



Case Highlights of Energy Saving Championship Scheme 2016 – 2018

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ENERGY SAVING FOR ALL Electricity Consumption in Commercial Sector by End-use







Highlight of Award-winning Cases by the following End-use:

- 1. Air Conditioning
- 2. Lighting
- 3. Vertical Transport
- 4. Hot Water





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1. Air Conditioning

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The Chinese University of Hong Kong Shatin – Ma Liu Shui Campus

- Award: Hanson Supreme Grand Award (2016)
- Key Elements:
- 1. Replacement of Air-cooled Chillers with more energy efficient Water-cooled Chiller systems and High Efficiency Chiller
- 2. **District cooling design** Shared the cooling capacity of the chiller plant system from adjacent buildings
- 3. Others: Energy conservation incentive scheme; Solar energy; Smart meter; LED street lamps

Effectiveness: Savings of about 90,000,000 MJ in the past 3 years

ENERGY SAVING FOR ALL







Landmark North

ENERGY SAVING FOR ALL

Awards: Hanson Grand Award (Shopping Mall) (2016)

Key Elements:

- 1. Replacement of Air-cooled Chillers with more energy efficient Water-cooled Chillers with chilled water monitoring and control system
- 2. Reduction of **building heat absorption** by adoption of **thermal insulation film** and initiative of **rainwater collection system** - recycle rain for reducing solar heat gain to the shopping mall via building skylights
- 3. Reduction of **loss of conditioned air** through adoption of **automatic door**, **double-layer door design and efficient wind curtains**
- 4. Other: Adoption of motion-activated LED tube at staircases and LED downlights at lift lobbies

Effectiveness: Total ~28.0% Electricity Savings (~3.3 million kWh)







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Award: Hanson Supreme Grand Award (Group 1) (2017)

• Key Elements:

- 1. Use of Chiller Sequencing Control via multilinear regression model
- 2. Use of Cooling Tower control via **big data analysis**
- 3. Supply Chilled Water temperature optimization
- 4. Fresh air control strategy to optimize AC system operation
- 5. Peak demand limiting strategy for chiller start up





Fig. 1 Chiller current and load profile in CLP online meter



ENERGY SAVING

FOR ALL

Effectiveness: 120,000 kWh of annual energy savings

Effectiveness: 200 kVA was reduced during the assessment period







- ✓ Adoption of High Efficiency Chillers
 - > ~10-20% based on experience of winners as compared with traditional chillers
- ✓ Adoption of Water Cooled Chillers (~30% saving compared with Air Cooled)
- ✓ Thermal Insulation & Rainwater Collection System
- Retro-Commissioning / Energy-saving solutions for Aged Equipment
- ✓ Big Data Analysis
- ✓ Multi-regression Model Analysis





2. Lighting

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Lingnan University

Awards: Hanson Grand Award (Post-Secondary Education) (2017)

Key Elements:

- 1. Adoption of **LED Lightings for Canteen and Corridors** in 4 Academic Blocks
- 2. Installation of **outdoor solar type LED lamps and lighting sensors** to increase the energy efficiency and **reduction of project cost**
- 3. External lighting in different environmental settings are designed to turn on according to the brightness of sunlight to reduce unnecessary energy consumption
- 4. Other: Replacement of existing aged installation with new chillers for a higher coefficient of performance



LED Lightings for Canteen and Corridors <u>40% energy reduction</u>

FOR ALL

ENERGY SAVING

84 nos Solar type LED lamps at Outdoor Sports Ground & Wing On Plaza





3,696kWh/per day Total ~230k to 300k project cost saving



International Commerce Centre

ENERGY SAVING FOR ALL

Award: Hanson Supreme Grand Award (Group 1) (2017)

• Key Elements:

- 1. Replacement of T5 fluorescent tubes with LED tubes with motion sensor
- 2. Installation of **light sensors** for data collection and analysis:
 - a) Daylight harvesting report
 - b) Power distribution report
- 3. Able to adjust lighting pattern based on need









- Awards: Hanson Grand Award (Shopping Mall) (2017)
- Key Elements:
- 1. Replacing 250W HIDs to 120W Induction Lamps at Carpark with total 120,712.80 kWh annual electricity savings
- Adoption of LED lighting with motion sensors and dimming function at staircases, E&M floor corridor, etc. for minimizing unnecessary electricity waste
- 3. Design and adoption of "**movable lighting cart**", which is low budget and easily applied to other properties, to save energy for night-time cleaning and maintenance
- Other: Replacement of air-cooled chillers by water-cooled chillers, Phase 2 & 3 replacement of water-cooled chillers shall be undertaken to improve overall energy efficiency







Movable lighting cart





✓ Efficient Lighting / LED Lighting Adoption

- > 30% energy saving from replacement of CFL to LED
- ✓ Daylight Harvesting
- ✓ Adopt Motion and Daylight Sensors and Dimming Function
- ✓ Automatic/Smart Lighting Control System





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3. Vertical Transport

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- Award: Hanson Outstanding Award (Residential Building / Housing Estate) (2017)
- Key Elements:
- 1. Turning off 3 of the 4 elevators at midnight for minimizing unnecessary electricity waste
- 2. Implementation of new technology Variable Voltage Variable Frequency (VVVF) lift motors
 - a. VVVF employs frequency inverter technology which regulates input voltage and frequency throughout the journey, drawing much **less current during acceleration and deceleration**
 - b. Replace existing technology in lift operation, which would save 68% in energy consumption
- 3. Others: replacing lighting system with LED, adoption of VVR water pumps



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Award: Hanson Supreme Grand Award (Group 1) (2017)

- Key Elements:
- Adopt Port Technology and Lift Traffic Analysis 1.
- Partial-operation of lifts and escalators during non-peak office 2. and non-office hours





PORT Technology





✓ Partial-operation during non-peak office and non-office hours

✓ Turning off when unnecessary

✓ Lift Traffic Analysis

✓ Port Technology

✓ Variable Voltage Variable Frequency





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4. Hot Water

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- Award: Hanson Outstanding Award (Shopping Mall) (2017)
- Key Elements:
- 1. Deployment of largest commercially-installed renewable energy system in Hong Kong (including solar photovoltaic panel and solar water heating system) to generate electricity and hot water, which would support daily operations and reduce carbon emission
- Others: Retrofitting of Central Chiller Plants, adoption of retro-commissioning practices and upgrade of Building Management System, Installation of power





Hotel Madera Hong Kong



Award: Hanson Outstanding Award (Hotel) (2017)

- Key Elements:
- 1. Insulation to hot water pipe to minimize heat loss
- 2. Installation of first set waste heat recovery chiller to provide pre-heating to the incoming shower water
- 3. **Other:** Lighting retrofits cover delamping, adoption of low energy consumption lighting with motion sensors and timers and adoption of intelligent energy saving key switches in guest rooms





- Award: Hanson Grand Award (Hotel) (2017)
- Key Elements:
- Through the adoption of 120 tons multi-function heat pump chiller, the heat released from air conditioning can be used to heat the water, thus reducing the consumption of towngas (40% reduction) for boiling hot water
- 2. Others: Adoption of higher thermal performance building external windows and retrofitting of Aged chillers with monocrystalline solar system





Noteworthy Elements



- Solar Water Heating System
- Insulation on Hot Water Pipes
- Waste Heat Recovery







The End

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