Green Imperative

Traditional Green roofs Many green roofs schemes have been implemented across the territory, ever since buildings had podiums decks. Climbers growing on trellis structures and pergolas are long established and largely successful vertical greening techniques. Skyrise greening is nothing new.

But recently we have seen designers pushing planting further up building facades and onto very high rise roof tops, testing new technologies and installation methods to get green into the most extreme locations.

Nowadays it seems that a building needs some form of green panel or specialist greening system bolted on to it worthy, to demonstrate its developers and owners to caring for the environment

Green Imperative

Traditional Green roofs

Projects. Fa Hui Park, Kowloon Image. mxd

Green Imperative

Podium deck gardens

Green Imperative

Podium deck gardens

Project. Olympian City, Kowloon Images. mxd

Project. IFC - P4 Garden Deck Images. mxd


Project. IFC - P4 Garden Deck Image. mxd

Green Imperative

But I keep wondering, how effective is this form of extreme “skyrise” greening ? and more importantly is it actually environmentally friendly ?

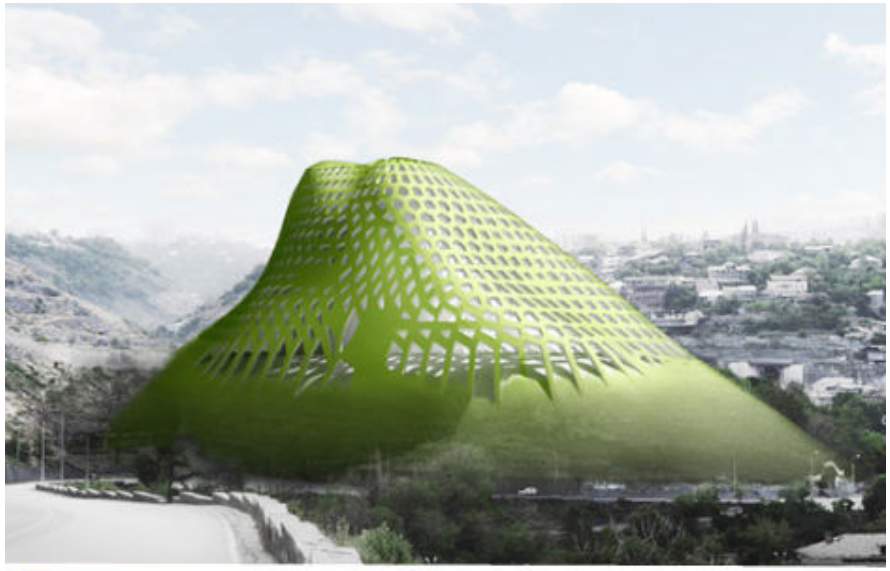
There are many and varied claims as to the value of these new ‘technologically advanced’ skyrise greening schemes, but are these benefits all that they are claimed to be and do they out weigh the cost, the true cost ?

I have a feeling that once we lose touch with the ground, where traditional planting techniques can apply, we are using landscape as carpet. Image after image in architectural design magazines and proprietary product manufacturers literature appears as if a neat uniform green carpet has been rolled out and .... a flat artificial landscape created. A little like artificial sports turf. It looks good from a distance, but up close and personal, it does not looks much like nature.

When I asked prospective candidates for the MLA program, in interview a few years ago, what they thought the future of HK 100% of them mentioned green roofs in their answers. I know there is good public awareness of the potential benefits of skyrise greening, but there is also a great desire to be environmentally responsible

