
ENER-SAVE
SDN. BHD
Company Profile
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Tel: +607-557 2669, Fax: +607-558 2669
Your One Stop
Energy Saving Solutions
Consultant

## Table of Content


1. The Company Page 3
2. Field of Expertise
   - A. Energy Savings System Page 4 – Page 11
   - B. Air Conditioner/ Chiller Page 12
   - C. Control Switch Board / DB Page 13
   - D. Power & Electrical Wiring Work Page 14
3. Company Information Page 15
4. Inspection Instruments Page 16
5. Organisation Structure Page 17
6. Qualified PE's Information Page 18 – Page 22
7. Past Experiences Page 23 – Page 26
8. Energy Savings Project Flow Chart Page 27
9. Appendix I Page 28 – Page 40
   - A. Hydrocarbon Refrigerant Gas- Environmentally Friendly Refrigerant Gas- Saving achieved report.
10. Appendix II Page 41- Page 46
    - A. LVD Induction Lamp,
    - B. T5 Electronic Ballast Fluorescent Lamp

## The Company

The Company was established on the foundation of experience since year 2005 and prudence with full commitments in delivering the **electrical engineering** projects and services entrusted to us.





The Company is more emphasizing on excellent projects (or services) completion to fulfill the customer's satisfaction. A team of dedicated staff who is qualified and owning vast site experience on project implementation and project management manage it. Throughout the completion of electrical engineering project in the field of commercial, residential and industrial zone, the company's ability and capability has been further enhanced.

The Company is now ready to undertake challenges in line with our field of expertise (such as **electrical wiring work, air conditioner service, fabrication of control switch board, energy savings system design & electrical drawing endorsement service**) in the cost effective manner within the agreed time frame and total quality achievement through excellent project management practices.

# Field of Expertise

## A. Energy Savings System

Many electrical energy consumers have became aware on the electrical energy saving solution without affecting the process of production. Throughout the investigation and the research, indeed there are many solutions can be implemented parallel to the potential of the particular machine. Such As:

1. Energy efficient solution
2. Energy saving through recyclable resources
3. Energy saving through operation management
4. Energy saving by cutting off the unnecessary or unwanted power feeding
5. Energy saving through high efficient replacement

We are the comprehensive energy saving solutions. We help to define the potential of power saving, chosen products and its payback period (Targeted payback period not more than 24 **months**).

**What Kind of Machines or Motors might need to be put into Energy Savings Solutions?**

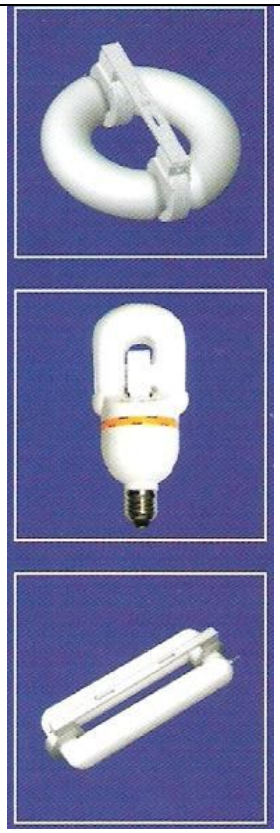
1. Induction motors
2. Water pumps, Hydraulic Pumps, Vacuum Pumps, and etc
3. Air Compressors
4. Exhaust Fans, Blower Fans, Suction Fans, Combustion Blowers, AHU Blowers and etc
5. Air Conditioners, Chillers, Water Cooled Packages and etc
6. Injection Moulding Machine and Casting Machine

7. Fluorescent Lamp, High Pressure Vapor Lamp, Metal Halide, Sport Light, High Mast Lighting and other Lightings
8. Crusher, Grinder, Mixer and etc
9. Conveyor line and escalator
10. Heater.

**Past project and energy saving results**

| No | Application | Specification | Before | After | Energy Saving (%) |
|---|---|---|---|---|---|
| 1 | Cooling Tower Fan (Dic Epoxy) | 415V, 45kW, 3Phase | 410V, 68.43A, 42.9kW, 22.85kVar, 0.88 | 410V, 55.54A, 33.06kW, 6.187kVar, 0.84 | 22.94 |
| 2 | Combustion Blower (Dic Epoxy) | 415V, 90kW, 3Phase | 411V, 122A, 77.65kW, 11.14kVar, 0.88 | 412V, 87.26A, 52.92kW, 8.7kVar, 0.84 | 31.84 |
| 3 | Chilled Water Pump (Dic Epoxy) | 415V, 55kW, 3Phase | 413V, 78.8A, 47.6kW, 11.2kVar, 0.85 | 414V, 66.4A, 38kW, 10kVar, 0.80 | 20.17 |
| 4 | Air Compressor (Southern Lion) | 415V, 22kW, 3Phase | Pavg = 18.92kW | Pavg = 16.48kW | 12.90 |
| 5 | Air Conditioner Split Unit (Shima Electronic) | 415V, 10HP, 3Phase | 419V, 8.96kW, 15.76A, 7.16kVar, 0.78 | 419V, 7.5kW, 14.46A, 7.24Kvar, 0.71 | 16.29 |
| 6 | Injection Moulding Machine (Mitsumi) | 415V, 37kW, 3Phase | Pavg = 33.62kW | Pavg = 28.01kW | 16.69 |
| 7 | Kitchen Exhaust Blower (Hotel Nikko) | 415V, 15kW, 3 Phase | 402V, 20.26A, 12.24kW, 6.9kVar, 0.86 | 406V, 12.7A, 8.46kW, 1.4kVar, 0.93 | 30.88 |
| 8 | Water Fall Pump (Hotel Nikko) | 415V, 22kW, 3Phase | 408V, 28.66A, 16.72kW, 11.58kVar, 0.82 | 410V, 19.74A, 13.16kW, 1.68kVar, 0.94 | 21.29 |
| 9 | Chiller (Southern Lion) | 415V, 30kW, 3 Phase | Pavg = 29.17kW | Pavg = 26.2kW | 12.03 |
| 10 | SDP Manufacturing Sdn Bhd | 415V, 22kW, 3 Phase | Pavg = 21.61kW | Pavg= 14.97kW | 30.70 |

**Products overview for energy saving purpose**



## 1. LVD Induction Lamp

World Most Advanced LVD Induction Lamp. Main Purpose of lighting system is producing light. LVD Induction Lamp can delivery best light density and generate less heat further enhanced the environmentally friendly purposes.

**Functions:**

3 Series of LVD induction lamp, 5W – 300W and above. High efficient LVD light. Less lumen depletion, lumen maintenance up to 95% after 2000 hours of utilization. Maintenance free. 5 years product assurance and guarantee.

**Applications:**

Applicable in Commercial complex and Industry- High bay lamp, HPV lamp, Metal Halide lamp, Fluorescent lamp, Down Light & etc

Applicable in Street Lighting- High Mast, Street Light, Sport Light and etc.

## 2. Ozlux T5 Electronic Ballast Fluorescent Lamp

Model Type: OZ4F25

**Functions:**

4-foot replaceable Fluorescent lamp, provide high lumen output (94 lumen/W) with low power consumption (25Watt), Long life span at 20,000 hours.

**Applications:**

Direct replacement towards T8 Fluorescent Lamp (Easy Installation)

## 3. 3-phase Power Saver

**Model Type:**

- **ETI3030- 3 phase 30A**
- **ETI3060- 3 phase 60A**
- **ETI3100- 3 phase 100A**
- **ETI3150- 3 phase 150A**
- **ETI3200- 3 phase 200A**
- **ETI2250- 3 phase 250A**
- **ETI3300- 3 phase 300A**
- **ETI3400- 3 phase 400A**
- **ETI3500- 3 phase 500A**

**Functions:**

- Modeling power output to match loads to reduce the wasted electricity up to 40%.
- Energy saving
- Power factor improvement
- Soft-start / soft-stop
- Protection for over current, high temperature, etc.
- Easy installation

**Applications:**

Can be applied to induction motors, such as air-compressor, modeling machine, injection machine, milling machine, machine tools, pumps, fans and oil pumping machine, etc.

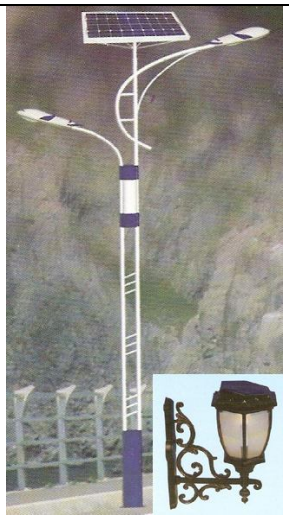
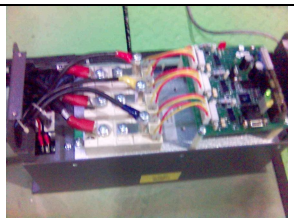
## 4. Power Controller

Air-Conditioner Saver

**Functions:**

Fuzzy-logically control compressor to adjust cool air output, and prevent the over-cooled to waste energy. Saving up to 30%.

**Applications:**

| | |
|---|---|
| | can be applied to air-conditioner |
|  | **5. Solar Module**<br><br>Solar Cell and Solar Panel, Solar Power Street Light and other decoration products.<br><br>**Functions:**<br>Recyclable Energy Resources. Direct Energy Saving Electrical Sources. Build-in Sensor and can continuously supply energy for approximately 7 days during raining days. No electricity bill charged.<br><br>**Applications:**<br>Applicable in open area- as street light, gardening decoration and walk way indicator. |
|  | **6. 3 Phase Intelligent Motor Controllers**<br><br>Powerboss<br><br>**Functions:**<br>• Modeling power output to match loads to reduce the wasted electricity up to 30%.<br>• Energy saving<br>• Power factor improvement<br>• Soft-start / soft-stop<br>• Protection for over current, high temperature, etc.<br>• Easy installation<br><br>**Applications:**<br><br>Can be applied to induction motors, such as air-compressor, modeling machine, injection machine, milling machine, machine tools, pumps, fans and oil pumping machine, etc. |
|  | **7. Inverter**<br><br>Variable Speed Drive<br><br>**Functions:**<br>With the macro-configurations and “Simply Start” menu, |

the inverter can be used to start up your application without delay and to make adjustment in virtually no time using dialogue tools. Energy Saving ratio, optimizing energy consumption whilst improving user comfort.

