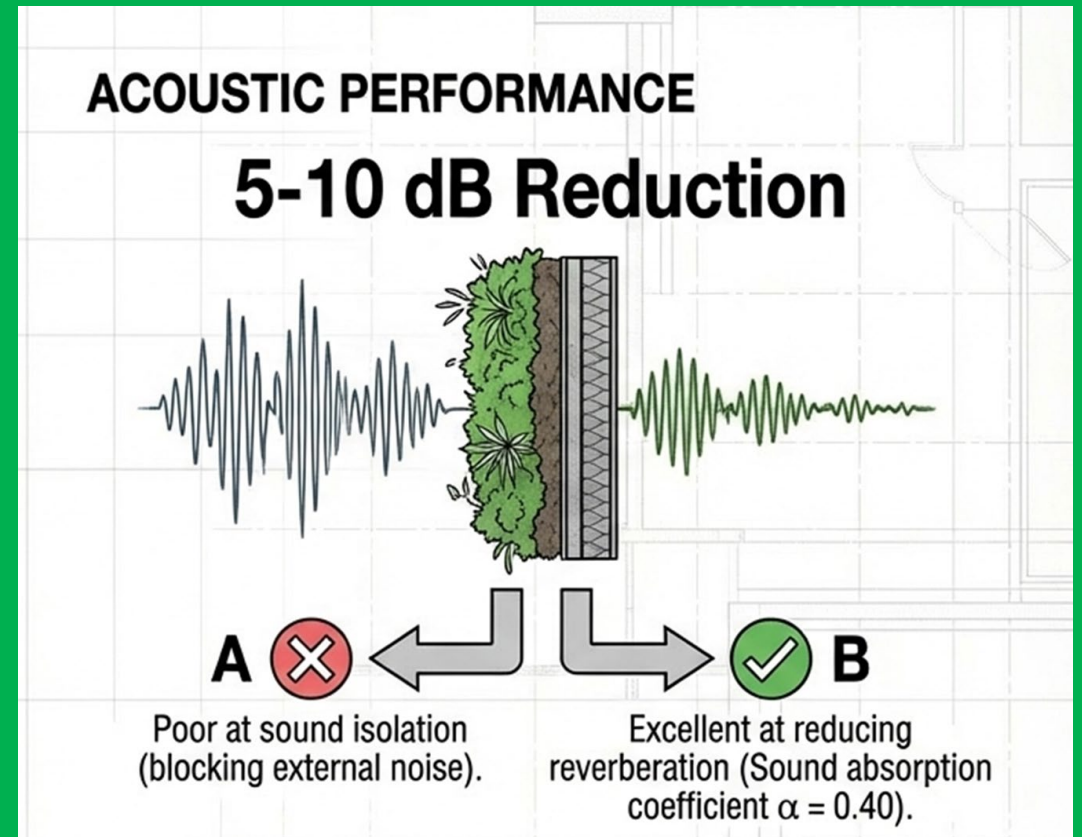
Building Physics

Plant evapotranspiration and solar shading drop exterior surface temperatures by up to 11°C and internal temperatures by 4°C.



Building Physics

Modular walls decrease low-mid frequency sound transmission by 5-10dB.



Environmental Impact

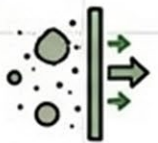
The Benefits



- Evaporative cooling



- Biophilia



- Particulate filtration
(40-60% reduction in urban street canyons)



The Burdens



- Raw material depletion



- HDPE plastic manufacturing



- Fresh water eco-toxicity



Operation



Water Consumption:
Intensive systems require
between 1.3-1.5 l/m²/day.

Operation



Baseline Running Costs:
Utility costs for water, power
and drainage average
roughly £1/m²/year.

Operation



Maintenance:

Proprietary systems require bi-annual specialist visits to calibrate digital irrigation.