Green Imperative

Pushing planting to extremes



Images. Web, Inhabitat.com

Green Imperative

Skyrise greening

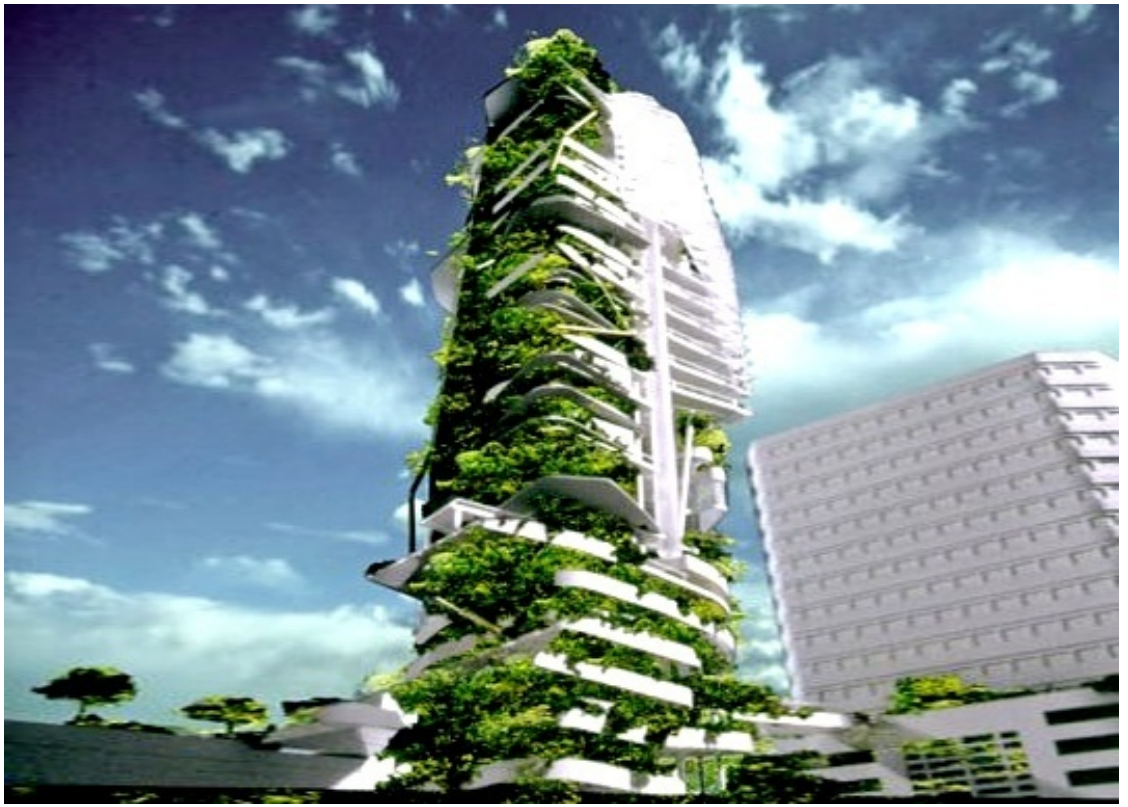


Image Sources. Web, The Haven by Aleksander Novak-Zemplinski - Nausori, Fiji, source. Inhabitat.com

Green Imperative

When it comes to the new advanced forms of Skyrise Greening I just wonder if we are getting the whole picture.

I was also reminded of the statistic about the manufacture of plastic water bottles, that you need 3 times as much water to make the plastic bottle as the bottle ultimately contains. How much effort do we need to put into skyrise greening, and is it worth it

So my question is Exactly how ‘green’ is this green ... how sustainable is it

I would like designer and developers to think very carefully about the objectives in skyrise greening projects, not to assume that green is always good, and make sure their schemes are comprehensively thought through

Green Imperative

Public Perception

Image Sources. Inhabitat.com

Green Imperative

How ‘green’ is green?

Image Sources. Weburbanist.com, treehugger.com

Benefits of Skyrise Greening

So what are the benefits of skyrise greening ?

Aesthetic - Looks green, makes our city look more natural
But does it look natural ? Will it look after a year or two, with plant failure, the in-seeding of weed species, erosion and natural wear and tear. Appearance is likely to be much reduced.

Winter Insulation - by adding mass and thermal resistance value skyrise greening reduces heat loss in the winter – which reduces energy consumption by lowering heating demand
Dependent on a comprehensive coverage, less effective than a thermal insulation layer on the roof. Limited effects in sub-tropical climates

Summer Insulation - Reduces heat gain by buildings in the summer,
Evaporative Cooling – transpiration and soil water loss result in an evaporative cooling effect in buildings, lowering their ambient temperature and so reducing cooling energy loads on a building (by fifty to ninety percent)
Evaporation effects are not consistent, and are largely competitive with plant requirements, it is also dependent on comprehensive plant coverage which can be reduced in time.

Passive solar heat reservoir — a concentration of green roofs in an urban area can even reduce the city's average temperatures during the summer

Benefits of Skyrise Greening

Noise insulation - soil blocks lower frequency sound, plants block high frequency sound effects on the building from outside sources
But this assumes that the planted layer intercedes between the building and noise, which it rarely does.

Pollution absorption and CO_2 uptake – planting can filter out some atmospheric pollutants and exchanges CO_2 for O_2.
Questions remain over the efficacy of pollution storage, how are the pollutants disposed of in the end, how often does the planting need to be replaced. if the soil and plants are genuinely absorbing significant amounts of pollutants is there a hidden disposal cost

Storm water management – roof planting layers can be designed as rainwater storage, buffering capacity
This is only suited to low to medium rainfall environments, i.e. not in HK, and is generally in conflict with plant drainage needs, and increases structural costs

Skyrise Greening
Maintenance Access

Costs of Skyrise Greening

Life cycle cost - life expectancy (the average life expectancy of shrubs in a roadside planter in HK is less than three years), repair and replacement costs, embedded energy costs in all the extra specialist materials

Failure costs - loss of function / reduced performance, natural succession with weeds coming in and taking over, problems with monocultures, erosion, washout staining
increased risk – fire, flooding, lack of oversight – out of sight out of mind, you don't know you have a problem until it is too late, lack of access to deal with failures

Typical planting issues - pest control, mosquitos and rats

It is expensive (in many respects), but is it worth it ?
Do the benefits outweigh the costs ?