**Applications:**

The inverter is a frequency inverter 3 phase asynchronous motor rated between 0.75kW to 630kW. The drive has been designed for stated-of the art applications in heating, ventilation and air conditioning (HVAC) in industrial and commercial building:

- Ventilation
- Air conditioning
- Pumps

## 8. HC Refrigerant

Molecule lighter, High Efficient, Environmentally Friendly Product.

**Benefits:**

- 100% natural organic refrigerant, non-ozone depleting, non-global warming.
- Increased **energy savings** up to 35%.
- Operates at lower head pressures and offers improved cooling properties and performance

**Applications:**

Applicable in all type of Air Conditioner System, Chiller and Freezer.

- **HC-12a®** is a direct replacement and retrofit refrigerant option for R12 and R134a
- **HC-22a®** is a direct replacement and retrofit refrigerant option for R22
- **HC-502a®** is a direct replacement and retrofit refrigerant option for R502

## 9. MXVR

The Voltage usually supplied is higher than the rated voltage in anticipation of voltage during transmission in peak hours of a day. MXVR help to eliminate the excessive voltage, while **maintaining the minimum voltage required by the loads.**

**Benefits:**

- Energy Savings (**Lighting savings: 8-13%, Motor loads savings: 6-10%**) Or overall savings 3% to 10%
- Preventing Power Surge

**Applications:**

Applicable for Loads from 85kVA – 3000kVA

**How do we conduct and start the energy saving solution?**

We provide total energy saving solutions to commercial and industrial premises. For the very beginning, a preliminary study on the electrical energy consumption for your complex or factories is required. Definitely, we would need your party's help. The draft below showing our methodology:

1. Provide us a copy of electricity bill for the latest 3 months. – will help to check your electrical energy efficiency.
2. Provide us a list of machines/ motors – will bring further to the studying of the potential of energy saving.
3. Provide us a visit to your complex or factories- will allow us to conduct an onsite survey, recording down the electrical power consumption for the proposal of energy saving.

As we known, there are many products in the market that help to save your electrical energy. How do you choose the suitable product for your particular machine among thousand of the products? Will the return period exceeding your requirement? Here after, we will come out a solution for you after the study in your complex or factories and help to identify areas offering the most potential pay back in energy saving. (PS: we will provide the format of machine/motor list to your engineer to fill up)

## Summary

**i. Site Survey**

1. Analysing and Studying The Potential of Energy Saving for the Particular Machine, Motor, Pump, Blower Fan, Air Conditioner, Lighting & Etc
2. Prepare a Proposal for the Machine that Can Do Energy Saving.

**ii. Contracting**

1. Energy Saving Devices Installation and Wiring (Integrated on the Application with Injection Moulding Machine, Crusher, Mixer, Conveyor line, Motors, Pumps, Blower Fan, Air Conditioner, Lighting & Etc, 10%- 25% Energy Saved)
2. Providing Monthly Energy Consumption Report for Energy Saving Project

Total Energy Saving Solutions Through Out Excellent Project Studying!

## B. Air Conditioner / Chiller

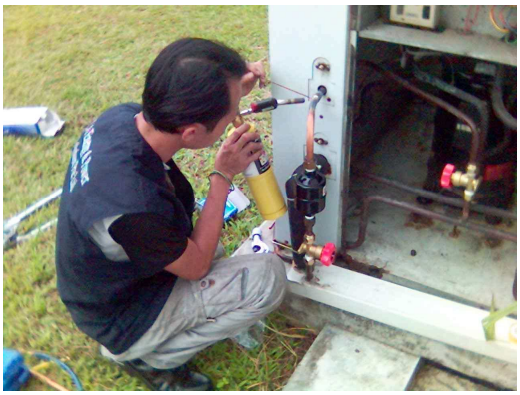
We do offer better service charge for Air Conditioners' Monthly Maintenance.

### i. Service & Maintenance

1. Replacing Spoiled Air-Conditioner Compressor (Screw Type, Reciprocating Type & etc)
2. Replacing Spoiled Condensing Fan
3. Cleaning Cooling / Condensing Fins
4. Gas Leak Checking
5. Changing Filter Drier
6. Refrigerant Charging Service and more

### ii. Energy Saving Integration A/C Project

1. Better Type Refrigerant Gas Replacement
2. Power Saver Controller
3. High Efficiency Lubricating Oil



## C. Control Switch Board / DB

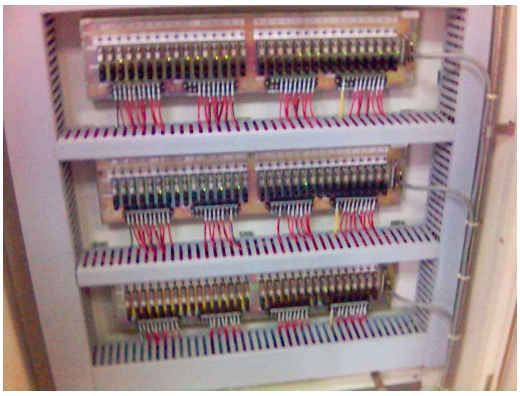
We appreciate your invitation to quote the services as stated below:

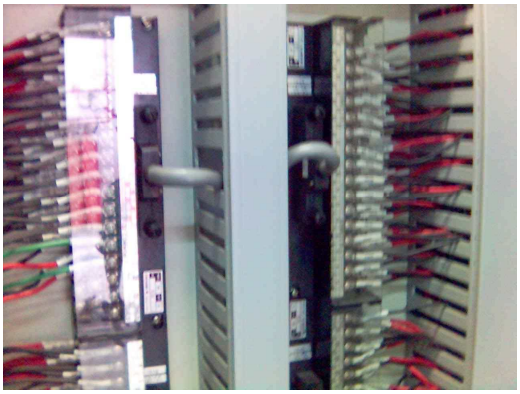
**i. Service & Maintenance**

1. Upgrading Bus bar & Cable to Higher Capacity
2. Upgrading Old Panel to New Panel
3. Power Meter Installation
4. ACB/ MCB Upgrading

**ii. Contracting**

1. Factory Control Switch Board / DB Design & Fabrication
2. PLC Programming
3. Switch Board / DB Internal Wiring, Trunking Lay Work & Etc



## D. Power & Electrical Wiring Work

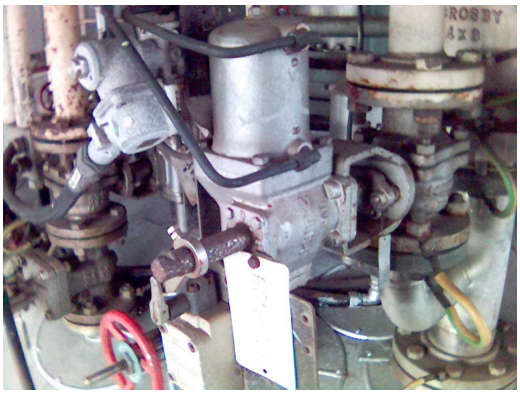
We appreciate your invitation to quote the services as stated below:

**i. Service & Maintenance**

1. Fitting & Tray Lay-Way Installation (Ladder Tray, Trunking, Conduit & etc)
2. Instrument Cable & Power Cable Wiring
3. Upgrading / Replacing Under-Sized Cable

**ii. Contracting**

1. Plant / Factory Electrical & Control Cable Wiring (From LV Room to Sub Board or From Sub Board to Motor, Machine or Instruments)
2. Lighting, Pillar Feeder, Emergency Exit Installation (Normal Type of Lighting, Lighting with back-up supply, High Pressure Vapor Lamp, Explosion Proof Lighting, Weather Proof Lighting & etc)

