3. OTHER EMERGING PRACTICES / TECHNOLOGIES

(*OT Nov 24*)

Publication date: Nov 2024

Introduction

(1) These slides contain potential innovative / performance enhancement technologies that may be applied to green building projects / existing buildings.

(2) Sources of these technologies include: past CPD events held by HKGBC, information on the Internet, suppliers or trade/industry organisations that proactively approached HKGBC, or case sharing by government departments.

(3) Interested users may directly contact the concerned suppliers whose information or website addresses have been indicated on the slides.

Integrated Design & Construction Management

MiMEP new support system (lightweight)

築印 Archi Tour的帖子

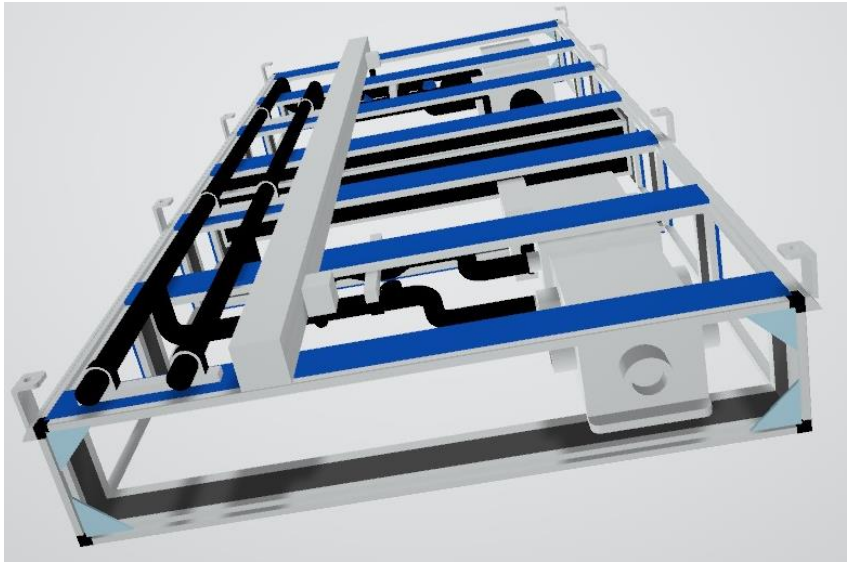
築印 Archi Tour
20 May 2024

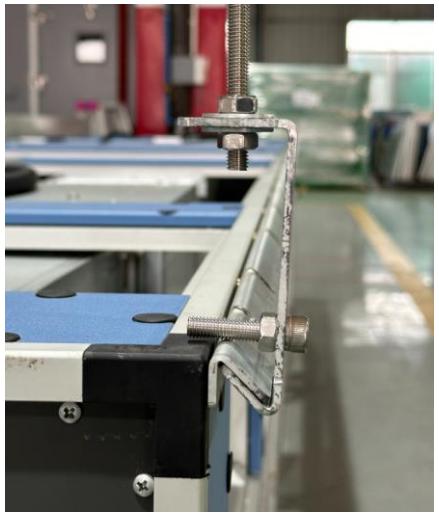
建築署奪國際發明獎項🥈

介紹一下建築署喺第49屆日內瓦國際發明展嘅銀獎作品 - 新一代機電裝備合成法 (Multi-trade integrated Mechanical, Electrical & Plumbing - MiMEP)。🔌⚡⚙️

香港每年都有大量嘅公共建築工程，工程當中亦會需要配置大量屋宇裝備設施，包括機電、冷氣及消防等系統。面對近年熟練勞工不足嘅情況，正如建築業界廣泛地採用的組裝合成建築法 (MiC) 外，同樣於工廠生產模組化設計的機電裝備合成法 (MiMEP) 亦日漸成熟。喺第49屆日內瓦國際發明展中，建築署就聯同承建商和製造商研發出新一代的MiMEP，以改善傳統模組設計，及發展更標準化、高質量、減碳和施工更安全的方案。♻️

