

## Energy Efficiency National Partnership Awards 2013

### **About the EENP:**

1 The National Environment Agency (NEA), Energy Market Authority (EMA) and the Economic Development Board (EDB) came together to launch the Energy Efficiency National Partnership (EENP) programme on 29 April 2010. It is a voluntary partnership for companies that wish to be more energy efficient, thereby enhancing their long-term business competitiveness and reducing their carbon footprint. The EENP aims to support companies especially those affected by the Energy Conservation Act (ECA), in their energy efficiency efforts through learning network activities, provision of energy efficiency-related resources, incentives, and recognition. To complement the ECA and to support the EENP, NEA has launch an Energy Efficiency Programme Centre (EEPC) as a one-stop resource to assist companies who may need help with implementing the ECA, adopting best practices in energy efficiency, and integrating energy efficiency as a strategic management tool.

### **About the EENP Awards:**

2 The EENP Awards, organised by the NEA, EMA and the EDB, aims to foster a culture of sustained energy efficiency improvement in Singapore, in particular within the major energy consuming industries. The EENP Awards also aims to encourage companies to adopt a proactive approach towards energy management by identifying and sharing best practices for companies to emulate. There are three award categories for the industry and one commendation for the public sector. They are:

#### Three categories for companies

- i. Excellence in Energy Management,
- ii. Best Practices
- iii. Outstanding Energy Manager of the Year

#### Commendation for Best Energy Efficiency Practices in the Public Sector

- i. Large Building
- ii. School

## Energy Efficiency National Partnership Award 2013 Recipients

### 1. Award Recipients in the Category of “Excellence in Energy Management”

This award recognises companies that have demonstrated a high level of commitment to excellence in energy management. The four award recipients under this category are:

- Asia Pacific Breweries (Singapore) Pte Ltd
- Eastman Chemical Singapore Pte Ltd
- GLOBALFOUNDRIES Singapore Pte Ltd
- Nestlé Singapore Pte Ltd (Jurong Factory)

### 2. Award Recipients in the Category of “Best Practices”

This award recognises corporate teams whose implementation of energy efficiency projects have led to improvements in the energy performance of their facilities. The six recipients are:

#### *Best Practices*

- EXXONMOBIL Chemical Operations Pte Ltd
- GlaxoSmithKline Vaccines
- United Microelectronics Corporation (Singapore Branch)

#### *Best Practices (Honourable Mentions)*

- Ascendas Funds Management (S) Limited (Manager of Ascendas REIT)
- Asia Pacific Breweries (Singapore) Pte Ltd
- Singapore Oxygen Air Liquide Pte Ltd

### 3. Award Recipients in the Category of “Outstanding Energy Manager of the Year”

This award recognises outstanding Energy Managers (EMs) within the organisation who have demonstrated leadership in driving energy efficiency improvements across the organisation, and who have played an instrumental role in promoting energy efficiency initiatives within the organisation. The award recipients under this category are:

- Mr Quah Han Song – Infineon Technologies Asia Pacific Pte Ltd
- Mr Muthusamy Ravichandran – Nestlé Singapore Pte Ltd

### 4. Award Recipients in the Commendation for “Best Energy Efficiency Practices in the Public Sector”

In addition, the commendation for “Best Energy Efficiency Practices in the Public Sector” was presented to six public sector agencies. This commendation recognises outstanding public sector agencies that have demonstrated exemplary performance and commitment to energy management efforts and have been proactive in implementing energy efficiency improvements. The award recipients under this category are:

#### *Large Building*

- Health Promotion Board
- Housing Development Board
- Ministry of the Environment and Water Resources

#### *School*

- Balestier Hill Primary School
- Tampines North Primary School
- Chong Boon Secondary School

## Energy Efficiency National Partnership Award 2013 Recipients

The National Energy Efficiency Award winners represent a wide range of industries including pharmaceutical, food manufacturing, energy, chemicals and water including APB, Eastman Chemical, ExxonMobil and Nestlé. All have either demonstrated their commitment to excellence in energy management or achieved significant energy savings through the implementation of innovative energy management systems with some companies achieving both. The following section outlines each winner's achievements.

### 1. Award Category: Excellence in Energy Management

This recognises companies that have demonstrated their commitment to excellence in energy management.

#### Asia Pacific Breweries (Singapore) Pte Ltd

In 2002, Asia Pacific Breweries (APB) Limited and its breweries embarked on an energy efficiency programme, "Aware of Energy", which aims to reduce specific energy consumption and carbon dioxide emissions. To establish APB Singapore as a "Green Brewer", a target was set for 2014 to reduce thermal energy and electricity by 13%. Current initiatives ensure continuous and thorough process optimisation and waste reduction. Some of the training capabilities APB has implemented include: participation in the Sustainability Academy where employees can learn more about "Brewing a Better Future", dedication of a pool of energy champions to drive energy saving initiatives and participation in the regional Energy Champion Workshop to build new knowledge and promote sharing.

