1. INNOVATIVE / PERFORMANCE ENHANCEMENT TECHNOLOGIES APPROVED FOR PREVIOUS NB PROJECTS

(*NB Nov 24*)

Publication date: Nov 2024

Introduction

(1) These slides contain innovative / performance enhancement technologies that have been approved in previous BEAM Plus NB (New Buildings) projects.

(2) The approval years are given in brackets / at left lower corner.

(3) Users are reminded that technologies approved as IA points for a past project do not necessarily mean that they would attain the same IA scores for other projects. Project assessment will take into account individual circumstances.

Introduction (cont'd)

Definitions of IA1 and IA2 under NB v1.2

- **Innovative Techniques (IA1)** – Advance practices and new techniques not yet been widely adopted in Hong Kong or even elsewhere with environmental benefit.
- **Performance Enhancements (IA2)** - Strategies and techniques perform sig. better than BEAM requirements.

Introduction (cont'd)

"IA" definition under NB V2.0

Present evidence of the application of new practices, technologies and/ or techniques that are

(1) not described in this manual;

(2) not market mainstream implementation; or

(3) multiple aspect achievement

There is only IA1 in NB v2.0. No IA2 is present.

LIST OF PAST CASES

IA 1 - Innovative Techniques

Carbon assessment during construction stage

https://cat.cic.hk/

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques

B5 Biodiesel for Diesel Plant on Construction Site (100% usage)

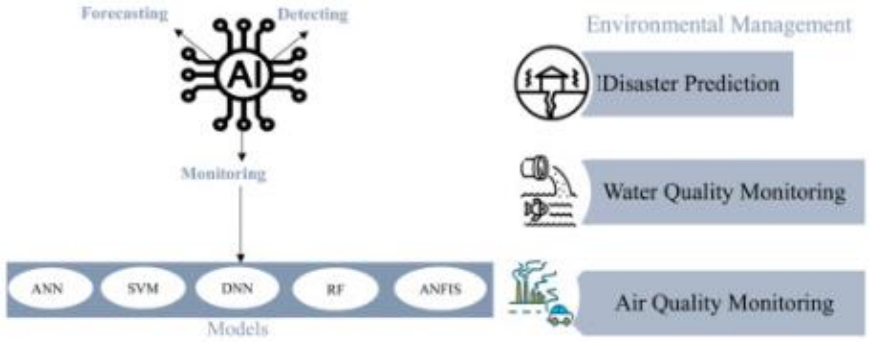
The bonus credit is granted in PA. The Applicant is reminded to demonstrate the use of biodiesel for both foundation and superstructure stages, provide evidence showing the total amount of B5 biodiesel used in the construction site and further demonstrate 100% usage of B5 biodiesel instead of petroleum diesel during construction in FA.

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques

AI used in Environmental Monitoring Stations

- Traditionally, environmental monitoring has been a labor-intensive and time-consuming process, relying on manual data collection and analysis. This method is not only inefficient but also prone to human error. Fortunately, **AI technology** offers a solution. By automating data collection and analysis, AI algorithms can handle large datasets in a fraction of the time it would take a human. Additionally, AI-powered sensors and drones can collect real-time environmental data that was previously impossible or too costly to obtain.
- One example of AI revolutionizing environmental monitoring is the use of machine learning algorithms to analyze satellite imagery for land cover change detection.
- Another application of AI in environmental monitoring is the use of sensor networks to monitor air and water quality. By deploying sensors powered by AI technology, we can continuously collect data on pollutants and other environmental factors, allowing for timely interventions to protect human health and the environment.
- By streamlining data collection and analysis processes, AI is enabling more efficient and effective environmental monitoring, giving scientists and policymakers the tools they need to make informed decisions.



(NB v2.0 Approved in 2024)

https://makersite.io/how-ai-is-transforming-environmental-monitoring-and-conservation/

IA 1 - Innovative Techniques

Smart Parking Systems

Reducing Vehicle Emissions

One of the most significant environmental benefits of smart parking systems is the reduction in vehicle emissions. Traditional parking methods often involve drivers circling around looking for an open spot. Consequently, increasing idle times and fuel consumption. Smart parking systems, like a parking guidance system, provide real-time information on available parking spaces. As as result, allowing drivers to find spots quickly and efficiently. This reduction in cruise time leads to lower emissions of carbon dioxide (CO2) and other pollutants, contributing to cleaner air quality in urban areas.

Decreasing Fuel Consumption

By guiding drivers directly to available parking spaces, through parking guidance, smart parking systems help decrease overall fuel consumption. When drivers spend less time searching for parking, they use less fuel. Not exactly rocket science eh? Furthermore, leading to cost savings and a reduced environmental footprint. Additionally, smart parking systems can integrate with parking **mobile apps** that offer route optimization. Further enhancing fuel efficiency by providing the shortest or least congested routes to parking spaces.

Optimizing Land Use

Efficient use of land is another environmental benefit of smart parking systems. By maximizing the utilization of existing parking spaces, smart parking reduces the need for additional parking infrastructure. For example, large parking lots or multi-story garages. With unbelievable **data and analytics** insights possible, optimization allows customers to preserve green spaces and reduce urban sprawl. Thus, contributing to better land management and a more sustainable urban environment.

