

E² Singapore



E² Singapore

Foreword

Climate change is one of the major environmental challenges of our time. It is a global challenge which requires concerted international action. The onus is also on individual countries to find appropriate measures to tackle the problem.

The burning of fossil fuels to generate energy has been identified as a major contributor of greenhouse gases which leads to climate change. As a responsible member of the international community, Singapore can do its part by promoting energy efficiency and energy conservation.

By leveraging on innovative ideas and technologies in energy efficiency and conservation, we can help to address climate change and save significant sums of money in the long run, without any loss in living comfort. It is a practical and cost-effective means of mitigating carbon dioxide emissions while sustaining economic development.

Singapore has a good track record in safeguarding our environment, and we will continue to actively pursue policies and measures to improve energy efficiency in the major sectors of energy use, namely power generation, industry, transport, buildings and households.

As part of the national drive to improve energy efficiency, a multi-agency committee known as the Energy Efficiency Programme Office (E²PO) has been set up. Led by the National Environment Agency, E²PO will integrate the overall efforts of the public, private and people sectors to improve energy efficiency. E²PO will also invest in and be supported by research & development capabilities to enhance our energy efficiency efforts.

This publication, E² Singapore, is a compendium of the current measures and some of the future plans for our various sectors, to mitigate carbon emissions and improve energy use.

For this endeavour to succeed, every sector, every company, every institution and every person, will need to play its part. As an energy efficient nation, Singapore can make a contribution to global efforts to reduce global warming and mitigate climate change.

Dr Yaacob Ibrahim

Minister for the Environment and Water Resources
Singapore

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The Energy Efficiency Revolution

To help actions on climate change in the world, the National Environment Agency (NEA) is committed to improve energy efficiency in Singapore. We are leading a whole-of-government approach and have formed the Energy Efficiency Programme Office (E²PO) to coordinate the drive towards an energy efficient Singapore.

Why is energy efficiency important? The world needs to mitigate global CO₂ emissions to slow and then stop climate change. According to the International Energy Agency's World Energy Outlook Report for 2006, energy efficiency can reduce projected CO₂ emissions by more than 60% by 2030.

What stands in the way? While investments must be made for this change, this can be done with relatively short payback periods. However, energy efficiency measures may not be implemented due to market barriers such as the lack of information and capability. Our E²PO will study these and other obstacles and how they can be effectively overcome.

An energy efficiency revolution is already happening - automobiles, lighting and green buildings are the more evident examples. Many countries are seeking to leapfrog ahead in energy efficiency. They know that excessive energy demand can adversely affect both the global environment and economic growth.

As an open economy with no natural resources, Singapore is vulnerable to rising energy costs, which can affect our economic competitiveness. It is therefore crucial that we take steps to improve our energy efficiency to be more resilient.

Singapore has excelled in other areas of efficiency, delivering greater utility and enhanced services by combining more advanced technologies and better business models. We must adopt a similar approach and boost our efforts for energy efficiency. We can then deliver more utility, reliability, convenience and comfort but at substantially higher levels of energy efficiency.

Let's do more with less. Let's be inspired, innovative and energy efficient, so that we can be more resilient and do our part for the global environment and climate change.

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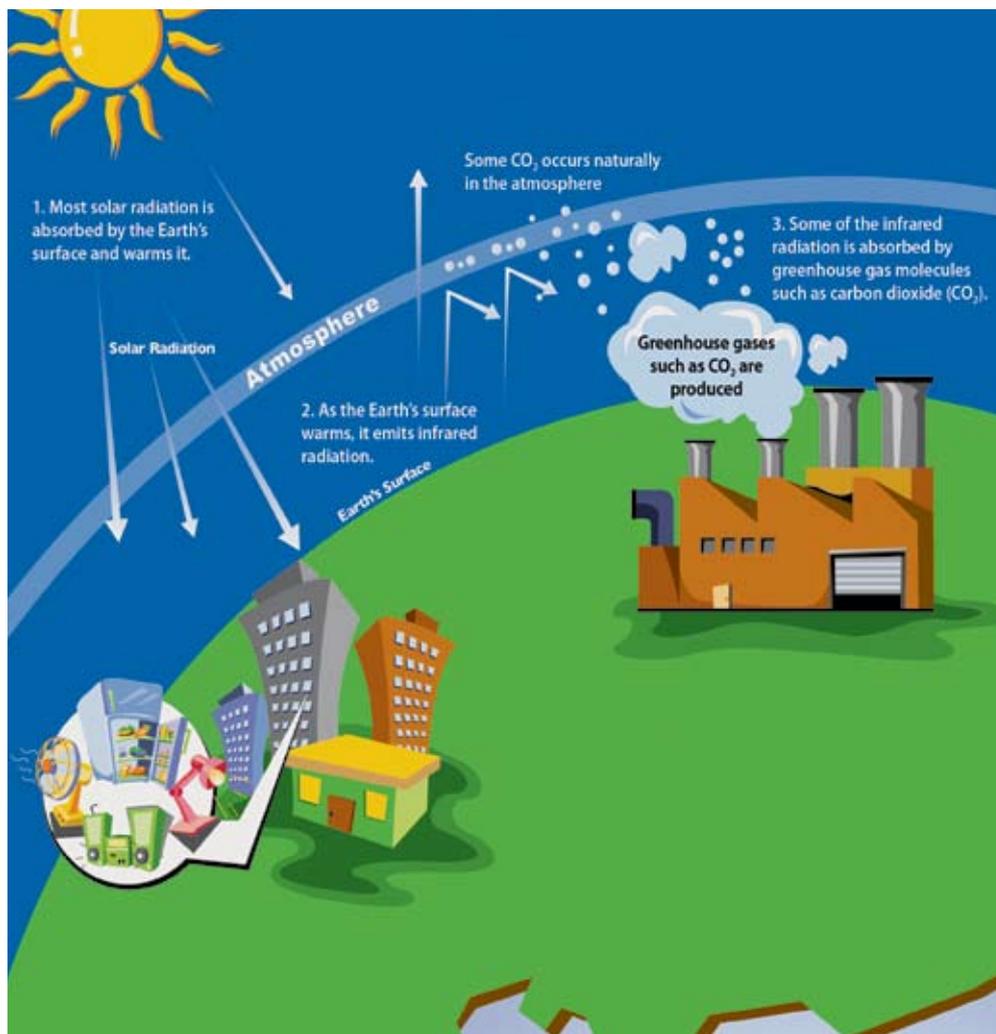
CLIMATE CHANGE AND WHAT WE CAN DO?

