綠建築評估手冊-境外版

GREEN BUILDING EVALUATION MANUAL - OVERSEAS VERSION

EEWH-OS

ECOLOGY ECOLOGY ECOLOGY ECOLOGY
ENERGY SAVING ENERGY SAVING ENERGY SAVING
WASTE REDUCTION WASTE REDUCTION WASTE REDUCTION
HEALTH HEALTH HEALTH HEALTH HEALTH HEALTH HEALTH

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序

1999 年政府建立「綠建築標章制度」以來，綠建築政策已經成為我國永續發展政策中最重要的一環。2001 年行政院核定實施「綠建築推動方案」，要求總工程經費五千萬元以上的公有新建建築物必須取得「候選綠建築證書」，由公有建築物率先推動作為領頭羊，引導民間業界跟進，更令我國綠建築發展突飛猛進，十多年來我國的候選綠建築證書與綠建築標章數量已超過六千多件，成效卓著，成為世界綠建築政策最有成效的國家之一。2008 年行政院推出「生態城市綠建築推動方案」，使我國的綠建築更進一步邁入永續都市政策的階段，2010 年更推出「智慧綠建築推動方案」，並於 2016 年賡續推動「永續智慧城市-智慧綠建築與社區推動方案」，決定擴大綠建築成為永續國土綠色產業之政策。

在前述各項推動方案中，綠建築仍是最核心的關鍵，內政部建築研究所為擴大臺灣綠建築評估系統(簡稱 EEWH)評估範疇，並帶動國內綠建築技術及產業發展，於 2012 年完成綠建築分類評估體系，依建築使用類型分為「綠建築評估手冊－基本型（EEWH-BC）」、「綠建築評估手冊－住宿類（EEWH-RS）」及「綠建築評估手冊－廠房類（EEWH-GF）」，同時訂定「綠建築評估手冊－舊建築改善類（EEWH-RN）」及「綠建築評估手冊－社區類（EEWH-EC）」等五類綠建築評估版本，建構完成我國的「綠建築家族評估體系」，從此我國正式邁入綠建築分類評估的時代，並於 2015 年全面更新手冊，使其評估功能更加完備。

我國 EEWH 綠建築標章與美國 LEED 綠建築標章，係國際認證數量最多之兩套系統，長期以來在國際間備受肯定，亦為國內相關企業或廠商習於採用，藉以建造節能減碳綠建築之主要參據。而面臨國際化的需求，企業或廠商為增加國際市場的競爭力及商機，於境外設立工廠或基地建築開發時，主動表達希望亦能取得臺灣綠建築標章認證的意願，以推動企業實質節能減碳，為減緩地球暖化善盡一己之力，同時提升企業環保永續形象，以爭取國際大廠的認同與合作。

有鑑於此，內政部建築研究所於 2017 年以 EEWH-BC 版為基礎，導入在地氣候條件、相關法令、設計慣例修正之「當地基準評估法」，創立「綠建築評估手冊－境外版」（EEWH-OS），提供境外建築物的申請，成為此「綠建築家族評估體系」的第六類家族成員。同時，手冊也首次以中英文對照方式呈現，並建立線上申請系統，讓 EEWH 系統邁向國際化。EEWH-OS 將秉持簡化、公平、合理的評估特性，讓我國的永續營建政策拓展至境外，進而為全球居住環境與地球環保做出最大的貢獻。

內政部建築研究所　所長

陳瑞鈴　謹上

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第一章　　緒論

1-1 世界綠建築評估系統的發展

「綠建築」在日本稱為「環境共生建築」，有些歐美國家則稱之為「生態建築」、「永續建築」，在美洲、澳洲、東亞國家，北美國家則多稱為「綠建築」。1992 年巴西的地球高峰會議以來，隨著地球環保熱潮，在建築產業界也興起一片綠建築運動。於是，全球第一部綠建築評估系統 BREEAM，在 1990 年首先由英國建築研究所 BRE 提出，此方法後來影響了 1996 年美國的 LEED、1998 年加拿大的 GBTool 等評估法。建立於 1999 年的台灣綠建築評估系統 EEWH，是來自亞洲的一匹黑馬，也是全球第四個上路的系統。此後，日本的「建築物綜合環境性能評估系統 CASBEE」、澳洲的「Energy Star」，則正式啟動於 2002 年。

2000 年以後，可說是全球綠建築評估體系發展的顛峰，像德國的 LNB、澳洲的 NABERS、挪威的 Eco Profile、法國的 CECALE、韓國的 KGBC、香港的 BEAM Plus 與 CEPAS、新加坡的 Green Mark，都相繼成立。2006 年，中國以節地、節能、節水、節材為主軸，公佈了「綠色建築評價標準」。到了 2011 年，全球正式擁有綠建築評估系統已達二十六個國家，已成立或正籌組綠建築相關協會的國家已達 89 個國家。其中有些系統，像 LEED、CASBEE、BREEAM、EEWH、Green Mark，已繼續擴大其適用範圍，並發展出不同建築類型的專用版，甚至提出舊有建築物、生態社區的評估版本，有些甚至已變成該國公共建設必要的規範。在地球環境危機的威脅下，在短短二十年中，綠建築評估工具在全世界已呈現百花齊放、爭奇鬥豔之勢。

1-2 台灣綠建築體系的發展

環視世界各國的綠建築系統發展，多少均習自英國的 BREEAM 或美國的 LEED，但台灣的 EEWH 系統因為獨力發展甚早，並未搭上歐美系統，是全球第一個獨自以亞熱帶建築節能特色來發展的系統，也是亞洲第一個綠建築評估系統。它由 1995 年的台灣節能設計法規發展而成，以「生態、節能、減廢、健康」為主軸，因而號稱為 EEWH 系統。1999 年，由內政部建築研究所公佈第一部「綠建築評估手冊」與「綠建築標章」以來，已變成國家級之綠建築認證標準；2004 年開始引入五等級分級評估法，並建立「綠建材標章」認證制度，奠定了我國綠建築政策的基礎；2011 年更發展出五大建築類型的「綠建築家族評估體系」，讓我國的綠建築政策成為國際綠建築發展的模範生。

近年來，台灣頻頻遭受山坡地災變、澇旱地震、土石流、都市淹水、缺水缺電之苦，尤其九二一震災與八八水災之教訓，民眾對於環境保護之期盼日益殷切，使綠建

築政策很順利成為國家永續政策最重要之一環。如今，綠建築政策已蔚為風潮，其「生態、節能、減廢、健康」之簡易口號，不但已成為政府、媒體、學界朗朗上口的口頭禪，同時也帶動了節能、再生建材、環保設計的建築環保產業。

2003 年，我行政院啟動「綠建築推動方案」，強制政府經費五千萬元以上的公有建築物必須取得「候選綠建築證書」，使我國綠建築標章認證通過的數量大增，成為全球難得的綠建築政策成就。台灣執行綠建築標章制度凡十年，至 2017 四月底評定通過「綠建築標章」及「候選綠建築證書」近 6,400 件，使台灣 EEWH 為僅次於美國 LEED，擁有綠建築認證數量最多的國家，顯示台灣似乎已在世界綠建築政策中一馬當先，甚至在台灣已經形成一股不可遏止的「綠建築改造運動」。

國際間大部分其他國家的綠建築評估系統，大多採分項獨立計分的「菜單式」評估系統，常流為強制採購與商品推銷的工具，但台灣的 EEWH 系統自始即堅持「綜合性能」之評分方式，設計者可權衡輕重，選擇經濟實惠的技術組合來達成綠建築目標，不但可確保最大設計彈性與技術選擇之自由，同時可防止過度設備、超量投資之傾向。尤其，EEWH 系統之評估內容只鎖定建築與都市計畫直接相關之最基本環境效益問題，排除了交通、環保等其他非建築產業之評估內容，同時避免鼓勵昂貴的綠色採購與高科技設備的評分，甚至堅守以自然設計優先、誘導式設計優先、防止超量設計優先的基本門檻，其節能要求比現行建築法規至少嚴格 20%，要求空調設備減量比傳統設計降低 30%以上。雖然台灣綠建築體系的評估項目相對少，通過門檻相對低，但其操作方法相對簡單，其認證時程相對簡化，此乃我國的綠建築認證工作得以普遍化、平價化的原因，也是我國綠建築政策得以快速推廣的原因。

行政院為了延續此一優良成果，在 2008 年推出「生態城市綠建築推動方案」，在 2010 年推出「智慧綠建築推動方案」，並於 2016 年賡續推動「永續智慧城市-智慧綠建築與社區推動方案」，決定擴大綠建築成為永續國土綠色產業之政策。然而，我國過去以單一綠建築評估手冊適用於所有新舊建築與各類建築之評估方法，顯然無法掌握各類建築在綠建築設計上之差異，也難以發揮綠建築標章認證應有之環境效益。有鑑於此，各界遂有仿效美日發展分類綠建築評估系統之建議，因此內政部建築研究所從 2009 年起委託成大建築研究所積極發展不同類型建築物的專用綠建築評估系統，終於啟動了我國的「綠建築家族評估體系」。

1-3 台灣綠建築家族評估體系概要

內政部建築研究所為了擴大綠建築評估適用於不同綠建築類型，決定將 1999 年以來的「綠建築解說與評估手冊」定位為最基本通用的綠建築基本版，並於 2011 年正

式改編為本「綠建築評估手冊 EEWH-BC（基本型）」，以做為其他類型評估體系之發展平台，同時於 2009 年開發完成「綠建築評估手冊 EEWH-EC（社區類）」，又於 2010 年完成「綠建築評估手冊 EEWH-GF（廠房類）」以及「綠建築評估手冊 EEWH-RN（舊建築更新類）」，另於 2011 年完成「綠建築評估手冊 EEWH-RS（住宿類）」，一共形成五種「專用綠建築評估手冊」，建構完成我國初步的「綠建築家族評估體系」。此五手冊於 2015 年再版修正，於 2017 年因應台商在全球佈局上新興綠色商機之需求，導入在地氣候與法令修正之「當地基準評估法」，創立「綠建築評估手冊---境外版」（EEWH-OS），成為此「綠建築家族評估體系」的第六家族成員。

2016 年，內政部建築研究所鑑於我國建築節能設計法規成立至今已屆二十多年，在近年氣候變遷與建築型態複合化、多樣化的衝擊下已難調適，因而成立「我國建築技術規則建築節能設計法規因應建築多樣化趨勢應有之調適策略研究」，並提出建築節能設計法規之修改建議。2017 年，我營建署依此建議全面修改建築節能設計法規與綠建築基準專章法條，同時一併更新綠建築基準專章所有的建築技術規範。內政部建築研究所因應此建築法令之巨大變革，再加上近年來綠建築新技術發展與地方政府強化綠建築自治條例的新需求，於 2018 年全面完成前五類綠建築評估手冊之更新版，成為嶄新的「綠建築家族評估體系」。

目前建構完成的六類專用綠建築評估系統與其適用對象如表 1.1 所示，其中境外版 EEWH-OS 必須依其建築物特性，合理選用另外五類國內版手冊之一搭配評估。其中 EEWH-BC、EEWH-RS、EEWH-GF 等三類版本，原則上以分棟評分、分別認證為主，但若有同一棟多類型混合使用建築物時，原則上必須選定樓地板面積最大的類型為主類建築，再依此主類建築所屬版本評估後，再依其樓地板加權計算其得分，假如各類建築物之指標項目與得分權重不一致時，則依主類建築之指標項目與得分權重來計算之，不存在於主類建築的指標項目則不予評估。在混合建築物中，若有一千平方米以下的非主類建築物時，則應歸入主類建築評估，不再另外評估。

EEWH 家族評估體系不以高科技為取向，而是一重視當地氣候與亞洲實用技術的評估工具，其評估方法遠較國外綠建築評估體系簡便而實用，尤其新境外版 EEWH-OS 更是積極以全球佈局的角色，搭配「當地基準評估法」而適用於全球，此乃獨領寰宇的綠建築評估體系。目前六類專用綠建築評估系統之適用範圍已涵蓋大部分建築類型與新舊建築市場，若能依此落實綠建築政策，將影響我國九成以上之建築市場，同時更提供台商全球佈局爭取商機之高度。環顧全球，除了美國 LEED 與日本 CASBEE 之外，台灣的 EEWH 系統為南方溫熱氣候國家中，率先擁有如此多樣化專業分類且具全球視野的綠建築評估體系，其簡便、平價、實惠、本土化、全球化的特色在國際間誠

屬罕見，也是我國綠建築政策一路走來的堅持。

表1.1　EEWH綠建築家族評估系統與適用對象

專用綠建築評估系統	適用對象
綠建築評估手冊之一（基本型），又稱 EEWH-BC	除了下述二～四類以外的新建或既有建築物
綠建築評估手冊之二（住宿類），又稱 EEWH-RS	供特定人長或短期住宿之新建或既有建築物（H1、H2類）
綠建築評估手冊之三（廠房類），又稱 EEWH-GF	以一般室內作業為主的新建或既有工廠建築
綠建築評估手冊之四（舊建築更新類），又稱 EEWH-RN	取得使用執照三年以上，且建築更新樓板面積不超過一半以上之既有建築物
綠建築評估手冊之五（社區類），又稱 EEWH-EC	任何合法之複合建築群
綠建築評估手冊之六（境外版），又稱 EEWH-OS	適用境外建築案件申請，並依其建築物特性自上五手冊中合理選用版本搭配評估

1-4 EEWH-OS 緣起

台灣的 EEWH 系統是全球第一個獨自以亞熱帶建築節能特色來發展的系統，也是亞洲第一個綠建築評估系統，發展至今，EEWH 也和全球幾個綠建築評估系統一樣，面臨境外適用版本上調整之要求。近年來，陸續有台商於境外設立工廠或開發建築投資案時，主動表達希望取得台灣綠建築標章認證的意願，以推動企業實質節能減碳而降低成本，同時藉此提升企業形象以爭取跨國際大廠的訂單，這顯示 EEWH 已廣受肯定。而面臨國際化的需求，台商在艱苦的全球競爭壓力下，EEWH 系統似乎已被期待為協助台商全球佈局與爭取綠色商機之利器。

有鑑於此，內政部建築研究所於 2015 年起，委託成功大學建築研究所執行一系列研究計畫，以探討台灣 EEWH 系統在境外應用的可行性。研究結果顯示，台灣 EEWH 系統具有系統架構明確、指標計算容易、申請流程順暢、書圖文件簡化之優點，若在既有架構下進行調整，應具有境外申請應用的可行性。然而，現有的 EEWH 系統的基準值均是依據台灣特有的條件背景所制定，這顯示現有 EEWH 系統架構及計算方式雖可應用到境外，但指標基準值應考量當地的氣候條件、相關法令、設計慣例，才能合乎在地的綠建築評估。

因此，內政部建築研究所於 2017 年以現有 EEWH-BC 版為基礎，導入在地氣候條件、相關法令、設計慣例修正之「當地基準評估法」，創立「綠建築評估手冊---境外版」（EEWH-OS），提供境外建築物的申請，成為此「綠建築家族評估體系」的第六家族成

員。同時，手冊也首次以中英文對照方式呈現，並建立線上申請系統，並配合本所「境外綠建築標章申請審核認可及使用作業要點」將 EEWH 系統推至國際化。

1-5 EEWH-OS 的雙軌制度原則

為了尊重境外氣候、法令、產業的差異性，同時兼顧我國 EEWH 系統的一致性與公平性，EEWH-OS 採用以下「國內基準評估法」、「當地基準評估法」之雙軌制度，申請時每項指標均可個別選用其中之一法來申請：

(1) 國內基準評估法

此法除了 1.6 新增境外版評估要項之外，其他完全採用國內 EEWH 五版本的評估公式、基準、計分權重與內容來執行，此情形大多出現在氣候相近地區。此法由於完全適用國內版的評估法，因此自可執行無誤。

(2) 當地基準評估法

本「當地基準評估法」為了維持 EEWH 制度的一致性，完全依據國內 EEWH 五版本的評估架構與公式來執行，但基於考量境外氣候、法令、產業的差異性，特別採用當地慣常合法的建築水準為基準值，並強化該基準值 5%為 EEWH-OS 基準值來執行的評估法。申請者必須提出當地合法建築產業水準之說明與圖說，並依該圖說計算出 EEWH-OS 基準值，並代入 EEWH 五版本的評估公式來執行之。

本「當地基準評估法」是因地制宜又不失公平性的抉擇，也是我國 EEWH 系統國際化的利器。在美國 LEED 系統中雖也有區域優先(regional priority)的類似概念，但 EEWH-OS 的「當地基準評估法」更是青出於藍的先進國際化方法。「綠建築在地化」是 EEWH-OS 最重要的精神，例如中東沙漠區不可能有大綠化量與基地保水之要求，在無屋頂隔熱要求的國家不可能比照國內屋頂隔熱 U 值 $0.8W/m^2K$ 以下之要求，對開發中國家強行要求高科技的中央空調評估也是違反地球環保的作為。又如，「當地基準評估法」對於日常節能指標在美國加州應遵守加州建築節能法令 Title 24 之規定；在新加坡則應符合建築外殼/屋頂熱傳 ETTV/RTTV 之規定；在毫無節能規定的國家則應以當地合法建築慣常水準作為參考起點。本 EEWH-OS 的「當地基準評估法」，乃是一種獨步全球、且最能貫徹「綠建築在地化」的綠建築評估創舉，有利於 EEWH 系統的國際化，並協助台商的全球佈局。

