

Hybrid Seminar:

Green Innovation in ESG: Pioneering Sustainable Solutions for a Better Tomorrow



Topic:

Driving ESG Transformation by Green Tech

Ir Prof C.F. LAM

Founder & CEO

EcoPro Service Limited

Remarks: This material/event is funded by the Professional Services Advancement Support Scheme of the Government of the Hong Kong Special Administrative Region. Any opinions, findings, conclusions or recommendations expressed in this material/any event organised under this project do not reflect the views of the Government of the Hong Kong Special Administrative Region or the Vetting Committee of the Professional Services Advancement Support Scheme.





ESG & TECHNOLOGY

Driving ESG Transformation by GreenTech

Key Technologies and Success
Stories for a Sustainable Future

Ir Prof CF LAM
Founder & CEO
EcoPro Service Limited



Ir Prof C.F. LAM

(林卓峯教授,工程師)

*BSc(Eng), BSc(Econ), MSc(Env Man), FHKIE,
MICE, Eng EIA Pro*

Founder & CEO, EcoPro Service Ltd
Your ECOMATIC (Green-Committed-Pragmatic)
Partner for sustainability solutions and
multi-media creations

PASS Seminar 14 September 2026

Driving ESG Transformation by GreenTech

INSTRUCTOR

Ir Prof Lam is a widely recognized professional civil and environmental engineer with extensive experience in managing a broad spectrum of infrastructure, sustainability and environmental management projects.

On professional service, he is a founding member of the organizing committee and judging panel of the Hong Kong Green Award, Hong Kong ESG Award, various environmental awards and competitions. Ir Prof Lam is a distinguished leader of prominent professional bodies including the Hong Kong Green Strategy Alliance, Hong Kong Institution of Engineers and Hong Kong Waste Management Association.

On academic front, he is the Adjunct Professor of The University of Hong Kong and part-time lecturer of HKUST teaching master courses on corporate environmental management and regulatory compliance, carbon neutral engineering, environmental impact assessment, ESG and green finance. He is also a sought-after expert witness for court proceedings, speaker and trainer on various environmental and management topics.



The “Well-being” Narratives

HONG KONG'S ESG LANDSCAPE & 2050 GOALS

Carbon Neutrality

The HKSAR Government's "*Climate Action Plan 2050*" sets a clear roadmap for roadmap for decarbonization decarbonization across four four major strategies.

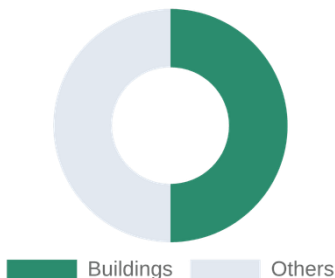
2050

Target for achieving Carbon Neutrality in Hong Kong.

Building Emissions

Buildings are primary focus for decarbonization in Hong Kong's dense urban environment.

Share of Carbon Emissions



*Buildings account for 90% of electricity use.

Key Targets

Net-zero Electricity: Phasing out out coal and increasing zero-carbon energy.

Energy Saving: Reducing electricity consumption in commercial buildings by 30-40%.

Green Transport: Promoting electric vehicles and hydrogen fuel cell technology.

ESG & Better Buildings

- Be outcome oriented – focus on well-being of people.
- Climate era means air-con becomes even more necessary.
- Improving indoor environment has many benefits that fit ESG.