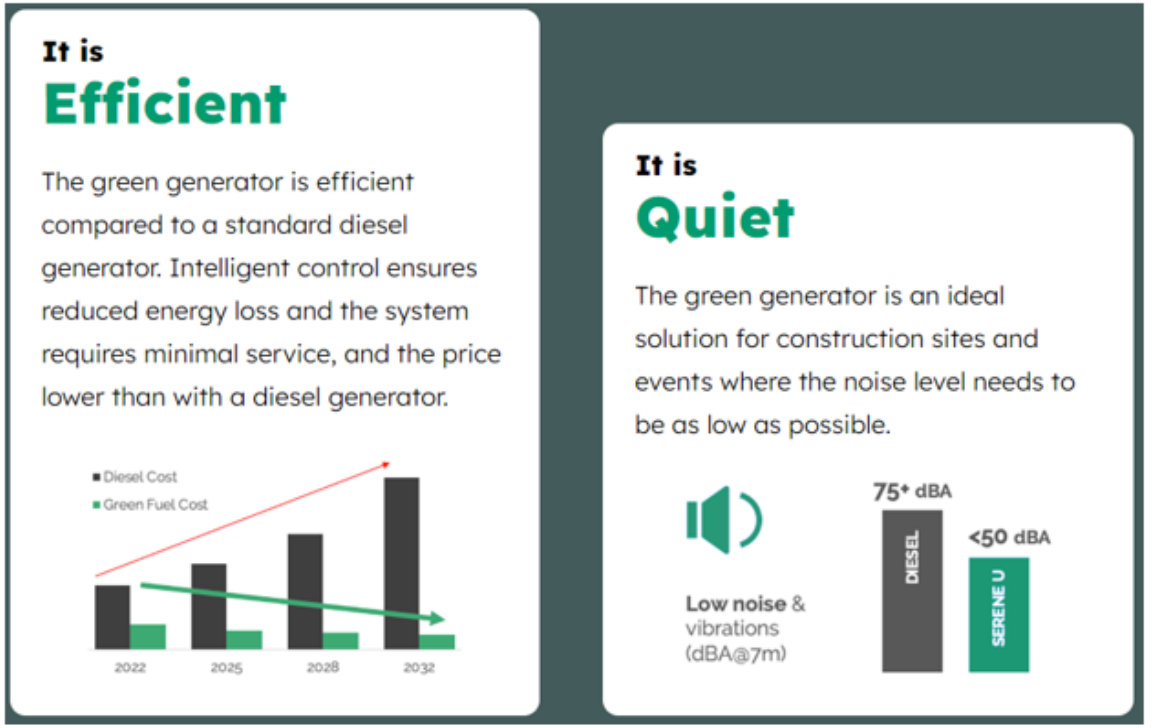
新一代MiMEP建基於專利嘅支撐結構系統，使用鋁架及雙面夾板 (傳統用於中央冷氣系統的風櫃)。由於選用了這些較輕身及堅固的物料，對比一個配置相若的傳統模組，重量大幅減少40%，深度亦減少38%。





Fuel cell generators on construction site

The solution is based on further innovation of the HTPEM (High Temperature Proton Exchange Membrane) fuel cell solution into a system that matches the performance of a traditional diesel generator but with a significant reduction in pollution. The system, which can be integrated into smaller units or as a container solution, runs on green methanol, thus becoming a flexible, sustainable solution with many applications. Regarding operation, the solution is additionally easy to manage and logistics-friendly compared to, for example, a 100% battery solution, which would not need to be moved ad hoc in connection with charging, but instead has an integrated tank.



https://dengroennegenerator.dk/en/about-the-green-generator/

Double refuse chutes on construction site

Wheelock Properties (Hong Kong) Limited
https://www.wheelockpropertieshk.com › files PDF

BUSINESS AND SUSTAINABILITY REPORT 2023

To increase the recycling rates in our properties, we have adopted the double refuse chute system, making us the first property in Hong Kong to implement this approach. These specialized chutes were created with the purpose of segregating inert and non-inert waste directly at each construction level. To further promote waste sorting awareness among our site workers, we have implemented various measures including regular training sessions, a dedicated inspection team, and incentivized vouchers. By combining both hardware and software solutions, our construction waste recycling rate has reached an impressive 90% at construction sites where this double refuse chute system has been implemented.

One for inert waste; the other for non-inert waste

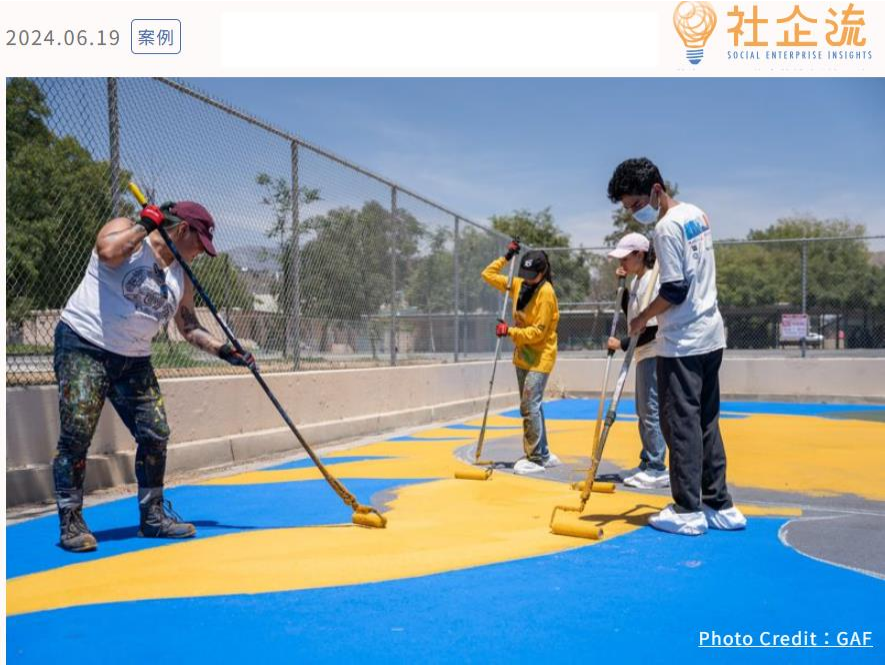
Sustainable Site

Cool pavements to mitigate UHI effect

Cool pavements include a range of established and emerging technologies that communities are exploring as part of their heat island reduction efforts. The term currently refers to paving materials that reflect more solar energy, enhance water evaporation, or have been otherwise modified to remain cooler than conventional pavements.

