HKGBC Guidebook on Urban Microclimate Study

Summary Booklet

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Introduction

In Hong Kong's high-density and subtropical environment, comfort is an important factor in people's use of the outdoor space. The intense Urban Heat Island (UHI) effect in Hong Kong means high temperature in built-up areas and uncomfortable urban living. It leads to heat stress and other related health problems. The issues of health and comfort in the outdoor space become even more complicated in face of the challenges brought about by climate change.

The building industry plays an important role in the improvement of the urban microclimate, for example, by using lighter colours in façades, providing shading, and incorporating greenery. The improved and more pleasant outdoor environment will in turn attract more visitors, reduce energy use in buildings and enhance the enjoyment of natural ventilation indoor.

The goal of the HKGBC Guidebook on Urban Microclimate Study is to give the industry's professionals and practitioners the inspiration for and knowledge of urban microclimate design. The ideas introduced in the Guidebook will facilitate their communication with specialists.

In the Guidebook, the science and principles of urban microclimate studies are introduced, followed by 31 strategies that suit Hong Kong's environment. Overseas and local good practices are reflected on, and recommendations for policy adjustments and further studies are made.

This booklet is intended to give readers an overview of the strategies introduced in the Guidebook. It also serves as a handy reference for practitioners. Readers are encouraged to seek further understanding of the concept of urban microclimate by reading the original Guidebook. The intent and points to note in the implementation of each strategy are also stipulated there.

With better understanding of the dynamics between the built environment and the microclimate, and improvement in awareness in the building industry, Hong Kong's urban living will become more comfortable and healthier.

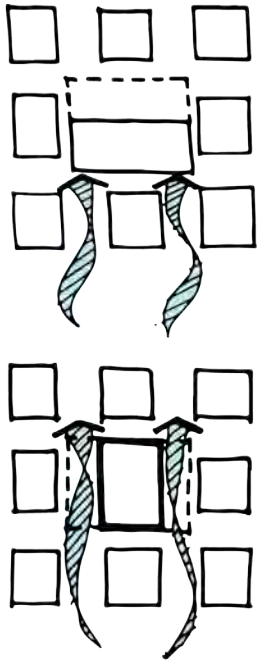
31 urban microclimate design strategies categorised into 8 approaches

31 Strategies at a Glance

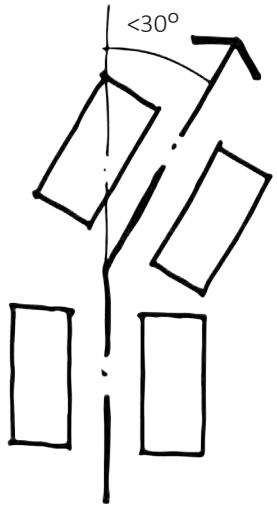
1. Manipulate layout massing to increase wind flow	Increase ventilation with site planning	Wind
2. Wind corridor to align with the prevailing wind		
3. Connect open spaces		
4. Arrange buildings to channel wind		
5. Building setback		
6. Increase permeability of building blocks/ no wall building		
7. Stepped building height profile		
8. Increase building permeability	Increase ventilation with building design	
9. Permeable sky garden		
10. Reduce building frontage		
11. Ventilation bay/ permeable podium		
12. Reduce ground coverage		
13. Increase ground zone air volume		
14. Provide shading for pedestrian activities	Reduce direct solar radiation	Thermal radiation
15. Provide tree canopies		
16. Manipulate building façade design to provide shading		
17. Shade openness by building blocks		
18. Use cool material for ground surface	Reduce surface temperature	
19. Green wall to reduce façade surface temperature		
20. Increase albedo in buildings		
21. Increase sky view factor to improve night cooling		
22. Water features to increase evaporation	Increase evaporative cooling	Temperature
23. Green wall to increase evapotranspiration		
24. Greening to increase evapotranspiration		
25. Use permeable paving		
26. Increase ventilation to carry away heat energy	Reduce heat accumulation	
27. Allow downhill wind flow		
28. Allow sea breezes		
29. Reduce anthropogenic heat discharge near pedestrian area	Reduce heat release	
30. Reduce thermal mass heat storage of building materials		
31. Provide cover for rain protection	Provide rain protection	Precipitation