上述「國內基準評估法」或「當地基準評估法」，必須依其建築物特性，合理選用另外五類國內版手冊之一搭配評估才能執行。

1-6 EEWH-OS 的特別規定

基於 EEWH 國際化與執行效率之考量，本 EEWH-OS 境外版的特別規定如下：

1. 申請 EEWH-OS 版者，新建建物必須提出該申請案之建築師執照以及合法使用執照或建照之相當證明文件，舊有建築應有房屋稅等合法建物證明，並擇要翻譯成中文以供查核。
2. EEWH-OS 版之得分計算公式、評分比重、分級得分基準完全依照國內版本之規定執行之，包含各項指標基本規定及綠建築創新設計升級特殊規定等。EEWH-OS 版優先以下述第二章之特殊規定處理之，若無特殊規定則依國內最新版手冊規定處理之。
3. 由於境外當地政府對於建築分類管制的法規不同，EEWH-OS 版對於建築分類不必強求我國建管分類之要求，可以實際建築使用空間特性為綠建築申請分類之依據，合理選用另外五類國內版手冊之一搭配評估。針對境外所有類型之新建或既有建築物，含基本型、住宅類、廠房類，可優先選用本手冊第二章所述之內容進行評估；針對境外舊建築更新類、社區類，則可依本手冊第二章修改的精神，自行依 EEWH-RN、EEWH-EC 提出合法、合理、合乎比例原則之評估法執行之。
4. 對於國內手冊中規定不詳或不合當地氣候法令時，可自行以假設情境提出合法、合理、合乎比例原則之替代計算法執行之。
5. 使用「當地基準評估法」時，申請者必須提出當地合法建築產業水準之說明與圖說為「當地基準評估法」之依據，該基準在合法、合理、合乎比例原則，且需強化該基準值 5%為 EEWH-OS 之基準值，同時必須根據國內版的指標公式及表格計算指標得分，始得被承認。
6. EEWH-OS 版對於手冊中所規定之物理性能數據、證明文件資料，可以當地或國際間同等級之物理數據、證明資料替代之，若無相對應之證明資料可由當地建築師出具簽章切結之說明文件替代之。
7. 內政部建築研究所指定評定機構將籌組一個「EEWH-OS 評定小組」，負責 EEWH-OS 版之評定、查核事宜，對於手冊規定未盡事宜或境外窒礙難行之疑慮處，可由申請單位提出處理方法說明，並由「EEWH-OS 評定小組」在合法、合理、合乎比例原則下認可解決之。

第二章　　EEWH-OS 的評估內容

2-1 生物多樣性指標

「生物多樣性指標」是專指廣域的生物棲地與生物交流之基盤。本指標僅以建築景觀實務所能操作的範疇，透過綠地品質的提升來掌握生物多樣性活動的生態基盤。內容以(1)生態綠網、(2)小生物棲地、(3)植物多樣性、(4)土壤生態、(5)照明光害、(6)生物移動障礙等六項領域之生態品質來評估。本指標評估方法及系統得分詳見國內版 BC 手冊。有關本指標在境外版的評估時其它需注意事項，茲說明如下：

1. 考量境外案例之特殊性，超過 1 公頃之基地亦可不檢討生物多樣性指標，總得分依 BC 手冊「各等級之得分界線一覽表」中免評估生物多樣性指標者來評估綠建築等級。
2. 有關「植物多樣化」之「原生或誘鳥誘蝶植物採用比例」，應檢附當地原生樹種或誘鳥誘蝶植物之相關文件，資料類型及格式不拘，說明資料來源或取得背景即可。

2-2 綠化量指標

「綠化量指標」是以植物固碳當量作為評估標準，此評估最大的功能在於提供不同植物環境效益的相對換算機制，排除過去景觀政策對各類植物只能分離規範之障礙，避免獨厚喬木綠化而忽略灌木、蔓藤、草花或複層綠化之缺失。具備鼓勵多樣化綠地設計的功能，在景觀實務上與生態效益上有重要貢獻。本指標評估方法及系統得分詳見國內版 BC 手冊。本指標在境外版的評估時其它需注意事項，茲說明如下：

1. r 值修正為實際建蔽率，即實際建築投影面積除以基地面積。當 r>0.85 時，令 r＝0.85。
2. 生態綠化修正係數 α 之採計原則按國內 BC 版手冊規定，應檢附當地原生樹種或誘鳥誘蝶植物之相關文件，資料類型及格式不拘，說明資料來源或取得背景即可
3. 採用「當地基準評估法」時，對於「單位綠地固碳當量基準值 β 」可假設當地設計情境來處理，若無特殊當地規定，可假設基地綠化條件在最小綠化面積的 1/3 為草地、1/3 為灌木、1/3 為闊葉大喬木之條件來做為當地基準情境處理之。

2-3 基地保水指標

所謂「基地保水指標」就是建築基地涵養水分及貯集滲透雨水的能力。「基地保水設計」主要分為「直接滲透設計」與「貯集滲透設計」兩大部分，「直接滲透設計」包括(1)綠地、被覆地或草溝設計，(2)透水鋪面設計, (3)貯集滲透空地, (4)滲透排水管設

計, (5)滲透陰井設計及(6)滲透側溝設計；「貯集滲透設計」包括(1)花園土壤雨水截留設計，(2)景觀貯集滲透水池設計，(3)地下貯集滲透設計等。本指標評估方法及系統得分詳見國內版 BC 手冊。有關本指標在境外版的評估時其它需注意事項，茲說明如下：

1. r 值修正為實際建蔽率，即實際建築投影面積除以基地面積。當 r>0.85 時，令 r＝0.85。
2. f 為基地最終入滲率，可依當地的規定做鑽探調查，或以其表土狀況依建築師經驗判斷之。

2-4 日常節能指標

日常節能指標沿用 EEWH 系統慣例，以建築外殼、空調系統及照明系統等三項來進行節能評估，任一建築物必須同時通過三項評估才算合格。為了尊重境外開發中國家普遍之產業工作環境，本手冊將空調系統擴充為一種廣泛的熱環境調節系統，包含1.中央空調系統、2.個別空調系統、3.負壓風扇系統等三種類型，均歸屬空調系統之評估對象，非屬上述中央空調系統與負壓風扇系統者，不論已裝或未裝空調機，均應視同採個別空調系統來評估。依上述空調類型分類原則，在日常節能指標之計算項目及評估方法如下表 2.1 所述。

表 2.1 EEWH-OS 日常節能指標評估方法

<table>
<tr><th>建築類型</th><th>方法</th><th>項目</th><th>計算方式及得分評定</th><th colspan="2">指標配分上限及範疇配分*</th></tr>
<tr><td>中央空調系統之空間</td><td>能源成本評估法</td><td>建築外殼、空調系統及照明系統</td><td>參照本手冊 2.4.1 節說明，採用能源成本評估法進行電腦模擬，計算日常節能指標系統得分(RS4)*。</td><td colspan="2">日常節能範疇配分=32 分</td></tr>
<tr><td rowspan="4">個別空調系統或負壓風扇系統之空間</td><td rowspan="4">逐項節能評估法</td><td>建築外殼</td><td>參照本手冊 2.4.2.1 節說明，依當地情境基準計算外殼節能指標以判定建築外殼節能系統得分($RS4_1$)*。</td><td>$RS4_1$ 配分上限=14 分</td><td rowspan="4">日常節能範疇配分合計=32</td></tr>
<tr><td rowspan="2">空調系統</td><td>若為個別空調系統之空間，參照 BC 手冊以空調系統節能效率 EAC 評估，並計算空調節能系統得分($RS4_2$) *。</td><td rowspan="2">$RS4_2$ 配分上限=12 分</td></tr>
<tr><td>若採負壓風扇系統之空間，參照本節「負壓風扇系統節能評估法」計算 $RS4_2$*。</td></tr>
<tr><td>照明系統</td><td>參照 BC 手冊以以室內照明系統節能效率 EL 評估，並計算照明節能系統得分($RS4_3$)*</td><td>$RS4_3$ 配分上限=6 分</td></tr>
</table>

*有關日常節能指標系統得分(RS4)之定義、建築外殼節能系統得分($RS4_1$)、空調節能系統得分($RS4_2$)、照明節能系統得分($RS4_3$)，請參照國內版 BC 手冊之定義。指標配分上限及範疇配分，應採用最新國內版 BC 手冊之數值。

2-4.1 中央空調系統空間之評估：能源成本評估法

屬中央空調系統之建築物或空間，在境外版之日常節能採用國內版 GF 手冊所述之「選項二：能源成本評估法」，可綜合評估建築外殼、空調系統及照明系統之整體節能效果。「能源成本評估法」依其設計之「設計模型 Proposed Model」以及標準化之「基準模型 Baseline Model」，各分析其能源成本，只要「設計模型」之能源成本低於「基準模型」之能源成本即可合格。詳細計算原則請參照國內版 GF 手冊所述之「選項二：能源成本評估法」所述，在境外版的模擬評估時其它需注意事項，茲說明如下：

1. 模擬採用之氣象資料應以當地或鄰近國際都市之平均氣象年資料為基準。
2. 材料與結構、照明與 HVAC 系統之基準模型建立，應以國內版 BC 手冊或當地法規或 ASHRAE 最低標準進行設定。
3. 其它項目之設定標準則參照國內版 GF 手冊「能源成本評估法關於設計模型與基準模型的設定條件規定」。

「能源成本評估法」解析後的節能指標得分率 Ren，乃是以設計模型對標準模型的節能比例來評分，在此設定對標準模型能源成本節省三分之一以上時可得滿分，其得分率計算如式 2.4.1，系統得分 RS4 如式 2.4.2，權重係數 Wen 為國內版 BC 手冊之日常節能範疇配分，即建築外殼、空調及照明之最高得分總和。

Ren＝3.0×(SEC-DEC)/ SEC，且 0.0≦Ren≦1.0 ------------------------------ (2.4.1)

系統得分 RS4＝Wen×Ren -- (2.4.2)

SEC：標準模型能源成本(kWh/yr)

DEC：設計模型能源成本(kWh/yr)

Wen：權重係數，為國內版BC手冊之日常節能範疇配分，即建築外殼、空調及照明之最高得分總和。

(註: 2015年國內版BC手冊之日常節能範疇配分為32分，計算時採用最新國內版BC手冊之數值)

2-4.2 個別空調系統或負壓風扇系統空間之評估：逐項節能評估法

屬個別空調系統或負壓風扇系統之建築物或空間，在境外版之日常節能採用國內版 GF 手冊所述之「選項一：逐項節能評估法」，逐項評估建築外殼、空調系統及照明系統之各別節能效果。所謂「逐項節能評估法」，就是依據建築物之建築外殼、空調、照明等三大節能要項，逐一檢討其節能設計之方法。

2-4.2.1　建築外殼節能評估

因國內版 BC 手冊之 ENVLOAD、AWSG 等外殼節能指標是以台灣氣候資料為基礎之評估法，無法直接於境外之建築物使用。考量到各國的建築執照核發時均代表已認可其外殼節能特性，故境外申請案若取得當地合法建築執照，即代表其符合當地節能規範，EEWH-OS 不再細究其規定。但基於屋頂隔熱之重要性，本系統得分係以屋頂隔熱 U 值為建築外殼耗能指標 EV 值指標，依 EEWH-BC 原有系統得分 $RS4_1$ 公式計算，如下所示：

EEV ＝ EV/EVc ≦ EEVc＝0.95 --（2-4.3）

系統得分 $RS4_1$＝a ×（(0.95-EEV)/ 0.95）＋2.0，且 0.0≦$RS4_1$≦14.0-------（2-4.4）

其中

$RS4_1$:建築外殼節能系統得分（分）

EEV、EEVc：建築屋頂節能效率、建築屋頂節能效率基準值，無單位。

EV、EVc：申請案建築設計之屋頂熱傳透率 U、當地建築物普遍之屋頂熱傳透率 Ud，單位：W/m^2K。

a：合格變距 Ri 得分權重，參照 EEWH-BC 手冊。

此方法乃是「當地基準評估法」之作法，其中當地建築物普遍之屋頂熱傳透率 Ud，計算時必須由申請者提出當地法規水準之說明與圖說以供認定。

2-4.2.2　空調系統分項節能評估法（負壓風扇系統節能評估法）

若屬「個別空調系統」的建築物或空間，參照 BC 手冊以空調系統節能效率 EAC 評估，並計算空調節能系統得分($RS4_2$)分數。若為負壓風扇系統之建築或空間，其評估方法則依下述「負壓風扇系統節能評估法」所述，進行計算其空調節能基準值(EAC)值後，再依國內版 BC 手冊「EEWH-BC 各指標計分法」求 $RS4_2$。

以冷凍機器為主的空調設備是較高級且昂貴的環境調節系統，但有些企業在競爭力考量上，改用負壓風扇系統作為替代空調的環境調節系統，在地球環保時代是值得鼓勵的方向，本手冊特別將之納入空調系統節能評估系統的選項之一。所謂負壓風扇系統是一種裝於建築物出風面的排風扇系統，利用風扇所產生的負壓吸引涼風由另一端進入生活空間以達到降低體感溫度的熱環境調節系統。負壓風扇系統有時會與所謂水簾設備一併使用，亦即將氣流吸入設在進風口處的水簾幕，利用冷水淋灑在簾幕上所形成的多孔隙熱交換與蒸發冷卻作用將外氣變成冷空氣，再進入室內以作為空調之用。這水簾設備有時是單純水簾，有時附有送風機以加強輸送效率。負壓風扇系統不

論有無附加水簾設備，均為本手冊的評估對象。此系統雖然不如正宗的冷凍空調系統有高水準的溫濕度調節功能，但設備頗為低廉而經濟實惠，尤其在一些較不受高濕環境困擾的建築案例中頗受青睞。

最新的環保節能理論並不一定固執過去偏狹的空調熱舒適範圍，負壓風扇系統乃是庶民的廉價環境調節系統，本手冊基於環境倫理與健康熱適應之理論，特將此視為一種綠建築政策輔導的節能減碳對象。本手冊對於負壓風扇系統的評估，要求使用該系統的建築空間平均風速 Va 必須介於 0.5~2.0m/s 才合格，合格判斷如公式 2.4.5 所示，同時其 EAC 之評分以通風潛力 VP 為指標計算如公式 2.4.6 所示：

Va＝Vt/Ar，且 0.5≦Va≦2.0--(2.4.5)

EAC＝1.0－（VP*－VP）--(2.4.6)

其中：

Va：負壓風扇系統建築空間平均風速 Va（m/s）

Vt：負壓風扇系統總送風量(m^3/s)，通常為所有負壓風扇送風量之總和。

Ar：負壓風扇系統建築空間平均流場斷面積（m^2）。將流場視為一風管，通常以最具代表斷面之天花高度（天花若設下垂擋風版，以實際流場高度計算）乘以通道寬度。

EAC：空調系統節能效率，無單位

VP：原平面未採用水簾或負壓風扇系統時，依國內版手冊附錄 3 所計算之自然通風潛力

VP*：原平面新增水簾或負壓風扇系統時，依下述規定與國內版手冊附錄 3 規定所計算之自然通風潛力

該公式的意義，乃是以負壓風扇系統所達成建築空間自然通風面積改善比例作為評比標準，設定自然通風面積改善比例增加 60%時，相當於中央空調系統節能效率 EAC 達 0.4 的水準之意。本來負壓風扇系統越是在自然通風難以達成的大深邃空間才有意義，此類大深邃空間通常有較小的 VP 值，此公式「VP*－VP」之意義在於對越通風不良的建築改善越多通風比例，才能得到越佳 EAC 值評估之意。該評估的相關規定如下：

1. 申請者必須提供負壓風扇系統的設備功率與型錄。
2. 申請者必須提供建築平面圖，平面圖上繪製清楚進風口與出風風扇位置（如圖　所示）。
3. 申請者必須依公式2.4.5計算出使用該系統的建築空間平均風速Va，且該Va必須介於0.5~2.0m/s才合格（通常辦公業務為0.5~1.0m/s，工廠作業為1.0~2.0m/s，但在此

不區別）否則不予評估，若不合規定則令EAC值為0.8即可。

4. 申請者必須提供原設計在水簾或負壓風扇系統裝設前後兩案依EEWH-BC手冊附錄3所計算之自然通風潛力VP、VP*之報告書。
5. 依EEWH-BC手冊附錄3規定，每一裝設負壓風扇的進風口與多個進風口之間可連結出多條對流通風路徑，但所有通風路徑均不得相交。
6. 由於負壓風扇系統之強制通風應比自然通風強勁，其VP*值應以所繪製之對流通風路徑左右各2.5m(共5.0m)之範圍計算其對流通風之面積（見國內版手冊附錄3）。
7. 以上評估對於裝設水簾的負壓風扇系統與無水簾的負壓風扇系統均相同。

2-4.2.3 照明系統節能分項評估法

本手冊之照明系統節能評估法以提高燈具效率與照明功率為主，其評估以室內照明系統節能效率(EL)計算，EL 值之評估方法及系統得分詳見國內版 BC 手冊「照明系統節能之評估」，再依國內版「EEWH-BC 各指標計分法」求照明節能系統得分($RS4_3$)。

2-5 CO_2 減量指標

「CO_2 減量指標」是以減少建材在生產與運輸兩階段的 CO_2 排放量為目標。本指標包含「結構合理化」、「建築輕量化」、「耐久化」與「再生建材使用」等四大範疇。本指標評估方法及系統得分詳見國內版 BC 手冊。有關本指標在境外版的評估時其它需注意事項，茲說明如下：