(NB v2.0 Approved in 2024)

https://frogparking.com/environmental-benefits-of-smart-parking/

IA 1 - Innovative Techniques

Revolutionising the Building Lifecycle with Robotics

Disinfection / cleaning robots

(can function in the dark without need to keep lights on)

Beyond painting and surface preparation

While painting and surface preparation applications are 'poster children' applications for consumable and material in robotics, most other industries using automation are also benefiting from reducing the cost of power consumption or more efficiently using raw materials.

Welding is another area where gas and wire costs are reduced through automation. 'One could argue that because the duty cycles are higher, robots give power savings, but in welding, it really comes down to consumables and waste,' 'An operator may manually cut wire, clip it or do a test arc. An operator is going to waste the materials, while a robot is going to lay it down the same way, over and over.'

https://www.automate.org/robotics/industry-insights/robots-save-on-consumables-raw-material-costs

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques

Metal Scaffolding

Steel scaffolds are incredibly durable, with a lifespan that can extend up to 50 years with proper maintenance. Steel is resistant to weathering, corrosion, and fire, making it an ideal material for scaffolding in harsh environments. Additionally, steel scaffolds can be reused for multiple projects, reducing waste and saving money on replacement costs.

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques – using recycled wood

Yard Waste Recycling Centre Y · PARK

Recyclable Products

Wood Chip

Large
30-60mm

Medium
20-30mm

Small
10-20mm

Mixed
10-60mm

Applications

Mulch for gardening and landscaping

Bulking agent for composting

Substrate for mushroom cultivation

Biochar feedstock

Filter media for treating surface runoff

Wood Board

50mm X 305mm X 500mm
25mm X 305mm X 500mm
12mm X 305mm X 500mm

*The wood boards have been dried.

Application

Wood furniture

Wood Beam

50mm X 50mm X 2000mm
50mm X 100mm X 1000mm
25mm X 50mm X 2000mm
25mm X 100mm X 1000mm
12mm X 50mm X 2000mm
12mm X 100mm X 1000mm

*The wood beams have been dried.

Applications

Facilities decoration/ renovation

Timber fencing for garden

Sawdust

<10mm

Applications

Particle board

Additives for composting

(NB v2.0 Approved in 2024)

https://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/waste/manage_facility/images/catalog1_eng_02.jpg

IA 1 - Innovative Techniques

DfMA and MiMEP

Medium level

Highly standardised design. A significant proportion of the project is delivered using offsite fabricated components.

High level

Nearly all project components are designed and delivered using prefabricated components with high degree of standardization, efficiently assembled onsite.