Wind

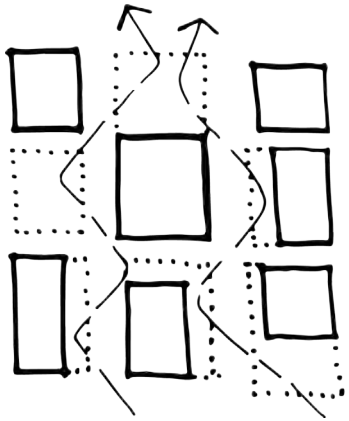
Increase ventilation with site planning



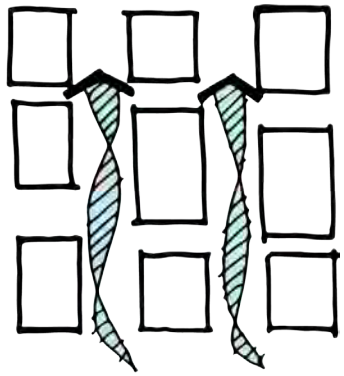
01 Manipulate layout massing to increase wind flow



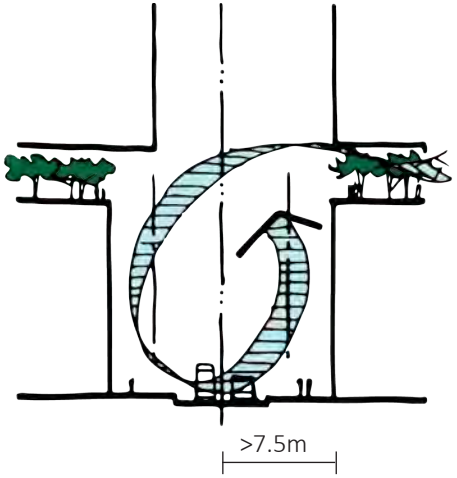
02 Wind corridor to align with the prevailing wind



