

Energy Saving through Replacing Fluorescent Tubes to LED Tubes

Mr. Paul K.W. YAM¹; Mr. Ray K.H. CHEUNG²; Ms. Doretta H.Y. LO³; Mr. Brain C.M. TSE⁴; and Ms. Eve T.L. LAI⁵
¹Vice President for Administration, ²Building Services Manager, ³Senior Nursing Officer, ⁴Senior Nursing Officer, ⁵Performance Improvement Manager

THE PROBLEM

The fluorescent tube adopted in Hong Kong Adventist Hospital – Tsuen Wan (the Hospital) consume a significant amount of electricity. With the advancement of technology, LED energy saving tube is a better option to save energy and decrease the expenditure for electricity fee. China Light and Power Co Ltd (CLP), one of the electricity supply company in Hong Kong, has launched an Electrical Equipment Upgrade Scheme, to subsidize to upgrade the electrical equipment to more energy saving and efficient models. As such, the Hospital has joined the scheme and started replacing from the existing T5 fluorescent tube to LED energy saving tube in 2019. This is a 3-year projects that expected to last till 2021.

AIM

- To be environmental friendly and energy efficient by replacing from T5 fluorescent tubes to LED energy saving tubes.
- To reduce the total expenditure by reducing the electricity fee and obtain CLP subsidy for electrical equipment upgrade.

ENERGY CONSUMPTION BEFORE LAMP REPLACEMENT (2018)

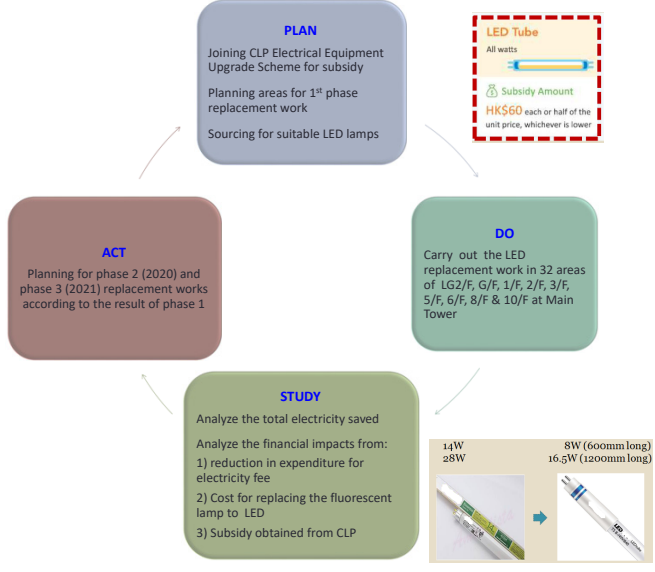
Existing T5 fluorescent Tube	Quantity (a)	Power Input/tube (W) (b)	Operating Hours /year (c)	Estimated Total Energy Consumption (kWh/year) (d)=(a)x(b)/1000x(c)
1200mm T5	453	28	4,380	55,555.92
600mm T5	2,710	14	4,380	166,177.2
	3,163			221,733.12

ENERGY CONSUMPTION & FINANCIAL IMPACT FOR REPLACEMENT (2019)

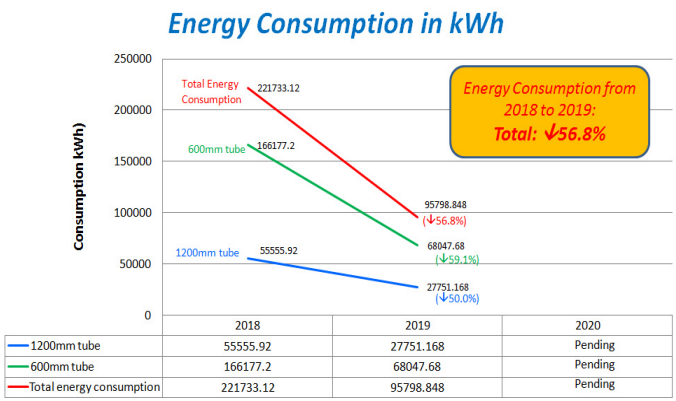
Replaced LED Tube	Quantity (e)	Power Input/tube (W) (f)	Operating Hours /year (g)	Estimated Annual Energy Consumption (kWh/year) (h)=(e)x(f)/1000x(g)
1200mm LED	384	16.5	4,380	27,751.68
600mm LED	1,942	8	4,380	68,047.68
	2,326			95,799.36

LED Replacement Cost			
LED Tube	Quantity	Material Cost (HK\$)	Amount (HK\$)
1200mm LED tube	384	150	57,600
600mm LED tube	1,942	95	184,490
			242,090

PLAN DO ACT STUDY CYCLE



DATA: ENERGY CONSUMPTION



DATA: FINANCIAL IMPACT

LED Replacement Cost			
LED Cost by HKAH-TW (a)	Refund by CLP (b)	Investment Cost (c) = (a) - (b)	Total Saving Electricity Expense (HK\$1.14/unit) (d)
HK\$242,090	HK\$115,285	HK\$126,805	HK\$132,246
		Payback Period	11.5 months (within one year)

RESULTS

- Totally replaced LED energy saving tube in year 2019 for Main Tower
- Total Saving 125,933kWh/yr or HK\$132,246.00/yr
- Power Company refund HK\$115,285.00 due to support CLP Electrical Equipment Upgrade Scheme
- Ongoing LED tube replacement in 2020, expected to further reduce the energy consumption and reduce the expenditure for electricity.

SUMMARY

- Overall the project reducing the electricity consumption and help reducing the pollutant from generating electricity.
- It also helps reducing the expense from electricity in the long run with expected payback period < 1 year for each phase
- Ongoing replacement work will be carried out till 2021.

2020 ONGOING PLAN

- Ongoing replacement of Light-Emitting Diode (LED) Lamp for saving 50% of electricity consumption in LG2F, LG1F, G/F, 1/F, 2/F, 3/F, 5/F, 7/F, 8/F, 10/F & 20/F, Main Tower and Roof, Old Wing.
- Excepted to replace 1,692 nos. of LED energy saving lamps in year 2020 for Old Wing and Main Tower.
- Expected Total saving 64,985kWh/yr or HK\$74,732.00
- Expected CLP to be refund HK\$82,110.00 for joined CLP Electrical Equipment Upgrade Scheme.