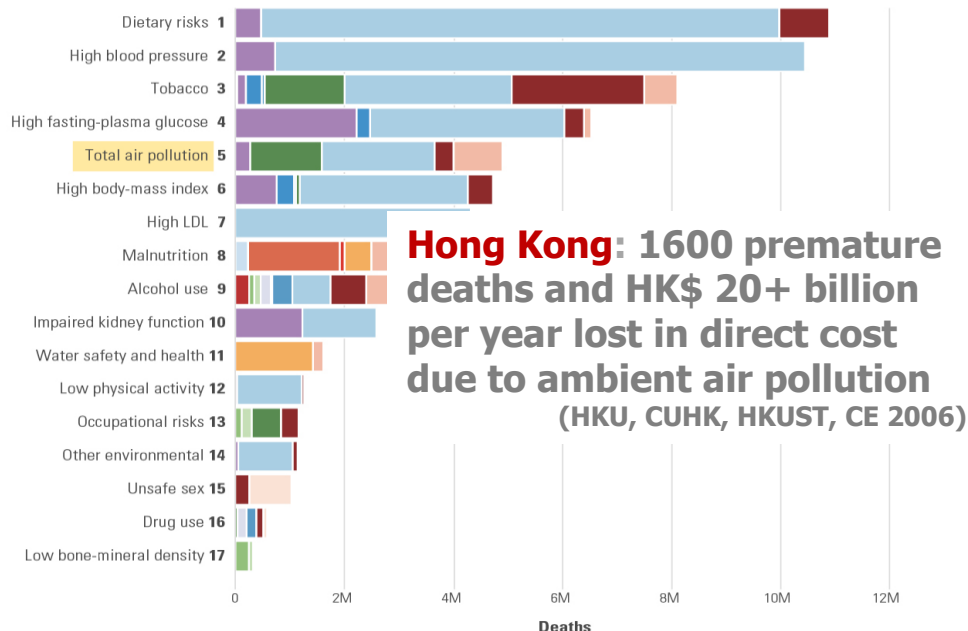
E = Energy Saving & Carbon Reduction.

S = Improved health with humidity & IAQ managed.

G = Board focusing on the right things to invest in.

- Building management is part of digital & sustainability revolution.

Indoor Air Quality vs Health Risk



Air Pollution-Related

- Respiratory infections & TB
- Neoplasms
- Cardiovascular diseases
- Chronic respiratory disease
- Diabetes & chronic kidney disease

Selected Other

- HIV/AIDS & STIs
- Enteric infections
- NTDs & malaria
- Other infections
- Maternal & neonatal
- Nutritional deficiencies

- Digestive diseases
- Neurological disorders
- Mental disorders
- Substance use
- Transport injuries
- Unintentional injuries
- Self-harm & violence

Global ranking of risk factors by total number of deaths from all causes for all ages and both sexes in 2017

2017年所有年齡和性別的所有原因死亡總人數的風險因素全球排名

Health Effects Institute. 2019. State of Global Air 2019. Special Report. Boston, MA: Health Effects Institute

How GreenTech Operationalizes ESG Commitments



Environmental Pillar Impact

GreenTech reduces emissions and pollution through renewable energy, carbon capture and circular materials.

Social Pillar Contributions

Technologies improve public health, create jobs, and support climate resilience via cleaner air and safer mobility.

Governance Enhancements

Digital platforms enable accurate ESG reporting and accountability through robust data measurement and verification.

Addressing ESG Credibility

Carbon accounting software and sensor networks prevent greenwashing by providing verifiable ESG data.

Emerging ESG Models

Technology Central to ESG

- Real-time monitoring vs annual snapshots
- Data automation (moving away from spreadsheets)
- Predictive modeling for climate risks
- Supply chain transparency (Scope 3)

Future ESG Models

- Outcome-driven ESG
- Technology-enabled transparency
- Integration into core business strategy



InvestHK
The Government of the Hong Kong Special Administrative Region
of the People's Republic of China

Deloitte.

The background image shows a lush green landscape in the foreground with several solar panels installed. In the background, the Hong Kong skyline is visible with several tall, modern skyscrapers under a cloudy sky.

GUIDE TO NAVIGATE THE GREEN TECH MARKET

Hong Kong's Path to Carbon Neutrality

December 2024

Hong Kong

A gateway for global green tech, leveraging policy support, ecosystem development and strategic infrastructure to attract investment and scale adoption

HONG KONG: A Global GreenTech & Finance Hub



Hong Kong is committed to promoting comprehensive development of five core green tech sectors, building a complete industrial ecosystem.

POLICY DRIVEN

National Strategy & Local Blueprint

The 15th Five-Year Plan supports HK as an I&T hub; "HK Climate Action Plan 2050" and Hydrogen Strategy provide clear paths.