Climate change is one of the most critical global environmental challenges of our time. Recent events have emphatically demonstrated mankind's growing vulnerability to climate change.

There is a general consensus amongst scientists and governments that our climate is changing at an unprecedented rate, and that it is largely caused by greenhouse gas emissions from human activities. Many studies indicate that a higher concentration of greenhouse gases (GHGs) in the atmosphere, particularly carbon dioxide, is the primary cause of global warming that is driving climate change.

THE EFFECT OF GREENHOUSE GASES ON GLOBAL WARMING

Greenhouse gases refer to gases in the atmosphere such as carbon dioxide and methane that absorb the infrared radiation from the sun and warm the lower atmosphere. A certain level of greenhouse gases is necessary to maintain the temperatures at which life on earth can exist. However, the rapid increase in the atmospheric concentration of carbon dioxide since the onset of the industrial revolution has caused the earth to warm beyond these levels, leading to a rise in sea levels (from thermal expansion and melting of polar ice caps and glaciers) and various effects on the global climate.



HOW CAN WE ADDRESS CLIMATE CHANGE?

Climate change is a global phenomenon and as an island state, Singapore is not spared from the effects of climate change such as warming temperatures and rising sea levels. NEA has commissioned a vulnerability study in consultation with other government agencies to study the possible effects and impacts of climate change on Singapore.

In Singapore, the primary greenhouse gas from human activities is carbon dioxide that is released when fossil fuels such as oil and gas are burnt to meet our energy needs. Our energy demand is expected to grow in the future due to an expanding economy and a growing population. Much of this growing energy demand could be avoided if we use energy more efficiently instead of increasing energy production. Energy efficiency is therefore an important strategy to reduce our GHG emissions.

In addition to mitigating climate change, there are many benefits to energy efficiency:

- **ENHANCING OUR AIR QUALITY**

In addition to greenhouse gas emissions, the burning of fossil fuels also generates air pollutants such as sulphur dioxide and particulate matter. By adopting more efficient technologies or practices we can reduce these pollutants, improve our air quality and secure a better quality of life for Singaporeans.

- **INCREASING OUR ECONOMIC COMPETITIVENESS**

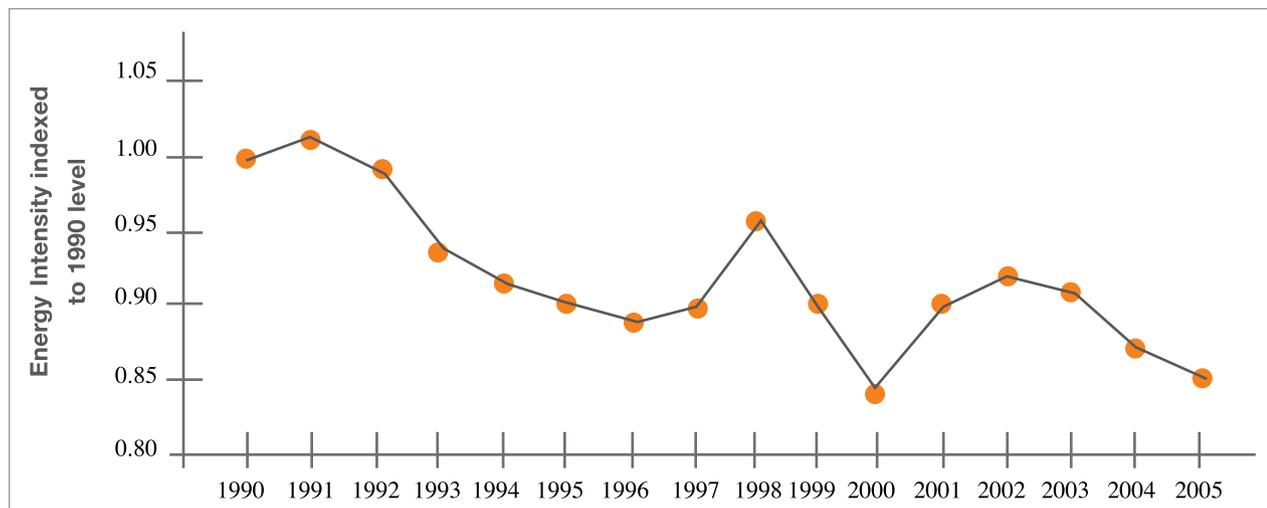
Improving energy efficiency will result in overall cost savings to businesses and consumers. This helps to cushion the impact of rising energy costs. A more energy efficient economy can help Singapore maintain its competitiveness over the long term.

- **REDUCING OUR DEPENDENCE ON FOSSIL FUELS**

Singapore is almost totally dependent on imported fossil fuels for her energy needs. Prudent use of energy through energy efficiency measures would help to moderate this dependence and defer the need for installing new energy infrastructure.

ENERGY EFFICIENCY IN SINGAPORE

On an economy-wide level, energy consumption per dollar gross domestic product (\$GDP), or energy intensity, is used globally as an indicator of a country's state of energy efficiency. Singapore's energy intensity improved by 15% between 1990 and 2005 due to the adoption of better technology in power generation and the more productive use of energy in other sectors.



NATIONAL CLIMATE CHANGE COMMITTEE

The National Climate Change Committee (N3C) chaired by Dr Amy Khor, Senior Parliamentary Secretary (Environment and Water Resources) provides a means for the Ministry of the Environment and Water Resources (MEWR) and NEA to work with key stakeholders on climate change issues by, among other means, promoting greater energy efficiency. It provides a platform whereby members from government, industry, academia, and non-governmental organisations can work together to contribute to efforts in mitigating climate change. More information on the N3C can be found on www.nccc.gov.sg

THE ENERGY EFFICIENCY PROGRAMME OFFICE



Energy efficiency is a cost-effective means of mitigating GHG emissions. Although energy efficiency makes financial sense, energy efficiency measures may not be implemented due to market barriers such as the lack of information and capability.

To drive energy efficiency improvement in Singapore, the Energy Efficiency Programme Office (E²PO) has been established. The E²PO is an multi-agency committee led by NEA and comprises the Energy Market Authority (EMA), Economic Development Board (EDB), Land Transport Authority (LTA), Building and Construction Authority (BCA) and the Agency for Science, Technology and Research (A*Star).