Degree of DfMA adoption

cic.hk/files/page/51/Reference%20Material

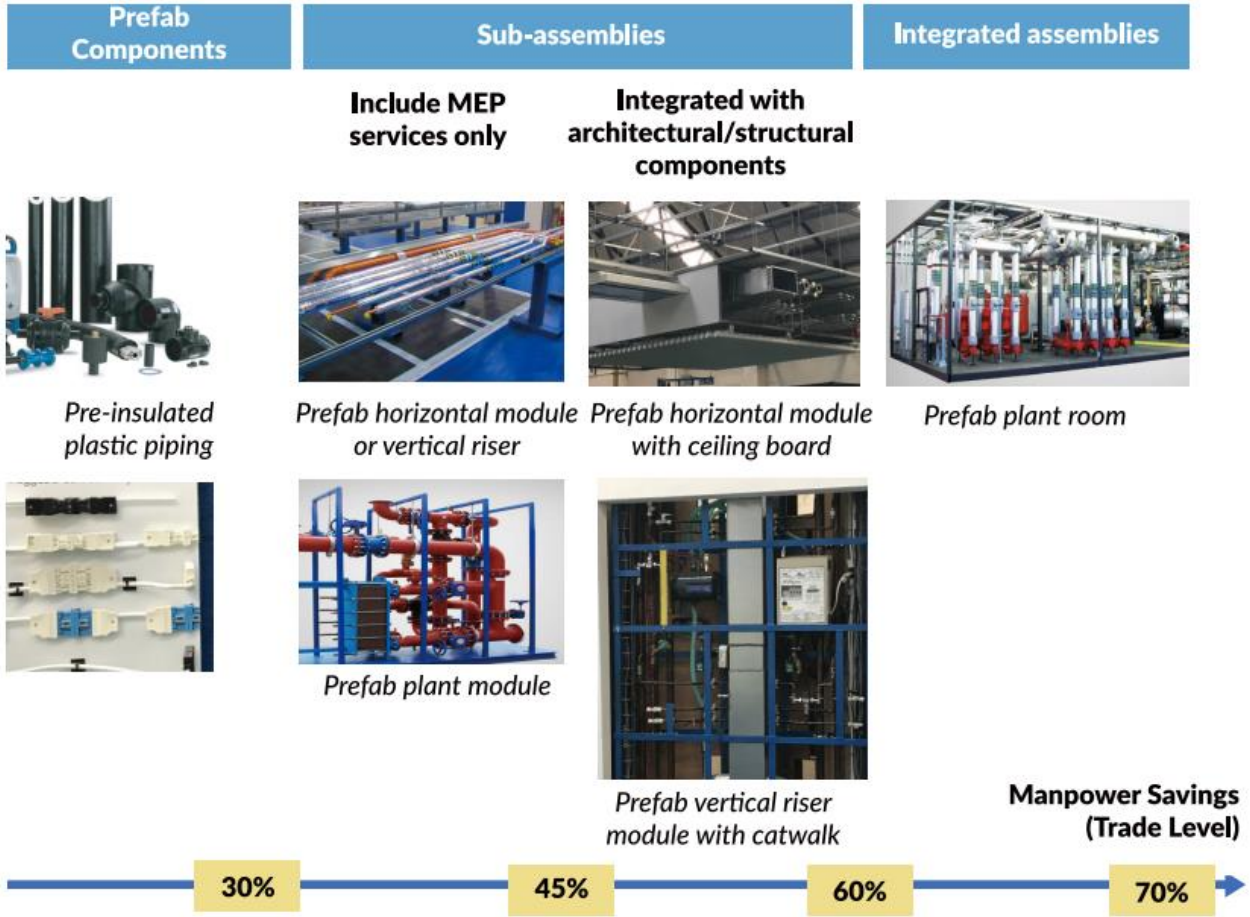


Figure 1.5 Design options for prefabricated MEP modules in Singapore (Courtesy of the BCA, Singapore)

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques

DALI Digital Lighting Standard

DALI was originally developed to allow digital control, configuration and querying of fluorescent ballasts, replacing the simple, one-way, broadcast-like operation of 0/1-10V analog control.

With DALI, the broadcast option is also available; in addition, with simple configuration, each DALI device can be assigned a separate address, allowing **digital control of individual devices**.

Furthermore, the DALI devices can also be programmed to **operate in groups**. This provides excellent flexibility since the lighting systems can be **reconfigured** by software reprogramming, without the need to change the wiring. Different lighting functions and moods can be achieved in different rooms or areas of a building, and then **easily adjusted and optimized**.

The digital nature of DALI allows **two-way communication** between devices, so that a device can report a failure, or answer a query about its status or other information.

Wiring is relatively simple; DALI power and data is carried by the same pair of wires, without the need for a separate bus cable. The polarity of the wires does not have to be observed, in contrast with 0/1-10V systems where wiring errors are common.

Source: Kinglumi

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques

Double Refuse Chutes in Residential Building

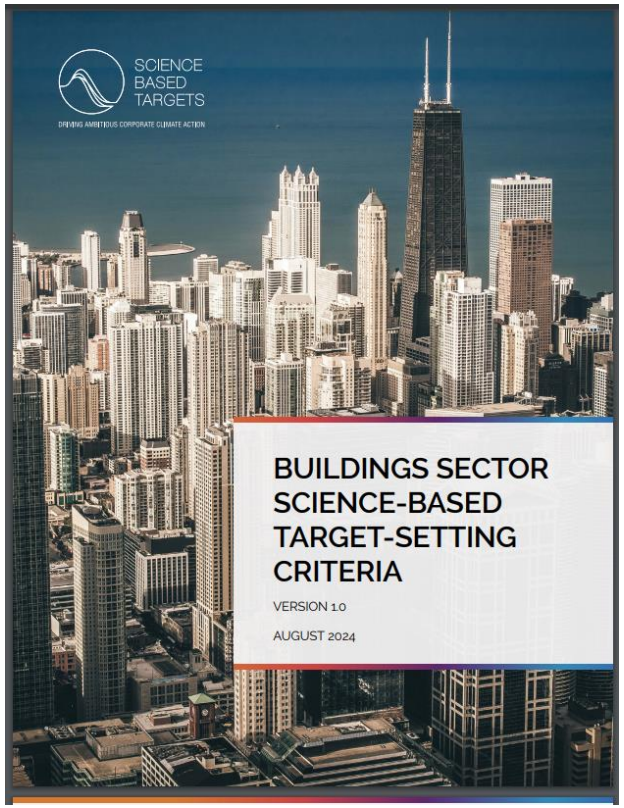
According to the submission template and supplementary information, two refuse chutes can be provided for every tower to collect general refuse and recyclables respectively to save the use of bins and to process sorting and handling tasks centrally. The essence is to have two chutes for separation of recyclable and general refuse. Bonus credit is achieved.

