



Accelerated development and sustainability: the retrofit of green roofs in city centres.

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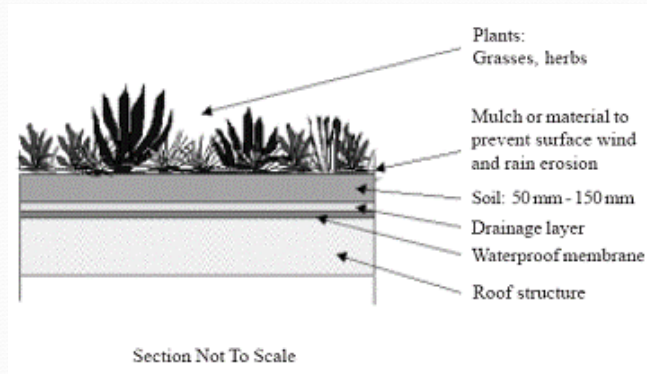


overview

- Types of green roofs
- Benefits of green roofs
- Barriers to green roofs
- Building attributes for green roof retrofit
- Method
- Findings

Types of green roof

- Intensive and extensive



Extensive green roof

- Shallow growing medium (<150mm)
- Lightweight structure to support roof
- Cover large expanses of rooftop
- Requires minimum maintenance
- Lower capital cost
- Not usually recreational
- Can be accessible or inaccessible
- Does not usually require irrigation
- Minimum structural implications for existing buildings

Intensive green roof

- Deeper growing medium (>150mm)
- Heavier roof structure required to support roof
- Small trees and shrubs feature
- more maintenance required
- More expensive
- More common in tropical climates
- Can be accessible or inaccessible

Benefits of green roofs

Environmental

- Reduction of noise pollution
- Water harvesting
- Stormwater management
- Energy conservation and greenhouse gas emissions reductions
- Reduces heat island affect
- Pollution abatement

Economic

- Credits available in known environmental rating tools
- Less maintenance required during roof life cycle
- Less energy consumed lowers bills
- New employment opportunities for a wide range of professionals including suppliers and manufacturers of green roofing materials

Social

- High aesthetic values provide wider benefit to society
- Increased worker health, productivity and creativity
- Additional recreational opportunities for people and building occupants.

Barriers

- lack of awareness
- few incentives in support of green roof technology diffusion
- higher construction costs
- barriers in adopting new methods and techniques
- technical data limitations in calculating the benefits of green roofs

Building attributes for green roofs

- dependent on the roof type, size and slope
- Position of the building
- Location of the building
- Orientation of the roof
- Height above ground
- Roof pitch
- Weight limitations of the building
- Preferred planting
- Sustainability of components
- Levels of maintenance.

research question

- what is the extent of the potential to retrofit green roofs within the city of Melbourne central business district (CBD)?

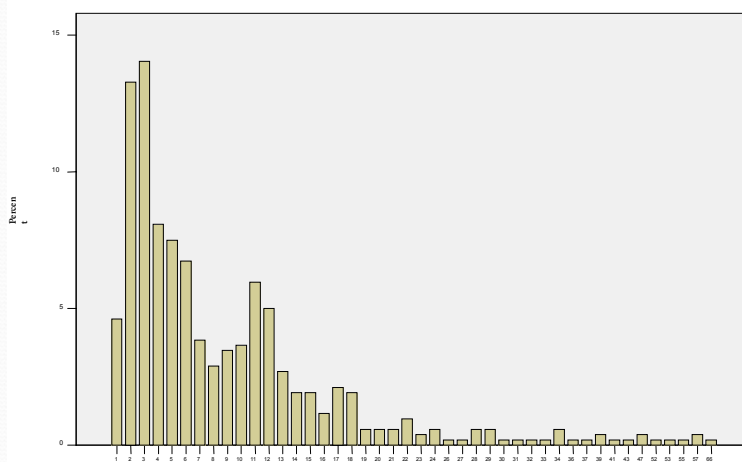
method

- building database contains 521 commercial buildings
- Considered all the criteria on slide 8
- Large survey of high number of buildings never previously undertaken
- Used google earth to closely inspect rooftops
- Data analysed using SPSS version 17

findings

- Overview of stock
- the stock is ageing - average age of 61 years or built in 1944.
- oldest building was built in 1853 - most recent 2005,
- The top 10 years for the construction of new buildings showed only two pre war entries - reflective of considerable post war construction in the CBD.
- Since 1940 302 (or 60.4%) new buildings have been added in the database population.
- building height - the modal number of stories is 3 and most buildings are low rise, and partially or totally overshadowed in some cases.
- 405 of the 521 is 4 stories or less, 68.1% are 10 or less. 4.4% is between 21 and 30 stories, 2% are 31 to 40 stories, 0.8% is 41-50 stories and 0.2% is up to 66 stories high