The E²PO has identified the following areas for action in developing a holistic energy efficiency strategy and Masterplan for Singapore:

- Promoting the adoption of energy efficient technologies and measures by addressing the market barriers to energy efficiency
- Building capability to drive and sustain energy efficiency efforts and to develop the local knowledge base and expertise in energy management
- Raising awareness to reach out to the public and businesses so as to stimulate energy efficient behaviour and practices
- Supporting research & development to enhance Singapore's capability in energy efficient technologies

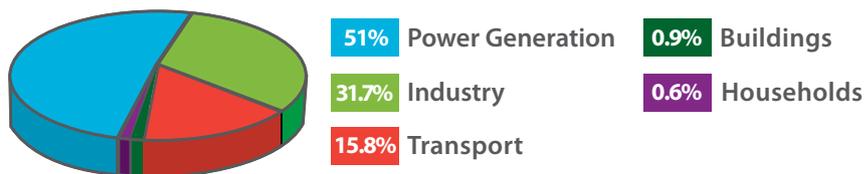
More information on E²PO's initiatives can be found in this publication and also online at www.e2singapore.gov.sg

SECTORAL APPROACH

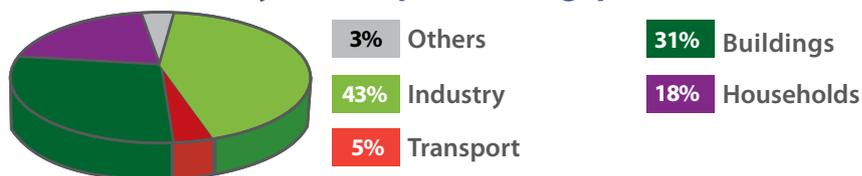
In developing its plans and programmes, the E²PO will primarily adopt a sectoral approach targeted at each of the five sectors, namely power generation, industry, transport, buildings and households. The E²PO will also develop policies and measures to overcome the barriers to adopt cost-effective energy efficient measures.

Power generation, industry and transport sectors are the largest consumers of fuel in Singapore while electricity is primarily consumed by the industry, buildings and households sectors.

Fuel Consumption in Singapore (2005)



End-use Electricity Consumption in Singapore (2005)



EFFICIENT POWER GENERATION



EFFICIENT POWER GENERATION

Efficiency in power generation in Singapore has improved over the last decade. With the implementation of a competitive electricity market that incentivises efficient power generation, we have seen a switch from less efficient and carbon intensive oil-fired plants to more efficient, clean and less carbon intensive gas-fired systems. In 2006, 78% of Singapore's electricity was generated by natural gas-fired combined cycle generation technology, the most energy efficient technology currently available. Between 2000 and 2006, overall power generation efficiency improved from 38% to 44%.

Other technologies that can improve fuel utilisation and reduce GHG emissions are cogeneration and trigeneration. Cogeneration refers to the integrated production of heat and electricity, while trigeneration refers to the integrated production of electricity, heat and chilled water. These technologies optimise the heat utilisation from fuel combustion and improve overall system efficiency. In view of the energy efficiency potential offered by these technologies, E²PO will continue to promote cogeneration and trigeneration in Singapore.

For cogeneration and trigeneration to be viable, a combined demand for electricity and heating (as well as cooling in the case of trigeneration) must be present. Hence, cogeneration and trigeneration facilities would have to be sited in close proximity to industries in need of the utilities. E²PO will integrate the deployment of cogeneration and trigeneration facilities into ongoing and future industrial planning.

PowerSeraya repowers to natural gas

PowerSeraya Ltd will commission an 800MW natural gas-fired Co-Generation Plant by 2010 to replace its three oil-fired steam units. This highly efficient cogeneration combined cycle plant (Co-Gen CCP) will help the company reduce its overall carbon dioxide emissions by a further 10% in addition to the 30% reduction it has achieved over the past 10 years.

In another first for the power industry, this large-scale project will, in the near future, seek to obtain certification of its emission reductions under the Clean Development Mechanism of the Kyoto Protocol.



Pfizer and Schering-Plough leverage on trigeneration

Pfizer Asia Pacific Pte Ltd and TPGS Green Energy Pte Ltd (TPGS), a joint venture company formed by Tuas Power Ltd and Gas Supply Pte Ltd, agreed to jointly develop the first-of-its-kind 5 MW trigeneration plant in Singapore. When completed by October 2007, the facility is expected to help Pfizer reduce its annual utility costs by about 8% and reduce carbon dioxide emissions by 17% per annum.



Pfizer's Trigeneration Facility

TPGS inked a separate agreement with Schering-Plough Ltd to build a 9.2 MW trigeneration facility, the biggest in Singapore to date. When completed by mid-2008, the new facility is expected to help Schering-Plough reduce its carbon dioxide emission by 24% yearly.

Both trigeneration facilities received funding support from NEA's Innovation for Environmental Sustainability (IES) Fund.

HIGHER ENERGY PRODUCTIVITY

Energy efficiency in industry results in higher productivity and leads to better profitability. The most energy intensive industries in Singapore are the petroleum refining, petrochemical, electronics and pharmaceutical industries, which are of strategic importance to the economy. Energy efficiency is a cost-effective means of improving the competitiveness of Singapore's industries.

Energy Efficiency Improvement Assistance Scheme (EASe)

Why conduct energy appraisals? An energy appraisal can identify degraded plant components that contribute to overall efficiency losses and enable a company to take the necessary corrective actions.

To encourage and help companies, which may not have the in-house energy management expertise, to engage energy consultants to conduct energy appraisals, the NEA introduced the \$10mil Energy Efficiency Improvement Assistance Scheme (EASe) in 2005.

Under EASe, NEA co-funds up to 50% of the cost of energy appraisals for buildings and industrial facilities. Each dollar spent on an energy appraisal uncovers about \$5-10 annual savings in energy costs with the energy efficiency investments identified having an average payback period of less than 3 years.

Energy Service Company (ESCO) Accreditation Scheme

With support from NEA, the Energy Sustainability Unit (ESU) of NUS administers an ESCO Accreditation Scheme. The objective is to enhance the professionalism and quality of services offered. This, in turn, will enhance confidence in the energy services sector and help promote the growth of the industry.

COST SAVINGS THROUGH ENERGY SERVICES

An energy services company or consultant (ESCO) is a service provider that develops, installs and helps to put together financing for projects designed to improve the energy efficiency and reduce maintenance costs for facilities.