來自北美地區最大的屋頂及防水材料製造商 GAF，洛杉磯 Pacoima 社區嘗試了一個全新的實驗——涼爽路面計畫（Cool Pavement Program），利用 StreetBond 塗層，以類似油漆的方式作為透明或有色塗層應用在道路、遊樂場和人行道上。「StreetBond 塗層採用了『隱形陰影（Invisible Shade™）』的技術，透過反射紅外線來減緩地表與空氣升溫。」GAF 總監 Eliot Wall 解釋。這項研究也在 2024 年《環境研究通訊》（Environmental Research Communications）期刊中發表，證實利用「冷路面」（cool pavement）能夠有效降低地表及周遭環境的溫度，有效取代傳統以瀝青鋪設路面方式。

https://www.seinsights.asia/article/9513



Materials and Waste

3D printing to reduce material consumption

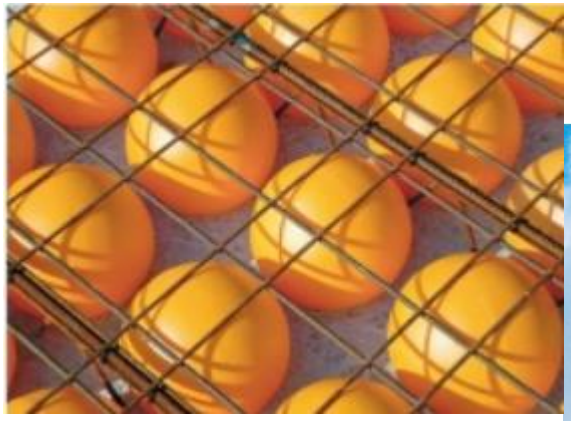
First 3D metal printed installation debuts at "Wedding Garden" of Tseung Kwan O Immigration Department Headquarters

"Weaving Love" is Hong Kong's first large-scale construction pilot project that embraces 3D metal printing technology. This extraordinary installation is at the "Wedding Garden" of the Tseung Kwan O Immigration Department Headquarters, where the wedding hall is set to commence operation by the end of June 2024.

Ms Christina POON, Senior Architect (Building Information Modelling) of the ArchSD says that according to the contractor's estimate, this 3D metal printing technology can reduce material wastage by over 80% compared to conventional construction methods.

https://www.devb.gov.hk/en/home/my_blog/index_id_1557.html

BubbleDeck



信報財經新聞

膠球預製板慳水泥鋼筋 港企引入歐技術 建築期縮達3個月

StartupBeat 創科門室

2023年5月29日

傳統的實心樓板以混凝土、鋼筋製成，BubbleDeck則利用雙軸空心板，取代混凝土的中軸結構。簡單而言，整套系統是在樓板中加入空心塑膠球體，這些球體整齊地排列於混凝土底盤上，並利用絲網加固，再依照傳統做法灌入混凝土。由於混凝土只需要填滿球體之間的空間，樓板所需的混凝土便大幅減少。

由空心塑膠球體組成的預製鋼模塊（steel modules）會直接吊入工地，黃炯堅稱，BubbleDeck可讓建築項目整體減省使用約三成混凝土和鋼筋，建築期縮短1至3個月，工人數目可望減少四成；建築物的主橫樑結構亦相應扣減，以增加立柱跨度。

The product is a lightweight biaxial prefabricated slab system incorporating recycled hollow plastic spheres in the slab. The system is designed to reduce the use of concrete and rebar in slab and speed up floor construction cycles.

黃炯堅補充，BubbleDeck採用空心塑膠球體優點之一，是圓形物體承重力往往更佳。此外，球體以回收塑膠廢料製成，有助環保及創造循環經濟。然而，出於樓板強度及運輸考慮，每塊鋼模塊均有尺寸限制（通常不大於2.5米乘12米），模塊之間可由鋼筋拼接，或預留空間擺放柱身及線管。此外，利用BubbleDeck製成的樓板，通常不建議用於核心牆（core wall）區域。

置地研究內地項目應用

目前BubbleDeck已通過屋宇署批核【見另稿】，亦已納入建造業創科基金預先批核名單。黃炯堅指出，暫未有本港建築項目使用BubbleDeck，因AST是置地公司及信和集團合辦的「城慧2022/2023」企業創新計劃入選企業，置地公司正研究於集團的內地項目應用BubbleDeck。

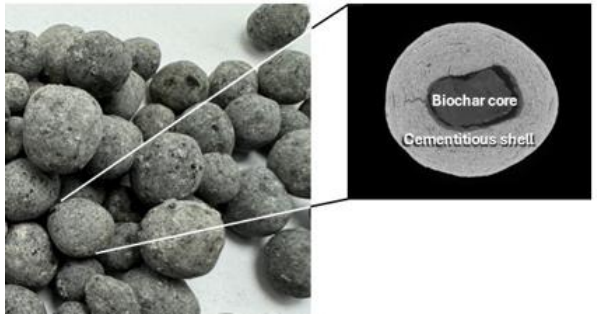
Carbon-negative building materials

Nano and Advanced Materials Institute ("NAMI") has developed the Carbon Negative Paving Block, a green product that integrates carbon capture, utilisation, and storage, as well as life-cycle assessment. Through judicious formulation design, NAMI's paving block is made of recycled materials which possess a low carbon footprint yet fulfilling the compressive strength requirements of the Highways Department. Atmospheric carbon dioxide can be permanently locked inside this paving block. The embodied carbon of the developed paving block is around -0.102 kg CO_2 e, meaning it can absorb and capture more CO_2 than it emits, being a solution to achieve carbon neutrality.