APB's "Energy Saving Programme" (ESP) was launched in 2009, and three objectives were set. These objectives are achieved through ongoing collection and exchanges of Good Practices, internal and external bench-marking and implementations of improvements driven by TPM (Total Production Management) deployment. In all, this is part of APB's mission towards achieving excellent energy management.

#### Eastman Chemical Singapore Pte Ltd

Eastman Chemical has an energy policy implemented which continuously improves energy efficiency and minimise overall energy impact while contributing to regulatory compliance. Eastman Chemical also has short-term to medium-term goals for energy saving in place. In addition, Eastman Chemical has several Training & Capability Building implementations, including an Energy Management and Conservation (ENMCON) energy team, comprising members from different departments to support the overall management of energy in the business. Eastman has also developed a strong energy efficiency culture among its employees through various initiatives such as organising energy efficiency awareness training for all employees and encouraging employees to make a pledge to make a small change in the workplace or at home to save energy. Evidence of the strong EE culture in Eastman can be seen from the high participation rate among Eastman employees for the energy pledge.

Since the start of operations 15 years ago, Eastman Chemical has embarked on several energy efficiency (EE) improvement projects to achieve sustained energy performance. These EE Improvement Projects are consistently implemented to help reduce the overall energy-to-product ratio.

#### GLOBALFOUNDRIES Singapore Pte Ltd

GLOBALFOUNDRIES seeks to continuously improve the energy efficiency of its

manufacturing operations. This process is driven by a cross-functional energy management team which focuses on improving loads optimisation and converting low energy efficiency to high energy efficiency system across all fabs in Singapore. Implemented in 2010, the team's goal is to achieve a 15% energy reduction across GLOBALFOUNDRIES in Singapore by 2013.

Regarding longer-term training and capability building, GLOBALFOUNDRIES has engaged a consultant to conduct workshops on energy efficiency improvement and this is open to all energy management team members. In addition there is a high level of employee engagement to increase the level of EE awareness in the company. For example, EE achievements are shared with all employees through the company newsletter. Further, they have also implemented several key energy improvement projects and savings such as the retrofitting of conventional lighting to LED and the optimisation of facilities infrastructure system to reduce utilities supply to production tools and processes.

#### **Nestlé Singapore Pte Ltd**

The energy policy at Nestlé is to continuously improve environmental efficiency. Nestlé aims to use the most efficient technologies and apply best practices to further optimise energy use, and control and eliminate emissions. Although Nestlé's target is to achieve energy savings of 2% year-on-year, they have been consistently achieving energy savings of more than 5% for the past 3 years. To create an energy saving culture, the Nestlé Jurong factory designed and implemented a 10 point-plan for education, training and capability building. In addition they have various energy saving projects and an Energy Task Force (ETF), who is responsible for identifying and implementing energy saving projects, as well as managing and sustaining energy savings in the company to achieve and exceed their target.

The Malt extract plant at Nestlé Jurong factory is the best-in-class in terms of energy usage (i.e. lowest in production cost and energy consumption). The Nestlé Jurong factory is also the best performer among the Singapore and Malaysia factories, in terms of energy saving projects.

## **2. Award Category: "Best Practices"**

This recognises corporate teams that have implemented energy efficiency projects which have led to improvements in the energy performance of their facilities.

#### **Exxonmobil Chemical Operations Pte Ltd**

*Project Title: Model Predictive Control (MPC) to Optimise Concurrent Refrigeration and Re-heating of Ethylene and Propylene Storage Systems*

Ethylene and propylene are stored in refrigerated state in storage tanks. A significant amount of energy is consumed in refrigeration of these products for storage and then re-heating them to supply to customers. The MPC control minimises rundown to the storage tanks through the refrigeration circuit of ethylene and propylene. At the same time it reduces the re-heating energy through making up from the tank via maximising draw off from the producing-unit directly.

The project was implemented with minimal incremental cost with no new capital being employed. It resulted in annual energy savings of about 3.2%, equivalent to 38,000 Million BTUs.

#### **GlaxoSmithKline Vaccines**

*Project Title: Installation of Tri-Generation Plant and Downsizing of Boilers*

The plant's energy team carefully studied its utility systems and demands for various utilities and thereafter implemented this project on installation of tri-generation plant and downsizing of boilers to improve efficiency and reduce energy consumption. The new system consists of the following components:

- A gas engine which uses a highly efficient electricity generation technology to generate 1.8MWh electricity
- A waste heat recovery boiler to generate 1.17 t/h of steam at 9 barg from engine high-grade exhaust gas.
- An absorption chiller to recover waste heat from the gas engine jacket to produce chilled water
- An economiser to produce 350kW hot water from the low-grade exhaust heat
- A 5-tonne high efficiency boiler (with turndown ratio of 10) to supplement the steam production from the tri-generation system.