INNOVATION ECOSYSTEM

San Tin Technopole & GBA Synergy

HSITP and San Tin Technopole connect upstream R&D with downstream markets, creating an international green tech city.

GREEN FINANCE

International Financial Center

Asia's leading green bond hub, offering abundant VC/PE opportunities to support green ventures from seed to scale.

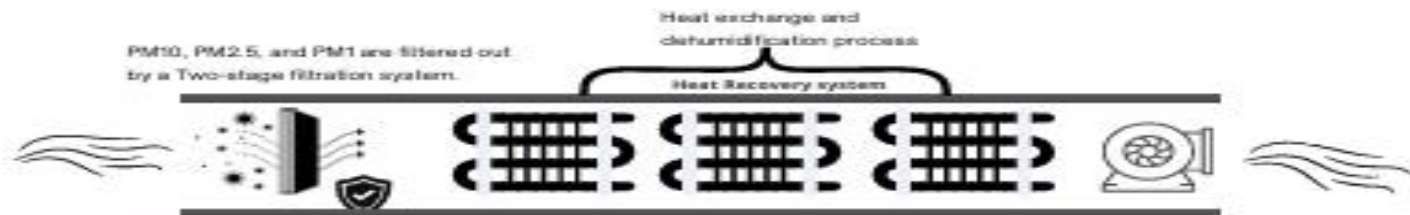
Key Technologies and Success Stories
Stories for a Sustainable Future

Fresh Air Units

Energy, IAQ & Humidity



Fresh Air Units: Energy, IAQ & Humidity



With various selectable modes, FAU is able to adapt to changing weather conditions, ensuring that you enjoy the utmost comfort and fresh air in your indoor environment."

FAU 3 in 1



Temperature control

+



Relative Humidity Adjustment

+



Fresh Air Supply

=



- Mini BMS Control (Online)
- Temperature and Relative Humidity Adjustment
- Fresh Air Supply

→

**SAVE UP TO
30%
ON
RUNNING
COSTS**
UNDER CONTROLLED
ENVIRONMENT

Fresh Air Units: Energy, IAQ & Humidity

Case Study – TAL Apparel Building

Co-benefits: energy saving (50%), IAQ & humidity + improved tech for building management from HVAC retrofit



Energy and Buildings

Available online 17 June 2019

In Press, Corrected Proof



Energy consumption, indoor thermal comfort and air quality in a commercial office with retrofitted heat, ventilation and air conditioning (HVAC) system

<https://www.sciencedirect.com/science/article/pii/S0378778819303640>

- Payback 3.5 year
- Initial investment: \$ 2.4 million
- Replacement of pleated filter: \$ 0.06 million/per year
- Energy saving: 670,000 kWh per year (equivalent to \$0.78 million)
- Net return: \$ 0.72 million/per year

Retrofit & IAQ Co-benefit Example

Case Study – Jao Tsung I Academy (Exhibition Hall)

- Reduced relative humidity by 25%; maintained at 65%.
- IAQ met local & international standards.
- ~30% electricity savings with 2-year payback.



Permanent Magnet Synchronous Motor

Key Technologies and Success Stories
Stories for a Sustainable Future

Suitable for 24-hour central air-conditioned places



**Data
Center**



Hotel



**Convenience
Store**



Hospital

Permanent Magnet Synchronous Motor (PMSM)