(NB v1.1, approved in 2013)

IA 1 - Innovative Techniques

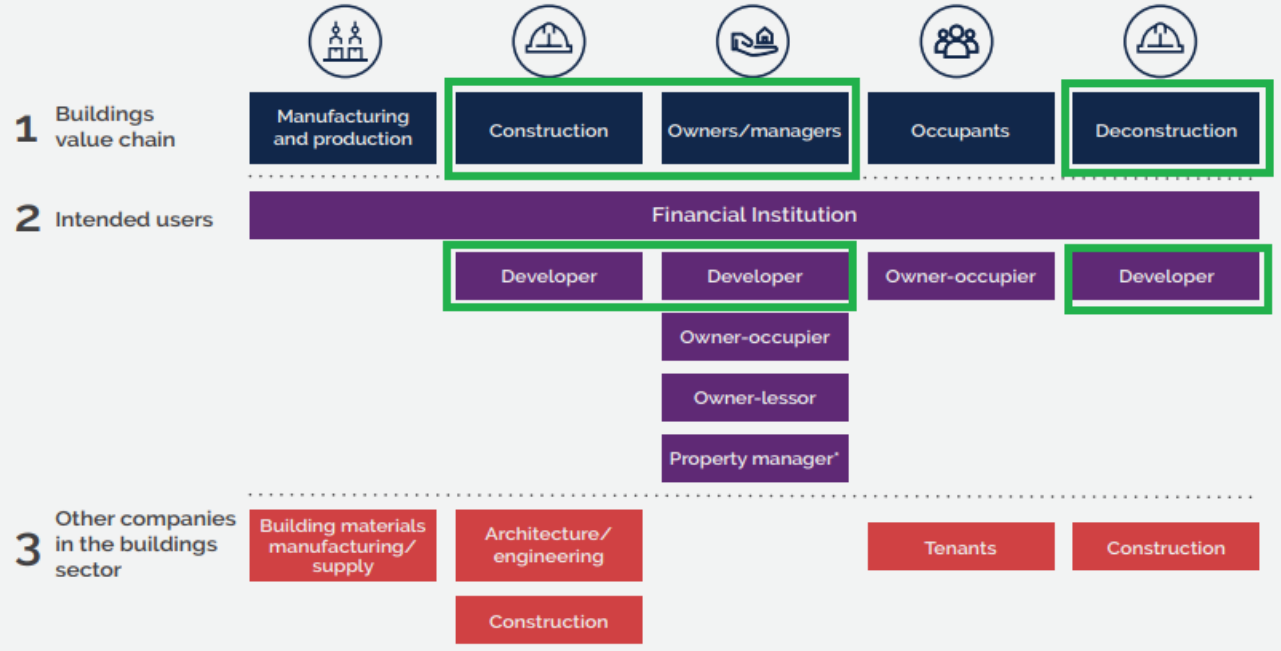
Designing the project using the approach of

Science Based Target Initiatives (SBTi)



(NB v2.0 Approved in 2024)

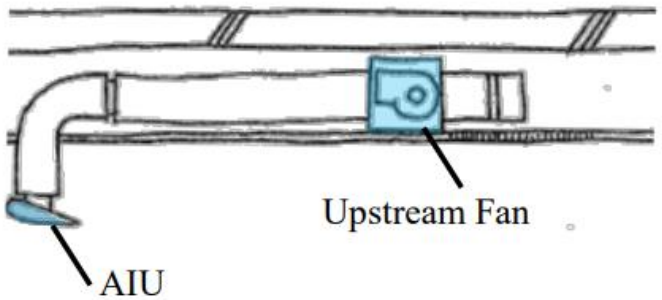
Figure 1. Intended users within the buildings value chain



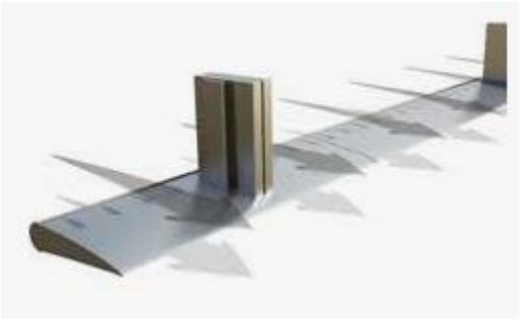
https://sciencebasedtargets.org/resources/files/SBTi-Buildings-Criteria.pdf

IA 1 - Innovative Techniques

Mall without AC



Courtesy: Arup air induction unit



(NB v1.2 Approved in 2024)

IA 1 - Innovative Techniques

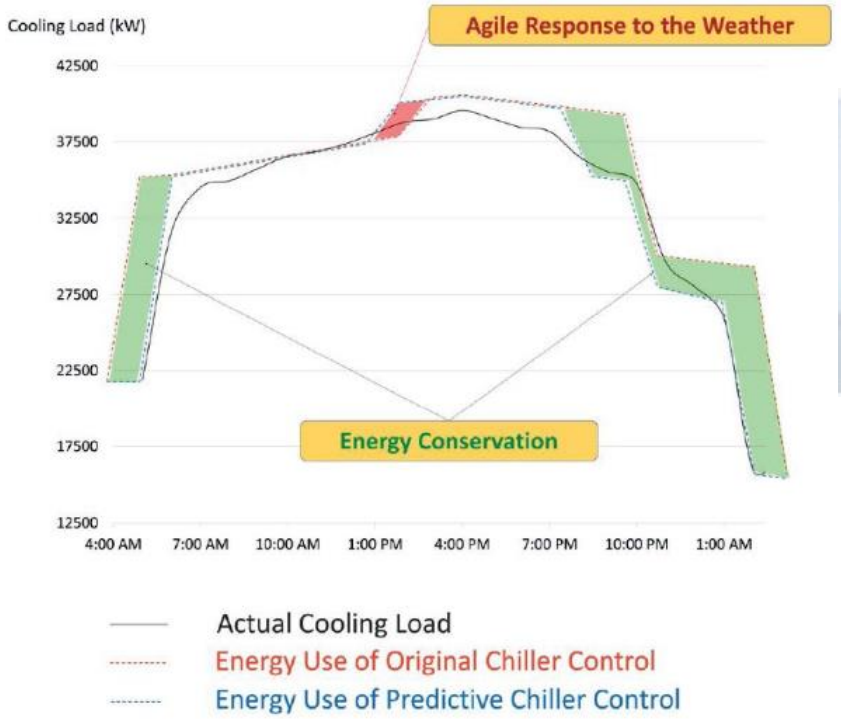
<u>Predictive control for air conditioning</u>