This project has reduced the total energy required to generate steam and electricity for GlaxoSmithKline's (GSK) plant. The project resulted in an annual energy savings of 8,800MWh, which is equivalent to 9% of GSK's total energy consumption. The payback of the project is about 6 years.

#### **United Microelectronics Corporation (Singapore Branch)**

*Project Title: Replacement of Compressor-Based Chillers with Point-of-Use chillers*

United Microelectronics Corporation (UMC) uses compressor based process chillers to regulate the temperature of sensitive wafer fabrication tools. Compressor-based Temperature Control Units (TCUs) comprise compressors with integral heaters. These TCUs supply water at a finely controlled temperature to regulate the temperature of the wafer fabrication tools, which are required to be maintained at different temperatures. These compressor-based TCUs are required to be operated continuously, leading to high energy consumption. To reduce energy consumption of the process chillers, UMC replaced 40 of its existing compressor-based chillers with Noah solid-state point-of-use (POU) chillers. The solid-state POU chillers make use of the thermoelectric effect to act as a heat pump to deliver heating or cooling on demand resulting in energy savings.

This has led to a reduction in energy consumption by 89%. The project resulted in an annual energy savings of 1,880 MWh or \$383,000.

#### **Best Practices (Honourable Mention)**

##### **Ascendas Funds Management (S) Limited (Manager of Ascendas REIT)**

*Project Title: Replacement of Chillers for Acer Building*

An energy audit conducted by an accredited energy services company found the existing air-cooled chiller system in the Acer Building to be operating at 1.79kW/RT, which was inefficient. This project involved the replacement of 6 sets of 200RT air-cooled chillers, with 3 sets of 500RT water-cooled chillers. The existing Building Management System was also upgraded to improve the monitoring and control of system performance and energy use.

The project has improved the chiller plant efficiency from 1.79kW/RT to 0.54 kW/RT. The reduction in energy consumption represented a 70% savings on a system level and a 45% savings in the landlord's total energy consumption. This is equivalent to about an annual energy savings of 2,035MWh and net utilities cost savings of about \$0.42 million a year.

##### **Asia Pacific Breweries (Singapore) Pte Ltd**

*Project Title: Recovery of Waste Heat from Wort Boiling Process*

Wort boiling is an essential part of the brewing process to produce the desired product quality and characteristics. The objective of this project was to recover the heat energy present in the evaporated steam during this process which would otherwise be discharged into the atmosphere. The heat energy in the evaporated steam was recovered and indirectly transferred using a plate heat exchanger to preheat the wort for the next production batch as well as to produce hot water for general cleaning purposes.

This project reduced the steam energy usage in the wort boiling process by 40% which is equivalent to an annual energy savings of \$190,000 or 12 terajoules. The payback period for this project is about 5 years.

**Singapore Oxygen Air Liquide Pte Ltd**

*Project Title: Nitrogen Compressor Optimisation*

This project involved the construction of an inter-connecting nitrogen (N<sub>2</sub>) gas pipeline to enable an optimised utilisation of existing compressors via an improved mapping to pressure and load profile of for the N<sub>2</sub> network.

With the investment amounting to \$1.5 million for this project, the project resulted in significant energy efficiency improvement of the nitrogen compression system which is equivalent to an annual energy savings of about 8,400MWh and net utilities cost savings of about \$2 million a year.

**3. Award Category: “Outstanding Energy Managers of the Year”**

This recognises outstanding Energy Managers who have demonstrated leadership in driving energy efficiency improvement across the organisation, and played an instrumental role in promoting energy efficiency initiatives within the organisation.

**Mr. Quah Han Song,**  
*Senior Facilities Engineer,*  
*Infineon Technologies Asia Pacific Pte Ltd*

Mr Quah Han Song is a dedicated and enthusiastic energy manager. His role is to identify equipment utilising significant amounts of energy in the plant, their effective energy usage and to propose and implement measures to mitigate the large energy consumption. He also leads the energy management team in Infineon to discuss energy reduction measures across all functions. To raise awareness in energy efficiency, he regularly conducts meetings and workshops on energy management to cater to different function groups.

Under his leadership, the energy management team aims to reduce the energy consumption of the company by 10% from FY 2011/2012 levels by the end of 2013.

