



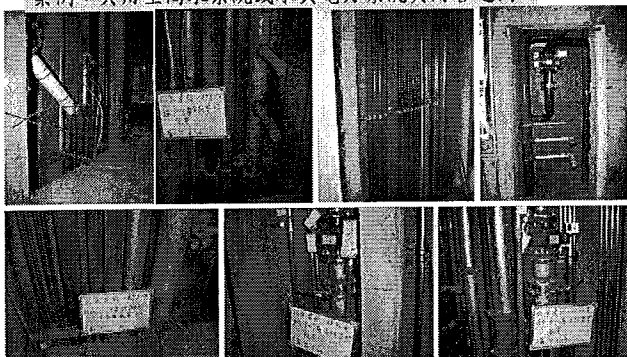
## 公寓住宅的管道間實況、問題、策略

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台灣地區公寓住宅給排水設備系統、電力設備系統、弱電設備系統、安全設備系統、消防設備系統、排風設備系統在傳輸側的管路（線）多配設於管道間內，因此管道間的良窳影響建築物的使用水準。然而國內目前並未對管道間訂定相關準則與執行勘驗，因此設計與施工單位多引用國外相關規範或自身設計經驗來加以設計。但從歷年研究調查中發現，管道間過於狹窄難以維修、防火安全不足、有毒氣體（或臭氣）逸散、噪音等問題仍普遍存在。同時因應永續發展提升生活品質的需求，避免廚房油煙污染、減少排水污染（包括污水、洗衣排水、廚房油脂等）、住戶水錶分表設置管道間內的技術，都是亟待克服與落實的事項。因此本文藉由歷年研究與工作經驗，彙整目前台灣地區公寓住宅管道間面臨的十九項課題，並從法令制度面、設計規劃、與施工執行等層面進行分析，由此衍生出在地狹人稠的台灣，適合公寓住宅的因應策略與具體作法。

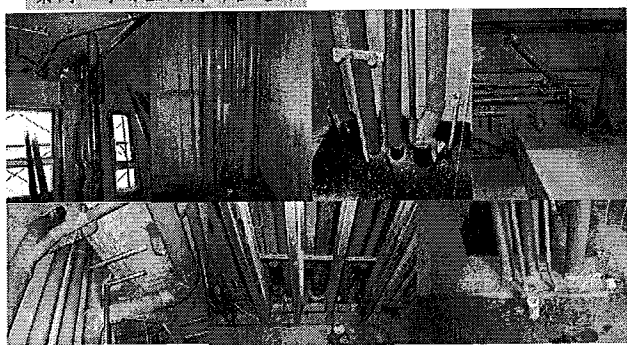
### 二. 公寓住宅的管道間實況

案例：共用空間水系統或水與電力系統共用管道間



### 二. 公寓住宅的管道間實況(續)

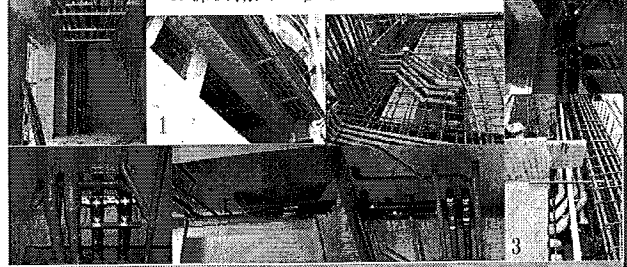
案例：專用空間廁所管道間



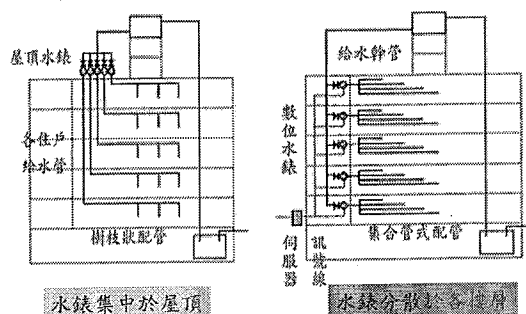
### 二. 公寓住宅的管道間實況(續)

