

## Summary Sheet for Pilot EMO Implementation Programme, Energy Efficiency Office, EMSD

|   | Date       | Project Title   | Scope of Work  | Remark/Achievement  | Performance Status  | Identified Annual Saving |
|---|------------|---|--|---|---|--------------------------|
| 1 | Sep. 1996  | Retrofit of electronic ballasts (EB) for essential lighting at 38 & 39/F, QGO             | Replacement of 200 sets 1x36W EBs in single 36W T8 batten fluorescent luminaires   | In-house testing of EBs showed great potential of energy saving. High initial cost due to rare utilization and few suppliers in 1996. "Osram" QTEC EBs models were used. Contract sum about \$0.1M. Simple payback period is about 8 years.     | Marginal Successful (long payback period due to high initial cost of EBs)     | 14,000 kWh               |
| 2 | Oct. 1996  | Variable Speed Drive (VSDs) installations for Primary Air Units (PAU) at QGO              | Installations of 4 sets 15kW VSD for PAUs controlled by timers   | First promotional project for VSD. "Danfoss" VSDs were used in this project. Contract sum was \$0.43M. Annual energy saving is 90,000 kWh. Simple payback period is 5.4 years.  | Successful (low cost timer control of fresh air demand)                       | 90,000 kWh               |
| 3 | Feb. 1997  | Retrofit of EBs for staircases & corridors at Eastern Law Courts Building                 | Replacement of EBs for 400 sets 3x18W, 4x18W & 1x58W fluorescent luminaires  | EB price drop due to market awareness of Government intention to promote wider use of EBs. Capital cost about \$0.14M with annual energy saving of 33,000 kWh. Simple payback 4.7 years (24-hour operation). "Osram" QTEC EBs models were used. | Successful (lower EB cost due to increasing market competition and awareness) | 33,000 kWh               |
| 4 | March 1997 | VSDs & CO <sub>2</sub> installations for PAUs & Variable Air Volume (VAV) AHUs at Harbour | Installation of 4 nos. CO <sub>2</sub> sensors, 3 sets 15 kW VSD for PAUs, 2 nos. duct-mounted static pressure sensors & 2 sets 11 kW VSDs | This was the 1 <sup>st</sup> pilot demand control AC project using CO <sub>2</sub> sensors. "Allen-Bradley" VADs were used. Contract sum was \$0.58M. Annual energy saving is 80,500 kWh. Simple payback period is 8 years                      | Successful (CO <sub>2</sub> used for demand control of fresh air intake)      | 80,500 kWh               |

|    |            | Buildings  | for VAV AHUs   |   |   |             |
|----|------------|--|--|---|---|-------------|
| 5  | March 1997 | VSDs installations for chilled water circuits at 32/F, QGO   | Installations of 3 sets 37.5 kW VSDs for chilled water pumps to control flow demand instead of by-pass valves.               | “Meiden” VSDs were used in this project.<br>Contract sum was \$0.33M.<br>Annual energy saving is 67,500 kWh.<br>Simple payback period is 5.4 years.   | Successful (first VSD application in chilled water circuit) | 67,500 kWh  |
| 6  | Oct. 1997  | Retrofit of EBs for staircase lighting and 15/F & 16/F Labour Department offices at Harbour Building | Replacement of EBs for 600 sets 2x36W recessed fluorescent luminaires in office areas and 200 sets of 1x18W staircase batten | Mainland’s “LEB” EBs were first used in this pilot project for trial.<br>Contract sum was \$0.47M.<br>Energy saving per year is 68,600 kWh.<br>Simple payback period is 7 years.              | Successful  | 68,600 kWh  |
| 7  | Oct, 1997  | VSDs installations for PAUs and VAV AHUs at Mong Kok KCRC GO   | Installations of 4 nos. CO <sub>2</sub> sensors, 2 sets 22 kW VSD for PAUs & 4 sets 11 kW VSD for VAV AHUs                   | “Allen-Bradley” VADs were used.<br>Contract sum was \$0.26M.<br>Annual energy saving is 103,000 kWh.<br>Simple payback period is 2.8 years  | Successful (lower tender return & lower VSD cost)           | 103,000 kWh |
| 8  | Nov. 1997  | VSDs installations for PAUs at Southorn Centre   | Installations of 8 nos. CO <sub>2</sub> sensors, 3 sets 22 kW VSD for PAUs   | “Allen-Bradley” VADs were used.<br>Contract sum was \$0.26M.<br>Annual energy saving is 92,500 kWh.<br>Simple payback period is 3.1 years   | Successful  | 92,500 kWh  |
| 9  | Dec. 1997  | Retrofit of EBs for 22/F & 23/F Environmental Protection Department offices at Southorn Centre       | Replacement of EBs for 1,000 sets 3x18W recessed fluorescent luminaires in office areas.                                     | EBs used were Thorn with better power quality performance (i.e. lower THD < 20%).<br>Contract sum was \$0.33M.<br>Annual energy saving is 101,500 kWh.<br>Simple payback period is 3.5 years. | Successful  | 101,500 kWh |
| 10 | Dec. 1997  | Retrofit of EBs for 4/F & 11/F offices at Mongkok KCRC GO  | Replacement of EBs for 350 sets 1/2x36W recessed fluorescent luminaires in office areas.                                     | EBs used were Thorn with better power quality performance (i.e. lower THD < 20%).<br>Contract sum was \$0.12M.<br>Annual energy saving is 21,500 kWh.   | Successful  | 21,500 kWh  |