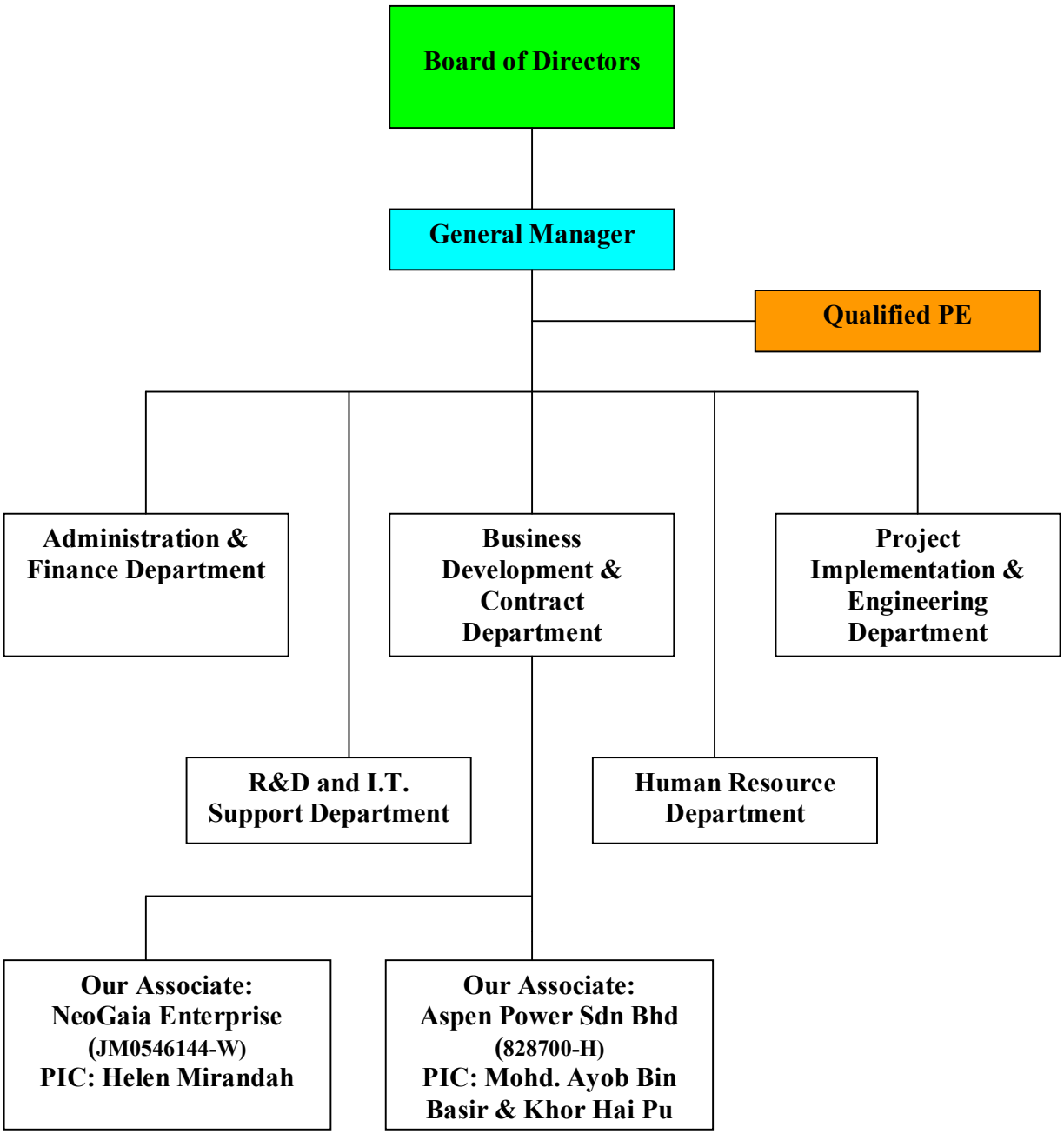


## Company Information

| | |
|---|---|
| Registration Company Name: | **ENER-SAVE SDN. BHD.** |
| Company Registration No.: | 661220-A |
| Correspondence Address | |
| Project Management Office: | 47A, Jalan Perwira 9,<br>Taman Ungku Tun Aminah,<br>81300 Skudai Johor, Malaysia |
| Show Room: | 47A, Jalan Perwira 9,<br>Taman Ungku Tun Aminah,<br>81300 Skudai Johor, Malaysia |
| Tel: | +607-557 2669 |
| Fax: | +607-558 2669 |
| Authorised Capital: | RM 100,000.00 |
| Paid Up Capital: | RM 100,000.00 |
| Web Site: | http://www.ener-save.biz |
| E-mail: | project@ener-save.biz |

## Inspection Instruments

## Organisation Structure



## Qualified PE's Information

| | |
|---|---|
| **Name:** | **Ir. S. Thayala Rajah** |
| **Current Areas of Responsibility:-** | **Electrical Engineering, Projects, Maintenance, Shutdown Works, Drawings Review and Approval, Coordination with TNB and Vendors, Contracts, Estimating, Engineering, Procurement & Projects, ISO 9001, Audits and Total Quality Management.** |
| **Identity card No:** | **530527-06-5205** |
| **Board of Engineers, Malaysia Registration:** | **11179 (Electrical) (PEng)** |
| **Inst. of Engineers Malaysia M'ship No:** | **03717 (MIEM)** |
| **Inst. of Electrical Engineers UK M'ship No:** | **15785392 (MIEST, C.Eng)** |
| **Suruhanjaya Tenaga Competent Engineer:** | **22KV Competency (JK-T-2-B-2008)** |
| **Mid Term Goals :** **Today** | **Tomorrow's Technology for** |
| **Vision :** | **To Leave a Legacy Behind.** |

WORK EXPERIENCE SUMMARY SINCE MAY 1978 TO DATE.

**HIGH TECH CONSULTANT**
**Since 1st May 2009 as Electrical Manager**

1. To assist the principal engineer in review of designs for Water Treatment Plants, Palm Oil Mills and Factories.

2. To coordinate electrical construction projects and electrical plant expansions.
3. To carry out HV Factory Inspection
4. To assist in the maintenance and calibration of LV and HV switchgears
5. To coordinate the smooth execution of all engineering projects.
6. Coordinate with Consultants, Contractors, TNB, Clients and Suruhanjaya Tenaga.
7. To prepare Construction and As Built Drawings.
8. Submit drawings and documentations to TNB and Register Installations with ST.

**CCM Chemicals Sdn. Bhd. Pasir Gudang Works.**
**Period From 16th Dec 1995 to date.**

***Post:- Electrical/Instrument Engineer. (Dec 1995-Aug 2001)***
***Electrical Manager/ Quality Systems Manager (Sept 2001-April 2009)***

## *Preamble To CCM Chemicals Sdn. Bhd.*

CCM Chemicals has a manufacturing plant in Pasir Gudang employing 117 people with the head office and the marketing arm in Kuala Lumpur employing 120 people. The main business is the manufacture of Chlor-Alkali products (Chlorine, Sodium Hydroxide, Hydrochloric Acid, Sodium Hypochlorite and Hydrogen) in Pasir Gudang, the manufacture of Calcium Nitrate and the Repacking of KLEA 134A refrigerant at the Shah Alam Plant.

The manufacturing plant in Pasir Gudang uses the Electrolysis Process Technology where direct current electricity is applied across the cathode and anode of the ICI FM 21 Membranes. There are 3 plants in Pasir Gudang, called Plant 1(commissioned in Jan 1992), Plant 2(commissioned in Dec 1996, and Plant 3(commissioned in August 1997). Approximately 3% of capital cost of RM 200 million is allocated as maintenance budget.

Plant 1 is designed for 10 MW at 22KV and likewise Plant 2 & 3 is also designed for 10MW. The electrical team consists of 1 superintendent, 1 technical assistant, 1-day charge man, 4-shift charge man and 1 electrician. The superintendent and technical assistant are authorised to handle 22KV switch gear. The electrical consumption for a year is approximately 135 GWh (RM 30 million per year).

**1.0) Preventive and Corrective Maintenance:-**

The incumbent's role here is to plan, co-ordinate and establish the work scope for carrying out the preventive maintenance and do the budget for overall electrical systems. Provide input for improvement and evaluate the effectiveness of the department.

Provide input to investigate the root cause of the defect and develop preventive systems and conduct safety assessment either formally or informally for all electrical works.

Review electrical designs and drawings and provide input for successful implementation.

**3.0) Annual Shutdown Maintenance:-**

Annual shutdown maintenance normally last about 8 to 9 days for each plant. The electrical man-hours during this period can reach about 2400 man-hours involving about 25 people.

(i) Prepare the necessary spares and procure the parts required for the job.
(ii) Plan the manpower requirement
(iii) Ensure all safety requirements are followed.
(iv) Carry out inspection and verification of HV and LV switchgear, motors, and generators.
(v) Coordinate with TNB for HV Switchgear maintenance and liase with Specialist Vendors.

**4.0) Engineering Support.**

The projects undertaken are:-

I. Upgrading plant load from 68 KAmps to 72 KAmps.
II. Additional storage tank (Hypo tank).
III. Harmonic analysis study.
IV. Power factor improvement.
V. Cogeneration feasibility study
VI. Upgrading 22 KV to 132 KV Study and Discussion with TNB
VII. Switch gear protection replacement.
VIII. Refurbishment of earthing and lightning system
IX. Review of Effluent Plant Design
X. Soft starter and Variable Speed Drive Installation.
XI. Boiler heat recovery project.
XII. Energy Efficiency Projects (Chiller / Variable Speed Drives )

**5.0) Management**

Safety Awareness Training.
Review of the understanding of the Permit to Work System
Conduct Hazop Studies
Budget Control
Review and Approve Operating Instructions
Develop Documentation and Work Instructions
QMR for ISO 9001 and Coordinator for Total Quality Management Systems

**Sime Engineering (formerly Sime Sembawang Engineering) Sdn. Bhd. Pasir Gudang.**
**Period from 18th Nov 1991 to 14th Dec 1995.**

***Post:- Asst.Engineering Manager (Elec/Inst) Nov 1991- May 1994 Dec.***
***Head of Research and Development (May 1994 – Dec 1995).***

Sime Engineering is a leading fabricator of oil and gas platforms for the local and foreign petroleum companies in the region. It is located in Pasir Gudang and employs about 450 staff on permanent and subcontractor basis reaching to about 2500 on project basis. The blueprints for the projects are prepared by the consultants and handed over to the fabricator.

The incumbent's role was:-
To establish, develop and maintain a disciplined well trained and highly motivated work unit in order to meet the short term and long term objectives expected of and engineering team in the area of electrical and instrumentation and ensuring the supports are provided for a successful commissioning and timely delivery of the Oil and Gas Project.

(a) Manage a team of 35 staff to review designs, drawings and generate construction drawings.
(b) Establish the Bill of Quantities (MTO).and prepare the purchase specification.
(c) Prepare testing and commissioning documents.
(d) Prepare as built drawings and documentation.
(e) Coordinate with consultants, clients and vendors in change of designs.

Transferred to head a new department to look at research and development areas as required by the company. Some of the task looked into were:-

(i) To study the impact of the ground contamination from the copper grit blasting.

(ii) To study methods to save cost and also suggest improvement plans in the safe way of erecting scaffolding materials.

(iii) To assist the company in participating for the quality awards.

(iv) To assist in the design and supervision of the electrical systems for a new 4 storey office.

(v) To develop in-house energy management programmes

(vi) To plan and coordinate the rewiring of Contractors Site Offices.