Simple housekeeping results in cost savings for Tuas Power

An accredited ESCO for the process industry, Actsys Process Management Consultants uses thermodynamic or process flow sheeting modeling tools to model the current performance of the plant.

By comparing the actual performance with the optimum performance, the state of degradation for each plant component is identified, allowing early corrective maintenance to be planned. For example, planned maintenance on a bypass valve for Tuas Power Ltd recommended by Actsys saved about \$360,000 annually in fuel costs.

Energy Saving Solutions for Hitachi Semiconductor Singapore

Hitachi Semiconductor Singapore Pte Ltd (HNS) has enlisted the services of Hitachi Asia Ltd (Hitachi Asia) to reduce energy consumption of its chilled water plant system by 19.5%. This is equivalent to a 5% reduction in total energy consumption at HNS and will result in 5 kilotonnes less carbon dioxide emissions annually. The investment cost for the project will be recovered by Hitachi Asia under a performance contract.

Improving Energy Efficiency Enhances Business Competitiveness – The GSK Story



Some companies have on their own initiative sought to improve their energy efficiency so as to enjoy considerable cost savings and higher margins. GlaxoSmithKline (GSK) has done much in the area of energy efficiency to enhance its business competitiveness as well as reduce its carbon footprint.

Since 2002, the company has completed a total of 167 energy conservation projects which helped the company keep its energy consumption constant even as production increased by 40%. Since 2002, the sustainable energy conservation programme has saved the company 51,789 MWh of electricity and reduced its carbon dioxide emissions by 22 kilotonnes.

GSK is also committed to the use of renewable energy. In 2006, GSK installed a total of 132 photovoltaic panels on the rooftop of an office building supplying electricity into the electrical grid of a warehouse.

Energy Efficient by Design

It is often most cost-effective to incorporate energy efficiency measures at the design stage of a facility. E²PO has introduced a Design for Efficiency Scheme to help companies incorporate efficiency considerations early in the conceptual design phase of a new facility.

Efficient Design

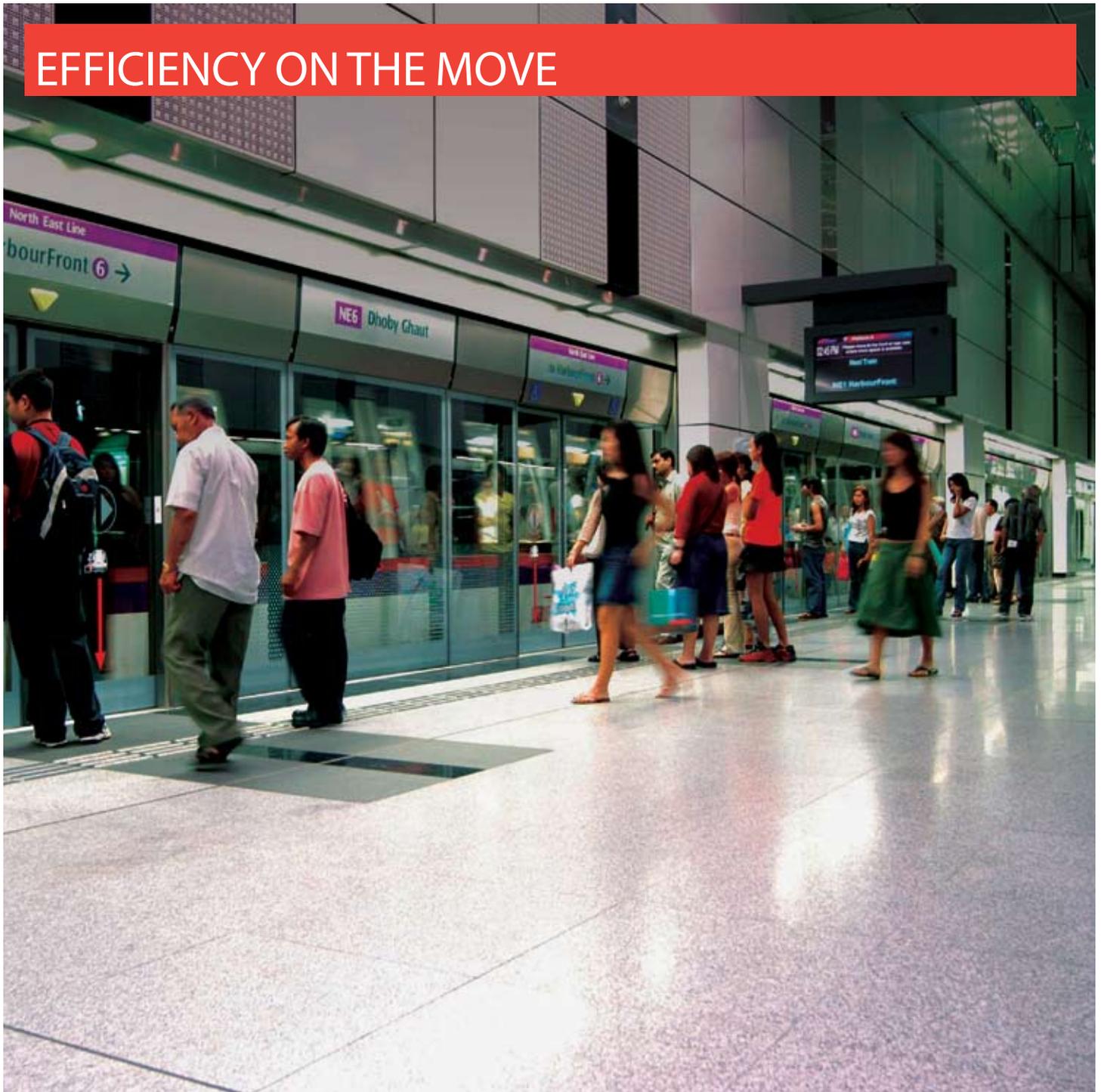
Singapore Olefins Plant (of Exxon Mobil Chemical Ltd) commissioned its 9th furnace in 2007, with energy efficiency built into the furnace design philosophy. A uniquely designed transfer line exchanger recovers heat from the cracking furnace. This heat is then used to generate super high pressure steam which is used to drive compressors. The substantial amount of heat recovered from the cracking process removes the need for additional fuel for boilers to produce steam and has led to a step improvement in furnace energy efficiency and lower carbon dioxide emissions.