Costs of Skyrise Greening

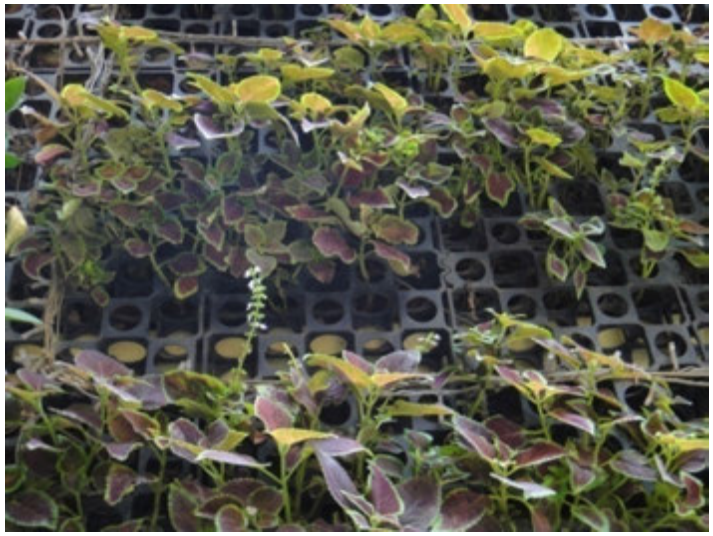
Planting on buildings and structures should definitely not be seen as just carpet. We cant just lay it and leave it. There are many physical requirements, high maintenance costs and short life expectancy

So, is it environmentally sustainable ? Is it a wise investment of resources ?
I believe the answer is 'No'. It doesn't have a long term (self sustaining) future, it is always a cost. Nor is it culturally, historically, economically sustainable.

A good test is whether we could perform these functions in another way at a cheaper overall cost. If we go back to the artificial turf, that is ultimately probably cheaper, easier to install, more effective, longer lasting.

'Green' (planting on buildings) is not always ... green (sustainable / justifiable)

Skyrise Greening
Life-cycle Costs



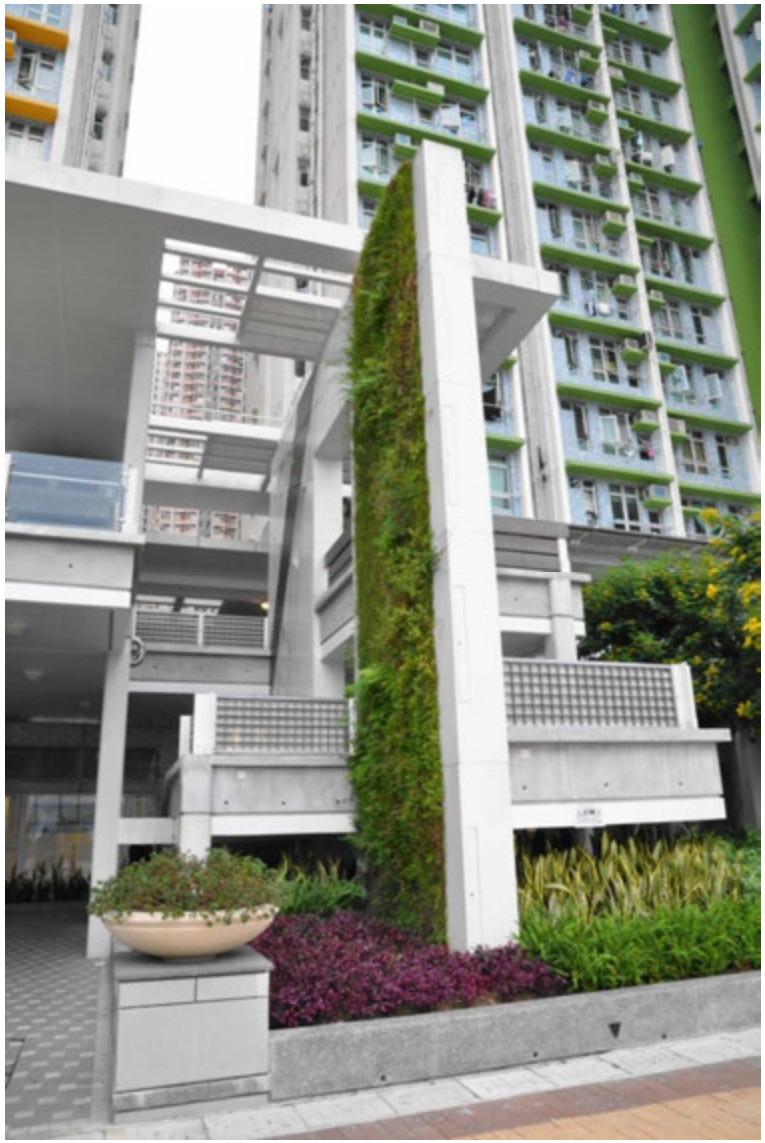
Project Location. Mong Kok Images. mxd

Skyrise Greening

Failure Costs

Project Location. Central London   Image. mxd

Skyrise Greening
Cost / Benefit Analysis



Project Location. Yau Lai Estate Images. mxd

Project Yau Lai Estate Images. mxd

Costs of Skyrise Greening

Aesthetically - Green is good. Many studies demonstrate the psychological benefits of natrual vegetation
Cognitively - The whole idea of naturalness in the city. Even in its most artificial form (we know it is fake) it has meaning for us. It shows we care about the Environment. Makes us feel like we are doing something
Experientially - we accept that they have function in cooling, insulating, creating habitat, horticultural production etc,