The predictive control system for air conditioning uses big data analytics (e.g. weather) to predict the cooling demand for the building to save energy, while maintaining the comfort of occupants and enhancing tenants' experience.

Besides weather, a system may sense the number of occupants entering the building and use this (instead of CO_2 concentration) to adjust the fresh air supply rate in advance.

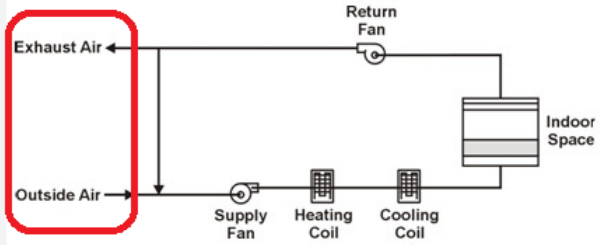
(NB v2.0 Approved in 2024)

Weather data utilisation



People counting for fresh air control

Fresh air control



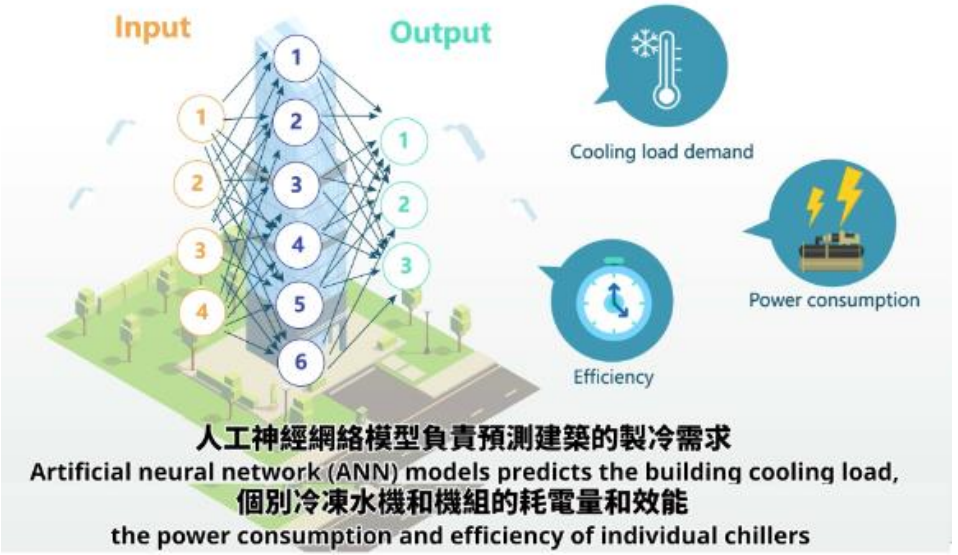
https://www.hkengineer.org.hk/issue/vol50-nov2022/cover_story/

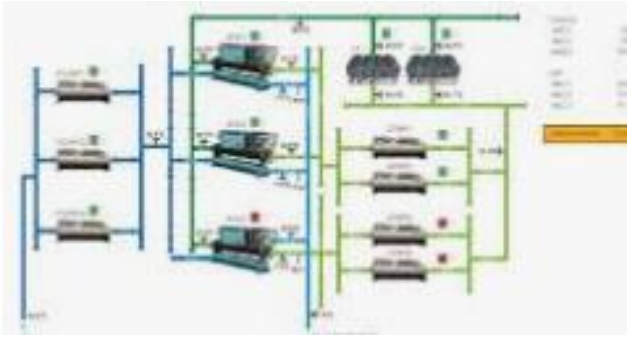
IA 1 - Innovative Techniques

Artificial Intelligence (AI) in Chiller Plant Optimisation

Machine learning technology is proposed for energy saving through:

- operation scheduling
- enhanced efficiency through optimising machine mix
- closing the gap between design and actual system operation