|    |           |  |  |  |            |            |
|----|-----------|--|--|--|------------|------------|
|    |           |  |  | Simple payback period is 6.5 years.  |            |            |
| 11 | Dec. 1997 | Retrofit of EBs for G/F, 2/F, 3/F, 6/F & 7/F offices at Kowloon East GO                          | Replacement of EBs for 600 sets 2x36W recessed fluorescent luminaires in office areas.                 | EBs used were Thorn with better power quality performance (i.e. lower THD < 20%).<br>Contract sum was \$0.16M.<br>Annual energy saving is 41,000 kWh.<br>Simple payback period is 4.4 years.   | Successful | 41,000 kWh |
| 12 | Aug. 1998 | Retrofit of EBs & 32W High Frequency T8 lamps for 1/F, 5/F & 15/F offices at Tsuen wan GO        | Replacement of EBs for about 1,000 sets 2x32W recessed fluorescent luminaires in office areas.         | This was the 1 <sup>st</sup> pilot project to use HF 32W tube, which was a new EE lamp version developed at that time.<br>Mainland's EBs "Hoye" were used for this project.<br>Contract sum was \$0.22M.<br>Annual energy saving is 63,500 kWh.<br>Simple payback period is 3.8 years. | Successful | 63,500 kWh |
| 13 | Aug. 1998 | Retrofit of EBs for 9/F, 10/F & 11/F offices at Yuen Long GO                                     | Replacement of EBs for about 700 sets 2x32W and 2x58W recessed fluorescent luminaires in office areas. | "Motorola" EBs were used for this project.<br>Contract sum was \$0.15M.<br>Annual energy saving is 50,000 kWh.<br>Simple payback period is 3.8 years.  | Successful | 50,000 kWh |
| 14 | Dec. 1998 | Retrofit of EBs for 3/F offices, carpark, lift lobbies and library at Civil Engineering Building | Replacement of EBs for about 700 sets 1x32W, 3x18W, 2x36W and 3x36W fluorescent luminaires.            | "Hoye" & "Magnetek" EBs were used for this project.<br>No major problems found.<br>Contract sum was \$0.22M.<br>Annual energy saving is 83,500 kWh.<br>Simple payback period is 2.9 years.   | Successful | 83,500 kWh |
| 15 | Dec. 1998 | Retrofit of EBs for G/F, 3/F, 4/F, 5/F offices & lift lobbies at Tai                             | Replacement of EBs for about 550 sets 1x32W, 3x18W, 2x36W and 3x36W fluorescent                        | "Magnetek" EBs were used for this project.<br>Contract sum was \$0.15M.<br>Annual energy saving is 40,500 kWh.   | Successful | 40,500 kWh |