When it comes to new, built elements people are much more ready to accept them or take ownership of them if they have a combination of these factors i.e. more than just an aesthetic function, they have some form of meaning and experiential use Greening on buildings scores very highly. We are more than happy to overlook the obvious technical and operational flaws in these system .... good reason, bad reasoning

As a landscape architect I want it to work. But know in my heart that this is fake landscape … it is not sustainable. What I would like is for people to set their assumptions aside and conduct a thorough, honest assessment of why they want planting on their building and structure and a detailed audit of all the costs and commitments that it will entail

Benefits of Skyrise Greening

Ecology - Creating the opportunities for Urban Habitats
Some of the planting schemes have virtually no ecological value due to the choice of only ornamental species. Ecology as a whole system : flora + fauna + soils, water, air etc. Skyrise locations are very harsh environments for habitats to develop, type of plant species that can survive do not always have high ecological potential. Some of the planting schemes have virtually no ecological value.

Production – space for growing horticultural crops
Roof gardens are seldom large enough to be commercial, but could be of local benefit.

Recreation - community gardens
Community gardens are very popular but need active management, and roof top environmental conditions are not ideal. Pollution factor also needs to be considered

Planning / Financial Gain - living roofs can contribute to LEED points, can increase sales values by association with 'feel good' issues
Roof gardens and vertical greening have value, largely due to perceived rather than actual benefits