案例：公寓住宅廁所管道間轉移

1. 明管施作。
2. 區域樓板加厚，管路埋設。
3. 樑側擴大，管路埋設。



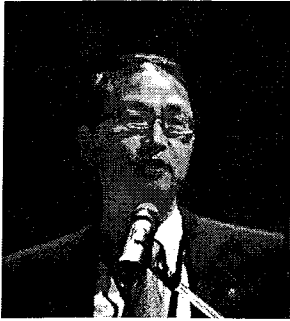
### 五. 個戶分錶集中於屋頂與分散於各樓層之優劣比較



### 作者簡介

**賴榮平** 教授目前任職於國立成功大學建築學系。研究課題以永續發展、建築設備、建築音響為主，前述領域的研究皆已發表在 SSCI、TSSCI 等學術期刊及各類研討會，近年來對於既有建築改善課題進行研究並已獲至一定的成果。

**沈政宏** 先生目前任職於巨成工程顧問公司總經理，並於國立成功大學建築學系進修博士班。在建築機電規劃、設計、施工、監造等工程實務領域已有二十七年之經驗。



## 邁向“平衡用水”的綠建築設計

Toward Water-Neutrality in Green Building Design

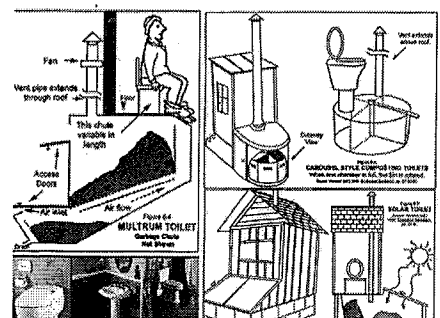
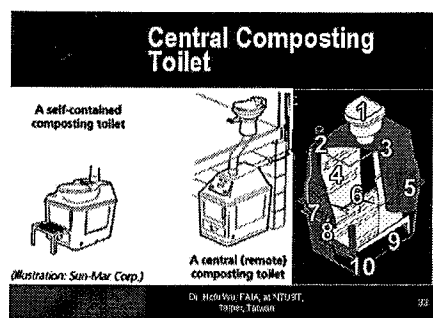
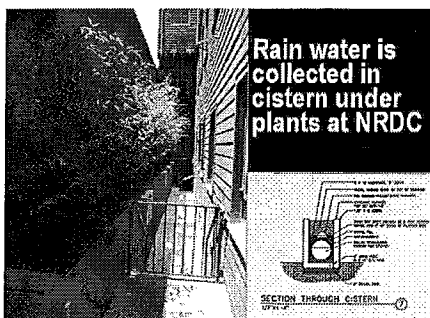
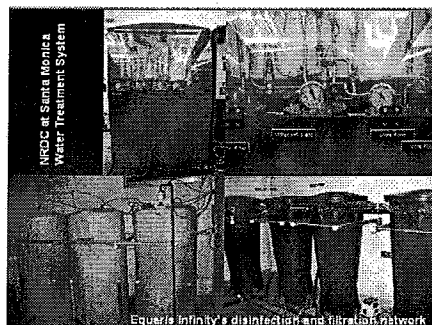
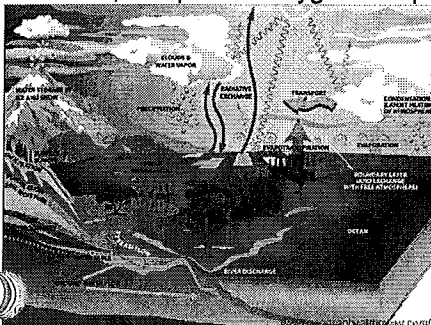
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Recent crisis on global warming has generated vast interests on Green House Gas (GHG) reduction which is closely related to building energy consumption. But beside energy crisis very little attention is taken on the scarcity of another vital life element -water and its depletion resource. Although 71% of the Earth surface is covered by water, the actual amount of consumable water available is only 0.2%. The United States alone uses approximately 340 billion gallons of fresh water daily but almost 65% of that is discharged into rivers and oceans as wasted fresh water. What have been extracted for consumption versus what have been put back to the nature is imbalanced. As described in the LEED Reference Manual; "In other words, every year Americans extract additional 3,700 billion gallons than they return to the natural water system to recharge aquifers and other water sources." What can we do responsibly to balance the deficit and to achieve water-neutrality as we diligently try to achieve carbon neutrality? Currently each one of us consumes about 180-200 litres daily which equals to approximately 70,000 litres of drinking water/person/year. Ordinary flush toilets are responsible for 15-20,000 litres out of this amount.

Architects, designers, and developers must take extra precautions on conserving water and to minimize the adverted impact on the environment. Proper management and treatment of portable water will help to reduce unintended pollution in the ecosystem and will regenerate the natural resource of clean water and environment. In USGBC green building criteria: Leadership in Energy and Environmental Design (LEED), subjects related to water conservation and control takes up to approximately 10% (7 out of 69) of the total potential credit points. These credits are covered in both the Sustainable Sites and the Water Efficiency categories. Thesis of this paper will explore means to achieve water-neutrality for a green building. It will delineate the water consumption among stormwater runoff, landscape irrigation, water treatment, and personal hygiene requirements.



Every new step in advancing eco-friendly environment has its hurdles to take down. The concept of eliminating waste must begin with changing the paradigm in understanding the creation of waste. A composting toilet begins with the idea of regeneration of nutrients. To bring what human takes in as food for energy back to its organic source of nutrients is exactly what a composting toilet intends to achieve. Although current public acceptance of waterless urinals are gaining its trend, the use of composting toilets still have a long way to go. Not only the public acceptance needs to be improved, the public health authority is far from approving their use in public buildings.

A thorough research and development of composting toilets need to be done in order to inform the public about the pros and cons of their performances. In addition, track records of their applications and installations need to be advertised to gain general public awareness and acceptance. Furthermore, building codes would need to be altered to regulate these water-less toilet systems as alternatives.