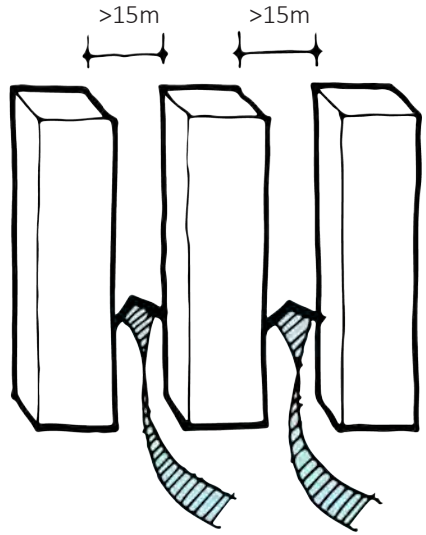
03 Connect open spaces



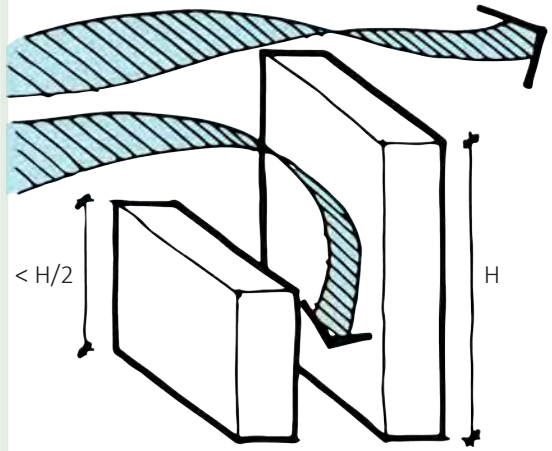
04 Arrange buildings to channel wind



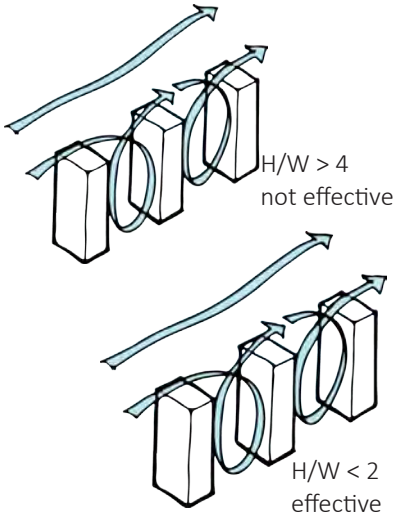
05 Building setback



06 Increase permeability of building blocks/ No wall building

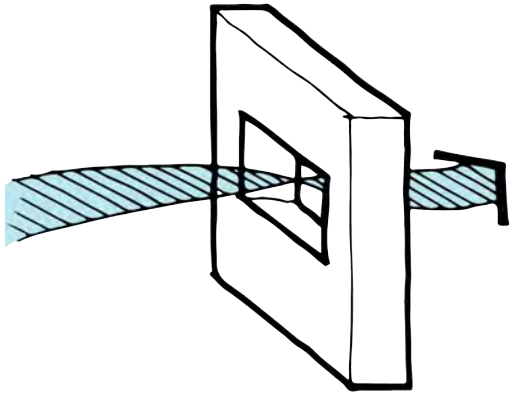


07 Stepped building height profile

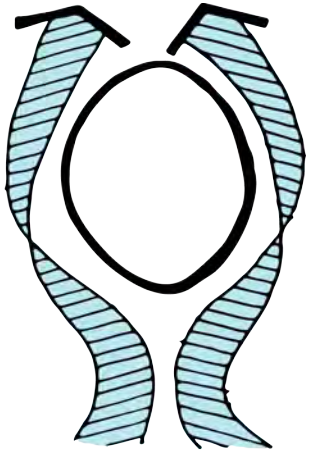


When buildings cannot be arranged to channel wind flow and a stepped building height profile cannot be adopted, a height-width ratio of less than 2 is recommended.

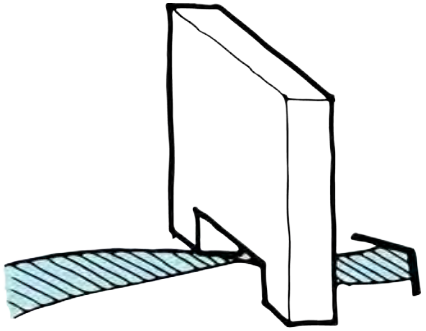
Increase ventilation with building design