1. 若申請案之建築物具有獨特結構造型、使用當地特有構造、材料或為複雜建築群之建築物時，則F、W等係數難以使用上述表格來計算。此時則可由申請者依結構合理性及輕量化特性來自行認定F、W等係數而提出說明表，但各係數之認定範圍必須維持在EEWH-BC手冊規定之範圍內才行。
2. 耐久化因子di中，耐震力設計標準和柱樑及樓板鋼筋保護層之規範，得依當地規範為基準，並檢附相關資料。

2-6 廢棄物減量指標

「廢棄物減量指標」主要針對工程不平衡土方、施工廢棄物、拆除廢棄物之固體廢棄物以及施工空氣污染等四大營建污染源，進行全面性控管。本指標評估方法及系統得分詳見國內版 BC 手冊。有關本指標在境外版的評估時其它需注意事項，茲說明如下：

1. 建築工程各項粒狀污染物防制措施之認定可採用拍照之方式或向當地環保機關或

其它具公信力之相關單位申請證明。

2. 若當地有相關之法規，且項目與 EEWH-BC 手冊規定雷同(如：手冊規定工地周界築有高 1.8m 以上之圍籬，當地規定 1.5m)，得以認可，但需另外檢附證明文件；其它當地特有，不在手冊表列之防塵規定，則以「其它措施」認定，由申請單位決定認定值。

2-7 室內環境指標

「室內環境指標」同時評估室內環境設計對人體健康與地球環境的負荷，主要以音環境、光環境、通風換氣與室內建材裝修等四部份為評估對象。本指標評估方法及系統得分詳見國內版 BC 手冊。有關本指標在境外版的評估時其它需注意事項，茲說明如下：

1. EEWH-OS 對於本指標要求各類標章與證明，如綠建材標章等、也接受當地或國際相同類型的標章與證明，但應檢附相關產品標示與認證文件。
2. 有關門窗氣密性等級、構造隔音性能等，得提供型錄、規格、或書圖文件，說明其符合該項指標之性能需求即可。

2-8 水資源指標

節約用水為「水資源指標」評估之主要目的，藉由使用節水設施並設置雨水回收系統，降低水資源的浪費。本指標評估方法及系統得分詳見國內版 BC 手冊。有關本指標在境外版的評估時其它需注意事項，茲說明如下：

1. EEWH-OS 對於本指標要求各類標章與證明，如省水標章，也接受當地或國際相同類型的標章與證明，但應檢附相關產品標示與認證文件。
2. 評估計算雨水利用所需之日之平均雨量、建議貯水天數等，可採用當地合理情境來模擬，但須檢附資料來源與計算原理。

2-9 污水及垃圾改善指標

「污水及垃圾改善指標」並非針對污水工程及垃圾生化技術的評估，而是加強落實現有污水及垃圾處理系統的功能。本指標乃特別檢驗評估生活雜排水配管系統，以確認生活雜排水導入污水系統；另一方面，鼓勵執行垃圾分類與資源回收的評估以達垃圾減量的目的。「污水及垃圾改善指標」分「污水改善指標」及「垃圾改善指標」兩項來評估，但「污水改善指標」是必要合格的門檻，而「垃圾改善指標」則是系統計分的對象。有關本指標在境外版的評估時其它需注意事項，茲說明如下：

1. 關於污水處理及放流水質標準需符合申請基地當地有關之規定，並依國內版 BC 手冊之各要項進行檢核。
2. 垃圾不落地為台灣特殊情境，境外多半不適用，申請單位可以依當地的狀況提出一個合乎當地垃圾清運規定者，即可取得垃圾不落地之得分 6 分。

附表1　生物多樣性指標評估表–境外版

一、生物多樣性評估

大分類	小分類	設計項目	說明	最高得分	評分 Xi
生態綠網 _分	總綠地面積比 Ax		Xi=100.0×(Ax-0.10)	40 分	
	立體綠網		Xi=二層以上立體綠化 Ga(m^2/公頃)×0.2(分.公頃/m^2)	5 分	
	生物廊道		興建具導引、安全、隱蔽功能的生物廊道(斟酌給分)	5 分	
小生物棲地 _分	水域生物棲地	自然護岸	Xi=自然護岸密度 Li(m/公頃)× 0.2(分/m)	15 分	
		生態小島	Xi=自然島嶼密度 Ai(m^2/公頃)× 0.5(分/m^2)	10 分	
	綠塊生物棲地	混合密林	Xi=混合密林密度 Ai(m^2/公頃)× 0.2(分.公頃/m^2)	10 分	
		灌木草原	Xi=雜生灌木草原密度 Ai(m^2/公頃)× 0.1(分.公頃/m^2)	8 分	
	多孔隙棲地	生態邊坡圍牆	Xi=Li(m/公頃)× 0.2(分.公頃/m)	6 分	
		濃縮自然	Xi=濃縮自然密度 Ai(m^2/公頃)× 0.5(分/m^2)	5 分	
	其他小生物棲地		由設計者提出有利於小生物棲地設計說明以供認定	認定值	
植物多樣性 _分	基地內喬木歧異度 SDIt		Xt=(SDIt-1)×0.4	8 分	
	原生或誘鳥誘蟲植物		Xa=5.0×ra	5 分	
	複層雜生混種綠化		Xh=20.0×rh	6 分	
土壤生態 _分	表土保護		對於原有表土層 50cm 土壤有適當堆置、養護並再利用者	10 分	
	有機園藝，自然農法		全面採用堆肥、有機肥料栽培者	10 分	
	廚餘堆肥		實際殺菌發酵處理之廚餘堆肥	5 分	
	落葉堆肥		實際絞碎覆土、通氣、發酵、翻堆澆水之落葉堆肥處理	5 分	
照明光害 _分	路燈眩光		Xi=ni(盞/公頃)×(-0.5(分.公頃/盞))	-4 分	
	鄰地投光、閃光		Xi=ni(盞或組/公頃)×(-0.5(分.公頃/(盞或組))	-4 分	
	天空揮光防制		Xi=ni(盞或組/公頃)×(-0.5(分.公頃/(盞或組))	-4 分	
生物移動障礙 _分	廣場或停車場障礙		Xi=(Ai-400)(m2)×(-0.0025(分/ m2))	-4 分	
	道路沿線障礙		基地內超過 15m 寬之道路，交叉路口 10m 以外之兩邊皆無綠帶之長度，每 1.0m/公頃扣 0.5 分，設有一邊甲級、兩邊或一邊乙級、兩邊或一邊丙級綠道者(註 1)，每 1.0m/公頃各扣 0.10、0.20、0.30 分	-4 分	
	橫越道路障礙		基地內 20m 寬以上道路，未設中間綠帶之長度(左轉專用車道段除外)，每 1.0m/公頃扣 0.2 分，或只設乙、丙級綠道者(註 1)，每 1.0m/公頃各扣 0.05、0.1 分	-4 分	
BD=ΣXi=					

註1：甲級綠道：喬木綠帶(但喬木間距應在6m以下，否則視同乙級)，
乙級綠道：密植灌木綠帶(平均每3.0m^2種一株灌木以下之疏植灌木綠帶視為丙級)，
丙級綠道：草花草坪綠帶
註 2：以上各項得分不一定全給分，可視其條件斟酌給予部分得分

二、總得分	BD=ΣXi=_分
三、基準值 BD_i，i=C or D	☐ 國內基準評估法 BDc=　分　　☐ 當地基準評估法 BD_D=　分
四、系統得分	RS1=18.75×【(BD-BD_i)/ BD_i】+1.5=_，(0.0≦RS1≦9.0)

附表2　綠化量指標評估表–境外版

一、綠化量評估

<table>
<tr><th colspan="2">植栽種類</th><th>栽種條件</th><th>固定量 Gi</th><th>栽種面積 Ai</th><th>計算值 Gi×Ai</th></tr>
<tr><td>生態複層</td><td>大小喬木、灌木、花草密植混種區</td><td>喬木種植間距 3.5m 以下且土壤深度 1.0m 以上</td><td>1200</td><td>㎡</td><td>kg</td></tr>
<tr><td rowspan="3">喬木</td><td>闊葉大喬木</td><td>土壤深度 1.0m 以上</td><td>900</td><td>㎡</td><td>kg</td></tr>
<tr><td>闊葉小喬木、針葉喬木、疏葉喬木</td><td>土壤深度 1.0m 以上</td><td>600</td><td>㎡</td><td>kg</td></tr>
<tr><td>棕櫚類</td><td>土壤深度 1.0m 以上</td><td>400</td><td>㎡</td><td>kg</td></tr>
<tr><td colspan="2">灌木</td><td>土壤深度 0.5m 以上 (每㎡至少栽植 2 株以上)</td><td>300</td><td>㎡</td><td>kg</td></tr>
<tr><td colspan="2">多年生蔓藤</td><td>土壤深度 0.5m 以上</td><td>100</td><td>㎡</td><td>kg</td></tr>
<tr><td colspan="2">草花花圃、自然野草地、草坪</td><td>土壤深度 0.3m 以上</td><td>20</td><td>㎡</td><td>kg</td></tr>
<tr><td colspan="2" rowspan="2">老樹保留</td><td rowspan="2">米高徑 30cm 以上或樹齡 20 年以上</td><td>900</td><td>㎡</td><td>kg</td></tr>
<tr><td>600</td><td>㎡</td><td>kg</td></tr>
</table>

ΣGi×Ai=　　kg

<table>
<tr><td colspan="2" rowspan="2">二、生態綠化優待係數 α
針對有計畫之原生植物、誘鳥誘蝶植物等生態綠化之優惠。無特殊生態綠化者設 α=0.8。此優待必須提出之整體植栽設計圖與計算表。其中 α=0.8+0.5× ra；ra=原生或誘鳥誘蝶植物採用比例</td><td>ra=_</td></tr>
<tr><td>α=_</td></tr>
<tr><td colspan="2">三、綠化設計值 TCO_2 計算
$TCO_2=(\Sigma(Gi \times Ai)) \times \alpha$</td><td>$TCO_2$=
_kg</td></tr>
<tr><td rowspan="2">四、基準值 TCO_{2i}，i=C or D</td><td>☐ 國內基準評估法
$TCO_2c=1.5\times(0.5\times A'\times\beta)$， $A'=(A_0-Ap)\times(1-r)$，若 $A'<0.15\times A_0$，則 $A'=0.15 A_0$， r=實際建蔽率，Ap 為不可綠化之面積，β 為單位綠地 CO_2 固定量基準 [kg/㎡]</td><td>$TCO_{2}c$=
_kg</td></tr>
<tr><td>☐ 當地基準評估法</td><td>TCO_{2D}=
_kg</td></tr>
<tr><td>五、系統得分</td><td colspan="2">$RS2=6.81\times$【$(TCO_2- TCO_{2i})/ TCO_{2i}$】$+1.5=$_，$(0.0\leqq RS2\leqq 9.0)$</td></tr>
</table>

附表3　基地保水指標評估表–境外版

一、基地最終入滲率 f 判斷

鑽探報告土壤分類=_　　　土壤滲透係數 k=　　　m/s

最大降雨延時 t= 86400 (s)　　　基地最終入滲率 f=　　　m/s

二、基地保水量評估

保水設計手法		說明	設計值	保水量 Qi
常用保水設計	Q1 綠地、被覆地、草溝保水量	綠地、被覆地、草溝面積(m^2)		
	Q2 透水鋪面設計保水量	透水鋪面面積(m^2)		
		基層厚度(m)		
	Q3 花園土壤雨水截留設計保水量	花園土壤面積(m^2)		
		花園土壤體積(m^3)		
特殊保水設計	Q4 貯集滲透空地或景觀貯集滲透水池設計	貯集滲透空地面積或景觀滲透水池可透水面積 (m^2)		
		貯集滲透空地可貯集體積或景觀貯集滲透水池高低水位間之體積(m^3)		
	Q5 地下礫石滲透貯集	礫石貯集設施地表面積(m^2)		
		礫石貯集設施體積(m^3)		
	Q6 滲透排水管設計	滲透排水管總長度(m)		
		開孔率 χ		
	Q7 滲透陰井設計	滲透陰井個數 n		
	Q8 滲透側溝	滲透側溝總長度(m)		
		滲透側溝材質 a		
Qn 其他保水設計		由設計者提出設計圖與計算說明並經委員會認定後採用		

$\Sigma Q_i=$

註：特殊保水設計為利用特殊排水滲透工程的特殊保水設計法，山坡地及地盤滑動危機之區域應嚴禁採用

三、基地保水設計值 λ 計算 各類保水設計之保水量$Q' = \sum Q_i =$ ； 原土地保水量 $Q_0=A_0 \cdot f \cdot t=$_；		$\lambda = \frac{Q'}{Q_0} =$
四、基準值 λ_i，i=C or D	□ 國內基準評估法 $\lambda c=0.5\times(1.0-r)=$ r=實際建蔽率，若 r＞0.85 時，令 r=0.85	λc=_
	□ 當地基準評估法	λ_D=_
五、系統得分	RS3=4.0×【$(\lambda-\lambda_i)/\lambda_i$)】+1.5=_，(0.0≦RS3≦9.0)	

附表4　日常節能指標評估表–境外版

一、建築名稱：

二、日常節能評估項目

□選項 1：能源成本評估法

基準案	SEC =
設計案	DEC=
Ren	Ren=3.0×(SEC-DEC)/SEC= ，(0.0≦Ren≦1.0)
系統得分	RS4=Wen×Ren=

□選項 2：逐項節能評估法

A、建築外殼節能評估

取得當地合法建築執照		□合格	□不合格
EV=	EVc=	EEV=EV/EVc=_____≦ EEVc=0.95	
系統得分	$RS4_1$＝a ×((0.95-EEV)/ 0.95)+2.0=____ ，且 0.0≦$RS4_1$≦14.0		

B、空調系統節能評估

B1 個別空調系統部分(個別空調部分面積 Afc”=_m²，自然通風空調耗能折減率 Vac=_)

1.　個別空調具有節能標章證明時，採用一級節能標章空調面積比 Ar’=_；二級節能標章空調面積比 Ar”=_； EAC”=0.8-(0.4×Ar’ + 0.2×Ar”) ×Vac =_≦EACc=0.8	□合格	□不合格
2.　無裝設或裝設而無法提供節能標章證明時， EAC” =0.80×Vac =_≦EACc=0.80	□合格	□不合格
子系統得分率	$RS4_2$”=18.6×【(0.80-EAC)/0.80】+1.5=_，(1.5≦$RS4_2$”≦12.0)	
系統得分	$RS4_2$=($RS4_2$’×Afc’+$RS4_2$”×Afc”)÷(Afc’+Afc”)=_，(1.5≦$RS4_2$≦12.0)	

B2 負壓風扇系統

平均風速	Va＝Vt/Ar ＝ ，且 0.5≦Va≦2.0	
自然通風潛力	VP*=	VP=
EAC	EAC＝1.0－（VP*－VP）=	
子系統得分率	$RS4_2$”=18.6×【(0.80-EAC)/0.80】+1.5=_，(1.5≦$RS4_2$”≦12.0)	
系統得分	$RS4_2$=($RS4_2$’×Afc’+$RS4_2$”×Afc”)÷(Afc’+Afc”)=_，(1.5≦$RS4_2$≦12.0)	

C、照明系統 EL

IER=_	IDR=_	β1=_	β2=_	β4=_
EL=IER×IDR×(1.0-β1-β2-β4)=_≦ELc=_			□合格	□不合格
系統得分	$RS4_3$=9.00×【(0.80-EL)/0.80】+1.5=_，(1.5≦$RS4_3$≦6.0)			

三、日常節能指標得分率

□	能源成本評估法	RS4=Wen×Ren=
□	逐項節能評估法	$RS4_1$= a×((0.95-EEV)/ 0.95)+2.0= ，(0.0≦$RS4_1$≦14.0)
		$RS4_2$=($RS4_2$’×Afc’+$RS4_2$”×Afc”)÷(Afc’+Afc”)= ，(1.5≦$RS4_2$≦12.0)
		$RS4_3$=9.00×【(0.80-EL)/0.80】+1.5=_，(1.5≦$RS4_3$≦6.0)

附表5　二氧化碳減量指標評估表–境外版

一、建築名稱：

建築構造：

二、是否為舊建築物再利用案？

□是	舊結構再利用率 Sr(舊結構體與總結構體之樓地板面積比)=　　， CCO_2=0.82－0.5×Sr=　　，(0.0≦RS5≦8.0)
□否	進入以下評估

三、CO_2 減量評估項目

A、形狀係數 F

	評估項目	計算值	fi 係數
平面形狀	1.平面規則性 a	□平面規則 □平面大略規則 □平面不規則	
	2.長寬比 b	b=	
	3.樓板挑空率 e	e=	
立面形狀	4.立面退縮 g	g=	
	5.立面出挑 h	h=	
	6.層高均等性 i	i=	
	7.高寬比 j	j=	
F＝f1×f2×f3×f4×f5×f6×f7 且 F≦1.2			

D、耐久化係數 D

大項	小項	di
耐久性	建築物耐震力設計 d1	
	柱樑部位耐久設計 d2	
	樓版部位耐久設計 d3	
維修性	屋頂防水層 d4	
	空調設備管路 d5	
	給排水衛生管路 d6	
	電氣通信線路 d7	
其他	其他有助於提升耐久性之設計 d8	
D＝Σdi，且 D≦0.2		