**Malaysian Marine Heavy Engineering (MMHE) Sdn. Bhd. Pasir Gudang.**
**Period From 11th Dec 1978 to 15th Nov 1991.**

***Post:- Management Trainee (Elec) Nov 1978 - June 1979.***
***Technical Exec.( Ship repair and Shipbuilding) June1979 - May 1986.***
***Asst. Mgr, Design and Estimating / Shipbuilding, May 1986 - June1988.***
***Asst Mgr, Estimating and Planning / Oil and Gas Proj., Jun 88 - Nov 91***

The incumbent started as a management trainee and moved on to be an estimator for the repair of vessels in the ship repair division. In 1981 transferred to assist in the set up of the Shipbuilding Division and started as a design engineer. The incumbent was involved in the electrical aspects of the construction of patrol crafts for the Malaysian Customs and offshore patrol vessels for the Royal Malaysian Navy. Incumbent was involved on Testing of Generators, Switchboards, and Electrical Equipments. In 1988 the incumbent was transferred to the Design and Estimating Department for the oil and gas projects due to the increase in the workload in that division.

**National Semiconductors (NS), Bayan Lepas,Penang.**

***Post:- Process Engineer May 1978 - Dec 1978.***

National Semiconductors **a** US multinational involved in the manufacturing of integrated circuits and employs over 2500 people on a 24 hour shift.

The incumbent's role was for duration of 6 months, primarily involved in trouble shooting in the process area and minor project upgrading exercises.

## Past Experiences

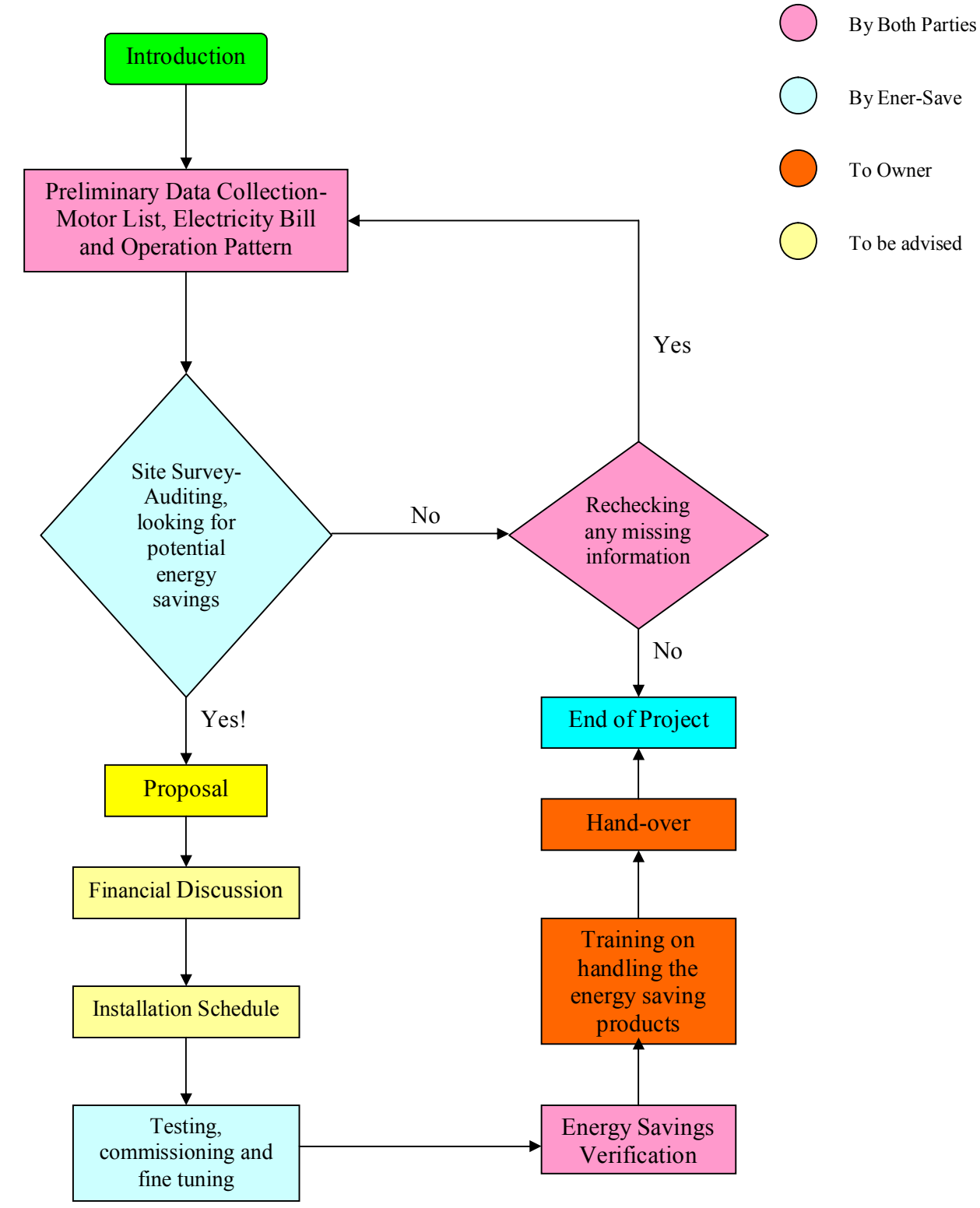
| No. | Client | Project Description | Completion Date |
|---|---|---|---|
| 1 | Mitsumi SDN BHD | Completion of 19 units Powerboss installation to the injection moulding machine and VFD Drive to CHWP and Air Compressor | Year 2005 |
| 2 | JB Cocoa SDN BHD | Completion of 7 Units of Capacitors installation and a harmonic filter. | Year 2006 |
| 3 | Southern Lion SDN BHD | Completion of electrical wiring and energy saving devices to the specific motor, exhaust blower, pumps & air compressor. | Year 2006 |
| 4 | JTI Tobacco (M) SDN BHD | 1st Phase and Second Phase Project- Completion of inverters installation on dust collector, chilled water pump, exhaust blower and dedusting dust collector, repairing spoiled soft-starter, power failure diagnostic and commissioning. | Year 2006 |
| 5 | Greif (M) SDN BHD | Completion of Capacitor Installation and 5 units of VFD Installation for Sub- Switch Board, Air Compressor and Granulator. | Year 2007 |
| 6 | DIC Epoxy (M) SDN BHD | Completion of 9 Units of inverters installation on combustion blower, chilled supply pumps, CW circulation pumps, CT fan and air compressors. | Year 2007 |
| 7 | Hotel Nikko Kuala | Completion of 4 units of VFD installation onto Kitchen exhausts Blower and Water | Year 2007 |

| | | | |
|---|---|---|---|
| | Lumpur | Fall Pumps. | |
| 8 | Shima Electronics Industry (M) SDN BHD | Completion of an inverter installation on Air Compressor, hand valves for air conditioner system, replacing old refrigerant gas (CHFC) to new type of refrigerant gas (HC). | Year 2007 |
| 9 | Shima Electronics Industry (M) SDN BHD | Completion of 16 units of hand valves installation on to air-conditioner units | Year 2007 |
| 10 | ALPS Electric (M) SDN BHD | Completion of replacing old refrigerant gas (CHFC) to new type of refrigerant gas (HC) - 64 Units. | Year 2007 |
| 11 | ALPS Electric (M) SDN BHD | Completion of replacing spoiled air conditioner compressor to brand new air conditioner compressor. | Year 2007 |
| 12 | Shima Electronics Industry (M) SDN BHD | Completion of upgrading Air Compressor Panel from 100A MCB to 125A MCB as well as current balancing tuning. | Year 2007 |
| 13 | GG Circuits Industries SDN BHD | Completion of Energy Saving Project for 11kW JSW Chiller and 30kW CNC Chiller, Completion of A/C Smart Controller Installation | Year 2007 |
| 14 | JTI Tobacco (M) SDN BHD | Third Phase Project- Completion of Energy Saving Project for 40HP x 8 units Air Cooled Chiller together with Compressor Oil Maintenance | Year 2007 |
| 15 | JCY HDD | Completion of Energy Savings | Year 2008 |

| | | | |
|---|---|---|---|
| | Technology SDN BHD | Implementation on 240 tons Chiller by converting the existing R22 Refrigerant gas to HC 22-a Refrigerant Gas | |
| 16 | Seagate (New Plant) | Completion of Swaft Vacuum Pump Electrical Wiring and Installation works at Seagate, Taman Technologies Senai | Year 2008 |
| 17 | UL-Tech Sdn Bhd | Completion of HC refrigerant gas Conversion (Total 24 units of A/C Compressor- WCPU) | Year 2008 |
| 18 | Drilmaco (M) SDN BHD | Completion of hooking up 9 units of machines, power line installation and blower fans. | Year 2008 |
| 19 | NatSteel (Sg) Pte. Ltd. | Completion of 1 no Air Conditioner HC refrigerant Gas conversion as for Demostration Purpose & 7 units of 5HP Air Conditioner. | Year 2009 |
| 20 | DGR Packing & Supply SDN BHD | Energy Savings Hydrocarbon Refrigerant Gas conversion (3 x 1hp) + Ozlux T5 Electronic Ballast Fluorescent Lamp | Year 2009 |
| 21 | Intel (KULIM) | Completion of Chiller Safety monitoring system using Bacharach Multizone Halogon Gas Monitor HGM300/RDM800 | Year 2009 |
| 22 | YKK (M) SDN BHD | Energy Savings Project on HC Refrigerant Gas Conversion WCPU 20HP x 5 units & 30HP x 4 Units | Year 2009 |
| 023 | Kualiti Alam Sdn Bhd | Energy Savings Project on HC refrigerant Gas Conversion ACPU 12.5HP x 7 nos & 7.5HP x 6 nos, Energy Savings Project on Installing Inverter Drive 30kW x 2 nos (For | Year 2009 |

| | | | |
|---|---|---|---|
| | | Drum Handling Fan A & B) | |
| 24 | JB Cocoa Sdn Bhd | Energy Savings Project On Air Conditioner HC refrigerant Gas Conversion 5HP x 4 nos, 2HP x 2 nos & 1 HP x 1 no | Year 2009 |
| 25 | Sinar TM Sdn Bhd | Energy Savings Project on HC refrigerant Gas Conversion 2HP A/C x 3 Nos + 16 Nos of Ozlux T5 Electronic Ballast Fluorescent Lamp | Year 2009 |
| 26 | TNT Logistic (Sg) Pte. Ltd. | Completion of Energy Savings Project on HC conversion at Ground Floor (5hp x 5nos + 1hp x 6 nos + 2hp x 2) & Level 4 (12.5hp x 2 nos + 9 hp x 4 nos + 2hp x 4 nos + 1hp x 2 nos) | Year 2009 |
| 27 | Joncan Composites Sdn. Bhd. | Completion of energy savings project on Air Conditioner (HC Conversion – 1hp x 1 no + 1.5hp x 1 no + 2hp x 1 no) & T5 Electronic Ballast Fluorescent Lamp x 16 nos | Year 2009 |
| 28 | SDP Manufactur-ing Sdn Bhd | Air Conditioner HC Refrigerant Gas Conversion 30HP WCPU x 1 unit at Moulding Area | Year 2009 |
| 29 | EE Guan Construction (M) SDN BHD | Completion of Hydrocarbon refrigerant gas Conversion for 3 nos of Split unit Air Conditioner | Year 2009 |