|    |           |   |  |  |                                    |             |
|----|-----------|---|--|--|------------------------------------|-------------|
|    |           | Po GO   | luminaires.  | Simple payback period is 4 years.  |                                    |             |
| 16 | Dec. 1998 | Retrofit of EBs for 3/F & 4/F, District Land offices at Sai Kung GO                                   | Replacement of EBs for about 400 sets 2x58W, fluorescent luminaires.   | “Osram” EBs were used for this project. Contract sum was \$0.12M. Annual energy saving is 40,000 kWh. Simple payback period is 3.3 years.  | Successful                         | 40,000 kWh  |
| 17 | Dec. 1998 | Retrofit of EBs & 32W High Frequency T8 lamps for 26/F, Audit Commission offices at Immigration Tower | Replacement of EBs for about 560 sets 2x32W recessed fluorescent luminaires in office areas.                   | “Motorola” EBs were used for this project. Contract sum was \$0.14M. Annual energy saving is 48,000 kWh. Simple payback period is 3.2 years.   | Successful                         | 48,000 kWh  |
| 18 | Dec. 1998 | Retrofit of EBs & 32W High Frequency T8 lamps for 31/F and 32/F offices at Revenue Tower              | Replacement of EBs for about 1,100 sets 2x32W recessed fluorescent luminaires in office areas.                 | Malaysian made “Micatron” EBs were used for this project. Contract sum was \$0.31M. Annual energy saving is 105,000 kWh. Simple payback period is 3.2 years.   | Successful                         | 105,000 kWh |
| 19 | Aug. 1999 | Installation of Escalator Power Saver (Energy Optimiser) at NPGO                                      | Installation of 1 no. 7.5 kW energy optimizer, energy & hour meters for the UP escalator from G/F to 1/F level | Contract sum was \$15,000. Average energy saving of 10% was recorded. Long payback period due to low energy consumption for escalators. Recommended for use in new escalator installation to replace conventional motor starters and to optimize energy consumption at light load condition. | Marginal successful (long payback) | 1,500 kWh   |

|    |            |   |  |  |  |            |
|----|------------|---|--|--|--|------------|
| 20 | Oct. 1999  | Installation of "Miconic 10" Lift Control System at MKGO            | Conversion of existing 4 nos. lifts to intelligent lift control system to optimize handling capacity & to minimize no. of stops at peak. | Contract sum was \$0.77M. Energy saving achieved was 10% with shorter traveling time and higher handling capacity. Problem encountered was first time users' unawareness to pre-register prior to lift entering. Additional AV used to help proper use of the new lift system. | Marginal successful (optimum energy saving potential could not be achieved because of existing low efficient DC lift drives) | 10,000 kWh |
| 21 | Feb. 2000  | Retrofit of T5 Luminaires & Automatic Lighting Control at 35/F, QGO | Installation of 500 1x28W new T5 luminaires c/w integrated sensors   | Contract sum was \$0.78M. "Tridonic" EB & sensors were used with luminaires assembled in Mainland. Achievements include a min. of 33% reduction in energy consumption & flexible lighting control. Simple payback period is about 8 years.                                     | Successful (First T5 lighting project)   | 30,000 kWh |
| 22 | March 2000 | Retrofit of T5 Luminaires at 27/F, Arsenal House                    | Installation of 320 3x14W new T5 luminaires  | Contract sum was \$0.18M. Mainland products "Yankon" luminaires were used in the project with very competitive tender price. Energy saving was 42% with 33% higher illumination. Simple payback is 3.5 years.  | Successful   | 55,000 kWh |
| 23 | March 2000 | T5 Luminaires Installation at EFB Office                            | Installation of 700+ 2x28W new T5 luminaires with sensors at perimeter offices   | Contract sum was \$0.58M. "Tridonic" EB & sensors were used with luminaires assembled in Mainland. Achievements include a min. of 32% reduction in energy consumption & flexible lighting control.   | Successful   | 70,000 kWh |