B、輕量化係數 W

	評估項目		Wi	ri
□載重項目	主結構體	□木構造 □鋼構造、輕金屬構造 □RC 構造 □SRC 構造 □磚石構造		
	隔間牆	□輕隔間牆　□磚牆　□RC 隔間牆		
	外牆	□金屬玻璃帷幕牆　□RC 外牆 、PC 版帷幕牆		
	衛浴 W_4	□預鑄整體衛浴		
	RC、SRC 構造混凝土減量設計	□高性能混凝土設計　□預力混凝土設計 □其他混凝土減量設計		
W =Σwi×ri，且 W≧0.7				

C、非金屬建材使用率 R

	高爐水泥	高性能混凝土	再生面磚、地磚 室內	再生面磚、地磚 室外	再生面磚、地磚 立面	再生級配骨材	其他再生材料
再生建材使用率(Xi)							
CO_2 排放量影響率(Zi)	CCR×0.12	CSER×0.05	0.05	0.05	0.05	0.10	-
優待倍數(Yi)	3.0	6.0	6.0	6.0	6.0	6.0	6.0
單項計算 Xi × Zi × Yi							
R=ΣXi×Zi×Yi，且 R≦0.3							

四、CO_2 減量設計值計算 CCO_2=F×W×(1-D)×(1-R)=_

五、基準值 CCO_{2i}，i=C or D	□ 國內基準評估法 CCO_{2C}=0.82　□ 當地基準評估法 CCO_{2D}=
六、系統得分	RS5=19.40×【(CCO_{2i} -CCO_2)/ CCO_{2i}】+1.5=_，(0.0≦RS5≦8.0)

附表6　廢棄物減量指標評估表–境外版

一、建築名稱：

容許開挖土方基準 Mc(m^3)		總樓地板面積 AF(m^2)	
工程不平衡土方量 M(m^3)		有利於他案土方量 Mr(m^3)	
建築構造別減量係數 α2		公害防治係數 β	_

二、是否為舊建築物再利用案？

□是	舊結構再利用率 Sr(舊結構體與總結構體之樓地板面積比)=　　， RS6=10.0×Sr=　　，(0.0≦RS6≦8.0)
□否	進入以下評估

三、廢棄物減量評估項目

A、工程不平衡土方比例 Pie

PIe =(M-Mr)/(AF×M_c)=　[_]　；且 0.5≦PIe≦1.5

B、施工廢棄物比例 PIb

營建自動化使用工法	採用率 ri	優待係數 yi	單項計算 ri× yi
金屬系統模版		0.04	
鋼承版系統或木模系統模版		0.02	
預鑄外牆		0.04	
預鑄樑柱		0.04	
預鑄樓版		0.03	
預鑄浴廁		0.02	
乾式隔間		0.03	
其它工法		-	
營建自動化優待係數 α1=Σri× yi=			

PIb=1.0-5.0×α_1-α_2=　[_]　；且 PIb≧0.0

C、拆除廢棄物比例 PId

	高爐水泥	高性能混凝土	再生混凝土骨材	再生面磚	其他再生材料
再生建材使用率(Xi)					
加權係數(Zi)	CWR×0.08	CSER×0.04	0.46	0.15	-
單項計算 Xi × Zi ×=					
γ=Σ Xi × Zi=					

PId=1.0-α_2-10.0×γ=　[_]　；且 PId≧0.0

D、施工空氣污染比例 PIa

PIa=1.0–Σ(α_{3i}) =　[_]　；且 PIa≧0.2

四、廢棄物減量設計值計算 PI=PIe+PIb+PId+PIa-β=_

五、基準值 PI_i，i=C or D	□ 國內基準評估法　PI_C=3.30　　□ 當地基準評估法　PI_D=
六、系統得分	RS6=13.13×【(PI_i -PI)/ PI_i】+1.5=_，(0.0≦RS6≦8.0)

附表7　室內環境評估表–境外版

一、建築名稱：

二、室內環境評估項目-(1)

大項	小項	對象	評分判斷	查核		小計	比重	加權得分
音環境		外牆、分界(*1)	下列三項，擇一計分： ・單層牆：RC 牆含粉刷厚度 dw≧20cm ・雙層板牆：雙層牆板間距 da1≧5cm，內填密度 24K 以上玻璃棉或岩棉厚度 dw≧5cm，且雙層實心面板總厚度 db≧4.8cm ・檢附牆板隔音性能証明 Rw≧55dB(*2)	A1=30	A=	X1=A+B+C=	Y1=0.2	X1×Y1=_
			下列三項，擇一計分： ・單層牆：RC 牆含粉刷厚度 dw≧15cm、磚牆含粉刷厚度≧24cm ・雙層板牆：雙層牆板間距 da1≧10cm，內填密度 24K 以上玻璃棉或岩棉厚度(dw)≧5cm，且雙層實心面板總厚度 db≧2.4cm ・檢附牆板隔音性能証明 Rw≧50dB(*2)	A2=20				
			・牆板構造條件未達 A1、A2 標準者	A3=10				
		窗	下列三項，擇一計分： ・符合氣密性 2 等級(2m^3/hm2, *3)且玻璃厚度≧10mm ・符合氣密性 2 等級(2m^3/hm2, *3)之雙層窗，窗間距≧20cm 且玻璃厚度≧5mm ・檢附窗戶隔音等級曲線 ≧35 或 Rw≧40dB (*2)	B1=35	B=			
			下列三項，擇一計分： ・符合氣密性 2 等級(2m^3/hm^2, *3)且玻璃厚度≧6mm ・符合氣密性 8 等級((8m^3/hm^2, *3)之雙層窗，窗間距≧20cm 且玻璃厚度≧5mm ・檢附窗戶隔音等級曲線 ≧30 或 Rw≧35dB (*2)	B2=25				
			下列三項，擇一計分： ・符合氣密性 8 等級(8m^3/hm^2, *3)且玻璃厚度≧8mm ・符合氣密性 8 等級(2m^3/hm^2, *3)之雙層窗，窗間距≧ 10cm 且玻璃厚度≧5mm ・檢附窗戶隔音等級曲線 ≧25 或 Rw≧30dB (*2)	B3=15				
			・窗構造條件未達 B1、B2、B3 標準者	B4=10				
		樓版	下列三項，擇一計分： ・RC 樓板版厚度(df)≧15cm，其上加設固定式表面緩衝材△Lw≧20dB(*4) ・RC 樓板厚度(df)≧18cm，其上加設固定式表面緩衝材△Lw≧17dB(*4) ・鋼承板式 RC 樓板厚度(df)≧19cm，其上加設固定式表面緩衝材△Lw≧20dB(*4) ・檢附樓板衝擊音之隔音等級 Ln,w≦55dB (*4)	C1=35	C=			
			下列三項，擇一計分： ・RC 樓板版厚度(df)≧15cm，其上加設固定式表面緩衝材△Lw≧15dB(*4) ・RC 樓板厚度(df)≧18cm，其上加設固定式表面緩衝材△Lw≧12dB(*4) ・鋼承板式 RC 樓板厚度(df)≧19cm，其上加設固定式表面緩衝材△Lw≧15dB(*4) ・檢附樓板衝擊音之隔音等級 Ln,w≦60dB(*4)	C2=25				
			下列三項，擇一計分： ・RC 樓板版厚度(df)≧15cm ，其上加設固定式表面緩衝材△Lw≧10dB(*4) ・RC 樓板厚度(df)≧18cm，其上加設固定式表面緩衝材△Lw≧7dB(*4) ・鋼承板式 RC 樓板厚度(df) ≧19cm，其上加設固定式表面緩衝材△Lw≧10dB(*4) ・檢附樓板衝擊音之隔音等級 Ln,w≦65dB(*4)	C3=15				
			・RC、鋼構複合樓版厚度(df)<15cm 或木構造樓版	C4=10				

二、室內環境評估項目-(2)

大項	小項	對象	評分判斷	查核		小計	比重	加權得分
光環境	自然採光	所有建築類型之玻璃透光性	・清玻璃或淺色 low-E 玻璃等(可見光透光率 0.6 以上)	D1=20	D=	X2=D+E+F=	Y2=0.2	X2×Y2=_
			・色版玻璃等(可見光透光率 0.3~0.6)	D2=15				
			・低反射玻璃等(可見光透光率 0.15~0.3)	D3=10				
			・高反射玻璃等(可見光透光率 0.15 以下)	D4=5				
		辦公、研究、實驗、臥房、病房、客房等 居室空間，以自然採光性能 NL 指標評估	・0.90≦NL	E1=60	E=			
			・0.80≦NL＜0.90	E2=40				
			・0.70≦NL＜0.80	E3=30				
			・0.60≦NL＜0.70	E4=20				
			・NL＜0.60	E5=10				
		上述以外空間	・不予評估	E6=36				
	人工照明	辦公、閱覽室、圖書室、教室等空間之 照明	・所有空間照明光源均有防眩光隔柵、燈罩或類似設施	F1=20	F=			
			・所有居室空間照明光源均有防眩光隔柵、燈罩或類似設施	F2=15				
			・面積一半以上居室空間照明光源均有防眩光隔柵、燈罩或類似設施	F3=10				
			・照明狀況未達 F1、F2、F3 之標準者	F4=0				
		上述以外空間	・不予評估	F5=12				
通風換氣環境	可自然通風型	全年或季節性採自然通風之空間部分以自然通風潛力 VP(*7) 指標評估（面積為 Af1）	・0.80≦VP	G1=100	G1=	X3= (G1×Af1+G2×AF2)÷(Af1+Af2)=	Y3=0.3	X3×Y3=_
			・0.70≦VP＜0.80	G2=80				
			・0.60≦VP＜0.70	G3=60				
			・0.50≦VP＜0.60	G4=40				
			・VP＜0.50	G5=10				
	全年空調型	全年以分離式、VRV 或中央空調為主的密閉空調型空間部分（面積為 Af2）	・所有居室空間設有新鮮外氣供應系統者（需提出外氣引入風管系統圖說）	G1=100	G2=			
			・80%以上居室空間設有新鮮外氣供應系統者（需提出外氣引入風管系統圖說）	G2=80				
			・60%以上居室空間設有新鮮外氣供應系統者（需提出外氣引入風管系統圖說）	G3=60				
			・40%以上居室空間設有新鮮外氣供應系統者（需提出外氣引入風管系統圖說）	G4=40				
			・低於 40% 居室空間設有新鮮外氣供應系統者	G5=20				

二、室內環境評估項目-(3)

大項	小項	對象	評分判斷	查核		小計	比重	加權得分
室內建材裝修	整體裝修建材	一般建築主要居室空間	‧基本構造裝修量(全面以簡單粉刷裝修，或簡單照明系統天花裝修者)	H1=40	H=	X4=H+I=	Y4=0.3	X4×Y4=_
			‧少量裝修量(七成以上天花或牆面未被板材裝潢裝修者)	H2=30				
			‧中等裝修量(五成以上天花或牆面未被板材裝潢裝修者)	H3=20				
			‧大量裝修量(七成以上天花及牆面被板材裝潢者)	H4=0				
		展示、商場、劇院、演藝廳等特殊裝修需求空間	‧不予評估	H5=24				
	綠建材	綠建材使用率(*8 附計算或說明)	‧Rg(*9)≧Rgc+15%	I1=60	I=			
			‧Rgc+15%＞Rg≧Rgc+10%	I2=45				
			‧Rgc+10%＞Rg≧Rgc+5%	I3=30				
			‧Rgc+5%＞Rg≧Rgc	I4=20				
			‧裝修毫無採用綠建材或 Rg＜Rgc	I5=10				
室內生態建材裝修	其他生態建材(優惠得分)(附計算或說明)	接著劑	‧50% 以上接著劑數量採用綠建材	J=20	J=	X5=J+K L+M+N+O=	Y5= 0.2	X5×Y5=_
			‧不符以上條件者	J=0				
		填縫劑	‧50% 以上填縫劑數量採用天然材料	K=20	K=			
			‧不符以上條件者	K=0				
		木材表面塗料或染色劑	‧50% 以上木材表面採用天然保護塗料	L=20	L=			
			‧不符以上條件者	L=0				
		電纜線、電線、水電管、瓦斯管線等管材	‧50% 以上管線以非 PVC 材料製品替代(如金屬管、陶管)或具有綠建材標章、或環保標章認可之管線	M=20	M=			
			‧不符以上條件者	M=0				
		建築外殼及冰水、熱水管之隔熱材	‧50% 以上隔熱材數量採用天然或再生材料	N=20	N=			
			‧不符以上條件者	N =0				
		其他	‧使用其他足以證明有益於地球環保之天然建材	O=認定給分	O=			

三、室內環境設計值計算 IE=ΣXi×Yi=_

四、基準值 IE_i，i=C or D	☐ 國內基準評估法 IE_C=60 ☐ 當地基準評估法 IE_D=
五、系統得分	RS7=18.67×【(IE- IE_i)/ IE_i】+1.5=_ ，(0.0≦RS7≦12.0)

附表8　水資源指標評估表–境外版

一、建築名稱：

基地所在地區	_	大型耗水設施	
日降雨概率 P	_	日平均雨量 R	_
集雨面積 Ar	_	儲水天數 Ns	_

二、水資源指標計算式

編號	評分項目	得分
a	大便器	_
b	小便器	_
c	供公眾使用之水栓	_
d	浴缸或淋浴	_
e	雨中水設施或節水澆灌系統	_
f	空調節水	_
水資源指標總得分 WI=a+b+c+d+e+f=		_

三、自來水替代率評估項目

A、自來水替代水量 Ws

日集雨量 Wr = R × Ar = _

雨水利用設計量 Wd =ΣRi = _

Ws = ⇨ _

(Ws 以 Wr 或 Wd 兩者中較小者帶入)

B、建築類別總用水量 W_t

評估項目	建築類型	規模類型	單位面積用水量 Wf (公升/(m^2.日))	Af 或 Nf(m^2)	全棟建築總用水量 Wt (公升/日)
➢		_	_	_	_

C、自來水替代率 $R_c = W_s \div W_t$ = _%

D、雨水貯集槽 V_S= _m³ 標準值 V_C = _m³ ☐合格 ☐不合格

三、水資源設計值計算 WI=a+b+c+d+e+f=_

四、基準值 WI_i，i=C or D	☐ 國內基準評估法 WI_C=2　☐ 當地基準評估法 WI_D=
五、系統得分	RS8=2.50×(WI- WI_i)/ WI_i +1.5=_，(1.5≦RS8≦8.0)

附表9　污水及垃圾改善指標評估表–境外版

一、建築名稱：

二、污水垃圾改善評估項目

A、污水指標查核

污染源	查核對象	合　格　條　件	有無
一般生活雜排水	所有建築物的浴室、廚房及洗衣空間，或其他類建築物之一般生活雜排水	所有生活雜排水管確實接管至污水處理設施或污水下水道，尤其住宅建築每戶必須有專用洗衣空間並設有專用洗衣水排水管接至污水系統(檢附污水系統圖)	☐
專用洗衣雜排水	寄宿舍、療養院、旅館、醫院、洗衣店等建築物的專用洗衣空間	必須設置截留器並定期清理，同時將排水管確實接管至污水處理設施或污水下水道(檢附污水系統圖)	☐
專用廚房雜排水	學校、機關、公共建築、餐館、俱樂部、工廠、綜合辦公大樓等設有餐飲空間、員工餐廳的專用廚房	設有油脂截留器並定期清理，同時將排水管確實接管至污水處理設施或污水下水道(檢附油脂截留器設計圖與污水系統圖)	☐
專用浴室雜排水	運動設施、寄宿舍、醫院、療養院、俱樂部等建築物的專用浴室	排水管確實接管至污水處理設施或污水下水道(檢附污水系統圖)	☐

註：複合建築或機能複雜之建築物所需檢討之生活雜排水項目若不只單一水源，必須同時檢查通過方為及格

B、垃圾指標查核

垃　圾　處　理　措　施(檢附相關圖說)	獎勵得分 Gi	有無
1. 當地政府設有垃圾不落地等清運系統，無須設置專用垃圾集中場及密閉式垃圾箱者(本項與 6.7.9.項不能重複得分)	G1=8 分	☐
2. 設有廚餘收集處理再利用設施並於基地內確實執行資源化再利用者(必須有發酵、乾燥處理相關計畫書及設備說明才能給分，限已完工建築申請)	G2=5 分	☐
3. 設有廚餘集中收集設施並定期委外清運處理，但無當地資源化再利用者(2.與 3.只能任選其一，限已完工建築申請)	G3=2 分	☐
4. 設有落葉堆肥處理再利用系統者(必須有絞碎、翻堆、發酵處理相關計畫書及設備說明才能給分，限已完工建築申請)	G4=4 分	☐
5. 設置冷藏、冷凍或壓縮等垃圾前置處理設施者	G5=4 分	☐
6. 設有空間充足且運出動線說明合理之專用垃圾集中場(運出路徑必須有明確圖示)	G6=3 分	☐
7. 專用垃圾集中場有綠化、美化或景觀化的設計處理者	G7=3 分	☐
8. 設置具體執行資源垃圾分類回收系統並有確實執行成效者	G8=2 分	☐
9. 設置防止動物咬食且衛生可靠的密閉式垃圾箱者	G9=2 分	☐
10.垃圾集中場有定期清洗及衛生消毒且現場長期維持良好者(限已完工建築申請)	G10=2 分	☐
11.上述以外之垃圾處理環境改善規劃，經評估認定有效者	G11=認定值	☐

三、污水垃圾改善設計值計算 GI=ΣGi=_

四、基準值 GI_i，i=C or D	☐ 國內基準評估法 GI_C=10　　☐ 當地基準評估法 GI_D=
五、系統得分	RS9=5.15×【(GI- GI_i)/ GI_i】+1.5=_，(0.0≦RS9≦5.0)

附表10　創新設計指標評估表–境外版		
一、建築名稱：		
二、主旨：假如本作品具備一些不能量化的設計巧思，或一些結合綠建築技術與環境美學的特殊「綠建築創新科技」，申請人可提出下表簡要說明，並提送合理可信之相關資料證明該創意之貢獻，本中心將召開綠建築委員會確認該作品對生態、節能、減廢、健康等四範疇之實質貢獻後，再依據委員會的共識與慣例，給予升級與否的認定。		
三、原等級：	申請升等：	□生態　□節能　□減廢　□健康　□其它
申請理由概說（證明及補充資料另附）：		審查意見：

Chapter 1 Introduction

1-1 Worldwide development in green building assessment systems

The concept of “green building” is known as “environmentally symbiotic building” in Japan, “ecological” or “sustainable building” in some American and European countries and often “green building” in North America. The Rio de Janeiro Earth Summit held in 1992 galvanized a wave of environmental movements, and the same effect materialized in the construction industry in the form of green building movements. It was under this context that BREEAM, the world's first green building assessment system, was put forth by the British Building Research Establishment (BRE) in 1990. This approach later influenced other assessment methods such as the American LEED in 1996 and the Canadian GBTool in 1998. The EEWH green building assessment system established in Taiwan in 1999 is a black horse from Asia and the fourth such scheme in the world. The Japanese CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) followed, and then the Australian Energy Star was officially launched in 2002.