Figure 2 - Number of storey's in buildings



Number of storeys in Melbourne CBD buildings

orientation

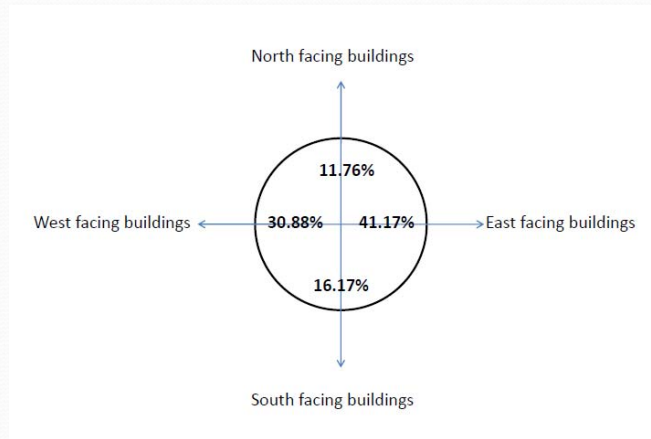
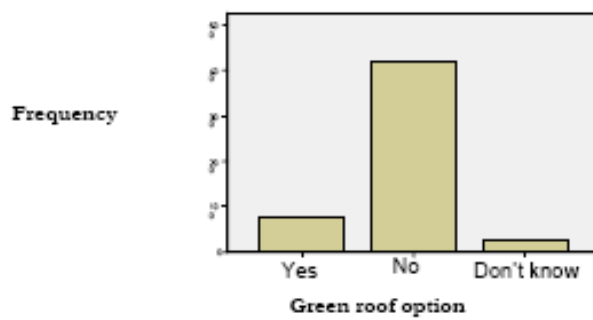


Table 4 Green roof option (Source: Author)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
yes	78	14.8	15.0	15.0
no	418	79.5	80.2	95.2
Don't know	25	4.8	4.8	100.0
Total	521	99.0	100.0	
Missing				
System	5	1.0		
Total	526	100.0		

Figure 5: Green roof option



(Source: Author)

Table 5 Overshadowing of roof

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
yes	205	39.0	39.3	39.3
no	127	24.1	24.4	63.7
partial	189	35.9	36.3	100.0
Total	521	99.0	100.0	
Missing				
System	5	1.0		
Total	526	100.0		

Figure 6: Roof overshadowing

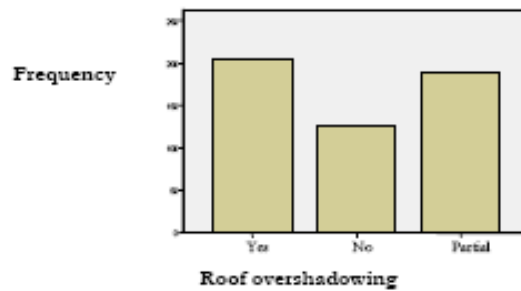


Figure 7 Green roof option and location of buildings

(source: Author)

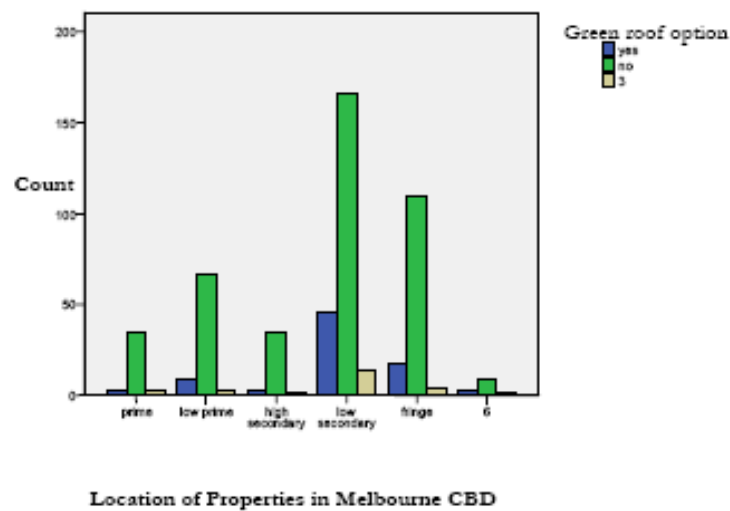


Figure 9 Roof overshadowing and PCA grade

(source Author)