Skyrise Greening

Benefits - Aesthetics

Project Location. Kwun Lung Estate Image. mxd

Skyrise Greening

Benefits - Aesthetics

Image Sources. kindergarten-sighartstein-by-kadawittfeldarchitektur

Skyrise Greening

Benefits – Winter Insulation

Project Location. Ma On Shan Image. mxd

Skyrise Greening

Benefits – Summer Insulation

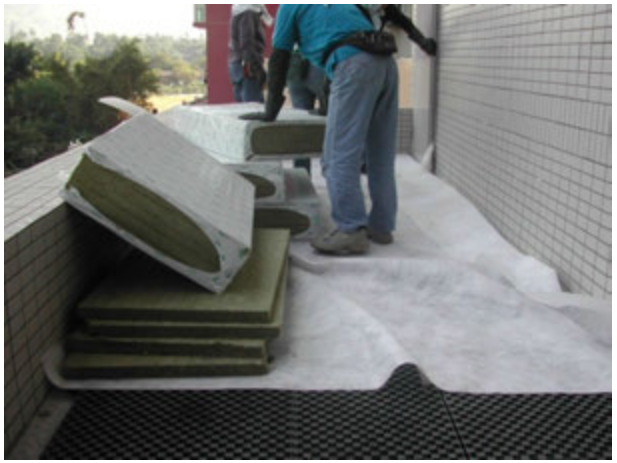
Project. Fu Shan Estate Image. mxd

Skyrise Greening
Benefits – Cooling

Image Source. Agencja Gazeta

Skyrise Greening

Benefits –Passive solar heat reservoir



Skyrise Greening

Benefits – Noise insulation

Image Sources. Weburbanist.com

Skyrise Greening

Benefits – Pollution absorption

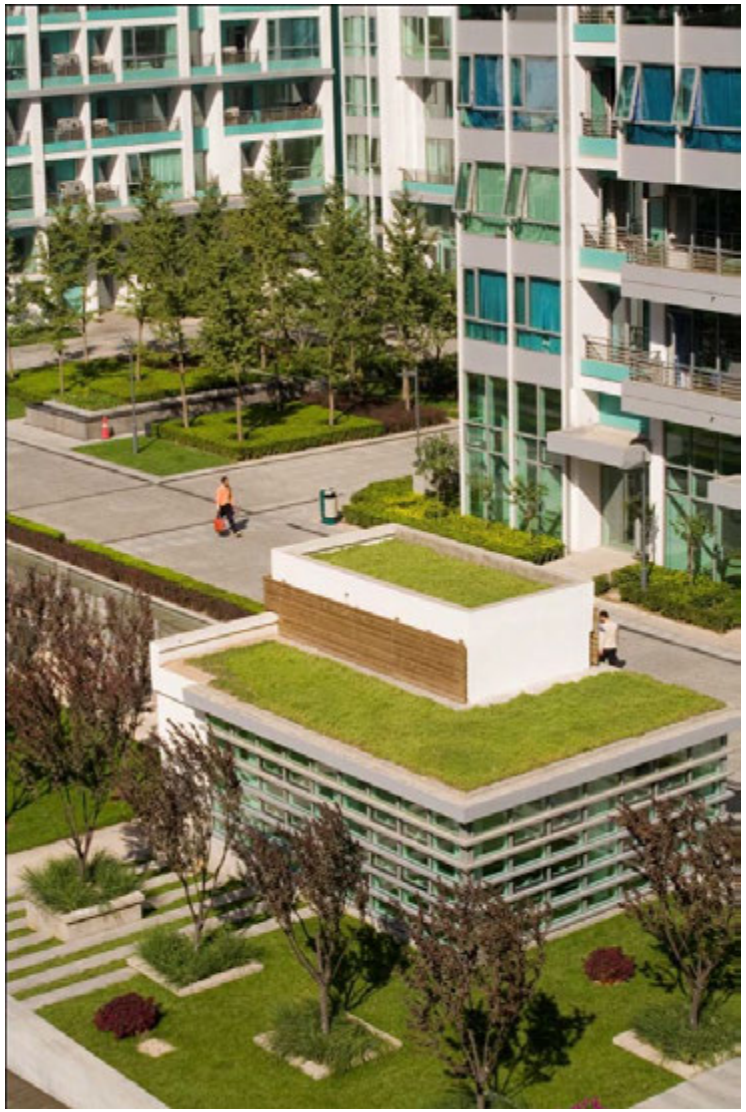


Image Sourecs. Wikimedia

Skyrise Greening

Benefits – Storm water management

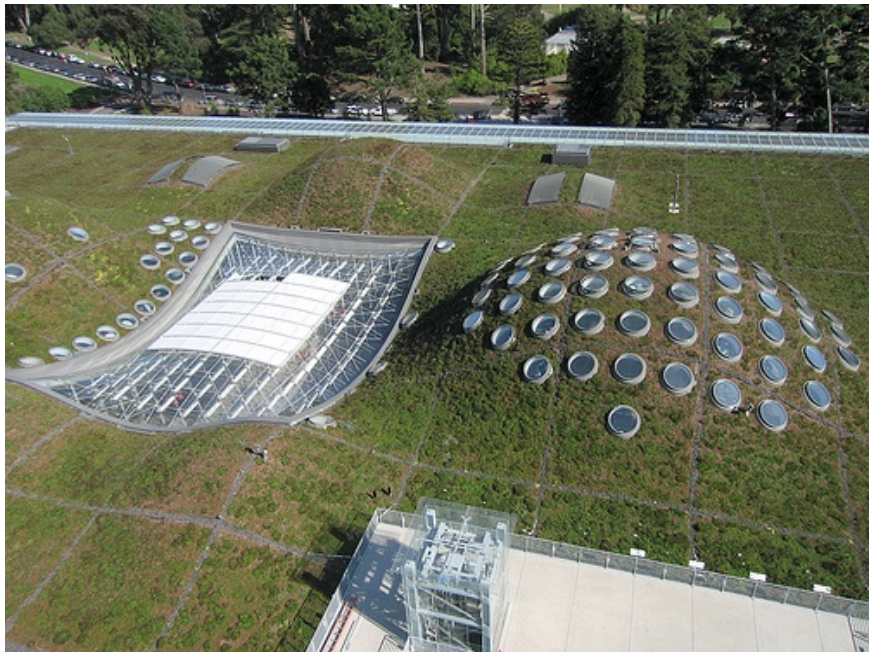


Image Sources. Wikimedia

Skyrise Greening

Benefits - Ecology

Image Sources. Wikimedia, mxd

Skyrise Greening

Benefits – Production & Recreation