The period following the year 2000 may be seen as the developmental climax of green building assessment systems around the world. Schemes such as the German LNB, Australian NABERS, Norwegian Eco Profile, French CECALE, Korean KGBC, Hong Kong BEAM Plus and CEPAS and Singaporean Green Mark were established one after another. In 2006, China published the Green Building Evaluation Standards centered on conservation in land, energy, water and materials. By 2011, there were already 26 countries with a green building assessment system in place, and 89 countries had established a green building association or were in the process of doing so. Some of the systems, such as LEED, CASBEE, BREEAM, EEWH and Green Mark, continued to broaden their scope and even evolved to become mandatory for public buildings in their respective countries. Threatened by an environmental crisis on our planet, green building assessment tools have blossomed in a remarkably eclectic way.

1-2 The development of a green building system in Taiwan

Most green building assessment tools around the world are predicated, to a certain degree, on the British BREEAM or American LEED systems. But Taiwan’s EEWH does not trace back to Western systems since it had an early and independent start. It is the only system in the world independently developed based on energy saving characteristics distinct to buildings in the subtropical climate, as well as the first green building assessment system in Asia. It was developed based on the 1995 building energy codes in Taiwan and focuses on ecology, energy saving, waste reduction and health, hence the abbreviation "EEWH". The Architecture and Building Research Institute (ABRI), Ministry of the Interior published the first "Green Building Evaluation Manual " and "Green Building Label" in 1999. Since then, the system has turn into a set of national-level green building certification standards. In 2004, a five-tier grading system was introduced to the green building labeling system, and the Green Building Materials Labeling System was established, together forming the pillars of Taiwan's green building policy. The further development of the "EEWH Family", a series of systems for five architectural typologies, shaped Taiwan's green building policy into a trailblazer and role model in international green building development.

In recent years, Taiwan has suffered frequent scourge from hillside landslides, floods, earthquakes, debris flows, urban flashfloods and power and water shortages. Lessons learned from the 921 Earthquake and Typhoon Morakot floods have elevated public awareness and expectations in environmental protection, making green building policy easily the most important part of the national sustainability policy. Today, green building policy has become a powerful trend. The simple slogan of "Ecology, Energy Saving, Waste Reduction and Health" has not only caught on as buzzwords for governments, media and academic communities alike but has also energized the building and environmental protection sectors around energy conservation, building materials recycling and eco-friendly designs.

In 2003, the Executive Yuen launched the "Green Building Promotion Program", under which public buildings with a government budget of NT$50,000,000 or more were required to obtain a "Green Building Candidate Certificate". This turned into an extraordinary policy-driven achievement in the global green building discipline because the number of projects with Green Building Label certification grew rapidly as a result. A decade after the Green Building Labeling System was first launched in Taiwan, the number of projects with "Green Building Labels" and "Green Building Candidate Certificates" totals 6,400 as of the end of April 2017, making the Taiwanese EEWH second only after the American LEED as the system with the most number of certified green buildings in its respective country. Evidently, Taiwan is a global forerunner in green building policy. This juggernaut system has even set into motion an unstoppable "green building reform movement" in Taiwan.

Most green building assessment systems in the world use a "menu-style" scheme with independent scoring for each category, often unintentionally falling into a tool for forced purchases and product promotion. However, the Taiwanese EEWH has always taken a "comprehensive functional approach". That is, designers get to weigh their own priorities and select a cost-effective portfolio of technologies to achieve green building objectives. This approach ensures maximum design flexibility and technology selection while preventing the tendency of excessive equipment purchasing and investment. Moreover, the EEWH's scope of evaluation zeroes in on issues with the most fundamental environmental benefits that are directly related to building or urban planning projects. Areas not related to the building industry such as traffic or environmental protection are eliminated from the scope. Meanwhile, the system even takes a firm stand on giving fundamental priorities to natural designs and induced designs and preventing excessive designs, with a view to steer away from a scoring scheme that encourages expensive green purchases and high-tech equipment. The resulting energy conservation requirements are at least 20% more stringent than existing building codes and the AC equipment reduction at least 30% better than conventional designs. Although the Taiwanese green building system has relatively few assessment items and lower qualifying thresholds, it is relatively simple to use and the certification process less time-consuming. These are the reasons why green building certification can be popularized in such a cost-effective way in Taiwan, and why Taiwan's green building policy has been so readily implemented.

To build on these exceptional results, the Executive Yuan initiated the "Eco-city Green Building Promotion Program" in 2008, "Smart Green Building Promotion Program" in 2010, and then in 2016, "Sustainable Smart City-Smart Green Building and Community Promotion Program" to expand our policy from green building into sustainable homeland and green industries. However, our past method of applying one single evaluation manual on all types of buildings new and old obviously falls short of catering to the differences in green designs across various building types. It does not take advantage of the full potential environmental benefit of the Green Building Labeling System, either. In light of this, the ABRI heeded recommendations from different communities and began to develop categorized green building assessment systems like the USA and Japan. Starting in 2009, the ABRI commissioned the Graduate School of Architecture, National Cheng Kung University (NCKU) to actively develop green building assessment systems dedicated to different building types. Thus, Taiwan's "EEWH Family" of green building assessment systems was born.

1-3 Overview of the EEWH Family in Taiwan

To expand applicability across different types of green buildings, the ABRI decided to position the "Green Building Explanation and Evaluation Manual" in use since 1999 as the most basic and general version. This version was formally revised in 2011 into the ”Green Building Evaluation Manual EEWH-BC (Basic Version)” as the basis for other building types. Another four followed to complete the family of five green building evaluation manuals: "Green Building Evaluation Manual EEWH-EC (Communities)” in 2009, "Green Building Evaluation Manual EEWH-GF (Factories)” and "Green Building Evaluation Manual EEWH-

RN (Renovations)” in 2010, and "Green Building Evaluation Manual EEWH-RS (Residential)” in 2011. This marks the start of Taiwan's "EEWH Family”. The five manuals were amended and re-issued in 2015. In 2017, the ”Green Building Evaluation Manual---Overseas Version” (EEWH-OS) was drafted to meet demand by Taiwanese businesses accessing global opportunities in emerging green business. A "Local Baseline Assessment Method” was developed to take into consideration local climates and regulations, and this sixth member was officially incorporated into the "EEWH Family".

By 2016, the building energy codes in Taiwan had been established for over 20 years. The ABRI recognized the codes were becoming obsolete under the impact of climate changes and growing complexity and diversity in building types. It then initiated the "Research in Adaptation Strategies for Building Energy Codes to Respond to Diversifying Building Trends" and presented recommendations for code revisions. In 2017, the Construction and Planning Agency heeded these recommendations and completely revamped the building energy codes and the chapter in building regulations prescribing green building standards; all regulations under the "Green Building Standards" chapter were simultaneously updated. In response to this major reform in building codes, as well as to meet demands arising from emerging green building technologies and emphases on self-governance by local governments, the ABRI committed to completing a full update of the first five of the Green Building Evaluation Manuals by 2018 to form a brand-new “EEWH Family”.

The six dedicated green building assessment systems and their applicable subjects are shown in Table 1.1 below. Of these, the overseas version, EEWH-OS, must be used in conjunction with one of the other five domestic versions depending on the building type. For EEWH-BC, EEWH-RS and EEWH-GF, the scoring and certification is done building by building, in principle. However, where a single building contains mixed uses, the use with the largest floor area, in principle, should be deemed the dominant use. The appropriate version of manual for that usage type should be used, and the resulting score should be weighted according to the associated floor area to calculate the final score. Should there be different indicator items and score weighting for the various building types, the items and weighting for the dominant use should govern. Indicator items not applicable to the dominant building type are not assessed. Where a non-dominant use in a mixed-use building occupies a floor area under 1000 square meters, the area is to be included under the dominant use for assessment purpose and need not be assessed separately.

Rather than favoring advanced technology, the EEWH is an evaluation tool that emphasizes local climates and practical technologies in Asia, and the methodology is far more simple and practical than green building assessment systems from other countries. In particular, the new EEWH-OS is an excellent system that takes a global perspective and makes itself applicable worldwide by incorporating the “Local Baseline Assessment Method”. The current six categories of dedicated green building assessment systems already cover most building types and both new and existing buildings. Using these schemes to implement green building policy would have an impact on over 90% of our domestic building market while putting Taiwanese businesses in a superb position in the face of global opportunities. Superseded only by the American LEED and Japanese CASBEE, the Taiwanese EEWH is the first green building assessment system in warm southern countries to have such diverse, specialized and globalized coverage. Its strengths of simplicity, affordability, practicality, localization and globalization are rare in the international arena, and these characteristics have always been centric to Taiwan's green building policy over the years.

Table 1.1. Applicable subject of the EEWH Family

Dedicated green building assessment system	Applicable subject
Green Building Evaluation Manual 1 (Basic Version), i.e. EEWH-BC	New or existing buildings other than those classified in Manuals 2~4 below
Green Building Evaluation Manual 2 (Residential), i.e. EEWH-RS	New or existing buildings providing long- or short-term accommodation for people (Type H1 and Type H2)
Green Building Evaluation Manual 3 (Factory), i.e. EEWH-GF	New or existing factories with mainly indoor operations
Green Building Evaluation Manual 4 (Renovation), i.e. EEWH-RN	Existing buildings having obtained an occupancy permit for 3 years or more and the renovated floor area does not exceed 50% of the total
Green Building Evaluation Manual 5 (Community), i.e. EEWH-EC	Any cluster of legally built buildings
Green Building Evaluation Manual 6 (Overseas), i.e. EEWH-OS	Qualified for overseas building application and applying a choice of one of the above five evaluation manuals as appropriate

1-4 The origin of EEWH-OS

Taiwan's EEWH is the first system independently developed based on the energy saving features of buildings in the subtropics, as well as the first green building assessment system in Asia. Like several other green building assessment systems around the world, there have been demands for the EEWH to make adjustments for overseas scenarios. In recent years, Taiwanese businesses have been proactively expressing intent to obtain Taiwan's Green

Building Labeling when setting up factories or developing building projects overseas. They are motivated by a desire to cut actual energy and carbon consumption, which translates into cost reduction, and an enhanced corporate image that may help them win over orders from large international businesses. It is evident that the EEWH is now widely recognized. Taiwanese businesses, faced with tough global competition, seem to be placing their hopes on the EEWH as their arsenal for gaining strong global positioning and green opportunities.

To respond to this call, the ABRI commissioned the NCKU Graduate School of Architecture to, beginning in 2015, undertake a series of researches that explore the feasibility of applying the EEWH overseas. The researches show that the EEWH, with its strengths in a clear framework, simple indicator calculations, smooth application process and simplified documentation, would become quite feasible for overseas application provided some adjustments are made to the current framework. Nevertheless, baseline values in the current EEWH system have been set according to Taiwan's unique context. Although the framework and calculations of the current EEWH system may be applied overseas, the baseline values for the indicators need to be modified according to local climates, regulations and design practices to make them relevant.

Thus in 2017, the ABRI introduced the "Local Baseline Assessment Method”, by which local climates, regulations and design practices are incorporated into the inaugural "Green Building Evaluation Manual---Overseas Version” (EEWH-OS). This sixth member of the EEWH Family enables application on overseas buildings. At the same time, the manual is for the first time presented in both Chinese and English, and an online application system has been set up. The EEWH system will now be promoted internationally in accordance with the ABRI's "Operation Guidelines for the Application, Review, Approval and Usage of Overseas Green Building Labeling".

1-5 The EEWH-OS Double-track System

To respect differences in climates, regulations and industry standards in other countries while ensuring consistency and fairness in Taiwan's EEWH system, the EEWH-OS uses a double-track system that includes the "Taiwan Baseline Assessment Method” and ”Local Baseline Assessment Method” as described below, where either method may be selected for each indicator:

(1) Taiwan Baseline Assessment Method

With the exception of Section 1.6, "Additional Assessment Items for the Overseas Version", the rest of this method follows all of the assessment formulas, baselines, score weighting and content of the five domestic EEWH versions. This method would usually be applicable to an area with a similar climate to Taiwan. Since the domestic assessment methods are completely applicable, there should be no problem in implementing this method.

(2) Local Baseline Assessment Method

To ensure consistency in the EEWH system, the "Local Baseline Assessment Method" completely follows the assessment framework and formulas in the five domestic EEWH versions. However, baseline values have been adjusted to suit common and legal practices in the local building industry in order to accommodate differences in climates, regulations and industry standards; the EEWH-OS baseline values are set by making a 5% improvement over the local baselines. Applicants must provide explanations and drawings demonstrating legal and standard practices in the local building industry, calculate EEWH-OS baseline values according to the drawings, and input them into the assessment formulas of the five domestic EEWH versions.

The "Local Baseline Assessment Method" ensures localization without losing fairness; it is also a powerful way to make the EEWH an internationally applicable system. Although the American LEED system uses a similar "regional priority" concept, the EEWH-OS Local Baseline Assessment Method is an even more advanced international approach that takes lessons from LEED. The most important spirit of the EEWH-OS is "localized green building". For instance, it is unreasonable to demand extensive greenery and soil water retention in Middle Eastern deserts, or follow Taiwan's roof insulation requirement of keeping U values under $0.8W/m^2K$ in a country where there is no need for roof insulation. It is also not very eco-friendly to mandate high-tech centralized air-conditioning in developing countries. As another example, the "Local Baseline Assessment Method" outlines the following requirements for the Daily Energy Saving indicator: compliance with energy conservation standards Title 24 in the State of California, USA; compliance with building envelope/roof thermal transfer values ETTV/RTTV in Singapore; where there are no local energy saving regulations whatsoever, the legal and common practices in the local building industry should be used as a starting point. The EEWH-OS "Local Baseline Assessment Method" is a one-of-a-kind approach and pioneering achievement in green building assessment that best realizes the objective of "localized green building". This strong point is conducive to the internationalization of the EEWH and global positioning by Taiwanese businesses.

The above-mentioned "Taiwan Baseline Assessment Method" or "Local Baseline Assessment Method" must be used in conjunction one of the above five domestic evaluation manuals as appropriate for the building type.

1-6 Special requirements in the EEWH-OS

The EEWH-OS contains the following special requirements in order to enhance the internationalization and implementation efficiency of the EEWH:

1. For new buildings, applicants using the EEWH-OS version must provide the architect's license and occupancy or building permits (or equivalents thereof) and, for existing buildings, proof of the building's legality such as housing tax documents. The documents should be selectively translated into Chinese for approval purpose.
2. The calculation formulas, scoring criteria and grading criteria of the EEWH-OS version are exactly the same as the domestic versions. Where the special EEWH-OS requirements in Chapter 2 below apply, such requirements supersede. Where there are no special requirements, the latest versions of the applicable domestic versions are to be followed.
3. Since local governments in other countries may classify building types differently than Taiwan, the EEWH-OS does not require the classification to follow Taiwanese regulations. One of the five domestic evaluation manuals may be selected as appropriate according to the actual spatial characteristics of the project. For all types of new or existing buildings overseas, including basic type, residential and factories, assessment may be conducted, as a priority, in accordance with the Basic Version described in Chapter 2 herein. For existing buildings overseas, i.e. renovations or communities, applicants may propose legal, reasonable and proportional assessment methods in accordance with the spirit of Chapter 2 herein and the EEWH-RN and EEWH-EC.
4. Where requirements in the domestic manuals are unclear or unsuitable for local climates and regulations, applicants may propose legal, reasonable and proportional alternative calculation methods based on hypothesized scenarios.
5. When applying the "Local Baseline Assessment Method", applicants must provide explanations and drawings demonstrating legal and standard practices in the local building industry as a basis for local baselines. In order for the proposed local baselines to be approved, they must be legal, reasonable and proportional, and they should be improved by 5% to become EEWH-OS baseline values. Indicator scores should also be calculated using the formulas and calculation tables specified in the domestic manuals.
6. Data for physical functions and proof documents as required in the EEWH-OS may be replaced with local or international equivalents. If no corresponding proof is available, a written explanation by a local architect complete with his/her seal and a signed affidavit may be substituted.
7. An assessment organization appointed by the ABRI will set up an "EEWH-OS

Assessment Group" responsible for assessment and approval. Should there be anything not clearly outlined in this Manual or difficult to execute overseas, applicants may propose their own solutions, which will be reviewed by the EEWH-OS Assessment Group under the principles of legality, reasonableness and proportionality.