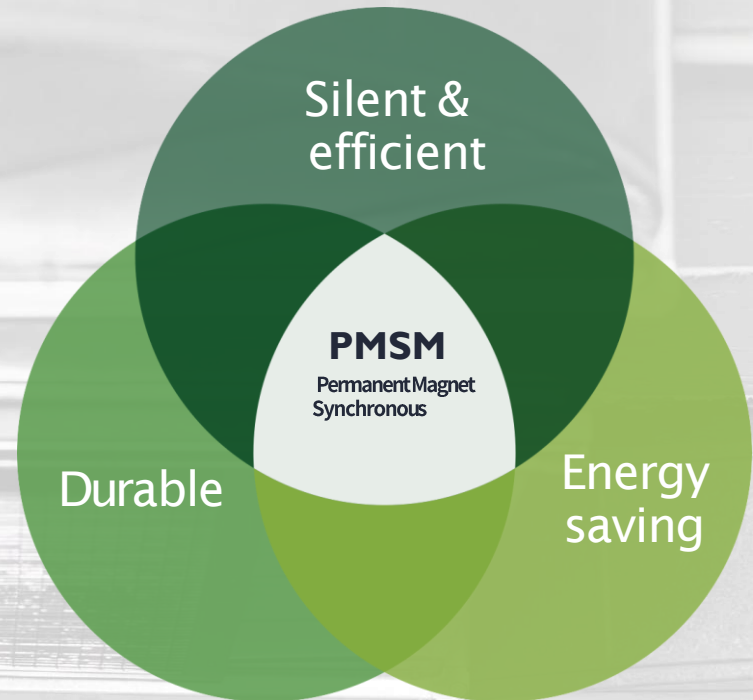
Permanent magnet synchronous motor demonstrates commitment to environmental, social and governance (ESG) standards and its efficient design significantly reduces energy consumption and greenhouse gas emissions. This innovative motor prioritizes environmental and social responsibility, ideal for businesses aligning with ESG goals.

FUNCTIONAL FEATURES

(COMPARED TO AC MOTORS)

- Up to 50% less energy consumption
- Durable for at least 9 years (versus 4 years or less for AC motors)
- Quieter in operation (Motor noise $\leq 45\text{dB}^*$)

*Background noise 29.9dB



Permanent Magnet Synchronous Motor (PMSM)

PMSM

Permanent Magnet
Synchronous
Motor



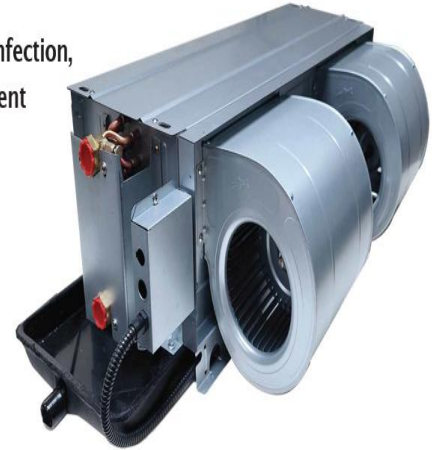
ELECTRICAL PARAMETERS

Item	Parameters
Operating voltage range(V)	AC 220 - 240V
Power output(W)	8 - 120W
Power factor	0.95 - 0.99
Operating temperature (approx °C)	-25°C to +50°C
Three speed range(rpm)	HIGH : 880-1270 rpm
	MED : 720-1080 rpm
	LOW : 500-930 rpm

Permanent Magnet Synchronous Motor

OTHER PRODUCTS

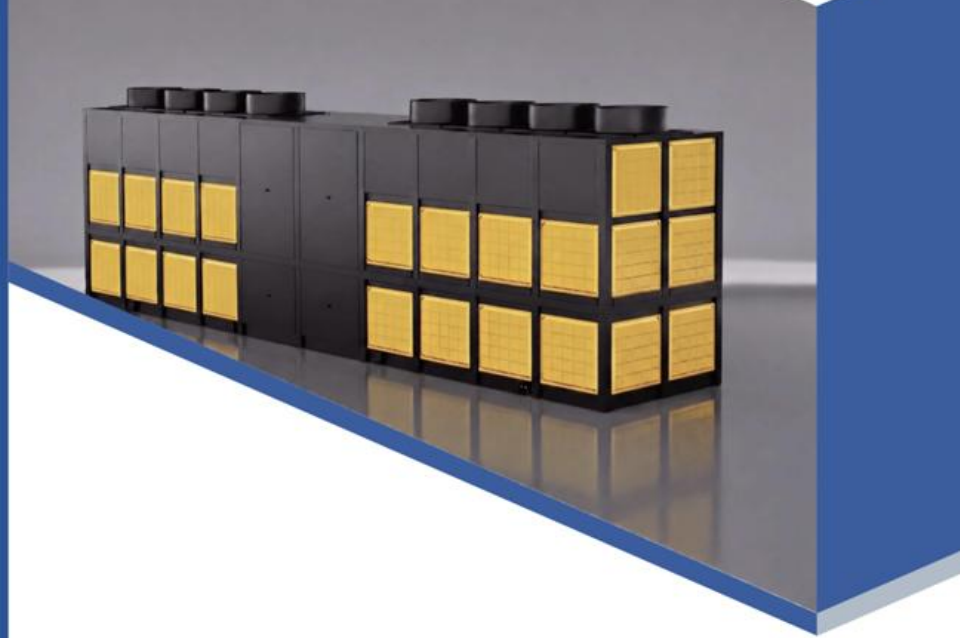
- Fan coil unit
- Sterilization, Disinfection, Dustproof treatment