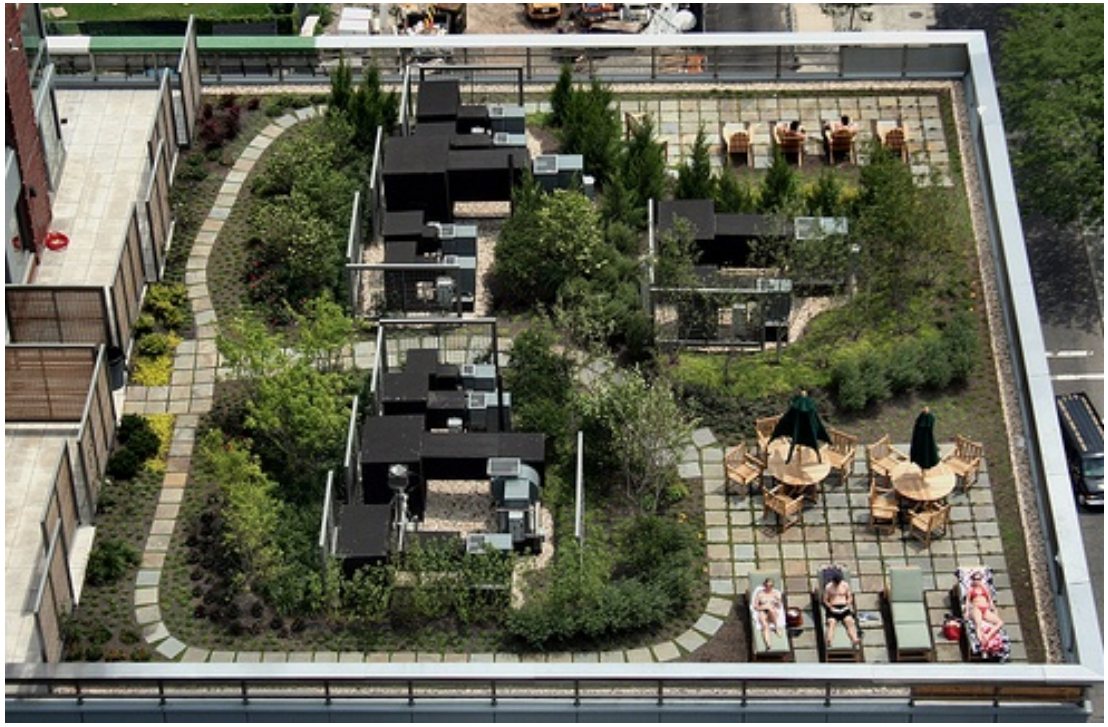


Image Sources. Inhabitat.com, wikimedia

Skyrise Greening

Benefits = Commercial Gain

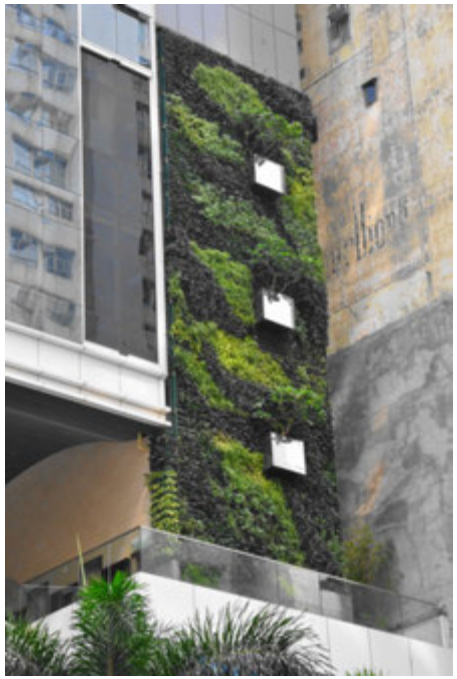
Project. Vision City, Tsuen Wan Images. mxd

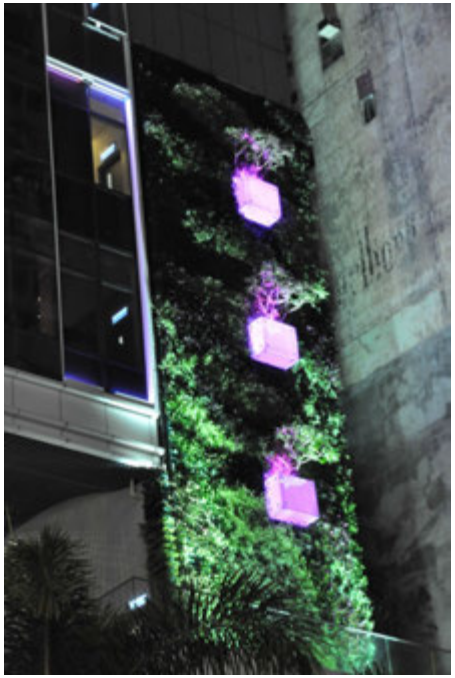
Green Imperative

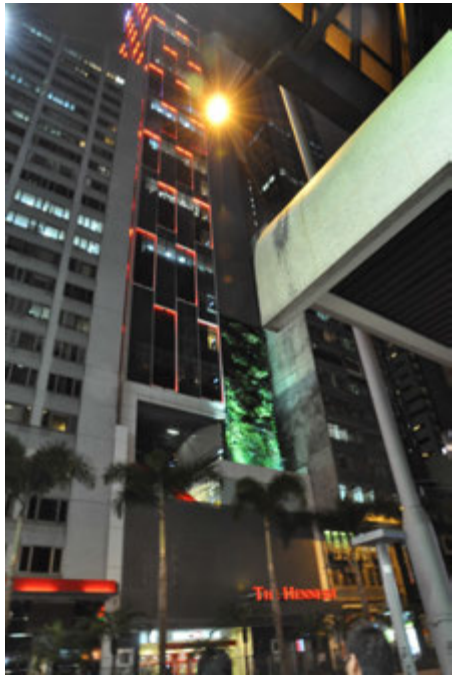
The small (but growing) amount of science done on the benefits of green roofs tends to be done within a controlled scenario and on short term cycles. The potential loss of efficiency resulting from maintenance effects / seasonal variations / system life-cycle factors etc are not always taken into consideration

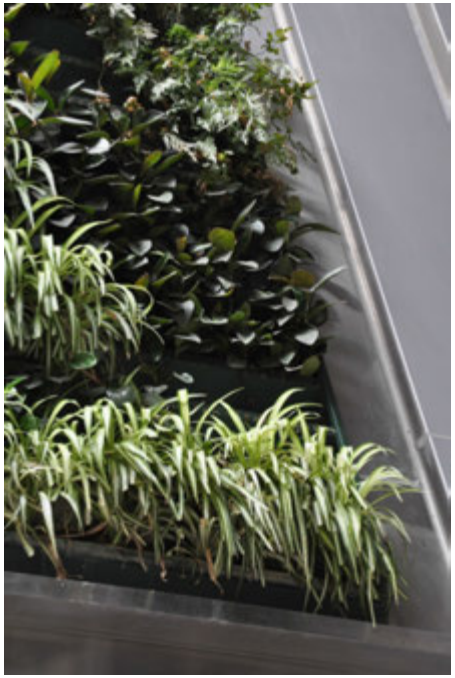
A lot of the 'science' is done in other climatic zones (on different plant/ ecological systems). Some of it is very limited in its depth of investigation, and care needs to be taken with any research scheme sponsored by a manufacturer of a skyrise green propriety product
So do the green roofs and vertical panels perform these functions?