NAMI - Bio-based Carbon Negative Concrete

Using carbon-negative biochar in concrete for buildings is a promising solution to carbon neutrality. However, directly incorporating biochar into concrete would negatively influence its mechanical properties. By forming a novel core-shell aggregate (CSA) by encapsulating biochar with cementitious materials, a bio-based carbon negative concrete with high mechanical strength of over C30 is developed. With negative embodied carbon, this carbon-negative concrete supports the sustainable development and environmental policy of the HKSAR government.

NAMI
https://www.nami.org.hk



Carbon-negative cement-bonded biochar particleboards

Original Research | Open access | Published: 09 October 2022

Volume 4, article number 58, (2022) Cite this article

Liang Chen, Yuying Zhang, Claudia Labianca, Lei Wang, Shaoqin Ruan, Chi Sun Poon, Yong Sik Ok & Daniel C. W. Tsang

Biochar from bio-waste pyrolysis presents excellent CO_2 sequestration capacity. This study innovated the design of cement-bonded particleboards utilizing a substantial amount of 50–70 wt.% pre-soaked biochar to render the products carbon-negative. We investigated the roles of biochar in magnesium oxysulfate cement (MOSC) system and demonstrated good mechanical and functional properties of biochar cement particleboards.

https://link.springer.com/article/10.1007/s42773-022-00185-8

Formwork IO's vision Urban Carbon Removal is based on a new set of carbon removal technology specifically developed for the built environment. The ambition is to transform our urban landscape into dynamic, carbon sequestering environments through the application of Formwork IO's innovative building elements that absorb and store carbon dioxide during production.

https://formworkio.com/about.html#/

Cement-less blocks
(make use of C&D waste, plastic & bones)

薛偉傑：港初創研發「無水泥磚」 善用建築廢料塑膠骨頭

文章日期：2024 年 10 月 6 日

【明報專訊】建築廢料和塑膠都是主要的固體廢料，而且兩者回收再造的比例明顯不及廢紙和金屬；另一方面，廚餘當中的骨頭亦較難處理。有初創公司想出，將這 3 種最棘手的廢料混合來製成環保磚頭。

TerraGreen Limited 共同創辦人蘇培燊、劉思豫、林伯軒表示，建築廢料和塑膠回收再造的比例偏低，已是眾所周知；至於廚餘當中的骨頭，亦沒有很好的處理方法，現時絕大多數方案都只是將之攪碎成粉末來棄置。

既然如此，他們想到將三者按適當的比例混合，而完全不用水泥，再造成稱為 EcoBrix 的環保磚頭，重新應用在建造業。這樣可以為社會減少固體廢物之外，也可以為建造業減少水泥使用量及二氧化碳排放量，可說是一舉多得。

現時，該公司已經在香港科技大學的實驗室內試造出 3 款 EcoBrix，分別能夠承受 4MPa、12MPa、30MPa 的壓力，分別適用於間隔牆、行人路地面以及主力牆，估計成本具有競爭力。在日前舉行的「科大—信和百萬獎金創業大賽」中，該公司在香港科技大學組別中獲得金獎（亞軍）。

至於回收方法，他們表示，建築廢料可以直接從政府的公共填料庫回收，比起從建築地盤回收更方便。比較棘手的是回收骨頭，可能需要在現時回收廚餘的地方增設一部專門回收骨頭的設備。

原文網址：
https://finance.mingpao.com/fin/columnist1578312142059/20241006/1728145572600

Recycling of oyster shell food waste for producing cement

hket 香港經濟日報

商業頭條
撰文：張寶燕
發布時間：2024/08/24

環境、社會及管治（ESG）和可持續發展的議題備受全球各界關注，各界紛紛著手研究不同創新且創效的點子，幫助發展ESG策略。為促進實現可持續發展、ESG，Eaton Workshop董事總經理暨香港逸東酒店總經理唐皓維（Harvey Thompson）表示，母公司鷹君集團自去年初與青洲英坭接洽，首次跨產業合作，夥拍香港朗廷酒店發起「蠔殼升級再造先導計劃」，將蠔殼轉化為可持續建築材料。

Harvey透露，在過去15個月，香港逸東酒店、香港朗廷酒店合共提供了9噸蠔殼，作為傳統水泥用「石灰石」的替代成分。而酒店會從源頭開始，對蠔殼進行分類，鼓勵享用酒店自助餐的顧客於食用生蠔後，將棄置的蠔殼放入指定盤子，與其他廚餘分開。其後再將所收集的棄置蠔殼進行分類和清潔，放入預先準備好的儲存箱，以便青洲英坭收集。

Reuse of ice cubes for AC system

2024-05-17

Times Square x ABURI-EN –
Stay Cool – Boosting Water Tower Performance with Unused Ice Cubes

[Times Square Limited x ABURI-EN was awarded "Collaborative Project of the Year (Circular Economy) – Merit" in the Hong Kong Green Shop Alliance Award 2023]

Times Square is a Grade-A building located in Causeway Bay that uses a centralised A/C system, which features water-cooled chillers and cooling towers. These chillers and towers comprise a significant proportion of the building's electricity consumption. After learning that its tenant ABURI-EN, a Japanese restaurant, was disposing of unused ice cubes daily, Times Square came up with an innovative idea to kill two birds with one stone.