INNOVATIVE CHILLER TECHNOLOGY

Ideal substitute for air-cooled and water-cooled chillers with savings:

- High efficiency: SCOP5.2-6.0
- Energy: 30-50%
- Water: 30-40%
- Footprint: 20-30%
- Installation time: 80%



**Oil-free Centrifugal Evaporative-cooled
High-efficiency Chiller**

INNOVATIVE CHILLER TECHNOLOGY

Oil-free Centrifugal Evaporative-cooled High-efficiency Chiller



Standardization&High-efficiency Refrigeration

Modular design allows flexible configuration according to actual requirements. Optimal solutions can be provided for customers in response to different space layouts and cooling capacity demands.



30%

Energy Saving VS.
Conventional
Water-cooled



50%

Energy Saving VS.
Conventional Air-
cooled



Integrated Design

The GLHA Oil-Free Centrifugal Evaporative Cooling High-Efficiency Chiller adopts falling-film evaporative condensation heat transfer technology. It integrates a conventional water-cooled chiller, cooling tower and cooling water delivery unit into one package. Featuring highly integrated design and compact structure with complete functions, the unit includes refrigeration host, cooling water pump, cooling tower, control module and power distribution system. It serves as a ready-to-use alternative solution for high-efficiency machine rooms.



Plug and Play

Equipped with advanced control modules and power distribution systems to ensure high-efficiency operation. The fabrication, pressure testing, cleaning and commissioning of pipelines, supports & hangers and auxiliary ventilation equipment are prefabricated in factory. After delivery to site, the unit can be quickly put into service simply by connecting chilled water, makeup water and power supply interfaces.

INNOVATIVE CHILLER TECHNOLOGY



数据中心

高密度散热，PUE值低至1.2以下，在保障服务器稳定运行的同时，显著降低能耗成本。



工业制造

为车间设备及产线工艺提供精准冷却，有效控温，保障生产连续性与效率，助力工业4.0升级。



食品冷链

覆盖各类食品冷库与保鲜库场景，实现全链路精准控温，最大程度锁住食材新鲜，显著延长产品保鲜期。



医药化工

满足GMP车间及反应釜冷却的严苛标准，稳定控温保障药品生产安全与化工流程稳定性。

SUCCESS STORY: SMART ASSET MANAGEMENT

DEVELOPER

Swire Properties

LOCATION

Quarry Bay, Hong Kong

STATUS

Triple Grade A Rated

LEED
PLATINUM

WELL
PLATINUM

BEAM
PLUS

"Neuron" Smart Platform

- ✓ Developed by Arup to enhance sustainability and efficiency.
- ✓ Centralized digital platform for Grade A office operations.
- ✓ Provides actionable insights through advanced data analysis.
- ✓ Sets a new benchmark for smart buildings in Hong Kong.

"A data-driven approach to building operation and occupant well-being."

AI AND DIGITAL TWINS

DRIVING OPERATIONAL EXCELLENCE

3D Digital Twin

A virtual replica of Two Taikoo Place that integrates real-time data from thousands of IoT sensors.

- Real-time spatial visualization of building performance.
- Simulation of "what-if" scenarios for energy optimization.
- Enhanced situational awareness for facility managers.

BIM + AM Integration

Seamless connection between Building Information Modeling (BIM) and Asset Management (AM).