|    |            |  |   |  |   |            |
|----|------------|--|---|--|---|------------|
| 24 | May 2000   | Automatic Tube Cleaning System at China Ferry Terminal     | Installation of I no. automatic condenser tube cleaning system for a direct sea-water cooled chiller                      | Contract sum was \$0.61M. Difficult assessment of accurate energy saving due to site constraint. A rough saving of 5% was recorded. Major benefit was less maintenance cycle required for tube cleaning. | Marginal successful (tube cleaning was effective, energy saving was lower due to good quality sea water used) | 60,000 kWh |
| 25 | Aug. 2000  | Retrofit of T5 Luminaires at EEO                           | Supply and install 100 nos. 3x14W T5 "Yankon" luminaires at 12 & 14F  | Contract sum was \$56,000. Energy saving was 30% with higher illumination achieved. Test site for Mainland products. Performance & reliability was good since August 2002.                               | Successful  | 15,000 kWh |
| 26 | Sept. 2000 | High Output T5 Luminaires at East Kai Tak Indoor Game Hall | Supply and install 56 nos. 3x49W HO T5 luminaires with new distribution boards & switching circuits                       | Contract sum was \$0.18M. Energy saving was 49% as compared with existing HID lamps. Illumination was 50% higher. Successful demonstration project for the application of HO T5 in high bay lighting.    | Very successful (First project using HO T5 lamp for high bay lighting)  | 60,000 kWh |
| 27 | Sept. 2000 | Occupancy Sensing for AC & Lighting at EEO Conference Room | Installation of movement detector and contactors for lighting & AC system   | Contract sum was \$10,000. Effectiveness of occupancy detection was tested in the meeting room. Saving via elimination of light & AC kept on when the room was unoccupied.                               | Successful  | 2,000 kWh  |
| 28 | Nov. 2000  | Indirect Evaporating Heat Recovery Unit at Kowloon Park    | Installation of the package unit together with the associate duct work & pipe work for heat exchange & condensate pumping | Contract sum was \$0.265M. Very effective pre-cooling of fresh air by indirect evaporation of condensate water. Preliminary data shown 15% saving in fresh air supply.                                   | Successful  | 8,000 kWh  |

|    |            |  |   |  |                 |            |
|----|------------|--|---|--|-----------------|------------|
| 29 | Feb. 2001  | Automatic Lighting & AC Control at CLK Police Station  | Installation of dimmable electronic ballasts, FCU controllers & relays and SMART sensors at Barrack Blocks            | Contract sum was \$0.5M.<br>Over 20% energy saving achieved by dimming down or switching off lighting, resetting FCUs to lower speed & higher temperature setting when spaces were unoccupied. | Successful      | 15,000 kWh |
| 30 | March 2001 | Upgrading 1 no. lift drive from AC-2 to VVVF at Po On Market   | Supply and install new VVVF lift drive system & demolish existing AC 2-speed control                                  | Contract sum was \$0.2M.<br>Energy saving of 40% was achieved with better riding comfort and less noise.   | Successful      | 20,000 kWh |
| 31 | March 2001 | Upgrading 2 nos. lift drive from AC-2 to VVVF at WSD Junior Staff Quarters at Hing Fong Road, Kwai Chung | Supply and install new VVVF lift drive system & demolish existing AC 2-speed control                                  | Contract sum was \$0.4M.<br>Energy saving of 40% was achieved with better riding comfort and less noise.   | Successful      | 40,000 kWh |
| 32 | April 2001 | Retrofit of 6 nos. Self-luminous EXIT sign at EEO  | Supply and install 6 nos. "Tritium" self-luminous EXIT signs to replace existing conventional fluorescent EXIT signs. | Contract sum was \$14,400.<br>Saving of 1500 kWh per year was achieved without any need for maintenance for 10 years.  | Very successful | 1,500 kWh  |
| 33 | June 2001  | Energy optimizers "Powerboss" systems for conveyers belt and chiller application at GPO                  | Installation of 4 nos. "Powerboss" motor controllers for conveyer and chiller   | Contract sum was \$0.135M.<br>Energy saving of 10% was achieved.<br>Controllers provided soft start and soft stop and reduce tear & wear of mechanical parts.                                  | Successful      | 25,000 kWh |
| 34 | July       | "Air-con   | Installation of   | Contract sum was \$80,000.   | Successful      | 50,000 kWh |