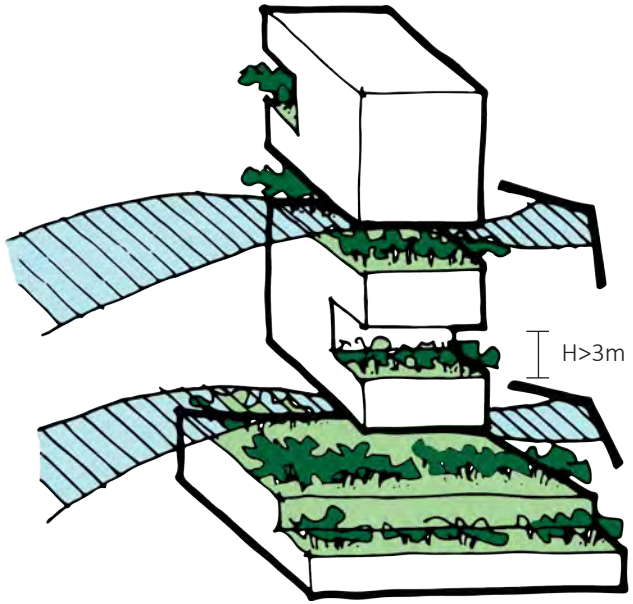
08 Increase building permeability



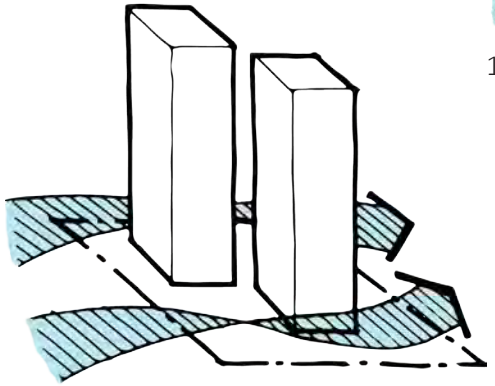
10 Reduce building frontage



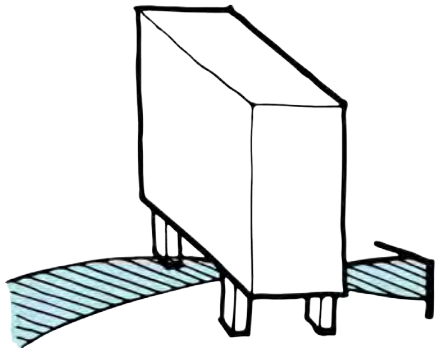
11 Ventilation bay/ permeable podium



09 Permeable sky gardens



12 Reduce ground coverage



13 Increase ground zone air volume

Thermal Radiation

Reduce direct solar radiation

15 Provide tree canopies

17 Shade openness by building blocks

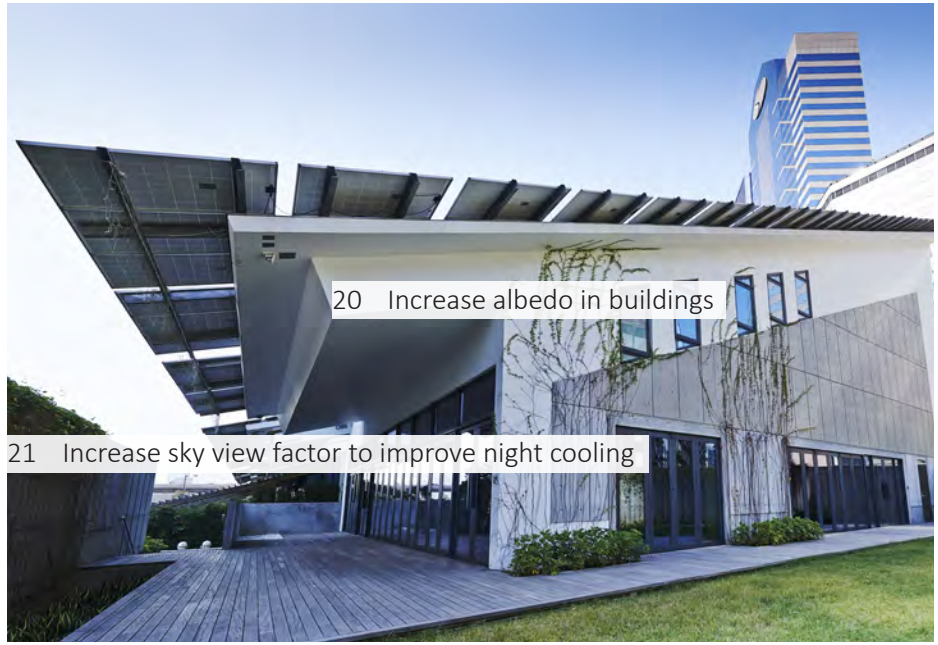
14 Provide shading for pedestrian activities