## Energy Savings Project Flow Chart



# APPENDIX I

# ENER-SAVE SDN BHD

47A, Jalan Perwira 9, Taman Ungku Tun Aminah,81300 Skudai, Johor.

Tel: 07-557 2669 Fax:07-558 2669
Email: project@ener-save.biz
Website: www.ener-save.biz

## AIR CONDITIONER ENERGY SAVING SOLUTION BY HYDROCARBON REFRIGERANT GAS AND $CO_2$ EMISSION REDUCTION BY HYDROCARBON REFRIGERANT GAS

**FEATURES OF HC REFRIGERANT:**
- HIGHLY EFFICIENT
- NON-OZONE DEPLETING
- NON-CORROSIVE
- NON-TOXIC
- NON-GLOBAL WARMING
- MOLECULE LIGHTER

**BENEFITS**
- ENERGY SAVING (10%-30%)
- ENVIRONMENTAL FRIENDLY
- ENHANCE LIFE AND PERFORMANCE OF A/C SYSTEM

## ENERGY SAVING SYSTEM FOR AIR CONDITIONER

HYDROCARBON REFRIGERANT GAS IS DESIGNED AS A DIRECT REPLACEMENT SUBSTANCE TO GLOBAL WARMING & OZONE DEPLETING HCFC/CFC/HFC REFRIGERANT GAS (R22, R12, R134-A)

## CLIMATE IS ONE OF THE BIG TOPIC NOWADAYS

ENER-SAVE SDN BHD IS PROVIDING ENVIRONMENTAL FRIENDLY HYDROCARBON REFRIGERANT GAS CONVERSION FOR RESIDENTIAL, COMMERCIAL & INDUSTRIAL AIR CONDITIONER. WE HELPS TO CHANGE THE NONE- ENVIRONMENTAL FRIENDLY, LOW EFFICIENCY, GLOBAL WARMING & OZONE DEPLETING SUBSTANCE TO ENVIRONMENTAL FRIENDLY, HIGH EFFICIENCY HYDROCARBON REFRIGERANT GAS. THE MOLECULE OF HYDROCARBON REFRIGERANT GAS IS LIGHTER. IT FURTHER EXTENDS THE LIFE SPAN OF AIR CONDITIONER'S COMPRESSOR & FURTHER ENHANCE THE PERFORMANCE OF AIR CONDITIONER. SWICTH TO GREEN, SAVE THE ENVIRONMENT, SAVE THE EARTH!

**OTHER SERVICES:**
1. AIR CONDITIONER MAINTENANCE & SERVICE
2. NEW AIR CONDITIONER INSTALLATION
3. ELECTRICAL WIRING WORK (POWER/ CONTROL CABLING)
4. CONTROL SWITCH BOARD DESIGN & FABRICATION.

ENER-SAVE SDN BHD
H/P: +6012-779 2669
(NG)

Total Quality Project's Completion Through Out Excellent Project Management!

## Hydrocarbon Refrigerant Gases for Chiller, WCPU, ACPU & Air Conditioner Solution


What Is Environmentally Friendly Hydrocarbon Refrigerant?

HC refrigerant is designed to replace ozone-depleting, global-warming refrigerants, HC Refrigerants are made of natural, organic compounds — not a blend of pre-existing, chemically based synthetic refrigerants.

| Features of HC Refrigerant: | Benefits |
|---|---|
| • Highly efficient<br>• Non-ozone depleting<br>• Non-corrosive<br>• Non-toxic<br>• Non-global warming<br>• Molecule Lighter | • Energy Saving<br>• Environmental Friendly<br>• Enhance Life and Performance of A/C System |

In fact, HC Refrigerant products can actually enhance the life and performance of air-conditioning and refrigeration system. Thanks to an anti-friction additive and their excellent thermal and chemical stability. After more than 12 years of extensive testing, it's clear that HC Refrigerant Products provide more efficient performance than the man-made, synthetic refrigerants they replace!

HC Refrigerant Type

- **HC-12a®** is designed as a drop-in replacement for ozone-depleting CFC R12 and global-warming HFC R134a refrigerant.
- **HC-22a®** is designed as a drop-in replacement for ozone-depleting HCFC R22 refrigerant
- **HC-502a®** is designed as a drop-in replacement for ozone-depleting CFC R502 refrigerant.

Refrigerant Gas Information

| Product | HC 12a ® | HC 22a ® | HC 502a ® | R12 | R134-a | R22 | R502 |
|---|---|---|---|---|---|---|---|
| Chemical Type | HC | HC | HC | CFC | HFC | HCFC | CFC+ HCFC |
| G.W.P. (CO2 = 1, 100 years basis) | 8 | 8 | 8 | 10,600 | 1,600 | 1,800 | 1,600 |
| O.D.P. | 0 | 0 | 0 | 0.9 | 0 | 0.32 | 0.5 |
| Atmospheric Life | < 1 year | < 1 year | < 1 year | 130 years | 16 years | 12 years | 16 years |
| Oils | Both | Both | Both | Mineral | Synthetic | Mineral | Synthetic |
| Leak Detection | Hydro-carbon | Hydro-carbon | Hydro-carbon | Halide | Halide | Halide | Halide |
| Boiling Point ( °C) | -33 | -42 | -49 | -30 | -26 | -30 | -26 |
| Autoignition (F) | 1636 | 896 | 882 | n/a | 1385 | n/a | 1385 |
| Refrigerant Mass Charge Size (R12= 100%) | 35% CFCR12 or 40% HFC R134a | 40% | 40% | 100% | 90% | 100% | 90% |
| Toxic Thermal Decomposition | None | None | None | Phosgene Gas | Hydro Fluoride Gas | Phosgene Gas | Hydro Fluoride Gas |

**Job Scope for Refrigerant Gas Conversion**

a. Preliminary data collection & study on particular air conditioner system.

b. A portable/power meter will be installed at Air Conditioner for "before" and "after" data collection. Note "after" data collection period shall commence after the final tuning as per item (h) below.

c. Conduct a thorough check on Air Conditioner. If the system not working as a normal mode, further maintenance shall be carried out by owner before we start the energy savings project on that particular Air Conditioner (Leaking, loses of refrigerant gas, A/C compressor down, control circuit fault and etc)

d. Recover the old refrigerant gas (R22) from Air Conditioner into empty cylinder, reclaiming, reprocessing & recycling under D.O.E. terms & conditions.

e. Replace the Filter drier/ Filter core & Lubricant Oils if necessary and per customer's request.

f. Purge the A/C System and vacuum the system to the required level.

g. Charging Hydrocarbon refrigerant gas (HC 22a®) into Air Conditioner's Compressor. (Remarks: We assume the A/C system is in good condition without leakage. If there is gas leakage due to minor leaks in evaporator, condenser, gaskets, "O" rings, connecting fittings and metal lines, we strongly recommend implementing our optional leak treatment as it will seal up the system to minimize gas loss**.** However any leakage more severe than hairline cracks may require change of the relevant spare parts that are causing the leakages. **Please note that leak Treatment is exclusive of this project and it is an optional treatment.**)

h. Tune the system to achieve optimum energy savings.

i. Verification data collection completed.

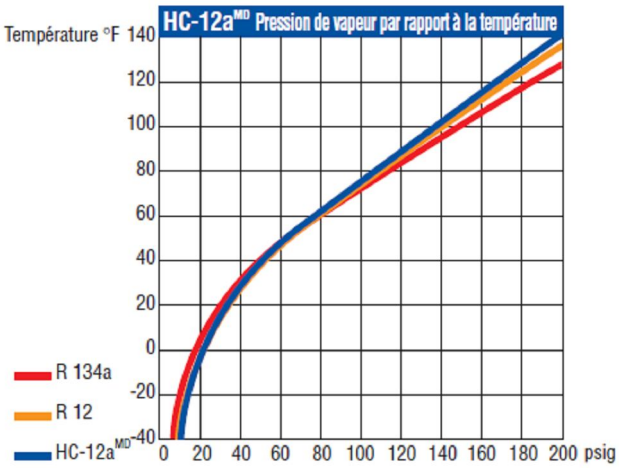
j. Dismantle the portable/power meter after the verification period.