Chapter 2 Assessment content of the EEWH-OS

2-1 Biodiversity indicator

The “Biodiversity indicator" is a broad-scoped evaluation of a project's performance as a habitat and place of interaction for living organisms. It only covers the scope that can be handled using architectural and landscape intervention and seeks to ensure biodiversity for living organisms by enhancing the quality of green spaces. Ecological quality in the following six areas is evaluated: (1) ecological green network, (2) habitat for small creatures, (3) botanical diversity, (4) soil ecology, (5) light pollution and (6) migration obstacle. Refer to the domestic EEWC-BC Manual for how to assess this indicator and calculate the system score. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. A site exceeding 1 hectare may be exempt from the Biodiversity indicator in consideration of the unique characteristic of an overseas project. The total score would then be calculated as a project exempt from Biodiversity indicator assessment according to the "Table of Scoring Boundaries for Each Grade" of the Basic Version.
2. For the "indigenous or bird/butterfly-attracting plants ratio” under "plant biodiversity", documents on the indigenous or bird/butterfly-attracting plants should be attached. There are no specific requirements regarding the type and format of such documents, as long as there is an explanation for the source of the documents or how the documents are obtained.

2-2 Greenery indicator

The “Greenery indicator” uses the equivalent CO_2 capture quantity as an assessment standard. The greatest purpose for such assessment is to provide a relative conversion mechanism for the environment benefits of various plants. It eliminates the barrier of having to regulate various plant types separately in past landscaping policies and avoid emphasis only on greenification using trees but neglecting shrubs, climbers, grasses, flowers or multi-layered greenification. It serves the function of encouraging a diverse approach to green space design, thereby making important contribution to landscaping practice and ecological benefits Refer to the domestic EEWC-BC Manual for how to assess this indicator and calculate the system score. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. The r value is revised to the "actual building ratio", i.e. the actual projected building area divided by the site area. Where r>0.85, r=0.85.
2. The Eco-greenery correction coefficient α is to be calculated according to the domestic EEWC-BC Manual. Documents about indigenous or bird/butterfly-attracting plants should be attached. There are no specific requirements regarding the type and format of such documents, as long as the document source or how the documents are obtained is explained.
3. When applying the "Local Baseline Assessment Method”, the "baseline value for equivalent CO_2 captured per unit green space", β, may be handled by hypothesizing a local design scenarios. Barring special local requirements, the local baseline scenario as follows may be used: assume the area available for greenification has 1/3 grassland, 1/3 shrubbery and 1/3 large broadleaf trees.

2-3 Soil Water Retention indicator

The ”Soil Water Retention indicator” evaluates the capacity of a building site to retain and store infiltrated rainwater. "Soil water retention design" may be divided primarily into the two main categories of "direct infiltration design" and "storage-type infiltration design". "Direct infiltration design" includes: (1) planting, groundcover or grassed swales, (2) permeable paving, (3) infiltration & retention with open ground, (4) permeable drainpipes, (5) permeable drain wells, and (6) permeable trench drains；"storage-type infiltration design" include: (1) rainwater interception with garden soil，(2) infiltration & retention with landscaped pond, and (3) underground infiltration & retention. Refer to the domestic EEWC-BC Manual for how to assess this indicator and calculate the system score. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. The r value is revised to "actual building ratio", i.e. the actual projected building area divided by the site area. Where r>0.85, r=0.85.
2. f is the ultimate site infiltration rate and may be determined based on a geological investigation conducted per the local requirements or by the architect based on his/her experience and according to the topsoil conditions.

2-4 Daily Energy Saving indicator

The "Daily Energy Saving indicator" follows the general practice of the EEWH system, which evaluates energy saving in three items: building envelope, AC systems and lighting systems. A building must pass in all three categories in order to be rated Satisfactory. In respect of the common industrial working environment of developing countries, this Manual has expanded the classification of AC systems to incorporate a broad range of thermal environment modulation systems and include the following three categories: 1. centralized AC system, 2. individual AC system, and 3. negative-pressure fan system. All of the above are evaluated under the "AC systems" item of this indicator. Any systems that do not fall under the categories of centralized AC system or negative-pressure fan system are to be evaluated as an individual AC system whether air-conditioning is installed or not. Based on the above-mentioned classification principles, the calculation items and assessment method for the Daily Energy Saving indicator are explained in Table 2.1 below:

Table 2.1. EEWH-OS Assessment Method for the Daily Energy Saving indicator

Building Type	Method	Item	Calculation Method and Scoring Criterion	Full Indicator Score* & Full Category Score*	
Centralized AC system	Energy Cost Assessment Method	Building envelope, AC systems & lighting system	Refer to Section 2.4.1 of this Manual; conduct computer simulations using the Energy Cost Assessment Method; calculate the system score for the Daily Energy Saving indicator (RS4)*	Full category score for Daily Energy Saving =32	
Individual AC system or negative-pressure fan system	By-item Energy Saving Assessment Method	Building envelope	Refer to Section 2.4.2.1 of this Manual; calculate the Building Envelope indicator based on the local baseline scenario to determine the system score for Building Envelope Energy Savings ($RS4_1$)*	Full score for $RS4_1$ =14	Full category score for Daily Energy Saving =32
		AC systems	For spaces using individual AC systems, refer to the EEWH-BC Manual for the assessment of AC system energy saving efficiency (EAC) and calculate the system score for AC energy saving ($RS4_2$)	Full score for $RS4_2$ =12	
			For spaces using negative-pressure fan systems, refer to the "Assessment Method for Energy Saving from Negative-pressure Fan System" in this section to calculate the score $RS4_2$		
		Lighting system	Refer to the EEWH-BC Manual for assessing indoor lighting system energy saving efficiency EL and calculate the system score for energy saving from lighting ($RS4_3$)*	Full score for $RS4_3$ =6	

* Refer to the EEWH-BC Manual for the definitions of the Daily Energy Saving indicator system score (RS4), building envelope energy saving system score ($RS4_1$), AC system energy saving system score ($RS4_2$) and lighting energy saving system score ($RS4_3$). For the full indicator scores and category scores, use the values indicated in the latest EEWH-BC.

2-4.1 Assessment of spaces using centralized AC: Energy Cost Assessment Method

For buildings or spaces with centralized AC systems, "Option 2: Energy Cost Assessment Method" detailed in the EEWH-GF Manual is to be used to assess Daily Energy Saving in overseas projects. The overall energy saving effect may thus be evaluated for the combination of building envelope, AC systems and lighting systems. The “Energy Cost Assessment Method” analyzes the energy cost of each of the "proposed models” and the standardized "baseline models”, and satisfactory rating is awarded as long as the energy cost of the "proposed model" is lower than that of the "baseline model". Refer to "Option 2: Energy Cost Assessment Method” outlined in the EEWH-GF Manual for detailed calculation rules. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. The average annual meteorological data for the local area or a nearby international city should be used in the simulations.
2. The EEWH-BC Manual, local codes or minimum ASHRAE standards should be used for establishing baseline models for the materials and structures, lighting and HVAC systems.
3. Refer to "Requirements on establishing proposed models and baseline models under the Energy Cost Assessment Method" outlined in the EEWH-GF Manual for the standards for establishing other items.

The Energy Saving indicator score (Ren) calculated under the “Energy Cost Assessment Method” is scored based on the energy saving ratio of the proposed model over the baseline model. A full score is awarded when the proposed model saves at least 1/3 of the energy of the baseline model. The score is calculated as per Equation 2.4.1, the system score RS41 as per Equation 2.4.2. The weighting coefficient Wen is the category score for Daily Energy Saving according to the EEWH-BC Manual, i.e. total of the highest scores for building envelope, AC systems and lighting system.

Ren=3.0×(SEC-DEC)/ SEC, and 0.0≦Ren≦1.0 ---------------------------------- (2.4.1)

System score RS4=Wen×Ren --- (2.4.2)

SEC: Energy cost for the baseline model (kWh/yr)

DEC: Energy cost for the proposed model (kWh/yr)

Wen: The weighting coefficient Wen is the category score for Daily Energy Saving according to the EEWH-BC Manual, i.e. total of the highest scores for building envelope, AC systems and lighting system. (Note: the full score for Daily Energy Saving in the 2015 EEWH-BC Manual is 32 points. Use the value in the latest EEWH-BC Manual when performing calculations.)

2-4.1.1 Assessment of spaces using individual AC systems or negative-pressure fan system: By-item Energy Saving Assessment Method

For buildings or spaces ventilated with individual AC systems or negative-pressure fan systems, "Option 1: By-item Energy Saving Assessment Method" detailed in the EEWH-GF Manual is to be used to assess Daily Energy Saving in overseas projects. The individual energy saving effect may be evaluated item-by-item for each of the following: building envelope, AC systems and lighting systems. The "By-item Energy Saving Assessment Method" analyzes the energy saving design for each of the above three items.

2-4.1.2 Assessment of building envelope energy saving

Building envelope energy saving indicators such as ENVLOAD and AWSG in the EEWH-BC Manual are based on Taiwanese climate data and cannot be directly applied to overseas buildings. Since the issuance of a building permit signifies the energy saving characteristics of the project's building envelope has been approved in that country, an overseas application is deemed to comply with the local energy saving codes and the EEWH-OS does not probe into their requirements. However, the EEWH-OS uses the roof insulation U value as the building envelope energy consumption indicator EV, with system score $RS4_1$ calculated according to the original EEWH-BC equation below:

$$EEV = EV/EVc \leqq EEV c=0.95 \text{ ---(2-4.3)}$$

$$\text{System score } RS4_1=a \times((0.95-EEV)/0.95)+2.0, \text{ and } 0.0\leqq RS4_1\leqq 14.0 \text{--------(2-4.4)}$$

Where

$RS4_1$: Building envelope energy saving system score (points)

EEV, EEVc: Building roof energy saving efficiency, building roof energy saving efficiency baseline value; no units.

EV, EVc: U value of the roof of the proposed project, U value of local buildings, Ud; unit: W/m^2K.

a: Weighting factor for the passing differential; refer to the EEWH-BC Manual.

This method applies the "Local Baseline Assessment Method", where Ud is a U value of local buildings. The applicant must provide explanations and drawings for the local required standards to support the calculations.

2-4.1.3 By-item Energy Saving Assessment Method for AC systems energy saving (Negative-pressure Fan System Energy Saving Assessment Method)

For buildings or spaces ventilated with individual AC systems, refer to the EEWH-BC Manual and assess using AC System energy saving efficiency (EAC) and calculate the score for AC system energy saving system score ($RS4_2$). For buildings or spaces ventilated with negative-pressure fan systems, calculate the AC system energy saving baseline value (EAC) first and then derive $RS4_2$ according to the "Scoring method for various EEWH-BC indicators" outlined in the EEWH-BC Manual".

Air-conditioning equipment using chillers is a more premium and expensive environment modulating system, but some businesses opt for negative-pressure fan systems as an alternative and this is an eco-friendly approach that should be encouraged. Therefore, this Manual makes a special inclusion of it as an option for the purpose of AC system energy saving assessment. The negative-pressure fan systems referred to herein is a thermal environment modulating system that includes a system of ventilation fans installed on the exhaust air side of a building. Negative pressure generated by the fans draws in cool air from the other side into the living spaces, thereby reducing apparent temperature. They are used sometimes in conjunction with a water curtain system, in which air is drawn through a water curtain set on the air intake side. Fresh air is turned into cold air due to the curtain's porous heat exchange effect and cooling by condensation effect and is then sent into the interior spaces for air-conditioning purpose. The water curtain equipment may be just a simple water curtain or may have its transport efficiency improved with the addition of a ventilator. Both kinds of negative-pressure fan systems, i.e. with or without a curtain wall system, are applicable subjects of this Manual. Although these systems do not have the excellent temperature and humidity modulating function of a conventional chiller-based AC system, the equipment is cheap and cost-effective and especially popular in projects not plagued by a high-humidity environment.

The latest energy saving theories no longer confine themselves to the narrow-scoped range of thermal comfort of the past. Negative-pressure fan systems are a cheap and accessible way to modulate the thermal environment. Based on theories in environmental ethics and healthy thermal adaptation, this Manual make a special inclusion of such systems as an energy- and carbon-reducing approach to be encouraged in green building policy. According to this Manual, the building spaces using such systems must have an average wind velocity (Va) between 0.5~2.0m/s in order to pass. The passing criterion is as shown in Equation 2.4.5, and the EAC score is calculated using ventilation potential VP and calculated as per Equation 2.4.6:

$Va=Vt/Ar$, and $0.5 \leqq Va \leqq 2.0$---(2.4.5)

$EAC=1.0-(VP^{*}-VP)$--(2.4.6)

Where:

Va: Average wind velocity of spaces ventilated with the negative-pressure fan system (m/s)

Vt: Total quantity of ventilated air with the negative-pressure fan system (m^3/s), usually the sum of the quantity of ventilated air by all the negative-pressure fans

Ar: Average flow field sectional area of spaces ventilated with the negative-pressure fan system (m^2). The flow field may be treated as a wind tunnel and the sectional area is usually calculated by multiplying the most representative ceiling height (use actual height of the flow field if downward wind reflectors are installed in the ceilings) by the tunnel width.

EAC: AC system energy saving efficiency, no units

VP: Natural ventilation potential of the original floor plan without a water curtain or negative-pressure fan system and calculated according to Appendix 3 of the Manual

VP*: Natural ventilation potential of the original floor plan after adding a water curtain or negative-pressure fan system and calculated according to the following requirements and Appendix 3 of the domestic version manual

The equation, as an assessment standard, calculates the ratio of additional naturally ventilated floor area attributable to the negative-pressure fan system; a 60% improvement in naturally ventilated floor area is equivalent to AC system energy saving efficiency EAC=0.4. A negative-pressure fan system is more meaningful in a large and deep space where natural ventilation is difficult to achieve. Such spaces tend to have relatively smaller VP values. The equation (VP*-VP) formula means the more poorly ventilated the space is, the higher the improvement ratio will be and therefore the better EAC value. Requirements for this assessment are as follows:

1. Applicants must provide the capacity and catalogue(s) of the negative-pressure fan system.
2. Applicants must provide the floor plans of the building, with the locations of the intake openings and exhaust fans clearly marked (as illustrated).
3. Applicants must calculate the average wind velocity of the spaces using the system (Va) via Equation 2.4.5, and Va must fall between 0.5~2.0m/s to pass (usually 0.5~1.0m/s for offices and 1.0~2.0m/s for factories, but no differentiation is made here), or otherwise assessment will not be undertaken. If the requirement is not met, then make EAC=0.8.
4. Applicants must provide a report on the natural ventilation potential of the original

design calculated according to EEWH-BC Manual Appendix 3, before and after the water curtain or negative-pressure fan system is installed.

5. In accordance with EEWH-BC Manual Appendix 3, multiple cross-ventilation paths may be connected between each intake opening equipped with a negative-pressure fan and multiple intake openings, but the paths must not cross each other.
6. Since the forced ventilation enabled by a negative-pressure fan system is usually stronger than natural ventilation, the cross-ventilated area of VP* should be calculated by extending 2.5m from each side of the ventilation path (total 5.0m) (see EEWH-BC Manual Appendix 3).
7. The above requirements apply to both a negative-pressure fan system with and without a water curtain.

2-4.1.4 By-item Energy Saving Assessment Method for lighting systems

The lighting system energy saving assessment in this Manual focuses on enhancing the efficiency and lighting power of fixtures. It is done by calculating the energy saving efficiency of indoor lighting systems (EL). For the assessment of EL and the system score, see "Assessment of lighting system energy saving" in the EEWH-BC Manual for details and then calculate the lighting energy saving system score ($RS4_3$) according to "Scoring method for various EEWH-BC indicators" outlined in the EEWH-BC Manual.

2-5 CO_2 Reduction indicator

The “CO_2 Reduction indicator” aims to reduce CO_2 emission from building materials during their production and transportation stages. The indicator is assessed under four categories: rational structure, lightweight structure, building durability and use of recycled building materials. Refer to the domestic EEWC-BC Manual for how to assess this indicator and calculate the system score. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. Where the building project has a unique structure or form, uses unique local structures or materials, or comprises a complex cluster of buildings, it becomes difficult to calculate F and W coefficients using the above-mentioned tables. In this case, applicants may assume their own F and W coefficients based on the building's structural rationality and lightweight design characteristics and provide explanations. However, the range of assumed values for the coefficients must fall into the required ranges in the EEWH-BC Manual.
2. For durability factor di, local requirements may be used for the seismic resistance design standards and protective layers for columns, beams and floor slab reinforcement, and the relevant documents should be submitted.

2-6 Construction Waste Reduction indicator

The “Construction Waste Reduction indicator” focuses on control of the four major polluting sources in the building industry: unbalanced cut-and-fill ratio, construction waste, solid waste from demolition and construction air pollution. Refer to the domestic EEWC-BC Manual for how to assess this indicator and calculate the system score. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. For proof of particulate pollutant preventive measures in a construction project, applicants may use photos or apply for proof from the local environment agencies or other credible agencies.
2. If the local codes contain items matching the EEWH-BC Manual (e.g. The Manual requires a fence at least 1.8m high around the construction site while the local codes require 1.5m), the local requirements may be accepted but proof documents must be submitted. Other anti-dust requirements unique to the locality and not listed in the Manual may be deemed "other measures" and applicants may assign an appropriate value.