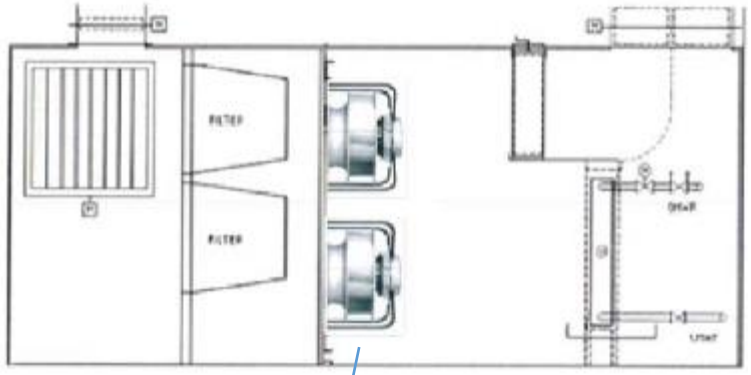
(New building / Approval year: 2023)

https://inno.emsd.gov.hk/en/it-solutions/index_id_1833.html

IA 1 - Innovative Techniques

EC Plug Fans in AHU

An EC fan can improve the energy efficiency of an air-conditioning system. In a conventional air-conditioning system, alternating current (AC) motor is used to drive the fan. But for EC fan, high-performance direct current (DC) motor is used instead. By itself, a DC motor is 10% more efficient than a conventional AC motor. In addition, an EC fan employs DC speed control technology that can vary the speed in accordance with the control target (such as temperature) without the use of a frequency converter. This allows more precise control but less energy is consumed. For example, when the room temperature reaches the preset control target, the motor will automatically slow down to reduce electricity consumption.



EC風扇可以提升空調系統的能源效益。在傳統的空調系統中，風扇是由交流電電動機驅動，但EC風扇則是由高效能的直流電電動機驅動，而直流電電動機本身已較傳統的交流電電動機節能10%。此外，EC風扇採用直流電變速技術，無須利用變頻器便可根據控制目標(例如溫度)改變轉速，令風扇的控制更精準，因而更加節能。舉例來說，當房間的溫度達到預設的控制目標時，電動機會自動減慢，減少耗電。

https://www.emsd.gov.hk/minisites/voice/en/issue43/p8c.pdf

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques

AHU advanced disinfection devices

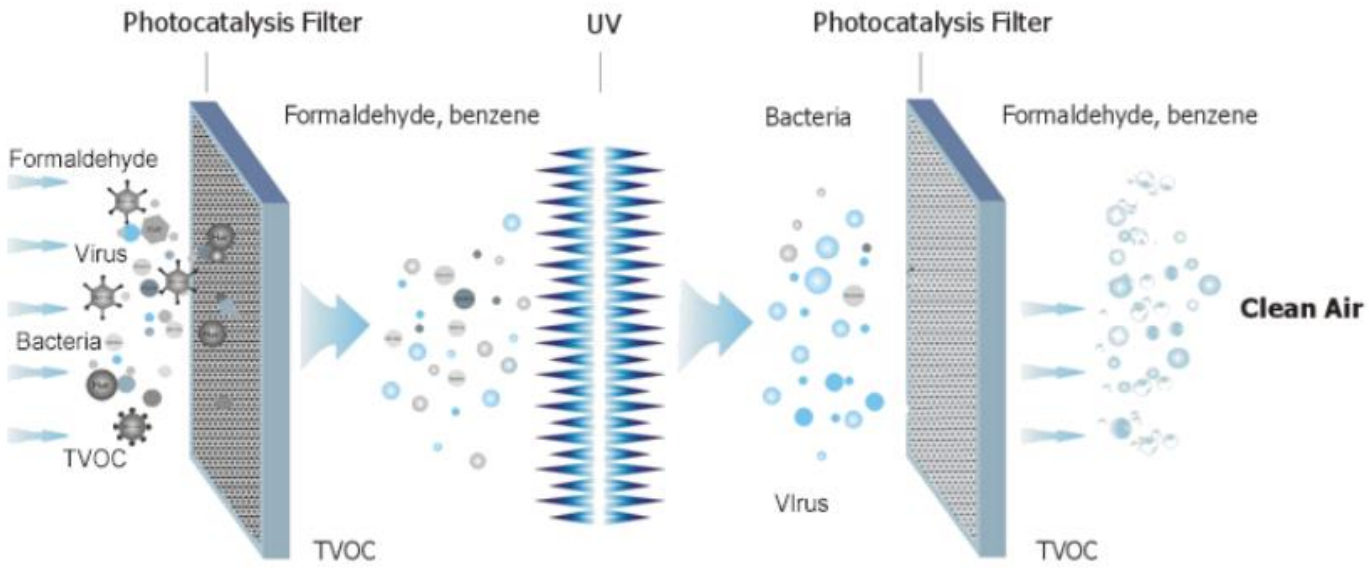


Photo-catalytic oxidation (PCO) is achieved when UV light rays with a TiO2 coated filter combined together. This process creates hydroxyl radicals and super-oxide ions, which are highly reactive electrons.