Times Square Limited first installed IoT sensors at its cooling towers to measure temperature fluctuations and prove the efficacy of its experiment. It then collected the unused ice cubes and disposed of them in the cooling towers. The condenser water was proven to become cooler after deployment of the unused ice cubes and the overall A/C system's COP (coefficient of performance) was boosted. At the same time, ABURI-EN was able to save costs and manpower on clearing unused ice, achieving "zero waste" and resulting in more efficient resource utilisation.

This collaborative project demonstrates that implementing environmentally friendly and sustainable measures doesn't necessarily require high costs or the addition of expensive machinery. Times Square aspires for this solution to set a high bar for the industry and foster similar partnerships. This approach also promotes the trend of a greener business model, achieving a win-win situation for landlords and tenants.

Glass bottles replace plastic bottles in hotels

Case Study: Replacing Plastic Bottles in Hotels

Reducing the use of single-use plastic products is a key objective for our hotels. In 2022, The Eaton HK, The Langham Hong Kong and Cordis, Hong Kong all replaced plastic drinking water bottles with water in refillable glass bottles. Tap water is filtered using patented technology from our partner, Nordaq, and bottled in-house in dedicated glass bottles that can be used repeatedly. This bottling system was trialled at Cordis, Hong Kong in October 2021 and was rolled out across all our Hong Kong hotels at the beginning of 2022. We are proud to be contributing to ending the use of disposable plastic bottles in Hong Kong.

Patented in-house refillable glass water bottles

https://www.greateagle.com.hk/files/sustainability-reports/2022-report-en.pdf

Energy Use

Passive radiative cooling (PRC) materials – tiles, asphalt, etc

最新研究是將 PRC 技術擴展及應用於三項新領域，包括建築外殼、行人道與公共場所的**製冷瓷磚、路面的製冷瀝青**。製冷瓷磚具有多孔結構、由無機材料組成，對陽光和熱量的吸收率低，並可抵抗紫外線(UV)輻射引起的降解，具備卓越的化學穩定性和強大的機械性能(材料在不同環境下的抗壓能力)，令這款瓷磚適合於戶外長期使用，有助建築外殼、行人道和公共場所減少吸收太陽熱力，並增強對外太空的熱輻射，從而降低對空調的需求。

傳統瀝青材料會於白天吸收太陽輻射，導致路面表面升溫至最高達攝氏50度至60度，團隊研發的製冷路面材料，將進一步減輕城市的熱島效應。曹指通過加入可反射更多陽光及降低路面溫度的無機顆粒，製冷路面材料將提高路面的太陽反射率和中紅外線發射率，其耐用性也適用於交通繁忙的城市道路。

原文網址：城大製冷技術新突破　瓷磚瀝青及紡織物可零耗能降溫 | https://hk.on.cc/hk/bkn/cnt/news/20241014/bkn-20241014160755390-1014_00822_001.html?link_id=7cd843a5-d86d-4cc0-9559-43b7a42f41e8

製冷瓷磚可應用作建築物外殼，圖為屋頂上鋪設的白色製冷瓷磚。(城大提供)

City University of Hong Kong

城大製冷技術突破應用擴展至道路建築物紓緩全球暖.

Passive radiative cooling paint on roof + Bifacial PV panels

With support from PolyU's Carbon Neutrality Funding Scheme, the team has integrated the photo-luminescent coating with bifacial solar photo-voltaics (PV) to achieve synergistic enhancement in thermal management and power generation, transforming buildings from energy consumers into energy harvesters. The team is planning to install bifacial PV panels on the rooftops of the under-construction PolyU Kowloon Tong Student Hostel, with new coating applied on the corresponding area under the panels to enhance power generation while ra-diatively cooling the building.

The team expects this dual-functional system to improve electrical power generation by 30-50% and reduce the carbon emission by 30% com-pared with conventional uncoated rooftops. Taking this project as an example, installation of PV over an area of approximately 600 m2 on hostel rooftops can generate 97,000 kWh of electricity, resulting in annual cost savings of over HK$120,000. The team is also developing a paraffin-based self-adaptive radiative cooling coating that can maintain appropriate solar reflectivity in response to cold and hot weather, achieving the effect of keeping warm in winter and cooling in summer.

The water-soluble SARC coating can also be produced in various colours, allowing it to be easily applied to building roofs, walls, roadways, and urban surfaces to achieve both cooling and aesthetic enhancements.

https://www.polyu.edu.hk/rio/news/2024/20240924---polyu-researchers-unveil-novel-carbon-dots-driven-green-radiative-cooling-coating/?sc_lang=en

BIPV applied to canopies (e.g. carparks, building façade, etc.)

LINE TODAY

全港首太陽能停車場上蓋工程今展開 迪士尼料年產20萬度電

全港首個太陽能停車場上蓋工程今日(2日)啟動，項目位於香港迪士尼樂園度假區，將會在迪士尼行政大樓戶外員工停車場，加建超過400塊太陽能板上蓋...