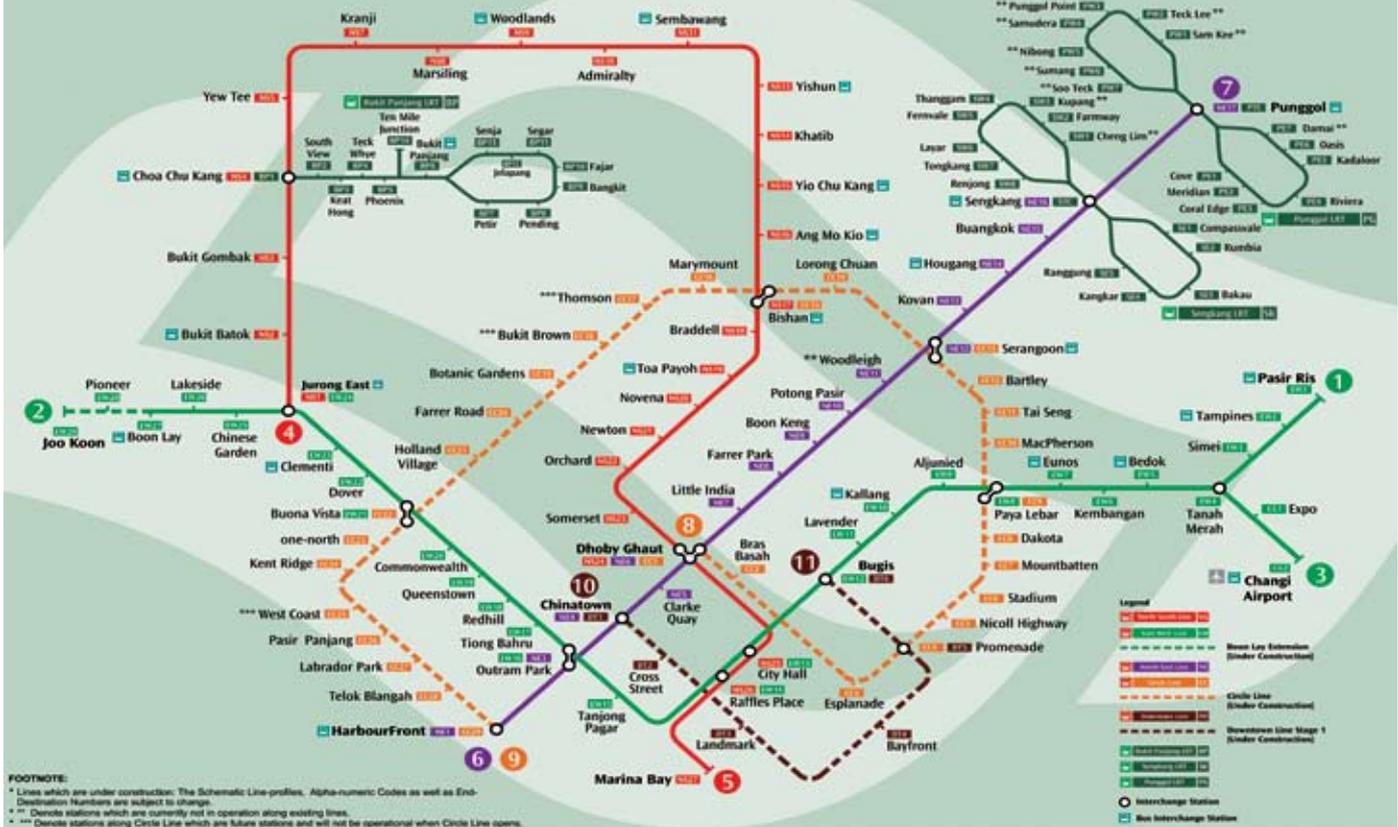
Investment Allowance (IA) Scheme

To encourage companies to invest in energy efficient equipment, EDB administers an Investment Allowance (IA) Scheme that is a capital allowance on qualifying equipment cost that allows a deduction against all chargeable income. The IA can be awarded if the capital expenditure results in, among others, more efficient energy utilisation.

EFFICIENCY ON THE MOVE



EFFICIENCY ON THE MOVE



The future of the MRT & LRT network

Vehicles on the roads are significant emitters of greenhouse gases and air pollutants in many countries and Singapore is no exception. As a result of policies over the years that have promoted public transportation, Singapore has a relatively low private vehicle ownership compared to other developed countries and there is widespread use of public transport.

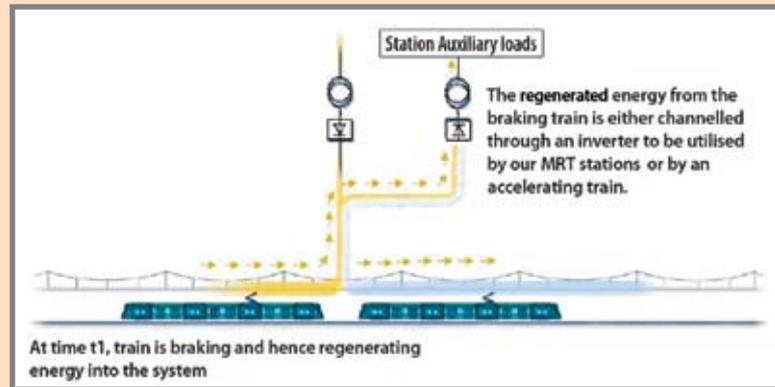
Public transportation is highly energy efficient on a per passenger-trip basis. In land scarce Singapore, it is the key to sustainability of the land transport system. To encourage more people to use public transport, LTA is expanding the rail transit system coverage to 215km by 2018, about 56%

more than it is today. From 2010, the Circle Line (CCL) will commence operation and help to enhance the connectivity of the island-wide MRT network. The Downtown Line will also add to the connectivity to serve the Marina Bay area when it opens in stages from 2013 to its full completion in 2018.

LTA will continue to promote public transport in Singapore by enhancing public transport infrastructure, improving public transport services and raising public awareness. The target is to raise the public transport modal split for the morning peak hours from the current 63% to over 70% in the next 10 to 15 years.

DO YOU KNOW THAT THE MRT HAS SUCH A FEATURE?