- Unified data environment from construction to operation.
- Instant access to technical specifications and maintenance history.
- Improved lifecycle management of critical building assets.

Machine Learning

Advanced algorithms that continuously learn from building data to optimize complex systems.

- Assisted Chiller Plant optimization for dynamic load matching.
- Significant reduction in energy waste during off-peak hours.
- Automated set-point adjustments based on weather forecasts.

Predictive Maintenance

Shifting from reactive to proactive maintenance using AI-driven fault detection and diagnostics.

- Identification of equipment anomalies before failure occurs.
- Reduced downtime and extended lifespan of mechanical systems.
- Optimized maintenance schedules based on actual usage data.

ENVIRONMENTAL MANAGEMENT AT WENT LANDFILL: **SUCCESS STORY**

Project Overview: Landfill Gas-to-Energy



OPERATOR

CLP Power Hong Kong Limited



LOCATION

West New Territories (WENT) Landfill, Nim Wan



GENERATION CAPACITY

10MW (Largest in Hong Kong)



STATUS

Full Operation since 2020

STRATEGIC SIGNIFICANCE

- A major milestone in Hong Kong's **Circular Circular Economy** journey, transforming transforming waste into a valuable resource. resource.
- A **local, renewable energy source** for the CLP the CLP grid by capturing methane-rich landfill gas that would otherwise be flared. flared.
- A key role in diversifying Hong Kong's fuel mix and supporting the city's **decarbonization targets**.

TURNING WASTE INTO CLEAN ENERGY

TECHNICAL INNOVATION



Capture

Methane-rich gas
extracted from landfill



Drive

High-efficiency power
generators



Power

Clean electricity for the
local grid

Environmental Impact

Significantly reduces greenhouse gas emissions by preventing direct methane release into the atmosphere, which is 25x more potent than CO₂.

Grid Integration

Direct connection to the CLP grid provides a stable, local source of renewable energy, enhancing Hong Kong's energy security.

Future Scalability

Modular design allows for expansion as landfill gas availability increases, with potential for hydrogen production in future.

ESG by Environmental Tech

Environmental Tech

- Layer 1: Sensors & IoT (Data capture)
- Layer 2: BMS / EMS (Operational control)
- Layer 3: Carbon Accounting Software (Aggregation)
- Layer 4: AI Optimization (Intelligent action)

ESG Data Value Chain

- Capture (Sensors/Meters)
- Aggregation (Centralizing data)
- Analytics & AI (Pattern recognition)
- Reporting (Automated disclosure)
- Optimization (Strategy adjustment)

ESG by Environmental Tech

Digital Twin

- Simulating energy-saving measures
- Building energy optimization (10-30% potential reduction)
- Construction waste reduction and predictive maintenance

AI & Machine Learning

- Energy load forecasting
- Climate risk modeling
- Carbon footprint estimation
- Portfolio optimization

ESG by Environmental Tech

Blockchain & Supply Chain Transparency

- Material traceability (Green sourcing)
- Carbon credit validation (Preventing double-counting)
- ESG data integrity and secure Scope 3 sharing

From Spreadsheets to ESG Software as a Service (SaaS)

- Automated disclosure and KPI dashboards
- Direct ISSB / TCFD mapping
- Eliminating manual errors and ensuring auditability