16 Manipulate building façade design to provide shading

Reduce surface temperature

19 Green wall to reduce façade surface temperature

18 Use cool material for ground surface

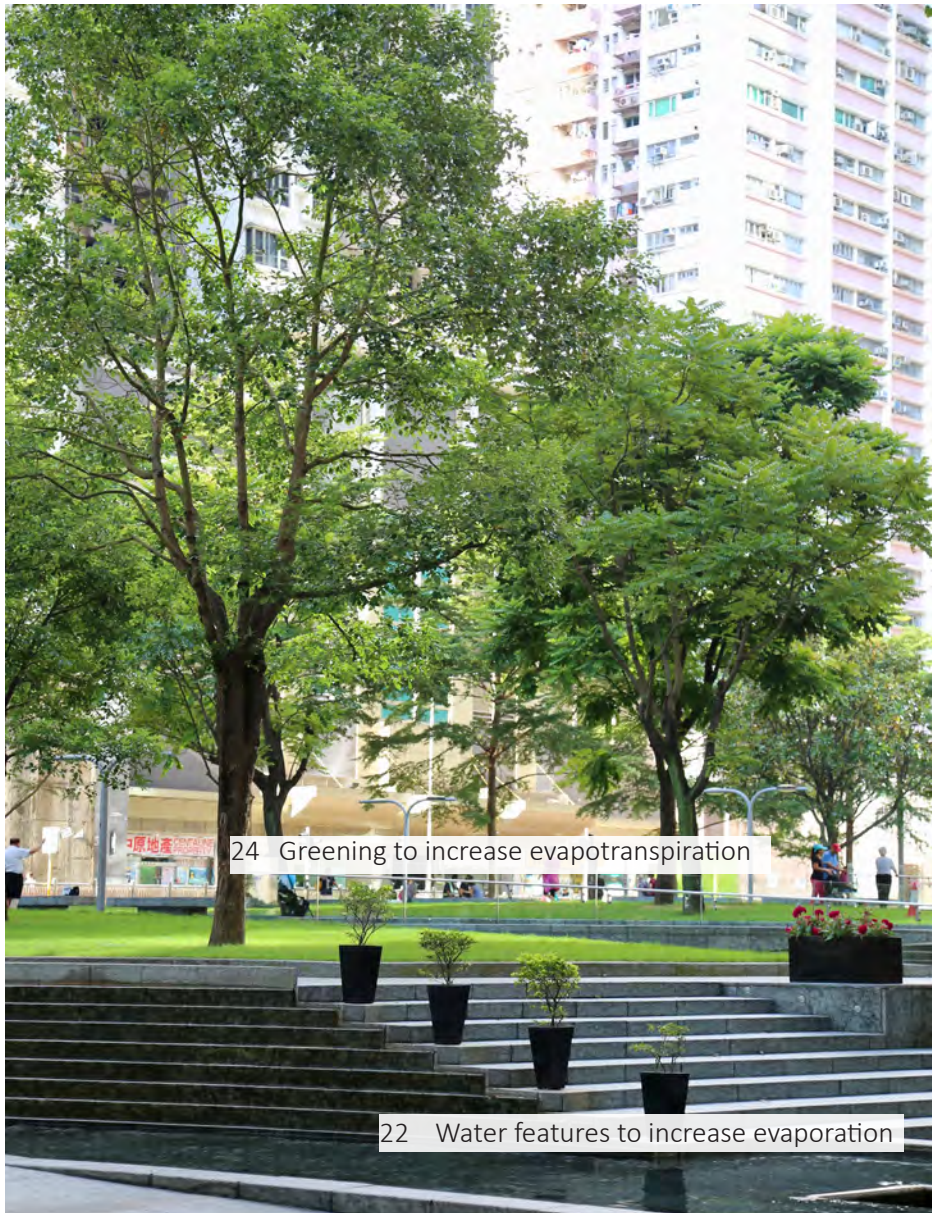


20 Increase albedo in buildings

21 Increase sky view factor to improve night cooling

Temperature

Increase evaporative cooling



22 Water features to increase evaporation

24 Greening to increase evapotranspiration

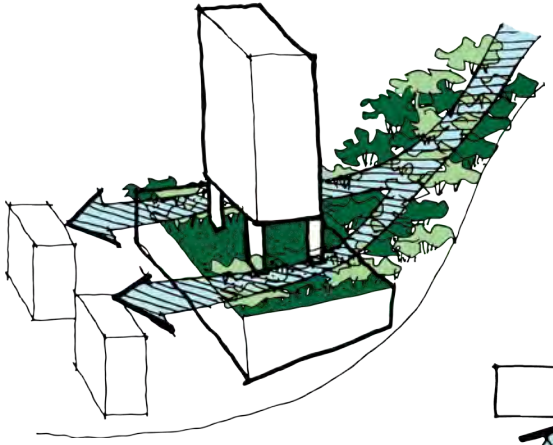
23 Green wall to increase evapotranspiration

25 Use permeable paving

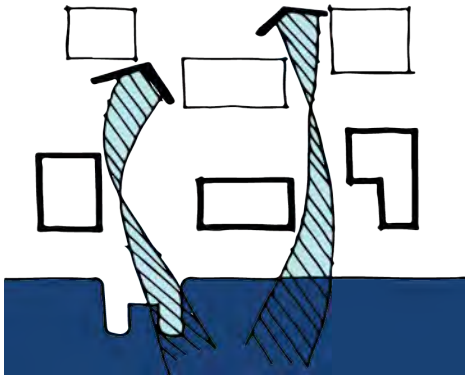
Reduce heat accumulation

26 Increase ventilation to carry away heat energy

Example:
Innovative ventilation is used at Green Atrium to introduce cooler fresh air from the outside to the semi-open space for dining use.