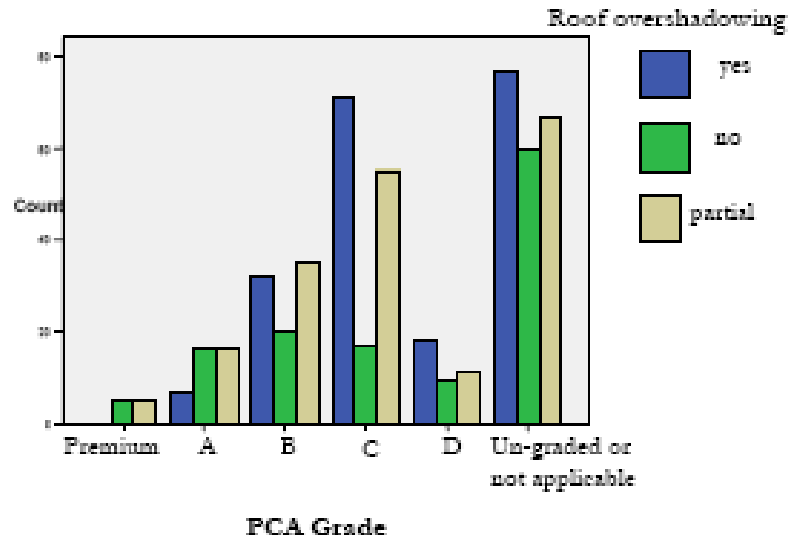
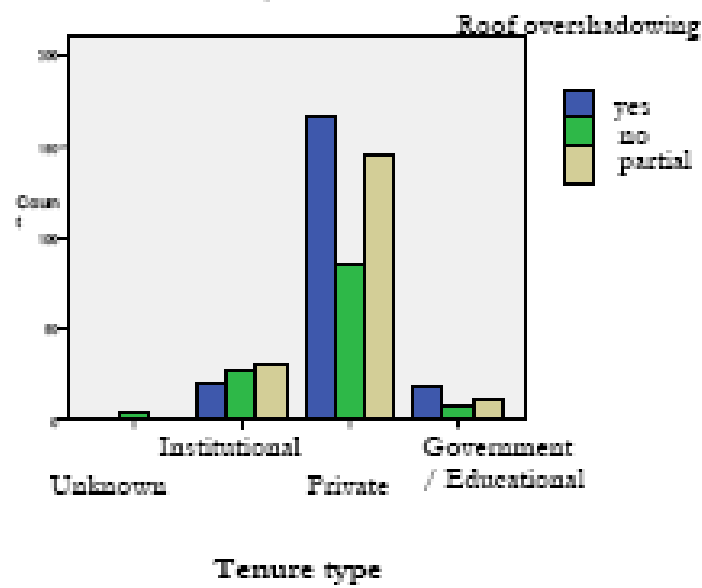


Figure 12 Roof overshadowing and ownership

(source Author)



Findings

This research produced six key findings in relation to green roof potential in the Melbourne CBD.

1. Only 15% of the 526 buildings in the database were considered suitable for retrofitting with green roof technology
2. Only xx% of roofs have a north facing orientation, are not overshadowed and a suitable for a green roof adaptation
3. Low secondary locations offer highest potential for green roof retrofits
4. Ungraded stock and B grade stock are least likely to be overshadowed
5. Concrete framed stock is more suited to extensive green roof retrofit
6. The highest amount of stock which is not overshadowed is in private sector ownership

conclusions

- arguments for green roof technology are clear and convincing
- barriers to uptake exist
- only small minority are suitable for retrofit in the CBD
- a similar analysis of a regional Victorian city is undertaken to establish whether more potential exists there
- this way policy makers will know whether strategies to encourage green roof adaptation are better suited to suburban and regional urban centres more so than the inner city.
- *Thank you for listening*