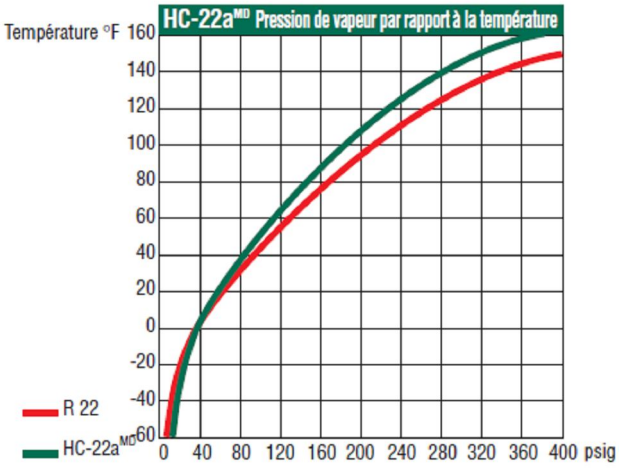
k. Provide project report with computation of saving achieved.

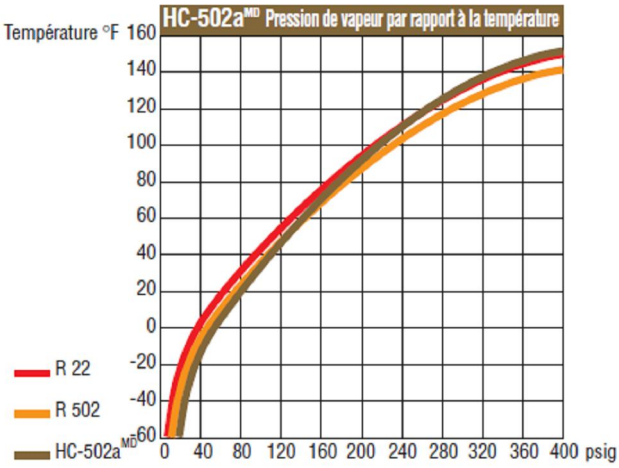
l. Project completion upon acceptance of report finding.

m. Warranty of this product is [6] months with effect from project completion (Only for replacing/ top up refrigerant gas once we found the fault is caused by our mistakes), no warranty coverage on wear & tear factor (Aging factor).

Refrigerant Vapor Pressure Vs Temperature Chart



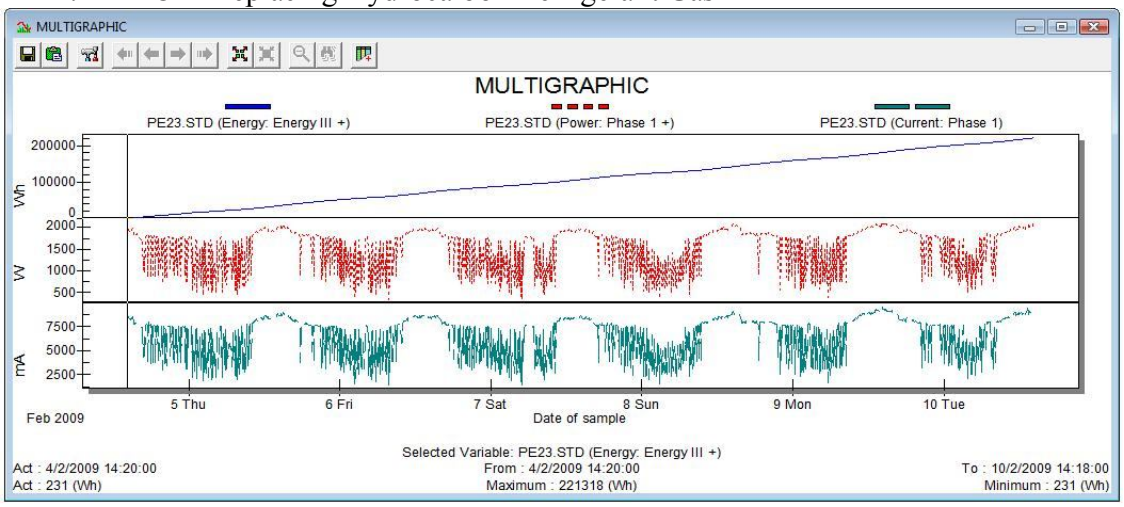



Actual Case Study:

Client**: NatSteel Holdings Pte. Ltd.**
Contact Person: Mr. Akhtar
Address: Kling Road, Singapore
Tel: Private
A/C Name: **PE23 (2HP, MC Quay, 18,000 Btu) Demo Unit**
Existing Refrigerant Gas: **R22 (HCFC)**
New Refrigerant Gas: **Hydrocarbon Refrigerant R22-a (HC)**
Location: Guard House

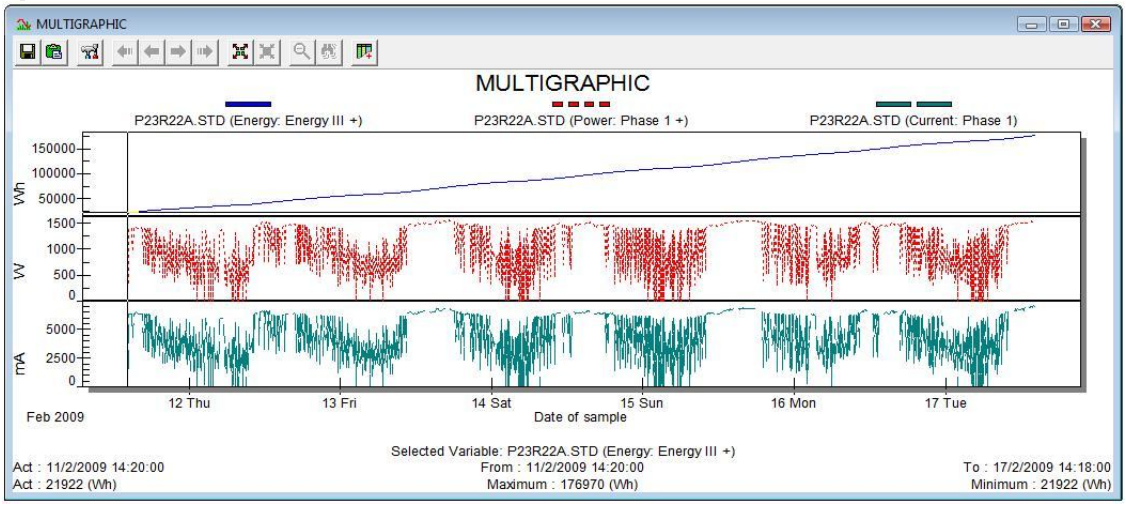
Energy Savings Verification

A. BEFORE replacing Hydrocarbon Refrigerant Gas




Recording Time: 04/02/09 14:20:00 – 10/2/09 14:18:00
Total Power Consumption ($A_1$): 221318Wh – 231Wh = **221087 Wh**

B. AFTER replacing Hydrocarbon Refrigerant Gas




Recording Time: 11/02/09 14:20:00 – 17/02/09 14:18:00
Total Power Consumption ($A_2$): 176970Wh – 21922Wh = **155048 Wh**

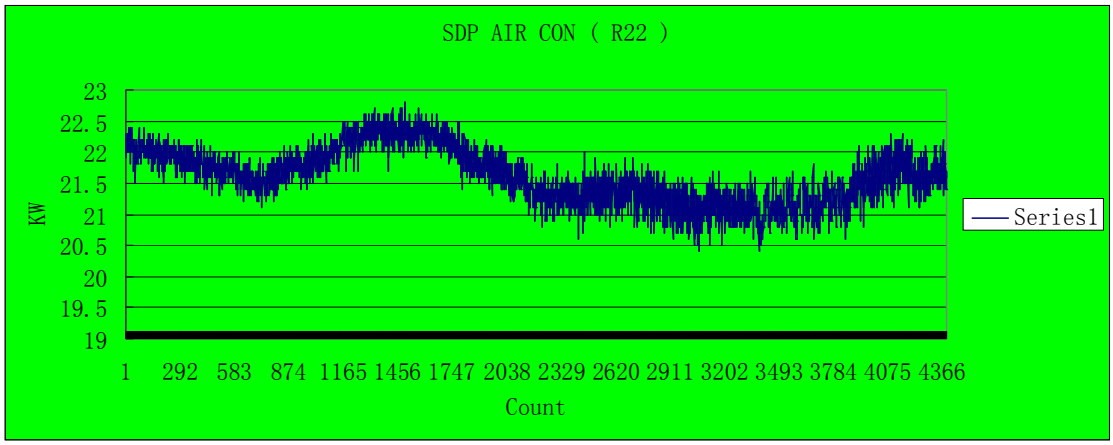
| **PE23 (2HP, MC Quary, 18,000 Btu)** | | |
|---|---|---|
| ***Descriptions*** | **Before Replacing HC Refrigerant** | **After Replacing HC Refrigerant** |
| Date & Time of Recording | 04/02/09 14:20:00 – 10/2/09 14:18:00 | 11/02/09 14:20:00 – 17/02/09 14:18:00 |
| Total Recording Duration | **144** Hours | **144** Hours |
| Refrigerant Weight (kg) | 2.2 | 0.88 |
| A/C Temperature Set Point ($^oC$) | 20 | 20 |
| Outdoor Temperature ($^oC$) while start recording | **NIL** | **NIL** |
| Room Temperature ($^oC$) | 19 - 22 | 19 - 22 |
| Relative Humidity (%RH) | 50-70% | 50-70% |
| Low Side Pressure (PSI) | 60 | 52 |
| High Side Pressure (PSI) | NA | NA |
| kWh Consumption during recording period | **221,087 Wh** | **155,048 Wh** |
| Average hourly Power Consumption (W) | **1,535.33** | **1,076.72** |
| Operating Hour (Hour(s)) | 24 | 24 |
| Operating day | 30 | 30 |
| Savings achievement | (221,087 – 155,048)/ 221,087 = **29.87%** | |
| Monthly Savings (kWh) | (1535.33 – 1076.72)/1000 x 24 x 30 = **330.20 kWh** | |