2-7 Indoor Environment indicator

“Indoor Environment indicator” simultaneously evaluates the burden placed on human health and the environment by the project's indoor environment designs. The indicator is assessed under four categories: acoustic environment, light environment, ventilation and interior finishing. Refer to the domestic EEWC-BC Manual for how to assess this indicator and calculate the system score. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. The EEWH-OS requires labels and certificates for this indicator, such as Taiwan's Green Building Materials Label. Local or international equivalents may also be accepted, but the labeling and proof documents for the applicable products must be submitted.
2. For the airtightness grading of doors and windows and the acoustic insulation performance of structures, please provide catalogues, specifications, documents or drawings to demonstrate that the applicable components comply with the performance requirements of the corresponding indicators.

2-8 Water Resource indicator

The main objective of the ”Water Resource indicator” is to conserve water, reducing waste of water resources by using water-saving facilities and installing rainwater recycling systems. Refer to the domestic EEWC-BC Manual for how to assess this indicator and calculate the system score. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. The EEWH-OS requires labels and certificates for this indicator, such as Taiwan's Save Water Label. Local or international equivalents may also be accepted, but the labeling and proof documents for the applicable products must be submitted.
2. For the average daily rainfall and recommended days of water stored required for calculation of rainwater usage, a reasonable local scenario may be used for simulation, but the source of data and calculation principles must be submitted.

2-9 Sewage & Garbage Improvement indicator

The “Sewage & Garbage Improvement indicator” does not seek to evaluate the technology levels of the sewage engineering and garbage treatment, but rather the reinforcement of the functions of existing sewage and garbage treatment systems. The indicator makes a special point to assess the plumbing system for domestic wastewater to ensure it is drained into the sewage system. At the same time, separating different types of garbage and recycling are encouraged to meet the goal of waste reduction. The indicator is separated into two categories: sewage improvement and garbage improvement. However, passing the Sewage Improvement indicator is mandatory for passing the entire indicator, while the Garbage Improvement indicator is used to calculate the system score. Other points to note while assessing this indicator according to the overseas version are outlined below:

1. The sewage treatment and quality standards to which wastewater should be treated before release must comply with the local requirements and should be assessed according to the EEWH-BC Manual.
2. “No garbage on the ground” is a scenario unique to Taiwan and is usually not applicable overseas. Applicants may receive the 6 points for the “no garbage on the ground” item by simply proposing something that complies with the local garbage removal requirements according to the local circumstances.

Appendix 1 Biodiversity Assessment Table - Overseas Version

I. Assessment of Biodiversity

Category	Sub-category	Design Feature	Description	Full Score	Score Xi
Ecological Green Network _points	Total green space ratio Ax		Xi=100.0×(Ax-0.10)	40	
	3D green network		Xi=Greenery over two stories or more, Ga(m^2/ha)×0.2(pts.ha/m^2)	5	
	Bio-corridor		Construction of a bio-corridor with guiding, safety and protective cover functions (points awarded as appropriate)	5	
Habitat For Small Creatures _ points	Aquatic habitat	Natural banks	Xi=Density of natural banks, Li(m/ha)× 0.2(pts/m)	15	
		Eco-island	Xi=Density of eco-island, Ai(m^2/ha)× 0.5(pts/m^2)	10	
	Green habitat	Mixed woods	Xi=Density of mixed woods, Ai(m^2/ha)× 0.2(pts.ha/m^2)	10	
		Shrubbery	Xi=Density of wild shrubbery, Ai(m^2/ha)× 0.1(pts.ha/m^2)	8	
	Porous habitat	Eco-hill/ eco-fence	Xi=Li(m/ha)× 0.2(pts.ha/m)	6	
		Condensed nature	Xi=Density of condensed nature, Ai(m^2/ha)× 0.5(pts/m^2)	5	
	Other habitats		Designer to provide explanations on small creature-friendly habitat design for evaluation	Assigned value	
Botanical Diversity _ points	Tree variety SDIt		Xt=(SDIt-1)×0.4	8	
	Indigenous or bird/butterfly-attracting plants		Xa=5.0×ra	5	
	Layered mix-species greenery		Xh=20.0×rh	6	
Soil Ecology _ points	Topsoil protection		Where the original topsoil has been adequately stored, protected and reused	10	
	Organic gardening/ natural farming		Where composting and organic fertilizers have been exclusively used	10	
	Kitchen scraps composting		Kitchen scraps composting with sterilization and fermentation treatment	5	
	Fallen leafs composting		Fallen leafs composting with grinding, aerating, fermenting and turning/piling treatment	5	
Light Pollution points	Glare from street lamps		Xi=ni(# fixture/ha)×(-0.5(pts.ha/fixture))	-4	
	Light/flashes from adjacent sites		Xi=ni((# fixture or set/ha)×(-0.5(pts.ha/((# fixture or set))	-4	
	Control of skyward light		Xi=ni((# fixture or set/ha)×(-0.5(pts.ha/((# fixture or set))	-4	
Migration Obstacle _points	Plaza or parking lot		Xi=(Ai-400)(m2)×(-0.0025(pts/ m2))	-4	
	Along a road		For a stretch of road without a greenbelt on either side, where the road is over 15m wide and the stretch is over 10m away from an intersection: 0.5 point is deducted for every 1.0m/ha; where a Class A greenbelt is in place on 1 side, or a Class B greenbelt on 1 or both sides, or a Class C greenbelt on 1 or both sides (Note 1), 0.10, 0.20 or 0.30 point is deducted for every 1.0m/ha, respectively.	-4	
	Across a road		For a stretch of road without a greenbelt at the center, where the road is over 20m wide and with the exception of a dedicated left-turn lane: 0.2 point is deducted for every 1.0 m/ha; where only a Class B or C greenbelt is in place (Note 1), 0.05 or 0.1 point is deducted for every 1.0m/ha, respectively.	-4	
BD=ΣXi=					

Appendix 1 Biodiversity Assessment Table - Overseas Version	
Note 1: Class A greenbelt: A tree-lined greenbelt (but the tree spacing should be under 6m or else the greenbelt is deemed Class B); Class B greenbelt: A dense shrub-lined greenbelt (where the density is less than 1 shrub/3.0m^2 the greenbelt is deemed Class C); Class C greenbelt: A greenbelt planted with grasses and/or flowers Note 2: It is not necessary to award a full score for each of the item above; a partial score may be awarded where appropriate.	
II. Total score	BD=ΣXi=_ points
III. Baseline value BD_i, i=C or D	□ Taiwan Baseline Assessment Method, BDc= _ points □ Local Baseline Assessment Method, BD_D= _ points
IV. System score	RS1=18.75×【(BD-BD_i)/ BD_i】+1.5=_, (0.0≦RS1≦9.0)

Appendix 2 Greenery Assessment Table - Overseas Version

I. Assessment of Greenery

Planting Type		Planting Condition	Capture Quantity Gi	Planting Area Ai	Calculated Value Gi×Ai
Layered planting	Large/small trees, shrubs, dense mixed-species planting of flowers & grasses	Tree spacing under 3.5m and soil depth above 1.0m	1200	㎡	kg
Trees	Large broadleaf trees	Soil depth above 1.0m	900	㎡	kg
	Small broadleaf trees, coniferous trees, thin-leaf trees	Soil depth above 1.0m	600	㎡	kg
	Palms	Soil depth above 1.0m	400	㎡	kg
Shrubs		Soil depth above 0.5m (at least 2 plants/㎡)	300	㎡	kg
Perennial creepers		Soil depth above 0.5m	100	㎡	kg
Flower gardens, wild grass fields, lawns		Soil depth above 0.3m	20	㎡	kg
Old tree preservation		Where the tree trunk diameter at 1m above ground is above 30cm or the age is above 20 years	900	㎡	kg
			600	㎡	kg

$\Sigma G_i \times A_i =$ kg

II. Preferential factor for ecological greenification, α An incentive for planned ecological greenification using indigenous or bird/butterfly-attracting plants, etc. α=0.8 where there is no special ecological greenification. Overall planting design drawings and calculation tables must be submitted for this preferential consideration. α=0.8+0.5× ra, where ra=ratio of indigenous or bird/butterfly-attracting plants		ra=_ α=_
III. Calculation of greenification design value, TCO_2 $TCO_2=(\Sigma(G_i \times A_i)) \times \alpha$		$TCO_2=$ _kg
IV. Baseline value TCO_{2i}, i=C or D	□ Taiwan Baseline Assessment Method $TCO_2c=1.5\times(0.5\times A' \times \beta)$, $A'=(A_0-A_p)\times(1-r)$; If $A' < 0.15\times A_0$, then $A'=0.15 A_0$; r=actual building coverage ratio, Ap=area that cannot be greenified, β=CO_2 captured per unit green space [kg/m^2]	$TCO_2c=$ _kg
	□ Local Baseline Assessment Method	$TCO_{2D}=$ _kg
V. System score	$RS2=6.81\times$【$(TCO_2-TCO_{2i})/TCO_{2i}$】$+1.5=$_, $(0.0 \leqq RS2 \leqq 9.0)$	

Appendix 3 Soil Water Retention Assessment Table - Overseas Version

I. Determination of final infiltration rate, f

Soil classification per geologic investigation=		Soil coefficient of permeability k	m/s
Max. rainfall duration, t =	86400 (s)	final infiltration rate f	m/s

II. Assessment of soil water retention

Water Retention Design		Description	Design Value	Water Retention Volume Qi
Common designs	Q1 Planting, groundcover or grassed swales	Area of planting, groundcover or grassed swales (m^2)		
	Q2 Permeable paving	Area of permeable paving (m^2)		
		Thickness of base layer (m)		
	Q3 Rainwater interception with garden soil	Area of garden soil (m^2)		
		Volume of garden soil (m^3)		
Special designs	Q4 Infiltration & retention with open ground or landscaped pond	Area of open-ground infiltration & retention space or permeable area of landscaped pond (m^2)		
		Storage capacity of open-ground infiltration & retention space or volume differential between high and low water levels of landscaped pond (m^3)		
	Q5 Infiltration & retention with underground gravel layers	Surface area of gravel-layered retention facility (m^2)		
		Volume of gravel-layered retention facility (m^3)		
	Q6 Permeable drainpipes	Total length of permeable drainpipes (m)		
		Opening ratio χ		
	Q7 Permeable drain wells	Number of permeable drain wells, n		
	Q8 Permeable trench drains	Total length of permeable trench drains (m)		
		Material of permeable trench drains, a		
Other designs, Qn		Applicant to submit design drawings and calculations for verification and approval by review committee		

$\Sigma Q_i=$

Note: Special water retention designs utilize special water drainage and infiltration engineering and should be strictly avoided for hillsides and areas with landslide hazards.

III. Calculation of Soil Water Retention Design Value, λ Volume of water retained using various designs: $Q' = \sum Q_i =$; Original volume of water retained: $vQ_0=A_0 \cdot f \cdot t=$_;	$\lambda = \frac{Q'}{Q_0} =$

IV. Baseline value λ_i, i=C or D	□ Taiwan Baseline Assessment Method $\lambda c=0.5\times(1.0-r)=$ r=actual building coverage ratio; if r＞0.85, make r=0.85	λc=_
	□ Local Baseline Assessment Method	λ_D=_
V. System score	RS3=4.0×【$(\lambda-\lambda_i)/\lambda_i$)】+1.5=_, (0.0≦RS3≦9.0)	

Appendix 4 Daily Energy Saving Assessment Table - Overseas Version

I. Building name:

II. Assessment items for Daily Energy Saving

□ Option 1: Energy Cost Assessment Method

Baseline case	SEC =
Design case	DEC=
Ren	Ren=3.0×(SEC-DEC)/SEC=0.00, (0.0≦Ren≦1.0)
System score	RS4=Wen×Ren=

□ Option 2: By-item Energy Saving Assessment Method

A. Assessment of energy saving from building envelope

Obtain local building permit		□Satisfactory	□Unsatisfactory
EV=	EVc=	EEV=EV/EVc=_____≦ EEVc=0.95	
System score	$RS4_1$＝a ×((0.95-EEV)/ 0.95)+2.0=____ ，0.0≦$RS4_1$≦14.0		

B. Assessment of energy saving from AC systems

B1 Individual AC systems (Partial area of individual AC systems, Afc”=_m², reduction ratio for energy saving from natural ventilation, Vac=_)

1. Use Class 1 area ratio for AC with Energy Saving Label, Ar’=_, where the individual AC system has Energy Saving Label; Class 2 area ratio for AC with Energy Saving Label, Ar”=_: EAC”=0.8-(0.4×Ar’ + 0.2×Ar”) ×Vac =_≦EACc=0.8	□Satisfactory	□Unsatisfactory
2. Not installed, or installed and unable to provide proof of Energy Saving Label: EAC” =0.80×Vac =_≦EACc=0.80	□Satisfactory	□Unsatisfactory
Sub-system score	$RS4_2$”=18.6×【(0.80-EAC)/0.80】+1.5=_, (1.5≦$RS4_2$”≦12.0)	
System score	$RS4_2$=($RS4_2$’×Afc’+$RS4_2$”×Afc”)÷(Afc’+Afc”)=_, (1.5≦$RS4_2$≦12.0)	

B2 Negative pressure fan system

Average wind velocity	Va＝Vt/Ar ＝ , and0.5≦Va≦2.0	
Natural ventilation potential	VP*=	VP=
EAC	EAC＝1.0－（VP*－VP）=	
Sub-system score	$RS4_2$”=18.6×【(0.80-EAC)/0.80】+1.5=_, (1.5≦$RS4_2$”≦12.0)	
System score	$RS4_2$=($RS4_2$’×Afc’+$RS4_2$”×Afc”)÷(Afc’+Afc”)=_, (1.5≦$RS4_2$≦12.0)	

C. Lighting system EL

IER=_	IDR=_	β1=_	β2=_	β4=_
EL=IER×IDR×(1.0-β1-β2-β4)=_≦ELc=_			□Satisfactory	□Unsatisfactory
System score	$RS4_3$=9.00×【(0.80-EL)/0.80】+1.5=_, (1.5≦$RS4_3$≦6.0)			

III. Score for Daily Energy Saving Indicator

□	Energy Cost Assessment Method	RS4=Wen×Ren=
□	By-item Energy Saving Assessment Method	$RS4_1$＝a ×((0.95-EEV)/ 0.95)+2.0=____ ，(0.0≦$RS4_1$≦14.0)
		$RS4_2$=($RS4_2$’×Afc’+$RS4_2$”×Afc”)÷(Afc’+Afc”)=_, (1.5≦$RS4_2$≦12.0)
		$RS4_3$=9.00×【(0.80-EL)/0.80】+1.5=_, (1.5≦$RS4_3$≦6.0)

Appendix 5 CO_2 Reduction Assessment Table - Overseas Version

I. Building name:

Building structure:

II. Reuse of an existing building?

□Yes	Reuse ratio of existing building, Sr (floor area ratio of existing structure over total structure)= , Reuse ratio of old structure, Sr (floor area ratio of old structure over total structure): CCO_2=0.82－0.5×Sr= , (0.0≦RS5≦8.0)
□No	Use assessment below

III. Assessment items for CO_2 Reduction

A. Shape coefficient F

Assessment Item		Calculated Value	fi Coefficient
Shape of plan	1.Shape regularity a	□Regular plan □Large, somewhat regular plan □Irregular plan	
	2. Length-width ratio b	b=	
	3. Opening ratio in floor plate e	e=	
Shape of elevation	4. Recess in elevation g	g=	
	5. Overhang in elevation h	h=	
	6. Uniformity in floor height i	i=	
	7. Height-width ratio j	j=	
F＝f1×f2×f3×f4×f5×f6×f7, and F≦1.2			

D. Durability coefficient D

Item	Sub-item	di
Durability	Seismic design of structure d1	
	Durability design of columns & beams d2	
	Durability design of floors d3	
Ease of maintenance	Roof waterproofing d4	
	AC system pipework d5	
	Plumbing pipework d6	
	Telecom cables d7	
Other	Other durability-enhancing designs d8	
D＝Σdi, and D≦0.2		

B. Lightweight coefficient W

Assessment Item			Wi	ri
□ Load-bearing element	Main structure	□Wood structure □Steel structure; light metal structure □RC structure □SRC structure □brick/stone structure		
	Partition walls	□Light partitioning □Brick wall □RC partitioning		
	Exterior walls	□Metal & glass curtain wall □RC exterior wall/PC curtain wall		
	Bathrooms W_4	□Pre-fabricated bathroom		
	Concrete reduction design in RC/SRC structure	□High-performance concrete design □Pre-stressed concrete design □Other concrete reduction design		
W =Σwi×ri, andW≧0.7				

C. Usage ratio of non-metallic recycled materials R

	Blast-furnace slag concrete	High-performance concrete	Recycled floor/wall tiles			Recycled graded aggregate	Other recycled materials
			Interior	Exterior	Facade		
Usage ratio of recycled materials (Xi)							
CO_2 emission influence ratio (Zi)	CCR×0.12	CSER×0.05	0.05	0.05	0.05	0.10	-
Preferential factor (Yi)	3.0	6.0	6.0	6.0	6.0	6.0	6.0
By-item calculation Xi × Zi × Yi =							
R=ΣXi×Zi×Yi, and R≦0.3							

IV. Calculation of design value for CO_2 Reduction: CCO_2=F×W×(1-D)×(1-R)=_

V. Baseline value CCO_{2i}，i=CorD	□ Taiwan Baseline Assessment Method CCO_{2C}=0.82 □ Local Baseline Assessment Method CCO_{2D}=
VI. System score	RS5=19.40×【(CCO_{2i} -CCO_2)/ CCO_{2i}】+1.5=_, (0.0≦RS5≦8.0)