A Financing Model for Retrofitting Buildings

10 October 2025



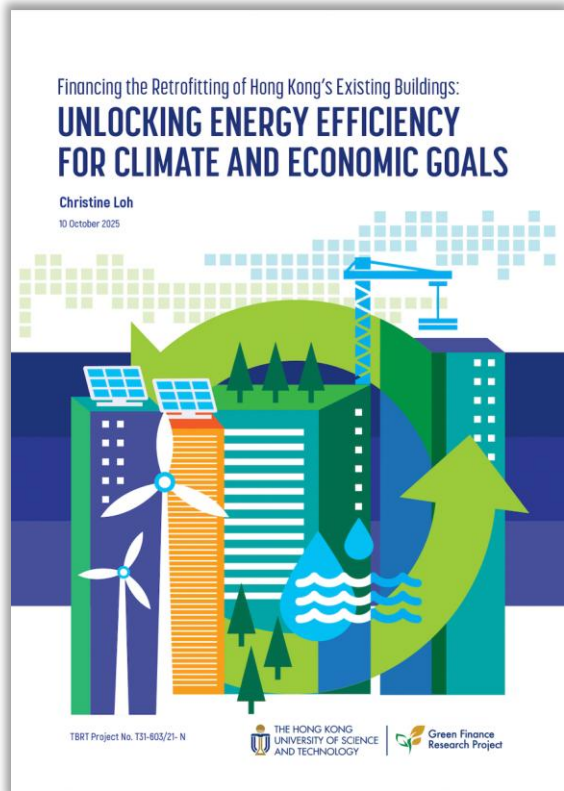
THE HONG KONG
UNIVERSITY OF SCIENCE
AND TECHNOLOGY



Green Finance
Research Project



KEY POLICY FOCUS



Adopt PBC – a model that shares costs, risks & benefits of the low-carbon transition.



Do pilots – use public sector buildings & infrastructure to stimulate market.



Establish Retrofit Finance Platform – possibly use HKMA's CDI and EMSD's audit information.



De-risk private investment e.g. guarantees, revolving funds etc.



Build trust – through raising awareness; promote standard contract terms, and transparency.

Building Energy Performance Contracting



Building Energy Performance Contracting

A business model undertaken by Energy Services Companies (ESCOs) to help owners speed up their decarbonization journey.

Payment made to ESCOs is directly linked with energy savings achieved.

Energy Performance Contracting (EPC) achieves energy savings by:

- ❑ Monitoring, optimization and system engineering with/without major capital investment
- ❑ Behaviour engineering through the use of innovation and IT

It can be conducted in the manner of hire purchase

Energy Performance Contract Model

(Case Study – A Secondary School)