**Mr Muthusamy Ravichandran**  
*Factory Engineer and Energy Manager*  
*Nestlé Singapore Pte Ltd*

Mr Muthusamy Ravichandran is overall in-charge of the energy management system for Nestlé. As the energy manager, he leads the plant’s ENERGY TASK FORCE (ETF) to conduct energy audits, identify energy-saving opportunities and source for funding to

implement the identified energy-saving projects. He has also initiated the Energy Savings Project Bank (a compilation of energy efficiency improvement projects) to support the plant's energy savings roadmap for 2013 to 2017. To cultivate an energy-saving culture in Nestlé, he also introduced an Energy Efficiency Awareness Campaign comprising of the 10 point improvement plan for education, training and capability building.

Together with the effort of the Energy Task Force Team, Nestlé has successfully reduced its energy consumption per unit production by 30% between 2005 to 2012

#### **4. Award Category: Best Energy Efficiency Practices in the Public Sector**

Recognises outstanding public sector agencies that have demonstrated exemplary commitment in adopting good energy efficiency practices and have been proactive in implementing energy efficiency improvement measures for their buildings. There are two categories: a) Large building and b) School.

##### **Large Building**

###### **Health Promotion Board**

Health Promotion Board's (HPB) Estate & Facilities team embarked on a programme in 2011 to achieve Green Mark Certification through the adoption of the Guaranteed Energy Savings Performance (GESP) contract. It implemented several building cost optimisation initiatives such as the replacement of three chillers with energy efficient variable speed driver (VSD) chillers, installing efficient LED light tubes at offices and car parks and so on. The team also looked at other ways to reduce energy consumption, including upgrading all the Fan Coil Units (FCUs) to higher energy efficient models and replaced the cooling coils of the Air Handling Units (AHU).

The collective efforts have delivered substantial energy savings. An average of 13% reduction in electricity consumption (or 400MWh) was achieved for the first six month since the commencement of the GESP contract.

###### **Housing Development Board**

Connection ONE is a commercial complex under the Housing & Development Board (HDB). Under the guidance of their Environmental Policy, HDB embarked on an energy conservation strategy in 2011 for Connection ONE. A series of energy conservation measures were implemented since 2011, including retrofitting the chilled-water plant, replacing light fittings and signage boards with LED lights, retrofitting 13 high-rise lifts to use AC VVVF motors with energy regenerative and sleep-mode functions, among others.

Since the implementation of the energy saving measures, an average of 10% in energy reduction from year 2012 baseline was achieved by Connection One. With 800MWh of electricity saved in the first six month since the commencement of the GESP contract, Connection One is on track to hit its target of 1,500 MWh of energy savings per annum.

###### **Ministry of the Environment and Water Resources**

ENV Building efforts include retrofitting the office lighting system with LED light tubes, replacement of general lighting using similar LED technology, chilled-water plant, sensor-operated carpark and staircase lighting systems, temperature and CO sensor-operated carpark ventilation and general system optimisation of operational parameters. Green Practice requirements were also incorporated into procurement of goods and services, such as specifying Green Labelled products and like-minded "green" service providers with ISO 14001 or similar certification.

Since 2005, the air-conditioned space has increased by 4% and occupancy headcount increased by more than 30% from 2005 to 2012. However, ENV Building's overall energy usage was reduced from 734 MWh/month in 2002 to 606 MWh/month in 2013.

## **School**

### **Balestier Hill Primary School**

Balestier Hill Primary's Economic Drive framework focuses on 3 pillars: 1) Creative ideas, 2) Education and 3) Stakeholders' Involvement. Ideas are welcomed and evaluated, agreed upon and briefed to all staff for implementation. The school also leverages specific lessons during curriculum and co-curriculum (CCA) to infuse environmental conservation habits to the pupils.

The school had set a target saving of 12% reduction from 2011 baseline focusing on air-conditioners and lightings usage control. BHPS has also received several national awards in past years and achieved significant energy reductions of 20% or 122 MWh between 2010 and 2012.

### **Tampines North Primary School**

The school adopts a three-pronged collective approach in energy management, which comprises 1) Infusion into School Operations, Informal and Formal curriculum, 2) Building Capacity and 3) Collaboration with Strategic Partners. The school also works with its Managing Agent in its estate management to leverage natural lighting and ventilation and implemented a slew of initiatives to reduce the school's energy consumption.

Tampines North Primary has achieved energy reductions of 10% or 73 MWh between 2010 and 2012 as well as received various building awards from BCA and Singapore Environment Council for its energy conservation efforts.

### **Chong Boon Secondary School**

The school adopted the framework, the 'Head, Hand and Heart' approach, to ensure a 3-stage implementation process for Environmental Education. The processes are: 1) educate on environment awareness through the curriculum and co-curriculum (Head); 2) act and practise green lifestyle (Hand); 3) and embrace and champion the green lifestyle (Heart). As part of the school's energy conservation programme, the school also installed energy-saving products and tapped on renewable energy.

Chong Boon Secondary managed to achieve energy reductions of 3.25% or 21 MWh between 2010 and 2012 despite an increase in staff.