(NB v2.0 Approved in 2024)

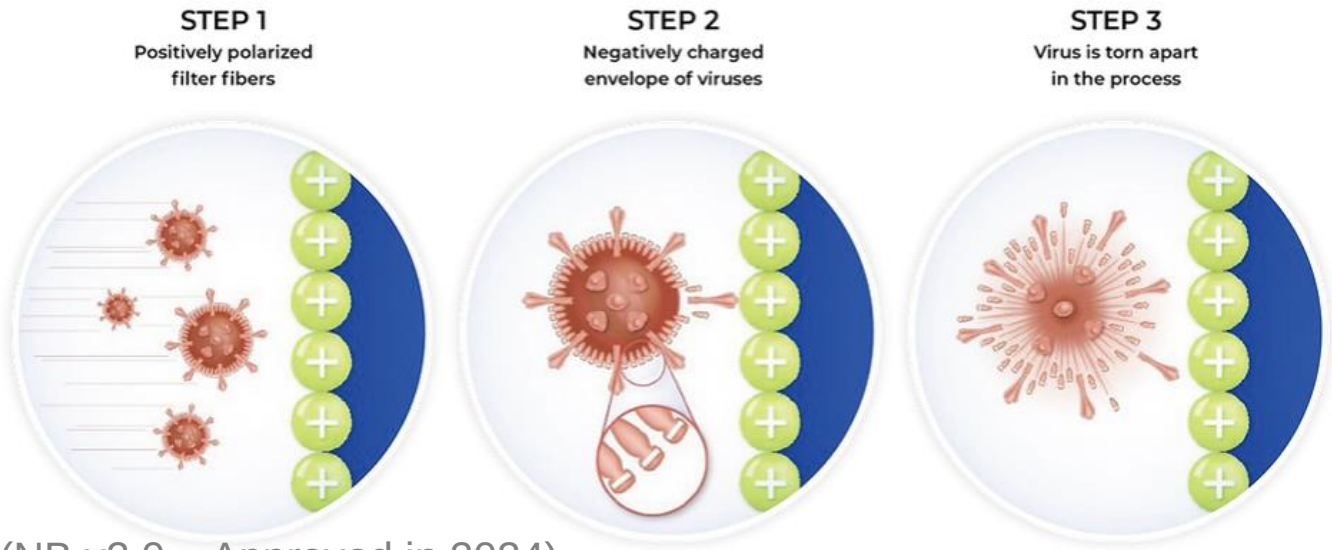
https://tofee.com.cn/wp-content/uploads/2020/06/AHU-Air-sterilization-Purifier.pdf

IA 1 - Innovative Techniques

C-POLAR filters

Traditional nonwoven air filters are designed to trap and block small particulates and microorganisms. However, even if the filter can trap 99.9% of microorganisms, the filter does not eradicate them. Consequently, microbials can accumulate and some even grow at trapping sites over time, leading to biofouling. Biofouling of filters causes the dissemination of pathogens into the air outlet, reducing its effectiveness and shelf life. It also provides a risk of infection to the users and individuals replacing or handling the filters.

To address this critical need, we developed C-POLAR™, a revolutionary technology that provides protection against viruses and microorganisms. C-POLAR™ is a positively polar material that can be incorporated into the air filter manufacturing process, thereby augmenting the filter's effectiveness.



	C-POLAR filters		HEPA filters
Capture viruses and bacteria	☑	Studies demonstrate that C-POLAR filters effectively captures viruses and bacteria.	☑ HEPA filters are effective in capturing viruses and bacteria through sieving, interception, inertial impaction, and diffusion.
Inactivates viruses and bacteria	☑	Studies demonstrate that C-POLAR effectively inactivates viruses and bacteria.	✕ HEPA filters, in isolation, do not inactivate viruses and bacteria.
Low energy consumption	☑	C-POLAR filters can reduce energy consumption due to its relatively minimal effect on pressure drop.	✕ Due to the thickness of the filter media, HEPA filters experience relatively high pressure drops, which results in higher energy consumption.

(NB v2.0 Approved in 2024)