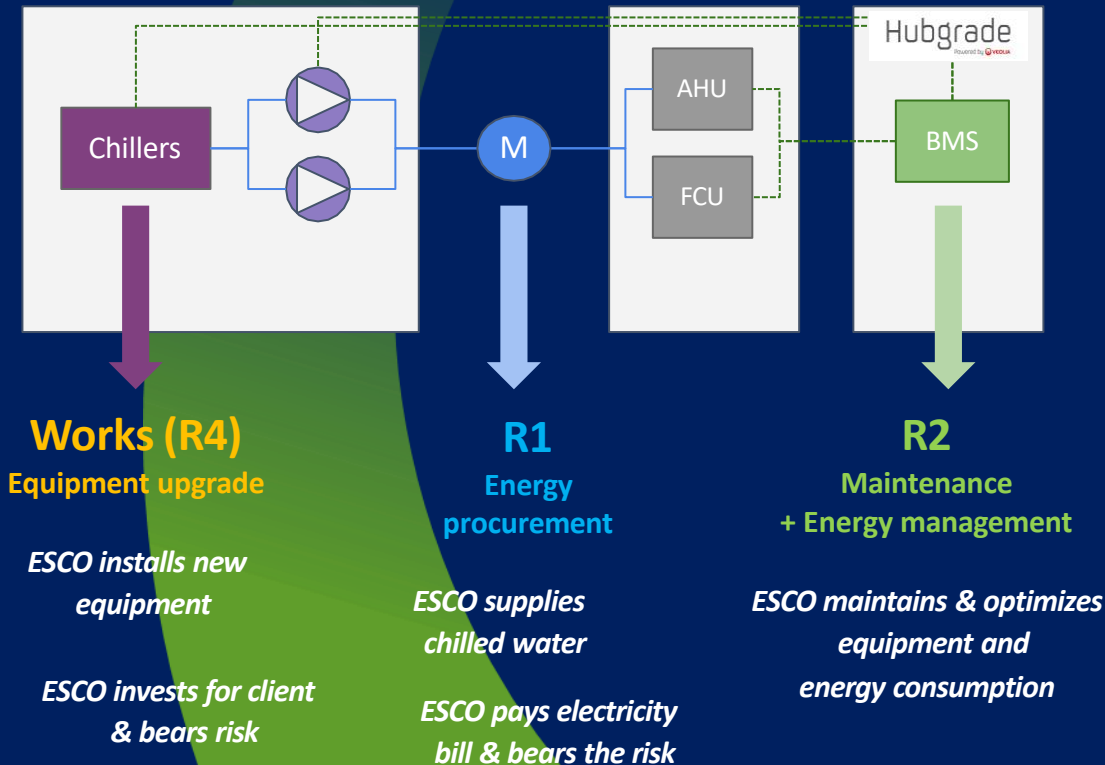
ESCO's Commitment

- ☐ Availability of energy
- ☐ Reliability of equipment
- ☐ Plant efficiency
- ☐ Consumption of building
- ☐ Maintenance



Contractual model

- ☐ Service contract with guarantee on energy consumption



Energy-as-a-Service (EaaS) Success Stories



中電源動出資為瑞安中心設計、建造、營運、維修及保養的全新淡水冷卻機組，配以人工智能系統「PlantPRO」及樓宇管理系統，較現有的海水冷卻機組節省超過三成用電量，相當於每年370噸的二氧化碳排放量。



中電源動集團為宏利金融中心打造全新的供冷系統，結合高效製冷設備及人工智能技術，預計新系統可提升供冷系統的能源效益超過 60%，每年節省超過30%的供冷用電量，減少約900噸碳排放量。



如心廣場位於荃灣西的核心地段，內設酒店、寫字樓、商場及木化石公園「如心園」，佔地超過18 萬平方米。新設的水冷式空調系統能夠大幅提升能源效益，預計較現有系統節省超過5成的用電量，相等於每年減少7,000公噸的二氧化碳排放量。

HONG KONG AS A GLOBAL GREEN TECH HUB



Strategic Location

- Gateway to Greater Bay Area and international markets
- Unique "One Country, Two Systems" advantage
- Proximity to world-class manufacturing in the GBA
- Ideal testing ground for global green tech solutions



Policy Support

- Government funding and supportive regulations drive innovation
- Green Tech Fund for R&D and commercialization
- Clear roadmap via the Climate Action Plan 2050
- Incentives for green building and transport adoption



Innovation Ecosystem

- Vibrant ecosystem for startups and established tech firms
- HKSTP and Cyberport as key innovation engines
- Strong collaboration between academia and industry
- Access to a diverse pool of international talent



Green Finance

- Asia's leading hub for green bonds and sustainable investment.
- Abundant capital for green ventures and infrastructure
- Robust regulatory framework for green finance.
- Leading the way in ESG disclosure and standards

OVERCOMING BARRIERS: THE PATH TO 2050

Current Challenges

⚠️ Economic Barriers

High initial capital expenditure for green tech retrofitting and the perceived long payback periods for investors.

👤 Talent Shortage

A critical gap in specialized skills for green engineering, ESG data analytics, and sustainable asset management.

📊 Data Standardization

Fragmented reporting frameworks and the lack of standardized, verifiable ESG data across different sectors.

Strategic Path Forward

🤝 Public-Private Partnerships

Leveraging government funding (Green Tech Fund) with private sector innovation to de-risk pilot projects.

🧪 Emerging Technologies

Accelerating the adoption of Hydrogen fuel, Carbon Capture (CCUS), and advanced long-duration energy storage.

🎯 Policy Efficiency

Streamlining regulatory approvals for green building materials and promoting unified ESG disclosure standards.

COLLABORATION ACROSS SECTORS IS ESSENTIAL TO MEET THE 2050 NET-ZERO GOAL
NET-ZERO GOAL



KEY TAKEAWAYS

Economic Opportunity

ESG transformation is a significant economic driver for Hong Kong, creating new markets in green tech and sustainable finance.

Proven Viability

Success stories like Two Taikoo Place and WENT Landfill demonstrate that green technologies are technically mature and commercially viable.

Strategic Hub

Hong Kong is uniquely positioned as a global green tech hub, bridging the Greater Bay Area with international innovation ecosystems.

Q&A

Questions & Discussion

Thank you for your attention.
Driving a Sustainable Future Together.