.... yes some perform some of the functions under certain circumstances









Project. The Hennessy, Wanchai
Image. mxd

Costs of Skyrise Greening

and what of the COST ?

Additional design elements - to cope with exposure, harsh conditions, special plants, special soils, fertilizers, other ameliorants, customized irrigation and drainage systems etc. supporting structures very extensive (especially for vertical greening), usually proprietary or customised

Weight of soils (+water) on roofs - either add to building costs or limits on planting design, and effects of retrofitting drainage and irrigation (waterproofing)

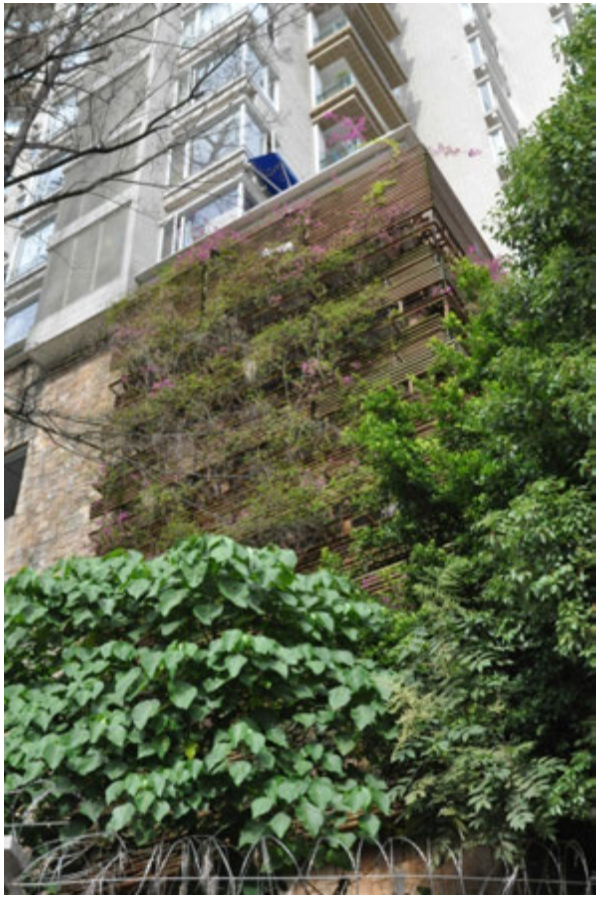
Maintenance requirements - key issue is access (lack of access very often means no maintenance), safety issues, plant failures tend to be high in exposed unnatural, un-maintained locations, resulting in loss of function / efficiency (with deterioration in plants), no mechanism for undertaking maintenance

Green Imperatives

So why do we do it?

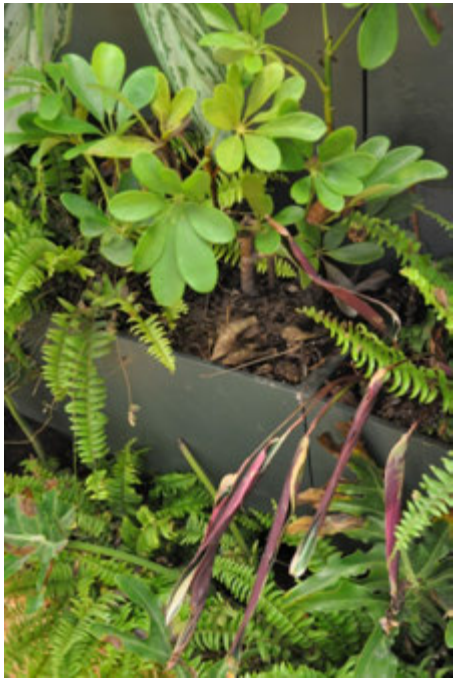
Public acceptance of or preference for landscapes / views/ objects in our surrounding environments, includes

- Aesthetic (how it looks)
- Cognitive (meaning)
- Experiential (use)