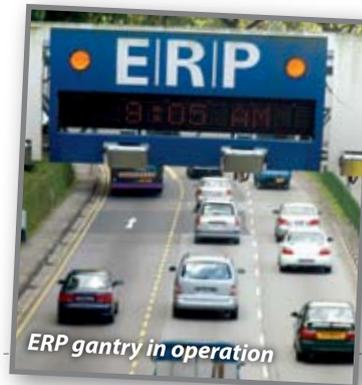
Within the Singapore Mass Rapid Transit (MRT) System, several energy saving measures are employed. Among these measures is regenerative braking whereby energy that is produced by the train during braking is re-used. The recovered energy can be re-used by any nearby trains or channelled through an inverter system to be used by an MRT station. If not for this simple engineering measure, the energy will be wasted as heat.



How the system works

Easing traffic congestion for better fuel economy

Traffic congestion results in wastage of fuel and air pollution. LTA will continue to manage road congestion through infrastructure development and refinement of car ownership and usage restraint measures such as the Electronic Road Pricing (ERP) system.



ERP gantry in operation

The Green Vehicle Rebate

To further promote the purchase of cleaner and more energy efficient vehicles such as hybrid cars, the Green Vehicle Rebate was enhanced in 2006 from 20% to 40% of the Open Market Value. Since then, the number of green vehicles has gone up from about 200 in 2005 to about 1000 in 2007.

Hybrid Vehicles for better energy efficiency

Hybrid vehicles have certain features that reduce energy wastage and help improve fuel economy. These include:

- turning the engine off during idle/low output to reduce fuel wastage
- recapturing kinetic energy through regenerative braking
- reducing the size and power of the engine without compromising its performance



A hybrid vehicle



The Fuel Economy Label

Fuel economy labels are affixed to vehicles at the point of sale to provide information on the vehicle's fuel economy. This is a labelling scheme administered by NEA and SEC to help car buyers choose fuel-efficient passenger car models.

The Fuel Economy Label

ENERGY SMART BUILDINGS



Energy efficiency is one of the main considerations in the assessment of a building's environmental credentials. Recently, there has been a significant drive by agencies such as BCA and NEA to encourage the development and construction of energy efficient buildings. Energy efficient buildings enjoy substantial energy cost savings compared to the average building because the energy cost is often the largest component of a building's total operating cost.

The EnergySmart label

In 2005, NEA and the Energy Sustainability Unit (ESU) of the National University of Singapore launched



the EnergySmart Labelling Scheme for offices to recognise energy efficient office buildings in Singapore. Buildings that perform in the top 25% in terms of energy efficiency and meet good indoor air quality standards are eligible for the EnergySmart Building Label. This scheme was extended to include hotels in 2007.



The Environment Building

Public Sector Taking the Lead

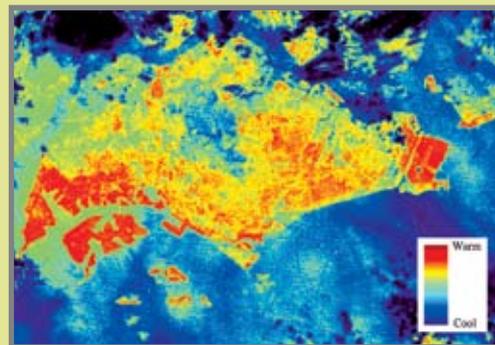
The public sector is taking the lead in moving towards environmental sustainability for its buildings. It aims to demonstrate the associated environmental and economic benefits and to set an example for the private sector. As a testament to this drive, buildings such as the National Library Board and the Environment Building have won the top ASEAN awards for energy efficient buildings in 2007.

Building control regulations

In Singapore's tropical climate, it is not surprising that air-conditioning forms a major part of our electricity demand. Rising temperatures due to possible climate change and the urban heat island effect will lead to increased demand for air conditioning. BCA established the Envelope Thermal Transfer Value (ETTV) standard to reduce heat transfer from the external environment into air-conditioned spaces so as to reduce the air conditioning load of buildings. Other building control regulations include minimum efficiency requirements for commercial air-conditioners and a maximum lighting power budget.

URBAN HEAT ISLAND EFFECT

Urban Heat Island (UHI) effect is a phenomenon whereby the urban area is found to exhibit higher temperature than the suburban or rural area. A research study conducted by NUS in 2004 showed that Singapore has exhibited an UHI intensity of close to 5 degrees Celsius.



Thermal Map of Singapore

THE REGENT SINGAPORE - 26% REDUCTION IN ELECTRICITY USE IN 2006

This energy smart hotel has taken measures to reduce lighting energy consumption, notably, by shifting to electronic ballast and replacing conventional light fittings with energy efficient bulbs.

The air-conditioning system was optimised and boilers were replaced with a heat recovery system. Overall, the hotel realised a reduction in electricity use of about 26% in 2006 compared to the previous years.



EASe for Buildings

Energy appraisals are also utilised in the buildings sector to identify potential improvements in energy efficiency and to plan appropriate measures to improve energy performance. The EASe scheme is also available to building owners and operators.

EASe FOR SINGPOST CENTRE TARGETS \$1.2M ANNUAL SAVINGS

SingPost carried out an energy appraisal funded through the EASe scheme. The air-conditioning system was retrofitted and optimized to achieve a coefficient of performance of 5.9. While the project cost \$2m to implement, the expected annual saving in energy cost is \$1.2m.



SingPost Centre

Green Mark Buildings

From 15 April 2008, all new buildings and existing buildings undergoing major retrofitting works with gross floor area (GFA) above 2000m² must meet the Green Mark Certified standard.



The Green Mark scheme is a green building rating system launched by BCA in 2005 to evaluate a building for its environmental impact and performance. It encourages the incorporation of environmentally friendly and energy-saving features in buildings. Buildings are awarded Certified, Gold, Gold^{PLUS} or Platinum rating depending on the points scored on the key criteria including energy efficiency. More details can be found at www.bca.gov.sg

In 2006, the \$20m Green Mark Incentive Scheme was launched to encourage building developers to achieve higher Green Mark ratings, which will result in more energy efficient buildings. New and retrofitted buildings with GFA above 5000m² that has achieved "Gold" Green Mark and above will be awarded cash incentives based on GFA and the Green Mark rating achieved.