Operation



Maintenance:

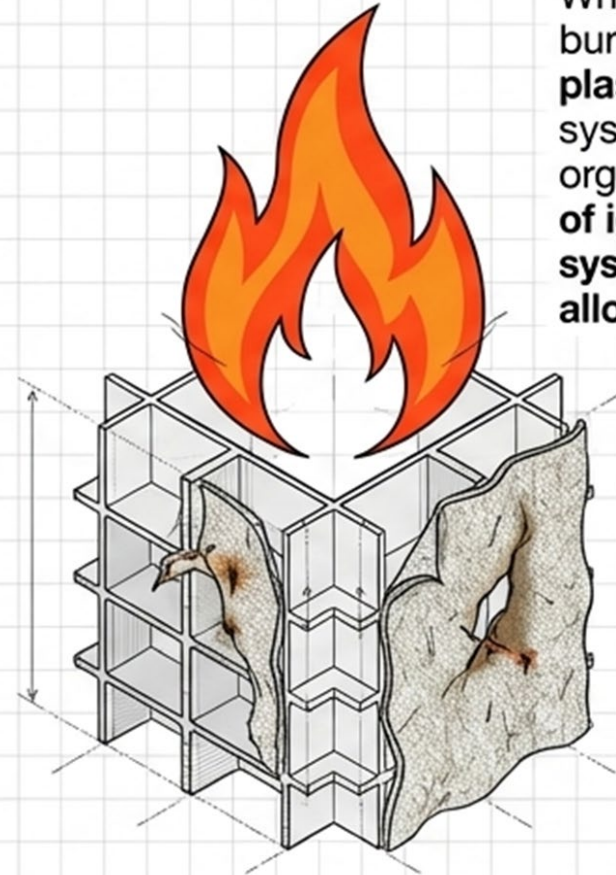
Fast growing climbers must be aggressively pruned to prevent self-strangulation, clogging of gutters and root infiltration into cavities.

Operation

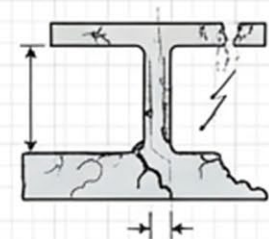
The Fire Risk

DCLG Warning:

While living plants do not burn easily, the **HDPE plastics** in modular systems and dried-out organic felt are highly capable of igniting. **These artificial systems must never be allowed to dry out.**

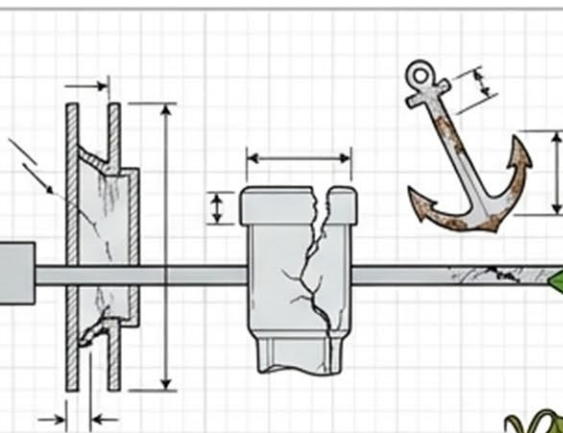


Anatomy of a system failure



Material Breakdown

UV degradation of plastics, rotting felt substrates, or physical anchor failure on the facade.



Biological Failure

Irrigation pump failure (causing desiccation within days) OR poor drainage causing saturated roots (Pythium / root rot).



Desiccation



Pythium / Root Rot



High Altitude /
Temperate Exposure

Ecological Mismatch

Specifying tropical water-loving plants on an exposed, high-altitude, temperate facade.



Tropical Species Incompatibility

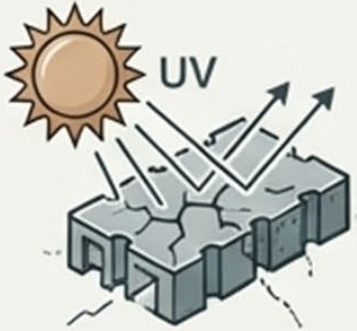
Case Study: Paradise Park, Islington

London's first living wall suffered complete biological failure due to system susceptibility. It was ultimately removed and replaced with traditional ground-rooted climbers.



System
Death

System Failure



Material Breakdown

Risk: UV degradation of plastic modules or felt rotting causes system to detach from the facade.



Engineered Solution

Specify UV-stabilized HDPE and inspect structural fixings every 5 years.