27 Allow downhill wind flow



28 Allow sea breezes

Reduce heat release

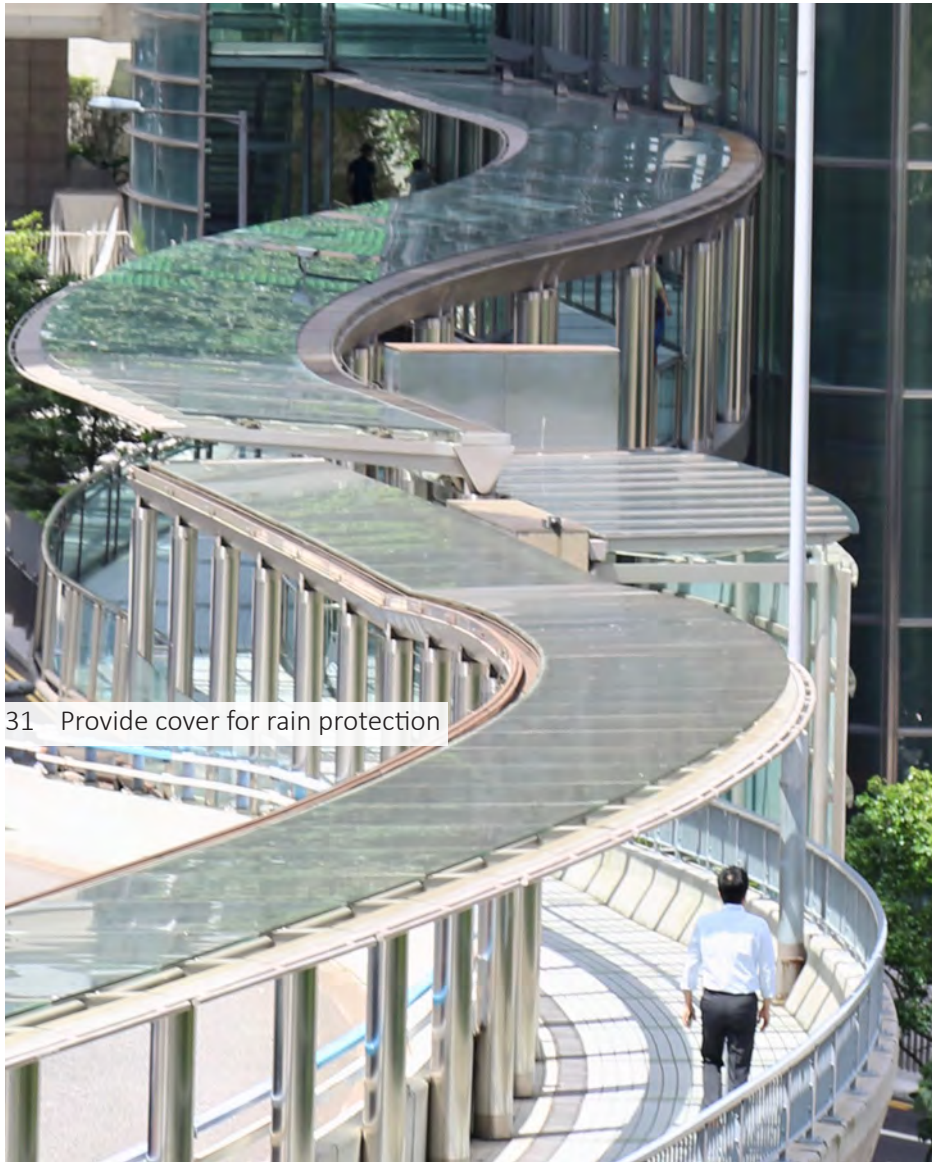
Example:
Private vehicle restriction in Discovery Bay

29 Reduce anthropogenic heat discharge near pedestrian area

30 Reduce thermal mass heat storage of building material

Precipitation

Provide rain protection



31 Provide cover for rain protection

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