|    |               |   |   |  |   |             |
|----|---------------|---|---|--|---|-------------|
|    | 2001          | E-Saver”<br>Evaporating<br>Cooling System<br>at GPO                   | evaporating cooling<br>system for existing air<br>cooled chiller and all<br>associate water supply<br>network                           | Energy saving of 15% was achieved.<br>Approval from WSD required before<br>installation.   |   |             |
| 35 | Sept.<br>2001 | T5 Lighting<br>Installation in<br>GPO                                 | Supply and install of<br>1,600 nos. T5<br>luminaires for testing in<br>industrial environment.  | Contract sum was \$0.46M.<br>Energy saving of 40% was achieved.<br>Most existing 58W T8 batten luminaires<br>in sorting offices were replaced by 35W<br>T5 luminaires with obvious<br>improvement in energy and visual<br>performance. | Successful  | 420,000 kWh |
| 36 | Oct.<br>2001  | T5 Lighting &<br>DALI Control at<br>KBIGH                             | Supply and install new<br>80 nos. 2x80W HO T5<br>luminaires and DALI<br>lighting control system   | Contract sum was \$0.98M.<br>First DALI system installed in HK to<br>dim light according to the actual<br>applications and functions.<br>Min. energy saving was 40% with<br>improved visual environment and<br>flexible control.       | Very successful<br>(First<br>intelligent HO<br>T5 lighting<br>system control<br>using DALI<br>technology) | 100,000 kWh |
| 37 | Jan.<br>2002  | DSI Lighting<br>Control System at<br>FPD HQs, 28/F<br>Southorn Centre | Supply and install 380<br>nos. 3x18W DSI<br>dimmable electronic<br>ballasts controlled by<br>SMART sensors                              | Contract sum was \$0.37M.<br>Existing fixed EBs replaced by dimming<br>EBs to provide flexibility in lighting<br>control and make use of daylight<br>available with occupancy sensing.<br>Minimum energy saving achieved was<br>15%.   | Successful  | 10,200 kWh  |
| 38 | Feb.<br>2002  | “Air-con<br>E-Saver”<br>Evaporating<br>Cooling at<br>YURIRC           | Installation of<br>evaporating cooling<br>system for 2 sets<br>existing air cooled<br>chiller and all associate<br>water supply network | Contract sum was \$0.2M.<br>Detailed study with sophisticated<br>monitoring equipment was installed.<br>Data are still being collected on site.  | Successful  | 80,000 kVA  |
| 39 | March<br>2002 | DALI Installation<br>at EEO Meeting                                   | Supply and install new<br>T5 luminaires &   | Contract sum was \$26,500.<br>Second DALI installation in HK.  | Successful  | 1,000 kWh   |

|    |           |  |  |  |                                      |                      |
|----|-----------|--|--|--|--------------------------------------|----------------------|
|    |           | Room   | downlighters c/w DALI ballasts   | Energy saving via pre-set sense dimming instead of switching on and off lighting to suit various functions required in the meeting room.   |                                      |                      |
| 40 | May 2002  | Solar Window Film at EPD HQs at Southorn Centre                      | Supply and install new V-Kool solar film at 3 perimeter office rooms at 28/F, Southorn Centre                | Contract sum was \$14,000. Performance tests were being done on site for rejection of IR & UV radiation and transmission of visible light. | Successfully completed               | ---                  |
| 41 | May 2002  | VSD Chiller Retrofit at Shatin Town Hall                             | Retrofit of VSD system in 1 no. existing water-cooled chiller for improvement of COP at part-load condition. | Contract sum is \$0.5M. Installation would start on site in October 2002.  | Completed in October 2002            | ---                  |
| 42 | Nov. 2002 | T5 Lighting & DALI Control at Po Kong Village Road Indoor Games Hall | Supply and install new 80 nos. 2x80W HO T5 luminaires and DALI lighting control system                       | Contract sum was \$0.5M. DALI system control to dim light according to the actual applications and functions.                              | Completed in December 2002           | ---                  |
| 43 | Feb. 2003 | Induction Lighting Installation at KBIGH                             | Supply & installation of 4 nos. high-bay luminaries c/w 2x150W induction lamps                               | Contract sum was \$49,500. Installation completed in February 2003   | Completed                            | ---                  |
|    |           |  |  |  | <b>Total Energy Saving per year:</b> | <b>2,217,800 kWh</b> |