https://www.wec.com.hk/waf

IA 1 - Innovative Techniques

Odour Control in Toilets using Advanced Technologies

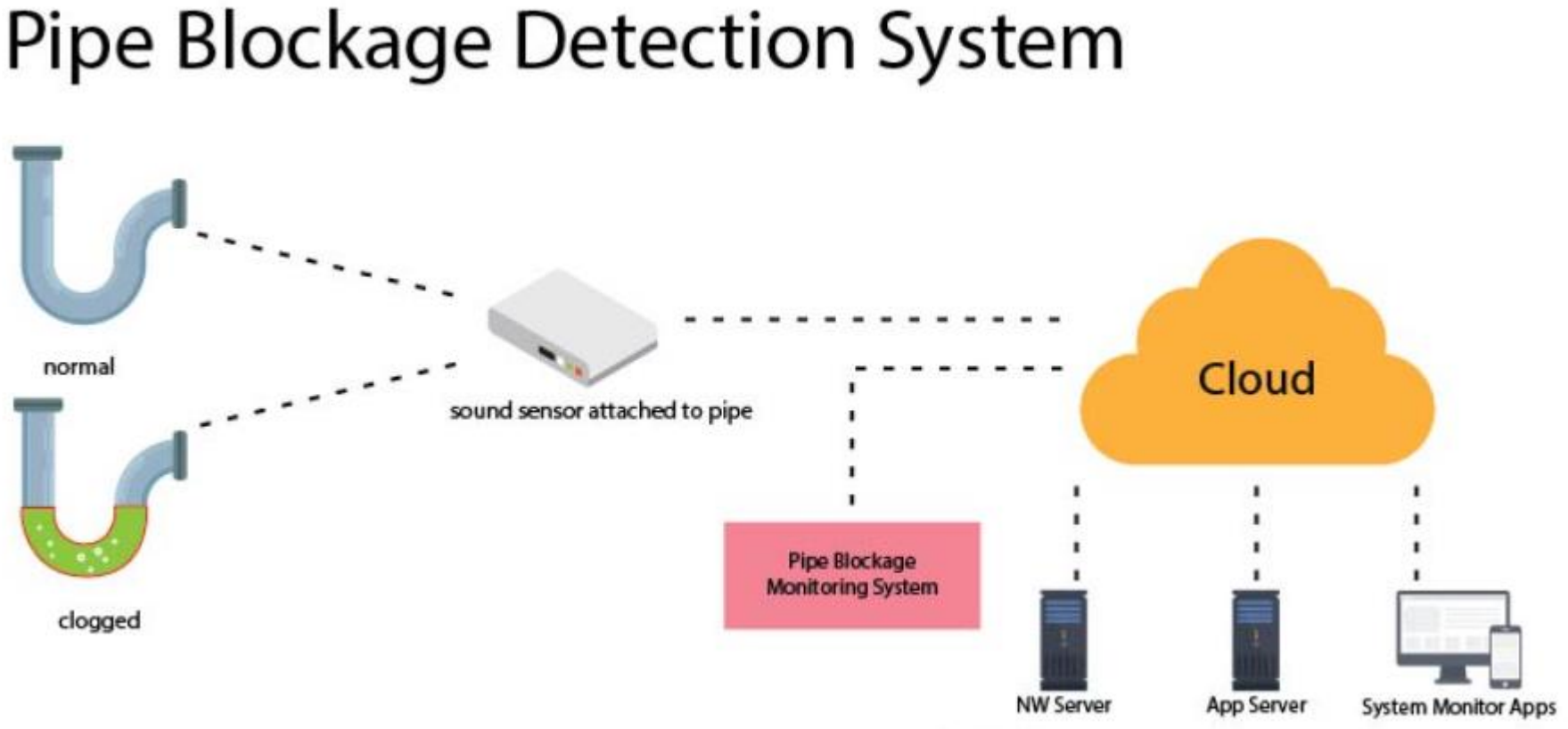
- Our system can generate ozonated water direct from tap water and no by product.
- Our patented Electrolytic technology produces high concentration ozonated water and able to link with your waterline system.
- Which is good for general odor control and general cleaning by toilet flashing and surface rinsing.
- decomposing odor molecules and impurities into harmless molecules, thereby improving the smell and air quality

https://www.biotek-ozone.com.hk/main/

https://inno.emsd.gov.hk/en/it-solutions/index_id_381.html

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques



(NB v2.0 Approved in 2024)

https://inno.emsd.gov.hk/en/it-solutions/index_id_1002.html

IA 1 - Innovative Techniques

Touchless operations in buildings to prevent transmission of diseases

and extended to smart toilet design ...

(NB v2.0 Approved in 2024)

IA 1 - Innovative Techniques

Self-cleaning devices for escalators

Sterilisation of handrails

Escalator Handrail Sanitizer

Courtesy: KONE / The Verge / Clean Room PH

(NB v2.0 Approved in 2024)

Remarks about IA1

(1) The assessment body will consider the **kind of technology** and the **extent of application** to judge whether it is an innovation worthy of a bonus (IA1) point. Typically, this would require newer kind of technology and a significant installation rather than a small trial.

(2) As time goes by, some of the above features may be adopted by more and more projects. There is a possibility that the features will **no longer** be counted as innovations due to their prevailing popularity.

IA 2 - Performance Enhancement

IA2 - Performance Enhancement

Food waste eliminator

廚餘攪碎機助您快速及簡
單處理廚餘，減少膠袋使用量及垃圾徵費。

廚餘攪碎機安裝於鋅盆去水位，把廚餘磨碎成微粒，直接經流動水隨水管排走，
防止細菌滋生，減少廚餘堆積及異味產生。

https://teka.shew.com.hk/media/u0sivmwz/teka_foodwastedisposal_user-guide.pdf

a food waste digester uses unique fast food waste decomposition technology, which applying highly efficient and concentrated bacteria to decompose food waste into liquid and carbon dioxide within 24 hours. It reduces organic wastes as well as carbon emissions significantly. The liquid discharged could be recycled for various purposes.

https://www.ecopia.com.hk/food-waste-digester-en

(v1.2 project; Approved in 2024)

Remark about IA2

The above list is not exhaustive. IA2 also includes initiatives where the quantitative achievements (e.g. percentage roof area covered, percentage material recycled, etc.) are significantly higher than those specified in the BEAM Plus Manual. For simplicity sake, these are not included in the slides.