Appendix 6 Construction Waste Reduction Assessment Table - Overseas Version

I. Building name:

Baseline allowable excavation, Mc(m^3)		Total floor area AF(m^2)	
Volume of unbalanced cut-and-fill earth, M(m^3)		Volume of earth that can be used in another project, Mr(m^3)	
Reduction coefficient by structure type, α2		Public hazard prevention coefficient β	

II. Reuse of an existing building?

□Yes	Reuse ratio of old structure, Sr (floor area ratio of old structure over total structure): RS6=10.0×Sr= , (0.0≦RS6≦8.0)
□No	Use assessment below

III. Assessment item for Construction Waste Reduction

A. Ratio of unbalanced cut-and-fill earth, Pie

$PIe = (M-Mr)/(AF \times M_c) =$ [_] ; and 0.5≦PIe≦1.5

B. Construction waste ratio, PIb

Construction Automation Technique	Usage Rate ri	Preferential Factor yi	By-item Calculation ri× yi
Metal modular formwork		0.04	
Steel or wooden modular formwork		0.02	
Precast exterior walls		0.04	
Precast columns & beams		0.04	
Precast floor slabs		0.03	
Prefabricated bathrooms		0.02	
Dry partitioning		0.03	
Other		-	
Preferential factor for construction automation, α1=Σri× yi=			

$PIb = 1.0 - 5.0 \times \alpha_1 - \alpha_2 =$ [_] ; and PIb≧0.0

C. Ratio of demolition waste, PId

	Blast-furnace slag concrete	High-performance concrete	Recycled concrete aggregate	Recycled tiles	Other recycled materials
Usage ratio of recycled materials (Xi)					
Weighting Coefficient (Zi)	CWR×0.08	CSER×0.04	0.46	0.15	-
By-item calculation Xi × Zi =					
γ=Σ Xi × Zi=					

$PId = 1.0 - \alpha_2 - 10.0 \times \gamma =$ [_] ; and PId≧0.0

D. Construction air pollution ratio, PIa

$PIa = 1.0 - \Sigma(\alpha_{3i}) =$ [_] ; and PIa≧0.2

IV. Calculation of design value for Construction Waste Reduction: PI=PIe+PIb+PId+PIa-β=_

V. Baseline value PI_i，i=C or D	□ Taiwan Baseline Assessment Method PI_C=3.30 □ Local Baseline Assessment Method PI_D=
VI. System score	RS6=13.13×【(PI_i-PI)/ PI_i】+1.5=_, (0.0≦RS6≦8.0)

Appendix 7 Indoor Environment Assessment Table - Overseas Version

I. Building name:

II. Assessment items for Indoor Environment -(1)

Item	Sub-item	Subject	Scoring Criterion	Assessment		Subtotal	Weighting	Weighted Score
Acoustic environment		Exterior walls, party walls (*1)	Choose from one of the three below for scoring: ・Single-layer walls: Thickness of RC walls including coatings, dw≧20cm ・Double-layer walls: Spacing between layers, da1≧5cm; thickness of glass wool or mineral wool filling above 24K, dw≧5cm; and total thickness of double-layered solid walls, db≧4.8cm ・Provide proof of acoustic insulation Rw≧55dB(*2) for walls	A1=30	A=	X1=A+B+C=	Y1=0.2	X1×Y1=_
			Choose from one of the three below for scoring: ・Single-layer wall: Thickness of RC walls including coatings, dw≧15cm; thickness of brick walls including coatings≧24cm ・Double-layer walls: Spacing between layers, da1≧10cm; thickness of glass wool or mineral wool filling above 24K, dw≧5cm; and total thickness of double-layered solid walls, db≧2.4cm ・Provide proof of acoustic insulation Rw≧50dB(*2) for walls	A2=20				
			・Wall structures do not meet the criteria for A1 or A2	A3=10				
		Windows	Choose from one of the three below for scoring: ・Meet Class 2 airtightness (2m3/ hm2, *3) and glass thickness ≧ 10mm ・Double-glazed windows meeting Class 2 airtightness (2m3/hm2, *3), with window spacing ≧ 20cm and glass thickness≧5mm ・Provide curve for window acoustic insulation class ≧35 or Rw≧40dB (*2)	B1=35	B=			
			Choose from one of the three below for scoring: ・Meet Class 2 airtightness ($2m^3/hm^2$, *3) and glass thickness≧6mm Double-glazed windows meeting Class 8 airtightness (($8m^3/hm^2$, *3), with window spacing≧20cm and glass thickness≧5mm ・ Provide curve for window acoustic insulation class ≧30 or Rw≧35dB (*2)	B2=25				
			Choose from one of the three below for scoring: ・Meet Class 8 airtightness ($8m^3/hm^2$, *3) and glass thickness≧8mm ・Double-glazed windows meeting Class 8 airtightness ($2m^3/hm^2$, *3), with window spacing ≧ 10cm and glass thickness≧5mm ・Provide curve for window acoustic insulation class ≧25 or Rw≧30dB (*2)	B3=15				
			・Window structures do not meet the criteria for B1, B2 or B3	B4=10				
		Floors	Choose from one of the three below for scoring: ・Thickness of RC floor slabs (df)≧15cm, with additional fixed impact dampening materials on surface △Lw≧20dB(*4) ・Thickness of RC floor slabs (df)≧18cm, with additional fixed impact dampening materials on surface △Lw≧17dB(*4) ・Thickness of steel-deck RC floor slabs (df)≧19cm, with additional fixed impact dampening materials on surface △Lw≧20dB(*4) ・Provide acoustic insulation classification for floor impact noise Ln,w≦55dB (*4)	C1=35	C=			
			Choose from one of the three below for scoring: ・Thickness of RC floor slabs (df)≧15cm, with additional fixed impact dampening materials on surface △Lw≧15dB(*4) ・Thickness of RC floor slabs (df)≧18cm, with additional fixed impact dampening materials on surface △Lw≧12dB(*4) ・Thickness of steel-deck RC floor slabs (df)≧19cm, with additional fixed impact dampening materials on surface △Lw≧15dB(*4) ・Provide acoustic insulation classification for floor impact noise Ln,w≦60dB(*4)	C2=25				
			Choose from one of the three below for scoring: ・Thickness of RC floor slabs (df)≧, with additional fixed impact dampening materials on surface △Lw≧10dB(*4) ・Thickness of RC floor slabs (df)≧18cm, with additional fixed impact dampening materials on surface △Lw≧7dB(*4) ・Thickness of steel-deck RC floor slabs (df) ≧19cm, with additional fixed impact dampening materials on surface △Lw≧10dB(*4) ・Provide acoustic insulation classification for floor impact noise Ln,w≦65dB(*4)	C3=15				
			・Thickness of RC/steel composite floor slabs (df)<15cm or wood floor systems	C4=10				

II. Assessment items for Indoor Environment -(2)

Item	Sub-item	Subject	Scoring Criterion	Assessment		Subtotal	Weighting	Weighted Score
Light environment	Natural lighting	Light emissivity of glass for all building types	• Clear glass or light-colored low-E glass (visible light transmittance above 0.6)	D1=20	D=	X2=D+E+F=	Y2=0.2	X2×Y2=_
			• Tinted glass (visible light transmittance 0.3~0.6)	D2=15				
			• Anti-reflective glass (visible light transmittance 0.15~0.3)	D3=10				
			• Reflective glass (visible light transmittance below 0.15)	D4=5				
		Office, research, laboratory, bedroom, hospital ward and guest room spaces assessed using natural lighting performance indicator NL	• 0.90≦NL	E1=60	E=			
			• 0.80≦NL＜0.90	E2=40				
			• 0.70≦NL＜0.80	E3=30				
			• 0.60≦NL＜0.70	E4=20				
			• NL＜0.60	E5=10				
		Spaces not listed above	• Not assessed	E6=36				
	Artificial lighting	Lighting for office, reading room, library and classroom spaces	• All light sources in the space are equipped with anti-glare grating, shading or similar devices	F1=20	F=			
			• All light sources in the living space are equipped with anti-glare grating, shading or similar devices	F2=15				
			• All light sources for half or more of the area of the living space are equipped with anti-glare grating, shading or similar devices	F3=10				
			• Lighting conditions do not meet the criteria for F1, F2 and F3	F4=0				
		Spaces not listed above	• Not assessed	F5=12				
Ventilation	Natural ventilation possible	Spaces utilizing year-round or seasonal natural ventilation, assessed using natural ventilation potential indicator VP(*7) (area=Af1)	• 0.80≦VP	G1=100	G1=	X3= (G1×Af1+G2×AF2)÷(Af1+Af2)=	Y3=0.3	X3×Y3=_
			• 0.70≦VP＜0.80	G2=80				
			• 0.60≦VP＜0.70	G3=60				
			• 0.50≦VP＜0.60	G4=40				
			• VP＜0.50	G5=10				
	Air-conditioned year-round	Sealed air-conditioned spaces mainly ventilated with separate-type, VRV or central AC systems year-round (area=Af2)	• All living spaces are equipped with a fresh-air supply system (must provide fresh-air intake ducting drawings)	G1=100	G2=			
			• 80％ of the living spaces are equipped with a fresh-air supply system (must provide fresh-air intake ducting drawings)	G2=80				
			• 60％ of the living spaces are equipped with a fresh-air supply system (must provide fresh-air intake ducting drawings)	G3=60				
			• 40％ of the living spaces are equipped with a fresh-air supply system (must provide fresh-air intake ducting drawings)	G4=40				
			• Under 40％ of the living spaces are equipped with a fresh-air supply system	G5=20				

II. Assessment items for Indoor Environment -(3)

Item	Sub-item	Subject	Scoring Criterion	Assessment		Subtotal	Weighting	Weighted Score
Interior finishing	Overall interior finishes	Main living spaces of common buildings	・Basic finishing for structures (finished exclusively with simple paint and plaster or simple ceiling lighting system)	H1=40	H=	X4=H+I=	Y4=0.3	X4×Y4=_
			・Modest finishing (above 70% of ceilings or walls not finished with panels)	H2=30				
			・Moderate finishing (above 50% of ceilings or walls not finished with panels)	H3=20				
			・Extensive finishing (above 70% of ceilings or walls finished with panels)	H4=0				
		Spaces with special interior finishing needs, e.g. exhibition rooms, shopping malls, theatres and performance halls	・Not assessed	H5=24				
	Green building materials	Ratio of green interior finishing materials used (*8 Attach calculations or explanations)	・Rg(*9)≧Rgc+15%	I1=60	I=			
			・Rgc+15%＞Rg≧Rgc+10%	I2=45				
			・Rgc+10%＞Rg≧Rgc+5%	I3=30				
			・Rgc+5%＞Rg≧Rgc	I4=20				
			・No green building materials used or Rg＜Rgc	I5=10				
Eco-interior finishing	Other eco-finishes (bonus points) (Attach calculations or explanations)	Adhesives	・Above 50％ of the adhesives are green building materials	J=20	J=	X5=J+K L+M+N+O=	Y5= 0.2	X5×Y5=_
			・None of the above	J=0				
		Fillers	・Above 50％ of the fillers are natural materials	K=20	K=			
			・None of the above	K=0				
		Wood coatings or colorings	・Above 50％ of the wood area is coated with natural materials	L=20	L=			
			・None of the above	L=0				
		Wiring/piping for electricity, water, gas, etc.	・Above 50% of the wiring/piping use alternative non-PVC materials (e.g. metal or ceramic) or have Green Building Materials Labels or Green Marks	M=20	M=			
			・None of the above	M=0				
		Insulation for building envelope and chilled/hot water pipes	・Above 50％ of the insulation uses natural or recycled materials	N=20	N=			
			・None of the above	N =0				
		Other	・Other natural building materials proven to be eco-friendly	O=Assigned score	O=			

III. Calculation of design value for Indoor Environment: IE=ΣXi×Yi=_	
III. Baseline value IE_i，i=C or D	□ Taiwan Baseline Assessment Method IE_C=60 □ Local Baseline Assessment Method IE_D=
IV. System score	RS7=18.67×【(IE- IE_i)/ IE_i】+1.5=_, (0.0≦RS7≦12.0)

Appendix 8 Water Resource Assessment Table - Overseas Version

I. Building name:

Region	_	Water-intensive facilities	
Probability of precipitation, P	_	Average daily precipitation, R	_
Rainwater Catchment Area, Ar	_	No. of days of water collection, Ns	_

II. Calculation of Water Resource Indicator

No.	Assessment Item	Score
a	Toilets	_
b	Urinals	_
c	Taps for public use	_
d	Showers or bath tubs	_
e	Rainwater/graywater recycling systems, water-saving irrigation systems	_
f	Water saving from AC systems	_
Total score for Water Resource indicator: WI=a+b+c+d+e+f=		_

III. Assessment items for tap water replacement ratio

A. Volume of tap water replacement, Ws

Daily water collection: Wr = R × Ar = [_]

Design volume for rainwater usage: Wd =ΣRi = [_]

Ws = ⇨ [_]

(Ws=the lessor of Wr or Wd)

B. Total water usage by building type, W_t

Assessment Item	Building Type	Scale Type	Water Usage per Unit Area, Wf ($l/(m^2.day)$)	Af or Nf(m^2)	Total Water Usage of Building, Wt (l/day)
➢		_	_	_	_

C. Tap water replacement ratio: R_c = $W_s \div W_t$ = [_%]

D. Rainwater storage tank VS = [_m³] Standard value V_C = [_m³] □Satisfactory □Unsatisfactory

III. Calculation of design value for Water Resource: WI=a+b+c+d+e+f=_	
IV. Baseline value WI_i ，i=C or D	□ Taiwan Baseline Assessment Method WI_C=2 □ Local Baseline Assessment Method WI_D=
V. System score	RS8=2.50×(WI- WI_i)/ WI_i +1.5=_, (1.5≦RS8≦8.0)

Appendix 9 Sewage & Garbage Improvement Assessment Table - Overseas Version

I. Building name:

II. Assessment items for Sewage & Garbage Improvement

A. Assessment of Sewage indicator

Pollution Source	Subject	Criterion	Yes
Daily wastewater	Wastewater from the bathrooms, kitchens and laundry rooms of all buildings, or miscellaneous wastewater from building type “others”	All daily wastewater must be drained into sewers or sewage treatment facilities; in particular, every household in residential buildings must have dedicated laundry space with dedicated drainpipes connected to the sewage system (provide sewage plumbing drawings)	□
Laundry wastewater from specific facilities	Laundry rooms of dormitories, nursing homes, hotels, hospitals and the cleaners	Interceptors must be installed and regularly cleaned; drainpipes must be connected to sewers or sewage treatment facilities (provide sewage plumbing drawings)	□
Kitchen wastewater from specific facilities	Kitchens of schools, institutions, public buildings, restaurants, clubhouses, factories and office buildings with dining facilities or staff cafeterias	Grease interceptors must be installed and regularly cleaned; drainpipes must be connected to sewers or sewage treatment facilities (provide sewage plumbing drawings)	□
Bathroom wastewater from specific facilities	Bathrooms for sports facilities, dormitories, hospitals, nursing homes and clubhouses	Drainpipes must be connected to sewers or sewage treatment facilities (provide sewage plumbing drawings)	□

Note: Mix-used buildings or those with complex functions whose daily wastewater do not come from one single source must pass assessment for all sources simultaneously in order to receive Satisfactory rating.

B. Assessment of Garbage indicator

Garbage improvement measures (attach relevant drawings to explain)	Bonus Point Gi	Yes
1. Where the local government has a “no garbage on the ground” direct garbage removal system is in place, a central garbage collection facility and sealed garbage bins are not required (bonus points may not be awarded simultaneously for both this item and item 6, 7 or 9)	G1=8	□
2. Projects equipped with food scraps recycling facilities accompanied with well-executed reuse programs in place for the recycled product (must provide program and equipment description for fermentation and dehydration treatment to receive points; limited to applications for buildings with construction already completed)	G2=5	□
3. Projects equipped with food scraps collection facilities where the collection is regularly removed by a contracted service rather than reused on-site (bonus points may only be awarded for either one of item 2 or 3; limited to applications for buildings with construction already completed)	G3=2	□
4. Projects equipped with fallen leaf composting/recycling facilities site (must provide program and equipment description for grinding, aerating, fermenting and turning/piling treatment to receive points; limited to applications for buildings with construction already completed)	G4=4	□
5. Projects equipped with garbage pre-treatment facilities, e.g. chilling, freezing, compression	G5=4	□
6. Projects equipped with spacious garbage collection facilities with clearly defined transport routes (must have clear drawings for transport routes)	G6=3	□
7. Projects equipped with planted, beautified or landscaped garbage collection facilities	G7=3	□
8. Projects with effective, well-executed recycling programs in place	G8=2	□
9. Projects equipped with animal-proof, hygienic and reliable sealed garbage bins	G9=2	□
10. Projects with central garbage collection facilities that are regularly cleaned, sanitized and maintained (limited to applications for buildings with construction already completed)	G10=2	□
11. Any garbage improvement measures not described above and assessed to be effective	G11=Assigned value	□

III. Calculation of design value for Sewage & Garbage Improvement: GI=ΣGi=_

IV. Baseline value GI_i，i=C or D	□ Taiwan Baseline Assessment Method GI_C=10 □ Local Baseline Assessment Method GI_D=
V. System score	RS9=5.15×【(GI- GI_i)/ GI_i】+1.5=_, (0.0≦RS9≦5.0)

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