NATIONAL LIBRARY BUILDING TAKES THE LEAD IN ENERGY EFFICIENCY

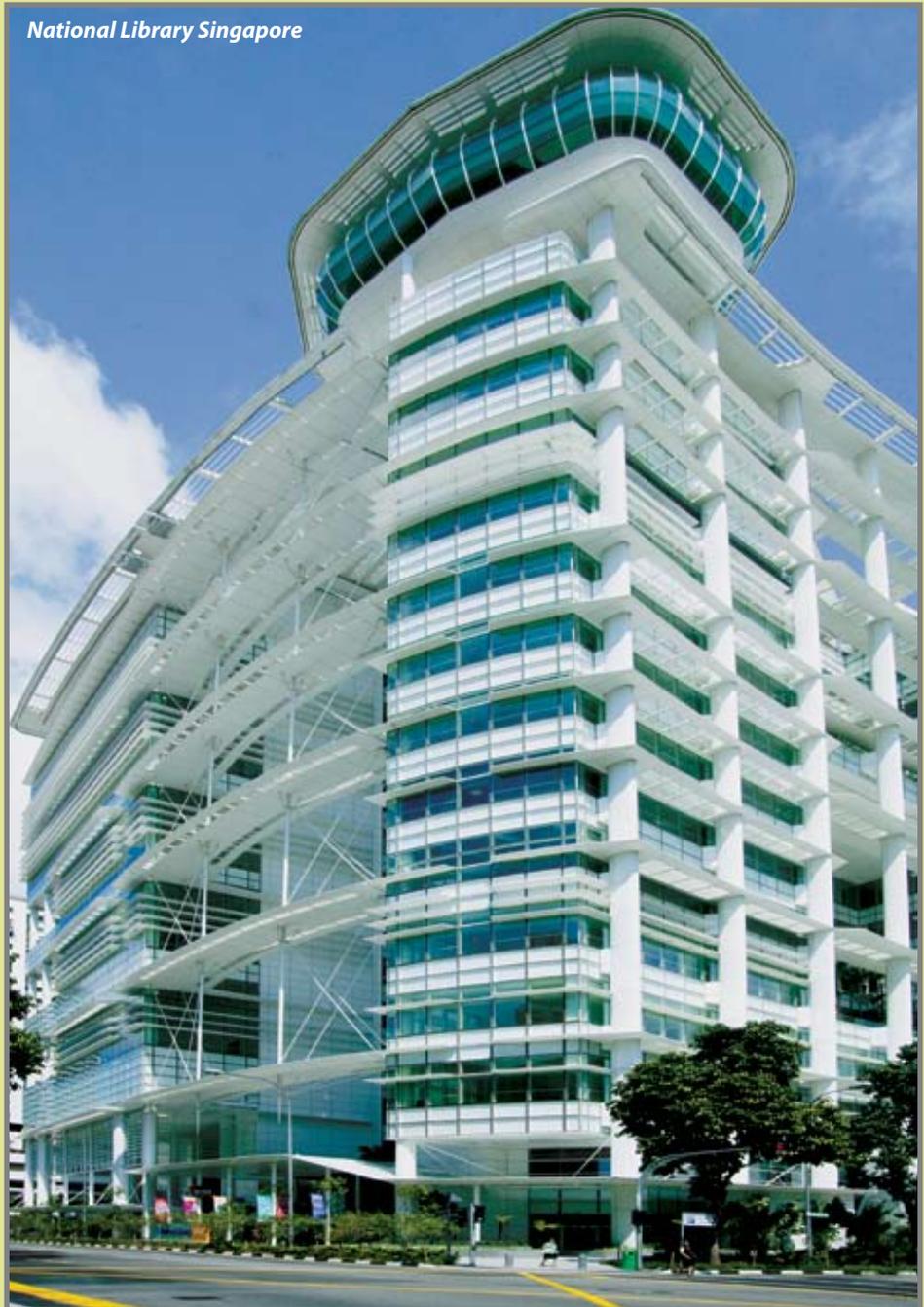
The National Library Building has been awarded both the EnergySmart Label and the Green Mark Platinum Standard.

Natural ventilation supplement fans in central transition spaces. Vegetation and landscaping are utilised to improve the indoor thermal environment and thermal performance of the building.

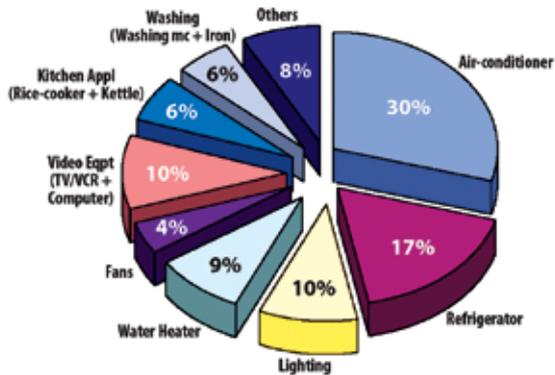
Through the use of light sensors, the lighting control system dims or switches off lighting when there is sufficient natural light to illuminate the building interior.

About two thirds of the building façade is double-glazed with special glass to minimise heat transfer. The building is heavily shaded to reduce solar heat gain through the façade. The air-conditioning system is also configured to ensure optimal energy performance under varying load conditions.

National Library Singapore



SAVING ENERGY AT HOME



Households account for close to a fifth of the electricity consumed in Singapore. In the typical household, refrigeration and air conditioning account for the lion's share of electricity consumption. Energy efficiency in the households sector can be improved by encouraging consumers to purchase energy efficient appliances and to adopt energy efficient habits.

Electricity Vending System

EMA is studying the feasibility of a scheme to retail electricity to small consumers, including households, more efficiently. Called the Electricity Vending System (EVS), the scheme integrates smart metering technologies and the existing e-Payment infrastructure. If it is found feasible, the system will also enable consumers to monitor their electricity consumption and allow consumers to reduce their electricity bill through prudent use of electricity. E²PO will also study the electricity consumption monitoring of highly energy intensive households appliances.

Energy Labelling Scheme

Energy labels are affixed to appliances at the point of sale to describe its energy performance. The information empowers consumers to make informed choices about the products they buy so as to better manage their energy bills. At the same time, manufacturers are also encouraged to design products that achieve higher efficiency ratings. Beginning 2008, all household refrigerators and air-conditioners that are supplied in Singapore must be energy labelled. E²PO will evaluate the introduction of minimum energy performance standards for energy intensive household appliances.



Energy Label for air-conditioners



Energy Label for refrigerators

Stand-by Power – The Preventable Waste

Modern appliances often consume power even when they are supposedly "off". Appliances on standby can account for up to 10% of typical household electricity consumption. E²PO will step up efforts to inform and encourage households to completely turn off appliances that are not in use. E²PO has introduced a national campaign, the 10% Energy Challenge, which shares tips on how to save energy and money.