Project. One Beacon Hill, Kowloon Images. mxd

Green Imperatives
Critical Assessment



Project. URA Display, Mid-levels Escalator, Central Images. mxd

Green Imperatives

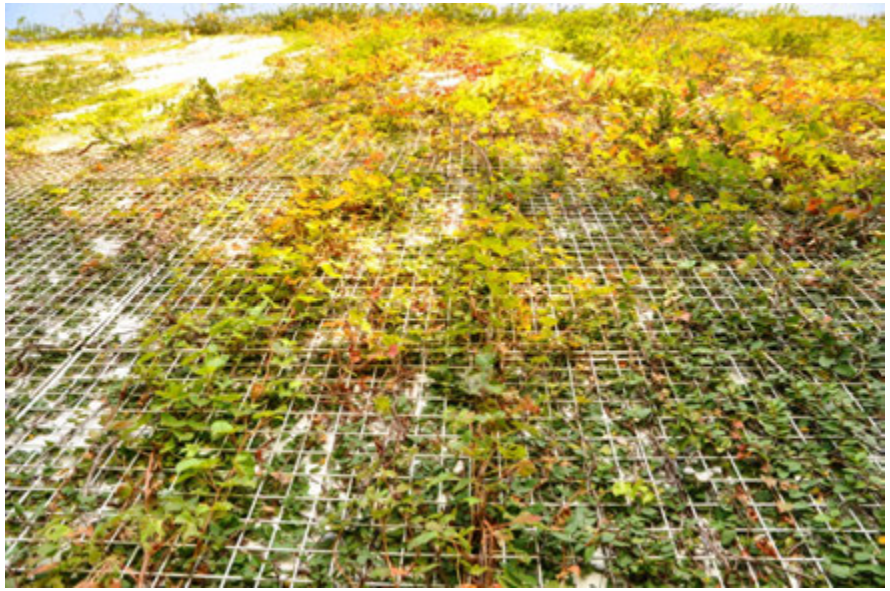
Checklist of Functions

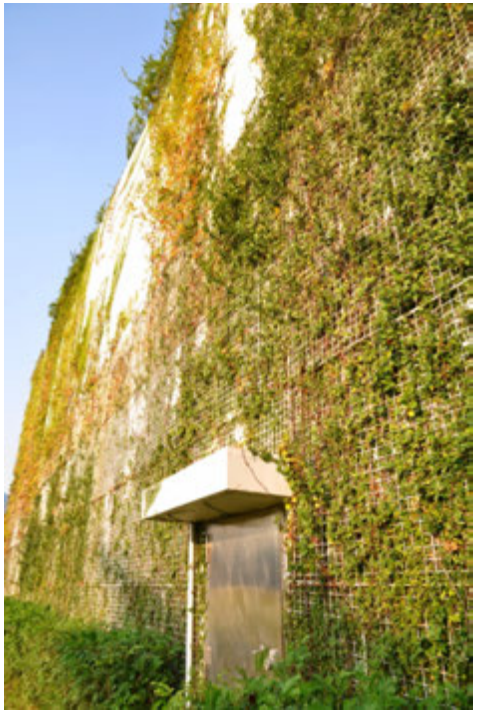
- ✓ Aesthetic
- ✓ Winter insulation
- ✓ Summer insulation + cooling
- ✓ Noise insulation
- ✓ Pollution absorption
- ✓ Storm water management
- ✓ Ecology
- ✓ Production
- ✓ Recreation
- ✓ Planning gain
- ✓ Financial gain

Green Imperatives

Checklist of Costs & Commitments

- ✓ Capital cost (direct & indirect) costs
- ✓ Recurrent maintenance costs
- ✓ Life-cycle costs
- ✓ Risk of failure costs
- ✓ Maintenance commitments
- ✓ Ownership





Project. Tai Hang Tung Road Images. mxd

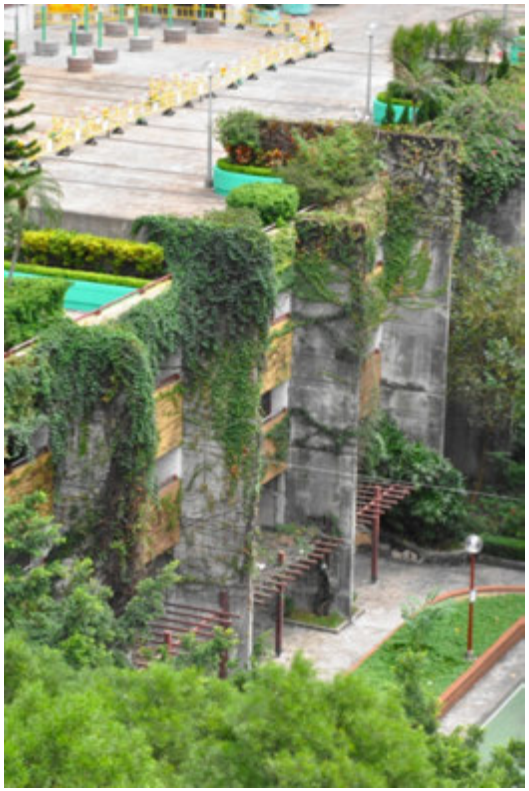
Green Imperatives

Assuming green is always good is far too simplistic

Project. Vision City, Tsuen Wan Images. mxd

Skyrise Greening

…… is it really necessary?



Project. Fu Shan Estate
Images. mxd

Conclusions

Assuming green is always good is far too simplistic

The science isn't comprehensive, the operational issues have not been factored in, the rationale for greening on buildings has not been established

We need very clearly defined objectives and a detailed examination of all the attendant costs and commitments, and a detailed justification that greening is the most sustainable option for each and every scheme

Image created using Wordle