2023年6月2日

Installation of outer sun-shading incorporating with solar cell system

(Source: ABRI, 2004)

GREEN RENOVATION FOR EXISTING BUILDINGS IN TAIWAN

Yuan-Liang Cheng, Ph.D.
cyl@abri.gov.tw
Director of Environmental Control Division
Architecture and Building Research Institute, Ministry of the Interior, Taiwan

BIPV applied to non-glass opaque wall surfaces

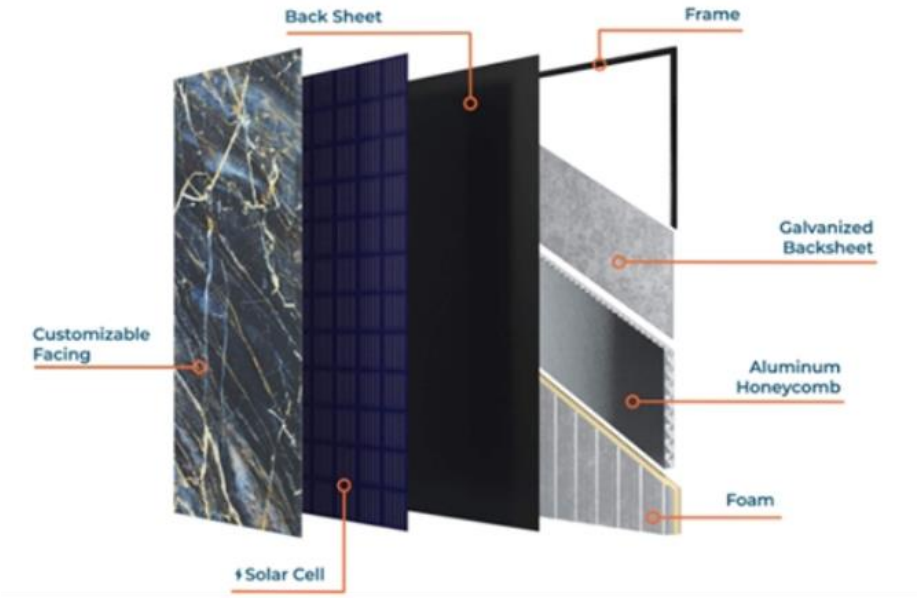
中國建築興業集團有限公司
CHINA STATE CONSTRUCTION DEVELOPMENT HOLDINGS LIMITED

With the proposal of China's 14th Five-Year Plan and the goals of carbon peak and carbon neutrality, the demand on new energy development and urban energy conservation is growing, and the concept of green environmental protection has gradually received more attention in the field of construction engineering. In this respect, the Group actively researches and develops BIPV technology and explores new solutions for renewable energy development.

Meanwhile, we also proactively collaborate with various external parties to promote the integration of BIPV into green building projects, such as reaching a strategic partnership agreement with a leading enterprise of the cadmium telluride industry to cooperate in the Hong Kong Chinese Medicine Hospital project, jointly produce imitation aluminum plates, imitation stone frosted photovoltaic glass modules, and carry out R&D and design of BIPV products.

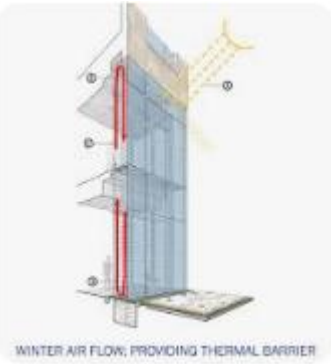
NON-GLASS PHOTOVOLTAIC MODULE DESIGN

- In addition to the research and development of standard BIPV systems suitable for different locations such as facade, roofs and railings, the Group is also committed to the research and development of BIPV system which is suitable for the photovoltaic-related renovation of old buildings. Meanwhile, the Group also carries out in-depth research and development of non-glass photovoltaic modules, breaks through the traditional all glass design option, and replaces the glass back sheet with aluminum veneer, aluminum honeycomb plate, galvanized plate and other materials, to improve the strength of photovoltaic modules and reduce the weight. At the same time, we also explore the replacement of glass panels with other transparent materials to provide a more diversified facade outlook of BIPV.