Switch off the mains when not using the appliance!



TEN TIPS TO SAVE ENERGY AT HOME

- Keep cool with fans instead of an air-conditioner where possible
- Set your air-conditioner's thermostat at about 25°C.
- Clean the air filter regularly and have your air-conditioner inspected annually.
- Switch lights off when you leave the room
- On cooler days, use an electric fan instead of turning on the air-conditioner.
- Do not overload the refrigerator as this will obstruct proper air circulation within.
- Dry clothes in the sun instead of using electric dryers.
- Use an instant water heater instead of a storage type.
- Use energy efficient lights such as compact fluorescent lamps rather than incandescent or halogen bulbs.
- Configure your computer to energy-saving mode.

Residential Building Standards

Apart from empowering consumers with energy efficiency know-how, it is also important to ensure that the living environment is energy efficient. From 15 April 2008, residential buildings with a gross floor area of 2000m² or more must comply with BCA's Residential Envelope Transmittance Value (RETV) standard. RETV is conceptually similar to ETTV, but applies specifically to residential buildings.

SPREADING THE WORD

To promote energy efficient behaviour and provide relevant energy efficiency information to stakeholders, E²PO will spearhead a sustained public awareness programme focusing on energy conservation action. It is important to raise awareness among households and motorists that simple changes in lifestyles and habits can save energy, save money and safeguard the environment.



Green Transport Week

The Singapore Environment Council organised the Green Transport Week 2006, in partnership with NEA, LTA and Public Transport Operators, to raise awareness among motorists of climate change issues and to promote energy efficient behaviour. Some pieces of advice included the following:

- Walking, cycling or taking public transport where possible
- Adopting simple driving habits to reduce fuel wastage and save money
- Choosing fuel-efficient vehicles when buying a car

All the above and more information for motorists are elaborated in the Green Transport Guide which can be accessed at www.sec.org.sg/gtw



SOME BRIGHT IDEAS

ENERGY SAVING LAMPS IN NATIONAL PARKS

Before 2005, mercury vapour lamps were widely used in our national parks, nature reserves and park connectors to provide lighting for footpaths and cycling tracks. In 2005, the National Parks Board (NParks) embarked on a pilot project to see if energy saving compact fluorescent lamps could meet the lighting requirements.

The results of the project were very encouraging and the use of the energy saving lamps was extended to the rest of the parks in batches. As at September 2007, 75% or about 10,000 lamps have been replaced. This translates into energy savings of 3,285,000 kWh and a 46% reduction in cost amounting to \$702,000 per year. An additional environmental contribution of such lamps is they have much lower mercury content. NParks plans to replace all lamps in our parks with energy saving ones by March 2008.



An Energy Saving lamp



Traffic Lights are operated by IT Systems

GREEN IT INITIATIVE

The Land Transport Authority (LTA) and IBM are collaborating on an energy efficiency programme for LTA's InfoComm Technology (IT) environment. The three-year "Green IT Initiative" aims to promote responsible and efficient use of energy in LTA.

IT is an integral component in its daily operations and LTA continuously seeks ways to innovate and provide quality public services. LTA and IBM will conduct a comprehensive, fact-based analysis and prioritise steps to reduce energy use across LTA's IT infrastructure. They will co-research the use of innovative green technologies and intelligent software to optimise usage of its IT infrastructure and investigate the potential of emerging liquid cooling solutions, including the use of water to cool IT infrastructure.

SENOKO IMPROVES NATURAL GAS DELIVERY

Power generators are highly conscious of energy efficiency. For example, Senoko Power has realised annual energy savings for its gas compressors of \$1 million since October 2006 by optimising and improving the efficiency of natural gas delivery to its plant.



POWERING AHEAD

Capability Building

Capability building is an important component of Singapore's energy efficiency strategy. The Singapore Certified Energy Manager (SCEM) Programme is the first of its kind to be introduced in the region and is recognised and endorsed by the US Association of Energy Engineers.



Launched in 2006, the programme equips facility and building managers, engineers, technicians and others who intend to build their career as energy professionals, with the technical skills and competencies needed to manage energy services within their organisations.

Going forward, the E²PO will promote greater participation in the SCEM programme to create a pool of energy managers within companies. These energy managers will plan and implement energy efficiency measures for their companies.

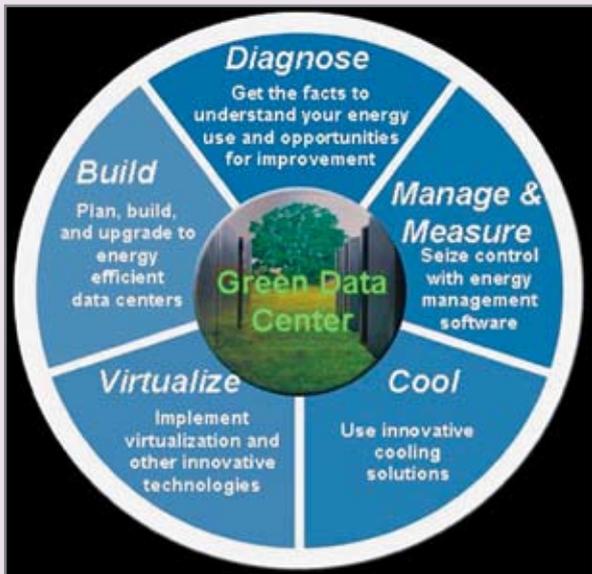
Over and above the formal training provided under the SCEM programme, E²PO will organise seminars, workshops and conferences to bring together stakeholders and experts in the field of energy efficiency, including energy managers, to share knowledge and expertise in effective energy management.

Research & Development

E²PO is working with relevant agencies, academics and industry to map out areas for research and to develop technologies that are relevant to Singapore's energy efficiency efforts.

NEA also administers the Innovation for Environmental Sustainability (IES) Fund which co-funds innovative environmental projects, including energy efficiency projects, that could help to meet the goal of environmental sustainability.

LTA and IBM aim to achieve a savings of at least 20% in energy consumption.



IBM's vision of Green Data Centres



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What are your thoughts?

The E²PO welcomes any suggestions or proposals on improving energy efficiency in Singapore.

You can contact us at the following email address:

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Go to www.e2singapore.gov.sg for more information