System Failure



Irrigation Errors

Risk: Over-watering traps roots (Pythium rot); under-watering causes desiccation; poor drainage cuts off oxygen.



Engineered Solution

Implement multi-zone digital drip lines with redundant loops. Use non-biodegradable inert substrates for permanent aeration.

System Failure



Botanical Mismatch

Risk: Mass plant death due to wrong altitude, wind chill, or sunlight exposure.

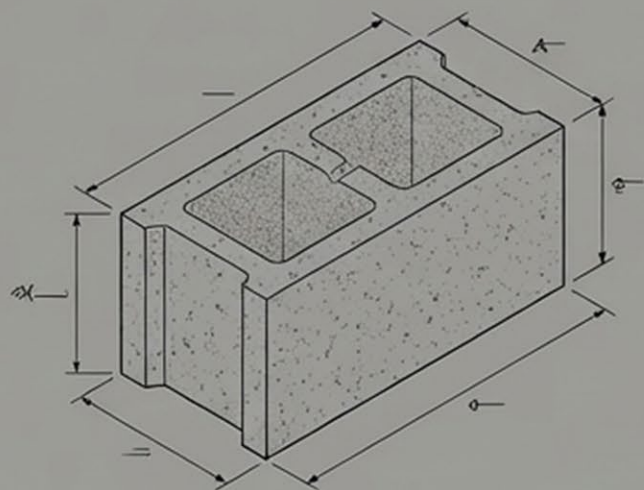


Engineered Solution

Conduct micro-climate horticultural profiling. Place water-loving plants exclusively at the wetter base of the wall.

Physical Performance

If you want enhanced thermal performance, sound isolation, or weathering protection—add more traditional insulation. It is vastly more reliable and cost-effective.

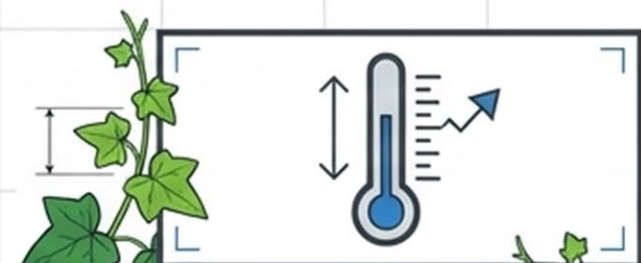


Psychological & Ecological Value

Specify greening for its true superpower: Biophilia. Its primary value is an intangible, profound psychological connection to nature and the creation of a localized oasis for urban biodiversity.

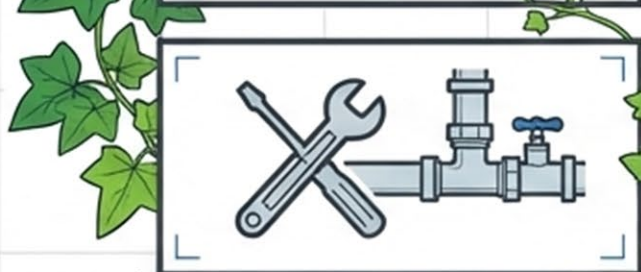


A blueprint for specifiers



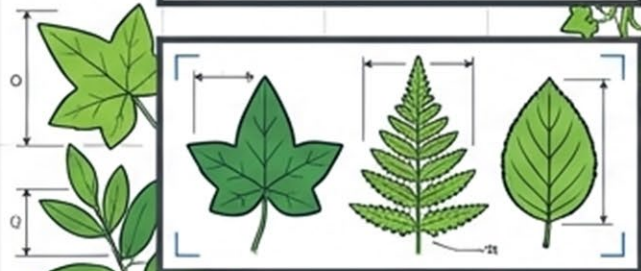
1. Align System to Climate

Do not force tropical hydroponics into temperate freeze-zones. Match the flora to the micro-climate.



2. Design for Maintenance

Assume the irrigation will fail. Ensure permanent, safe access for horticultural specialists and pump maintenance.



3. Mix the Flora

Avoid mono-cultures (like pure Ivy). Diverse planting attracts a wider array of insects and birds, building true biodiversity.



4. Embrace the Brown

Consider the 'Urban Cliff' approach. Allowing spontaneous natural colonization is the lowest-cost, zero-maintenance path to urban ecology.