https://www.cscd.com.hk/category.aspx?NodeID=312&siteid=27547

Double Skin Façade



中國建築興業集團有限公司
CHINA STATE CONSTRUCTION DEVELOPMENT HOLDINGS LIMITED

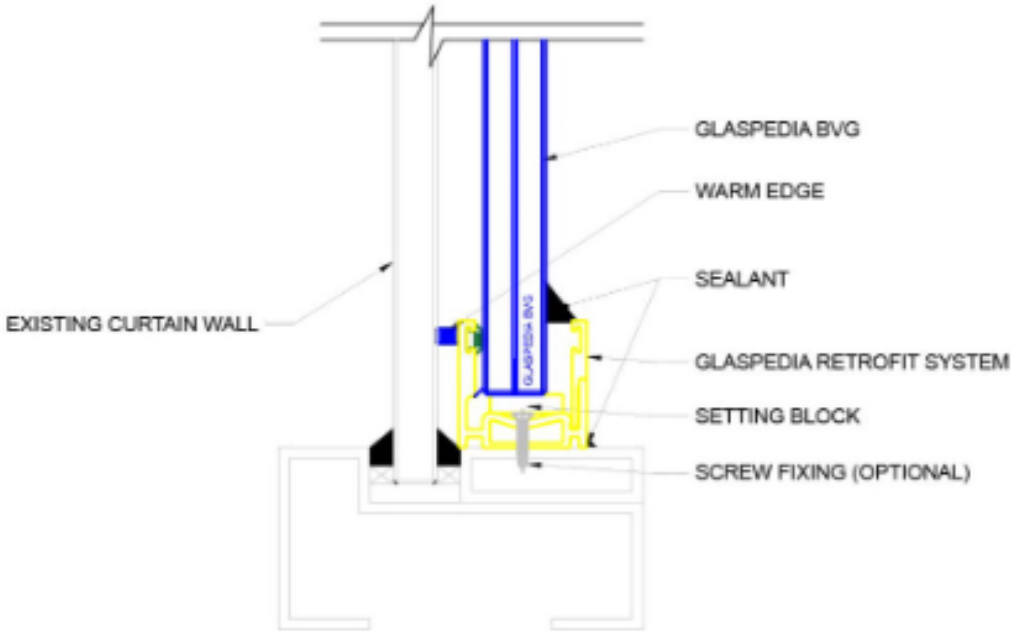
APPLICATION OF RESPIRATORY DOUBLE-SKIN FACADE

The Group boasts mature technologies in respiratory double-skin facade. Respiratory facade introduces an internal circulation and ventilation system, which improves a building's overall thermal performance by controlling the flow direction and flow of the wind. It prevents curtain wall from frosting on cold days and facilitates heat dissipation in high temperature, thereby reducing energy demand and improving energy efficiency.

* Respiratory Double-skin Facade in the Hong Kong Science Park Project

https://www.cscd.com.hk/category.aspx?NodeID=312&siteid=27547

Building Vacuum Glass (BVG) Glazing Retrofit



Glaspedia

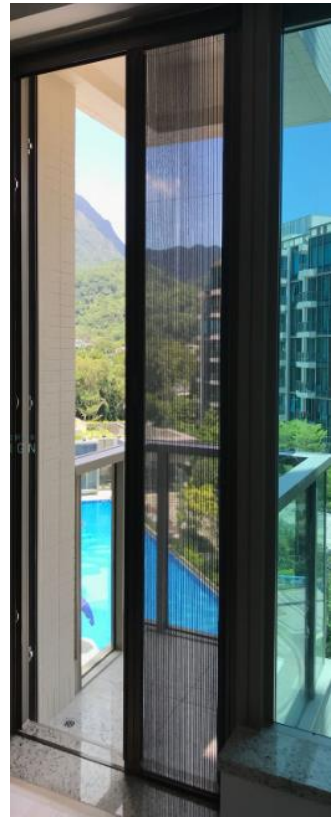
- What is BVG Glazing Retrofit?
- BVG Glazing Retrofit is a secondary with independent BVG System added to the room side of existing window or curtain wall glass panels.
- Sustainable Retrofit – There is no need to remove existing windows, meaning that there is no waste going to indoor
- Improve the thermal, acoustic, safety and security performance of existing windows.

https://www2.glaspedia.com/843-2/

https://rethink-event.com/insight/glazing-retrofit-solution-for-existing-building/

Window screens (bug & pet resistant) to facilitate the use of natural ventilation

The screens are highly vision-transparent, and can be provided by the developer on Day One in order to save flat buyers' fitting-out efforts.



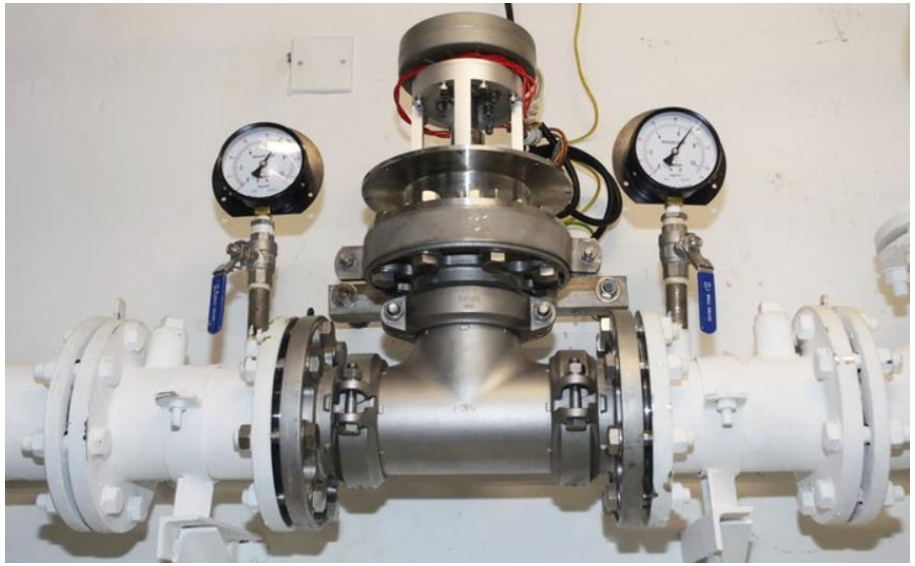
https://www.homydesignhk.com/en/type_of_products/window-screens/

Make use of unused water head to generate electricity (inline hydropower system)

Sino Green, Arup and The Hong Kong Polytechnic University unveil a research project on the first in-building hydro power that makes use of unused water head in pipelines. The study has achieved encouraging preliminary results, generating hydroelectricity in a green and low-cost way while reducing carbon emissions.

