

# SUBMISSION FORM

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## Pillar

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- Smart Transport
- Smart Building
- Smart Grids
- Smart Job and Consumers
- Low Carbon Model Town

## Basic Information

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Program name:

S.M.A.R.T I-C-C Program

Responsible organization:

Kai Shing Management Services Limited

Strategy:

International Commerce Centre, a super high-rise composite commercial building has operated for almost 10 years. With a large footprint, ICC operates with a mission and goal of minimizing its environmental impacts to reduce resource consumption and carbon emission.

S.M.A.R.T I-C-C program has been initiated to sustain the building performance. This program comprises two parts. The first part of operational model is based on the concept of Intelligence (I), Collaboration (C) and Continuity (C). The second part of the program further elaborates the elements required to sustain the optimization of energy consumption of the building, which include Sustainability (S), Machine Learning (M), Artificial Intelligence (A), Research and Development (R), and Training (T).

The operation of ICC follows the sustainability frameworks in enhancing the environmental quality while minimizing the carbon emission. The building management team collaborates with different stakeholders, including Local University, mobile communications company, IoT solution providers, tech companies. By developing cutting edge technologies, operational data are collected which facilitate the machine learning algorithm and AI program.

Hong Kong Government recently published Climate Action Plan, Energy Saving Plan and Smart City Blueprint, in combating climate change, promoting energy reduction and smart city development. The "S.M.A.R.T-ICC" operation model echoes with the company mission and vision for environmental protection and sustainable development. It is also in support of policy framework of Hong Kong Government. The S.M.A.R.T-ICC programme is designed and adopted in ICC to reduce energy consumption via the use of smart technology to improve building performance.

There are over 42,000 existing buildings in Hong Kong and account for 90% of energy consumption. As a landmark building in Hong Kong, ICC plays a leading role in optimization of building energy use. As stated in the Sun Hung Kai Properties Sustainability Report, the energy reduction target of ICC is 15% by 2021 with 2015 as base year.

The strategies adopted in ICC include:

- (I) Lift-cycle testing and commissioning approach;
- (II) IoT development & big data analytic;
- (III) HK BEAM Plus Certification - Platinum Rating under “BEAM Plus Existing Buildings V2.0”;
- (IV) Around 66% LEED office in the building;
- (V) Implementation of ISO management system such as ISO 50001 Energy Management System and ISO 22301 Business Continuity Management System ;
- (VI) 4T charter programme, etc.

The details can refer to Section 2 Strategy of “ICC-ESCI Report”.

## Measure:

5-year energy saving target is set up to save 6.89 million kWh between 2015 and 2021, i.e. 15% energy saving reduction target.

Through the collaboration and partnership with academia, network provider, IoT solution providers, end users, local power company, ICC makes use of Internet of Things (IoT) technology to improve energy efficiency and building comfort. The projects include:

- Optimal Control of Central Cooling & Air Conditioning System
- Real-time Indoor Air Quality (IAQ) Monitoring System
- Smart Lift Control System
- Smart Lighting System
- Air Handler Reborn Project
- Renewable Energy System (Feed-in Tariff)
- Demand Response Programme

The Life-cycle Testing and Commissioning works has been implementing since design stage. It ensures systems operate as good as intent while the operation and control are optimized. Over 10 nos. energy saving strategies have been adopted in centralized air-conditioning system such as optimize chiller sequence control, optimize temperature reset control of AHU and peak demand control method. This resulted over 10 million kWh energy saving.

For AHU Reborn Project, IoT sensors were installed to collect environmental data and operation data. Condition-based maintenance is staged by cloud technology, machine learning algorithms and big data analytics. Energy conservation is achieved by enhanced operation control strategies based on past operational pattern and real-time data. The project cut the peak demand by 40% while estimated energy saving over 3 million HK dollar could be achieved after applying to all office floors. The return of investment is 1.3 years. The project provides a retro-commissioning model for existing buildings, beyond chiller plant of HVAC system. It is a showcase of quick deployment of emerging technologies and on-going commissioning of air-side system.

For energy management, power monitoring system (PMS) & building energy management system (BEMS) are adopted. The sophisticated energy system collects, record and analyze the building power usage data to provide a full picture of each building service system floor-by-floor within a confined time interval. The system assists in reviewing load profile, load monitoring, energy analysis and forecasting peak demand of ICC.

For implementation of various systems, the details can refer to Section 3 Measure of “ICC-ESCI Report”.

### Performance:

- By implementing various energy saving strategies, over 14 million kWh energy saving, approximately 26% achieved in 2018 with 2012 as baseline year.
- As stated in the SHKP Annual Sustainability Report, the energy saving target is 15% by 2021 using 2015 as baseline. Over 4 million kWh energy saving, approximately 10% saving was achieved up to the year of 2018.
- Periodic energy audit is conducted annually to keep monitoring the energy performance of ICC. Energy saving opportunities like housekeeping practices, enhancement works have been introduced throughout the years. Energy utilization index (EUI) reduced by 18% from 2013 to 2018.
- Over 20 nos. publications were issued based on the implementations of emerging technologies in ICC. Over 20 nos. undergraduate students participated in their final year projects based on the optimization projects in ICC while over 6 nos. PhD students have been trained based on the practical and innovative projects in ICC.
- Various seminars and visits have been conducted to share best practices in ICC in enhancing energy efficiency and achieve energy saving.
- The details can refer to Section 4 Performance of “ICC-ESCI Report”.

### APEC Economies:

- Australia
- Brunei
- Canada
- Chile
- China
- Chinese Taipei
- Hong Kong
- Indonesia
- Japan
- Korea
- Malaysia
- Mexico

- New Zealand
- Non-APEC Economy
- Papua New Guinea
- Peru
- Philippines
- Russia
- Singapore
- Thailand
- United States
- Viet Nam

## Additional Project Details

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Image:

Photo of ICC is attached

Upload:

Appendix 1: ICC-ESCI Award Report

Appendix 2: ICC-ESCI Award Supplementary Report

Website:

<https://www.shkp-icc.com>

## Contact Information

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