Client: SDP MANUFACTURING SDN BHD
Contact Person: Mr. Sakirin
Address: 32, Jalan Masyhur Satu, Taman Perindustrian Cemerlang ,81800 Johor Bahru, Johor, Malaysia.
Tel: 07-8618 000, Fax: 07-8618 018
A/C Name: **SDP AC 18 ( 2 x 15HP )**
Existing Refrigerant Gas: **R22 (HCFC)**
New Refrigerant Gas: **Hydrocarbon Refrigerant R22-a (HC)**
Location: Production – Moulding Area

| **SDP AC 18 (2 x 15HP)** | | |
|---|---|---|
| ***Descriptions*** | **Before Replacing HC Refrigerant** | **After Replacing HC Refrigerant** |
| Date & Time of Recording | Start = 07-31-2009 10:33:22 End = 07-31-2009 17:51:40 | Start = 08-02-2009 10:14:42 End = 08-02-2009 16:27:30 |
| Refrigerant Weight (kg) | Sys 1 = 3.18kg<br>Sys 2 = 3.82kg | Sys 1 = 1.4kg<br>Sys 2 = 1.48kg |
| A/C Temperature Set Point ($^{o}$C) | N/A | N/A |
| Outdoor Temperature ($^{o}$C) while start recording | **32** | **32** |
| Air Outlet Temp (Off-Coil) | 22.1 | 19.6 |
| Low Side Pressure (PSI) | Sys 1 = 55 PSI<br>Sys 2 = 52 PSI | Sys 1 = 55 PSI<br>Sys 2 = 56 PSI |
| High Side Pressure (PSI) | Sys 1 = 200 PSI<br>Sys 2 = 210 PSI | Sys 1 = 190 PSI<br>Sys 2 = 200 PSI |
| Average hourly Power Consumption (kW) | **21.61** | **14.97** |
| Power Saved (kW) | **6.64** | |
| Operating Hour (Hour(s)) | 24 | 24 |
| Operating day | 26 | 26 |
| Savings achievement | (21.61 – 14.97)/ 21.61 *100<br>**30.7%** | |
| Monthly Savings (kWh) | 6.64 x 24 x 26 = **4,143.36kWh** | |

Energy Savings Verification

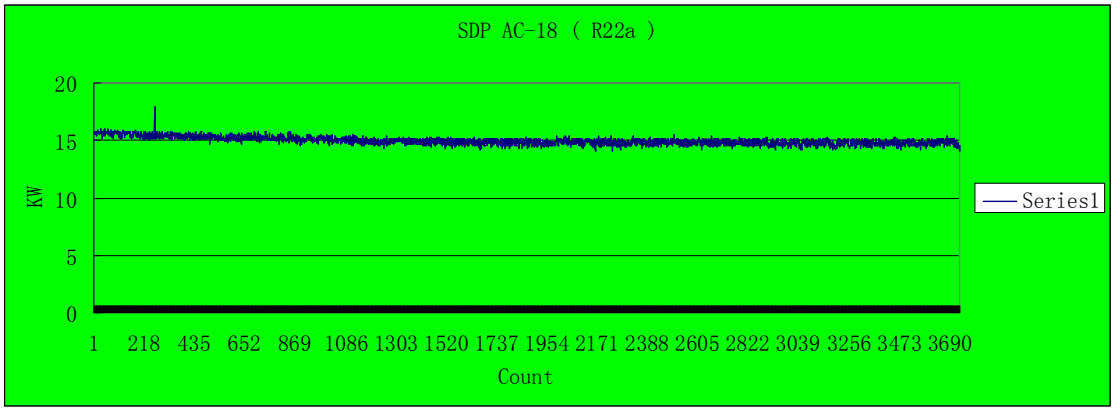
A. BEFORE Conversion ( refer to excel file named: SDP-AC 18 R22 )




Recording Time: Start = 07-31-2009 10:33:22, End = 07-02-2009 17:51:40 (6 Sec Interval)

Average Power ($P_1$): **21.61 kW**

B. AFTER Conversion ( refer to excel file named: SDP-AC 18 R22a )




Recording Time: Start = 08-02-2009 10:14:42, End = 08-02-2009 16:27:30

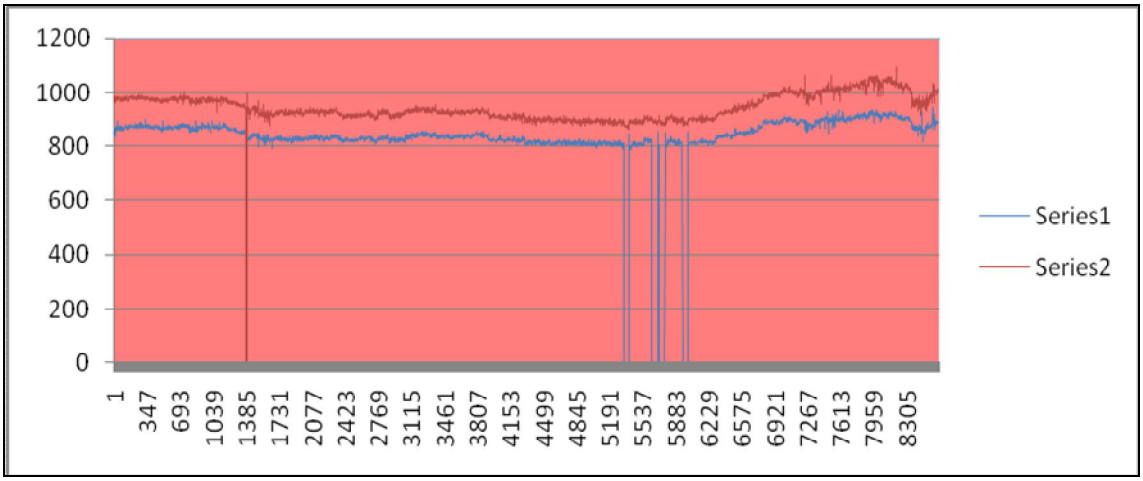
Average Power (P2): **14.97 kW**

**HC R22a VS HCFC R22**
A/C Name: **Acson (1HP)**
Existing Refrigerant Gas: **R22 (HCFC)**
New Refrigerant Gas: **Hydrocarbon Refrigerant 22-a (HC)**
Recorded Period: 30/11/09 14:36:40 to 1/12/09 14:36:40 (24 hour)

| **ACSON ( 1 HP )** | | |
|---|---|---|
| ***Descriptions*** | **HCFC R22 (之前)** | **HC-22a (之后)** |
| Air Conditioner |  |  |
| Refrigerant Weight (kg) | 0.56 | 0.25 |
| A/C Temperature Set Point ($^{o}$C) | 21 | 21 |
| Outdoor Temperature ($^{o}$C) while start recording | **27 - 34** | **27 - 34** |
| Air Outlet Temp (Off-Coil) | 15 - 16 | 15 – 16 |
| Low Side Pressure (PSI) | 80 - 85 | 80 - 85 |
| High Side Pressure (PSI) | N/A | N/A |
| Average Power ( KW ) | **0.949** | **0.834** |
| Power Saved ( KW ) | **0.115** | |
| Operating Hour (Hour(s)) | 8 | 8 |
| Operating day | 26 | 26 |
| Savings achievement 省电 | (0.949 – 0.834)/ 0.949 *100<br>**11.5%** | |
| Monthly Savings (kWh) | 0.115 x 8 x 26 = **23.92kWh** | |

Energy Savings Verification

HC-22a vs HCFC R22

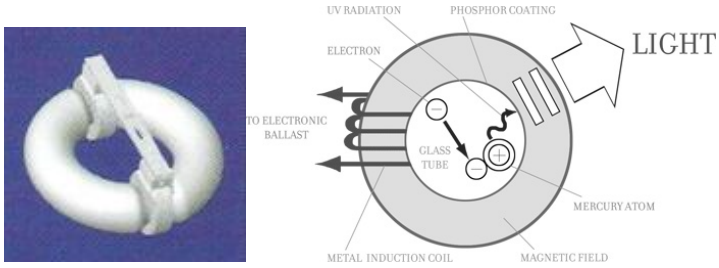



Series 1 – HC-22a (Average KW = 0.834KW)
Series 2 – HCFC R22 (Average KW = 0.949KW)

# APPENDIX II

# LVD Induction Lamp

**LVD Induction Lamp**




Whatever aspect of lighting that you prioritize, LVD induction lamps are superior in many categories. Energy efficiency, life, colour rendition, lumen depreciation, waste/heat output, glare... the list goes on. LVD lamps are truly the next generation of electric light that is set to displace several existing forms of electric lighting.