講到可再生能源，很容易就會聯想到風力發電機、水壩、大範圍太陽能板等大型基建。原來就連藏在我們日常生活中的輸水管，都能成為發電系統之一！

水務署的「智管網」是監察水管滲漏、避免用水流失的重要計劃。他們與香港理工大學合作研發內嵌微型水力發電系統，利用輸水管內的水流發電，為監察水管網健康的「智管網」系統供電。以可再生能源保障資源的高效利用，體現循環經濟的特點。



微型水力發電系統，利用輸水管內的水流發電，

Source: HKIE

https://www.sino.com/en/sustainability/latest-activities/2014/sino-green-unveils-first-in-building-hydro-power-system/

https://www.polyu.edu.hk/kteo/knowledge-transfer/innovations-and-technologies/technology-search/2-construction-and-environmental-technology/2_bse_04_0419/

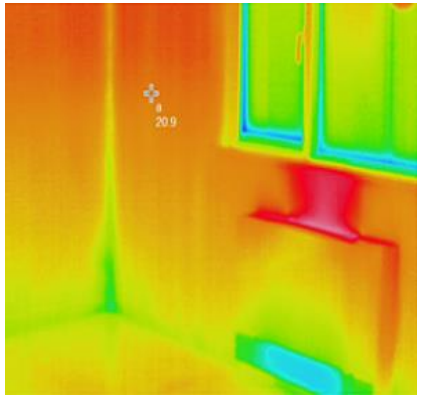
Energy Use + Health & Wellbeing

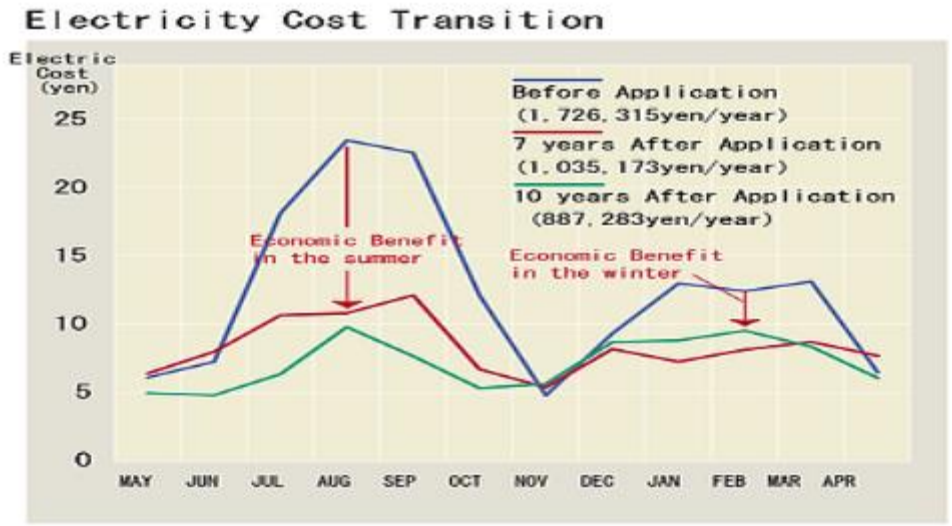
Ceramic coating (interior & exterior) to improve building performance

GAINA is a top-class energy saving ceramic coating material developed by GAINA-intl based on the Japanese rocket insulation technology from JAXA (The Japan Aerospace eXploration Agency) for protecting both rockets and satellites from the heat of the atmosphere. GAINA Tecnology is used as a part of building materials as a thermal insulation a water-based coating composed of unique ceramic beads blended with Acrylic resin.

NOISE REDUCTION

GAINA coating reduces all kinds of audible noise by 4 to 10 decibels, GAINA has powerful effects on dampening vibration. GAINA keeps your residence very quiet.





Gaina Japan ceramic insulation coating is applied to indoor and outdoor to help keep warm or to resist heat. It also improves sound performance, and improves IAQ due to negative ions.

https://www.gaina-intl.com/usecase

Tilted glazing panels reduce glare & solar heat gain

The Inland Revenue Centre (IRC) in Kai Tak Development Area, which was opened in end-2022, is the first government building that has adopted an innovative curtain wall design with tilted glazing panels to minimise the impact of potential glare to the surrounding environment. Senior Project Manager of the ArchSD, Mr FUNG Yiu-leung, says that tilted glazing panels are mainly installed in the office areas of the IRC. Occupants are generally satisfied with the office space. Tilted glazing panels are visually similar to the traditional vertical ones, but are more insulating and can help reduce the solar heat gain of the building, which in turn can reduce the demand on air-conditioning.

https://www.devb.gov.hk/en/home/my_blog/index_id_1557.html

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Nanofiber filter that has low pressure drop

MultiH® Air Filters

MultiH®, a multifunctional nanofiber filter material, that developed in collaboration with the Hong Kong Government funded research centre, Nano and Advanced Materials Institute Limited (" NAMI").

WHY NANOFIBER?

- 1/20 fiber diameter than Microfiber
- High air permeability, pressure drop equivalent to MERV-13
- 6x faster air exchange
- Removal of bacteria and virus at > 99%
- Consistent performance in spite of long exposure, IPA discharging test

Thanks to the superb porosity, the power consumption of a HEPA H13 filter has no difference to any MERV-13.
Easily upgrade any air conditioning mechanical systems (ACMV), and many other applications.

https://www.focusfareast.com/multih

Disclaimers

(1) The indications of suppliers are not exhaustive. The inclusion of any particular brands in these slides is meant to be examples only and does NOT imply endorsement.

(2) The use of the above technologies does not necessarily mean that IA points would be attained under BEAM Plus. Granting of points is on a case-by-case basis based on degree of innovativeness, amount of environmental benefit and other considerations.

(3) Any suppliers who wish to share their innovative or performance enhancement technologies via these slides can contact HKGBC Secretariat via tel no. 3994 8868.