Below we have listed most of the benefits of LVD lamps. It is not an all encompassing list but you will see that they are the superior choice for many applications.

| **LVD Induction Lamp Features** |
|---|
| Patented IC controlled electronic ballast |
| No electrodes or filaments, external ferrite coils |
| Wide voltage (120-277V, 12/24DC) / wattage range (15W - 200W) |
| Available color temperatures: 2700K, 3500K, 4100K, 5000K, 6500K |
| Excellent Lumen Maintenance over life |
| Low EMC interference frequency of 210kHz |
| Reliable ignition at -35°C |
| Color Rendition, CRI 82 with no shifting over life |
| High Luminous Efficacy, 80 lm/W |
| Low Total Harmonic Distortion (THD) 2.7% |
| Superb Efficient Power Factor of 0.99 |

| **LVD Induction Lamp Advantages Over Other Light Sources** | |
|---|---|
| **LVD vs Bubble (Internal Coil) Induction** | **LVD vs Metal Halide Lamps (MHL)** |
| Longer life at extreme temperatures | Instant on / re-strike |
| Dimmable (now in testing) | 5-10x longer life than Metal Halide Lamps |
| Higher Light Output - 80 lm/W vs 60lm/W | No flickering, strobing and much less glare |
| Lower Frequency - 210kHz vs. 2.65Mhz | Lower Maintenance Costs |

| | |
|---|---|
| Greater range of wattages available<br>More color temperatures available<br>Frequent switching - no affect on life | Better Color Characteristics - 82 CRI vs. 65-75<br>Lower Min. Start Temp -35°F vs. -20°F<br>Less Heat Output - Reduces cooling costs<br>Higher Lumen Maintenance - 70%@60,000 hrs.<br>MHL 65%@mean life (4000-8000 hrs.)<br>CMH 80%@mean life (3600-8000 hrs.) |
| **LVD vs Fluorescent Lamps**<br><br>Longer life - 100,000 hours<br>Similar energy efficiency of T8 & T5 HO<br>No flickering or strobing<br>Size - LVD Venus more lumens than CFL<br>No Electrodes - no on/off impact on life<br>Low Maintenance - 1 LVD lasts as long as:<br>8 HO replacements<br>6 T8 replacements | **LVD vs Incandescent Lamps**<br><br>20x the rated life<br>Clearly better energy efficiency<br><br>Less glare<br>Less heat and CO2 output |

| **LVD Induction Lamp Benefits** |
|---|
| **Low Total Cost of Ownership**<br><br>**Less Energy**<br>70% energy cost savings vs. HID lamps, similar to new high energy saving fluorescent lamps<br>Low heat output reduces electric cooling costs<br>Electronic IC ballast allows dimming (coming soon) which lowers energy consumption<br><br>**Less Maintenance**<br>Longer life means reduced re-lamping costs - In some cases zero maintenance<br>Great for hard to reach and busy areas like tunnels, roads, high-bay areas<br>High and low operating temperature good for emergency use and extreme climates<br><br>**Better Health, Safety & Environment**<br>No flicker and less glare provides maximum eyesight protection<br>Crisp White Light, choice of color temperatures - Increases safety, productivity & performance<br>Outstanding Color Performance - no shift over lamp life<br>Less CO2 output and mercury waste to dispose |

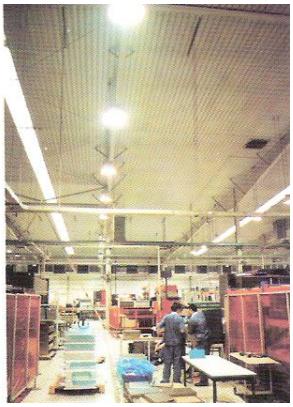
## Certificates


## Comparison Chart

| Comparison | LVD | Metal Halide | HP Vapor Lamp |
|---|---|---|---|
| Warranty | 5 years | None | None |
| Life Span | 60,000 – 100,000 Hrs | 6,000 – 20,000 Hrs | 24,000 Hrs |
| Energy savings | Yes | No | No |
| Luminance Efficiency | 150 Plm/W | 110-140 Plm/W | 90 Plm/W |
| Lumen Depreciation | 5% (2000Hrs) | 40% (2000 Hrs) | 30% (2000 Hrs) |

Case Study:

Before



After

| **Description** | **Traditional Lighting System** | **LVD Lighting System** |
|---|---|---|
| Product | Metal Halide Bulb | LVD Induction Lamp |
| Wattage | 400W | 200W |
| Actual Consumption | 460W | 210W |
| Luminance | 373 Lux | 510 Lux |
| Effectiveness | Low, High Depreciation | High, Less Depreciation, True Colour |
| Life Span | 8,000 Hours (About 1 Year) | 100,000 Hours (10 Years) 10 times longer |
| Quantity Changed | 274 sets | 274 sets |
| Energy Saved | Direct Saving = (460 W - 210 W) x 274 = 68,500W<br>Saving per day = 24 x 68,500W = 1,644 kWh<br>Saving per year = 600,060 kWh = RM 140,414.04<br>10 Year saves up to 6 million kWh = RM 1,404,140.40 | |
| Related Money Saving | 10 years Maintenance Free (10 x RM100.00 x 274 sets = RM 274,000.00) | |
| Conclusion | Energy Saved up to 50% and above, Extra 37% Brightness, High Luminance Maintenance | |

> 35% POWER SAVINGS

# ozlux™

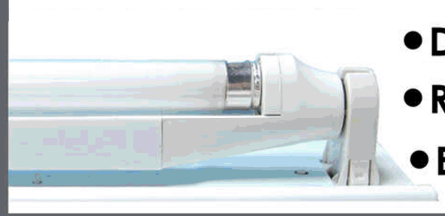
## ENERGY SAVING FLUORESCENT TUBES

| Characteristics | Normal Fluorescent Lamp | T5 Electronic Ballast Lamp |
|---|---|---|
| Rated Power | 36 Watt | 25 Watt |
| Actual Power Consumption | 43.5 Watt | 25.5 Watt |
| Savings per T5 Lamp | 18 Watt | |
| Savings In terms of RM (12 hrs x 30 days) | RM 2.89 / months / tube | |
| Savings In terms of RM (24 hrs x 30 days) | RM 5.78 / months / tube | |
| Life Span | 12k to 13k Hours | 20,000 hours |
| Total RM Saved per tubes after 20,000 hours | No | RM160.56 |

**Based on RM0.446 / kwh & Actual tested in Ener-Save Sdn. Bhd**

save RM160.56 per tube

MORE EFFICIENT
LESS ENERGY

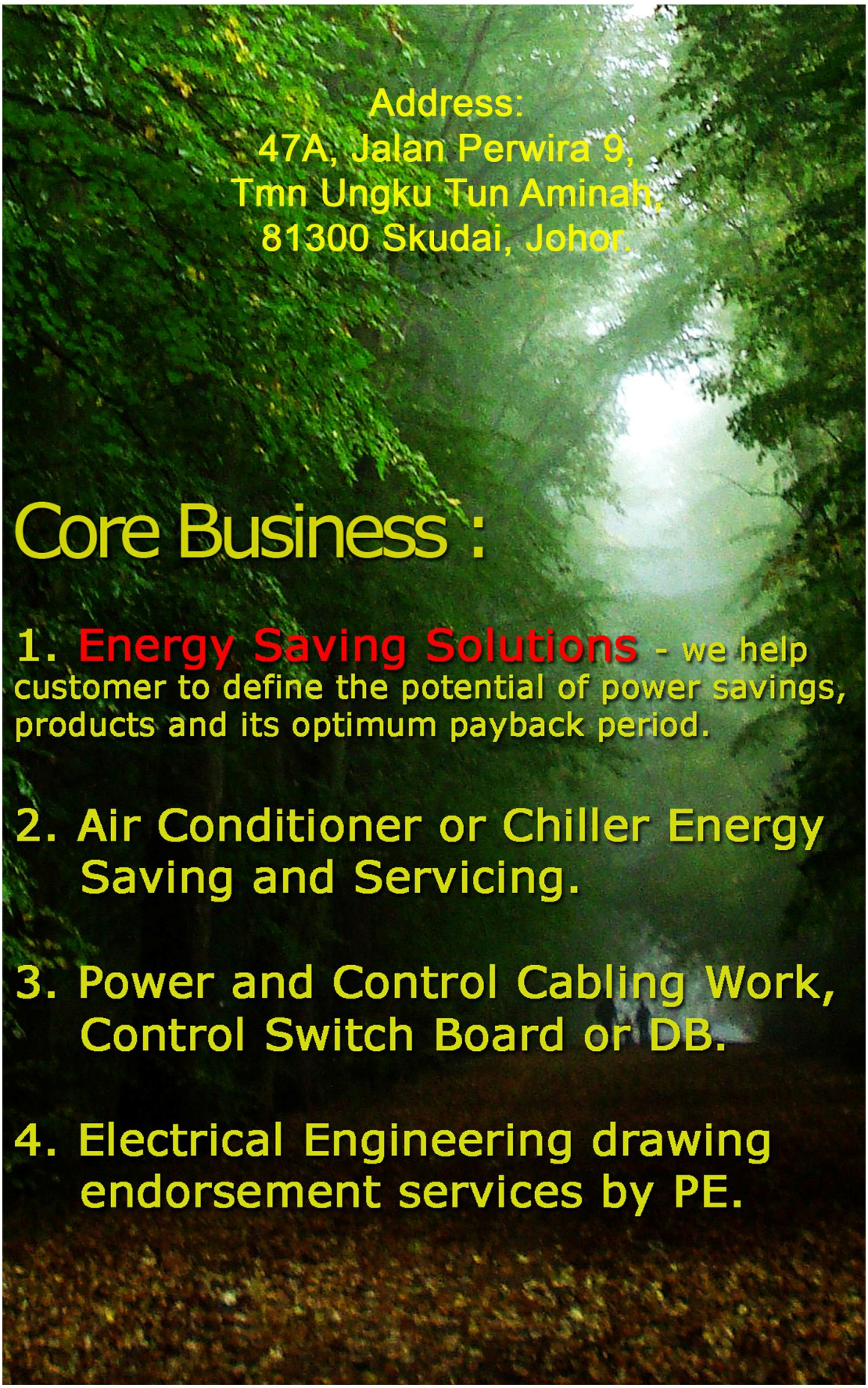


- DIRECT RETRO-FIT
- REPLACEABLE T5 TUBE
- EASY REPLACEMENT

**ENER-SAVE SDN. BHD** (661220-A)
No. 47A, Jalan Perwira 9,
Taman Ungku Tun Aminah,
81300 Skudai, Johor,
Malaysia

H/P : 012-7792669(Ng) / 012-4315573(Felix)
Tel : +607-557 2669
Fax : +607-558 2669
Web Site : www.ener-save.biz

Switch with us to GREEN


Address:
47A, Jalan Perwira 9,
Tmn Ungku Tun Aminah,
81300 Skudai, Johor.
Core Business :
1. Energy Saving Solutions - we help customer to define the potential of power savings, products and its optimum payback period.
2. Air Conditioner or Chiller Energy Saving and Servicing.
3. Power and Control Cabling Work, Control Switch Board or DB.
4. Electrical Engineering drawing endorsement services by PE.