

*the Environment
is ours*





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The environment draws no borders.

Rapid urbanisation around the world, growing energy consumption, globalisation and the cumulative impact of over two centuries of industrialisation. These bring about consequences that are faced by the entire world, such as climate change, diminishing resources, trans-boundary pollution and epidemics. Given the scale of these issues, and how interconnected the world is today, the way every country manages its environment has the potential to impact other regions as well.

On top of that, what seems to be an environmental issue on the surface actually cuts across many other spheres of interest. Take, for instance, energy conservation. On a nationwide scale, energy efficiency encompasses many aspects, from infrastructure and work processes to consumer products and mindsets of Singaporeans. Singapore also needs to take note of the diminishing supply of resources worldwide for energy production, explore new technologies developed elsewhere and adapt them to its use.

Singapore is in a particularly vulnerable position with its small land area, high population density and status as a travel hub. Yet it has to uphold its environmental performance and ensure that the expectations of its people are met continually.

Tackling such cross-cutting issues requires a whole-of-government approach. Environmental management thus has to be a key thrust in governance, and strategised in alignment with national development.

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NEA addresses this on various fronts. First it actively identifies emerging environmental challenges and invests in building capacity to meet them, both within NEA and the environment industry. Next, it collaborates with other government agencies to develop holistic strategies. Lastly, it uses various means to promote Singapore's expertise in environmental management on the international stage. This enables Singapore to contribute its best practices and knowledge to the global discourse on the environment.





Collaboration Is The New Normal

Close collaboration among government agencies to tackle environmental issues is more crucial than ever before. NEA has always been working with other government agencies on issues ranging from land-use planning and emergency responses to environmental incidents to vector surveillance and food safety. However, this is usually at an operational level to smoothen out processes and implementation. What is required today goes further than that. Agencies need to come together to jointly develop and take part in realising a national vision for sustainability, from tackling climate change and promoting energy efficiency to pollution control.

BANDING TOGETHER AGAINST CLIMATE CHANGE

Battling climate change requires a concerted and co-ordinated global effort due to the scale of its potential impact, such as rise in sea levels, drastic changes in weather patterns, increased spread of vector-borne diseases and damage to ecological systems. In the scientific community, it is widely held that the build-up of greenhouse gases in the atmosphere, predominantly carbon dioxide, is the main cause for global warming which results in climate change. In this connection, large amounts of greenhouse gases are produced by human activities such as burning of fossil fuels to produce energy.

While climate change is a global challenge, Singapore remains committed to doing our part to tackle this issue. Singapore ratified the United Nations Framework Convention on Climate Change in 1997. In 2006, Singapore acceded to the Kyoto Protocol. The Inter-Ministerial Committee on Climate Change (IMCCC) was established in 2007 to coordinate inter-agency efforts on climate change. In 2010, Singapore pledged to reduce greenhouse gas emissions by 7% to 11% below business-as-usual levels in 2020. If a legally-binding agreement is reached, in which all countries in the world implement their commitments in good faith, Singapore has further committed to reduce its emissions by 16% below business-as-usual levels in 2020.

Under IMCCC, there are three Working Groups. The International Negotiations Working Group will work out Singapore's strategy in the international climate change negotiations under the UN Framework Convention on Climate Change. The Long Term Emissions and Mitigation Working Group will study how Singapore can stabilise its long-term emissions. The Resilience Working Group will study Singapore's vulnerability to the adverse effects of climate change and develop long-term plans to ensure that Singapore is able to cope with the phenomenon.

NEA is a member of all the three Working Groups and supports the whole-of-government approach in addressing climate change. For example, the climate change vulnerability study commissioned by NEA in 2007 was the first nationwide study to look into the potential long-term impact of climate change on Singapore. The two-year vulnerability study investigated the effects of sea level rise and changes in meteorological patterns such as temperature and rainfall. The findings support the work of the Resilience Working Group. NEA will commission future studies to update the findings as climate science and models improve over time.

“It is inevitable that as our knowledge base grows, new questions will arise and old assumptions will be overturned. We must have a constant sense of inquiry – sharing timely and relevant insights across disciplines, striving to prepare early against uncertainties.”

— Desmond Kuek, Permanent Secretary, MEWR, at the launch of the Climate Science Experts Network on 3 February 2012



From left: Raising awareness of climate change during events such as this training workshop in 2007; In 2008, NEA jointly organised an exhibition on climate change with the Singapore Science Centre and the Shell Companies in Singapore; The multi-agency Energy Efficiency National Partnership was launched in 2010.



Energy Efficiency Programme Office (EzPO)

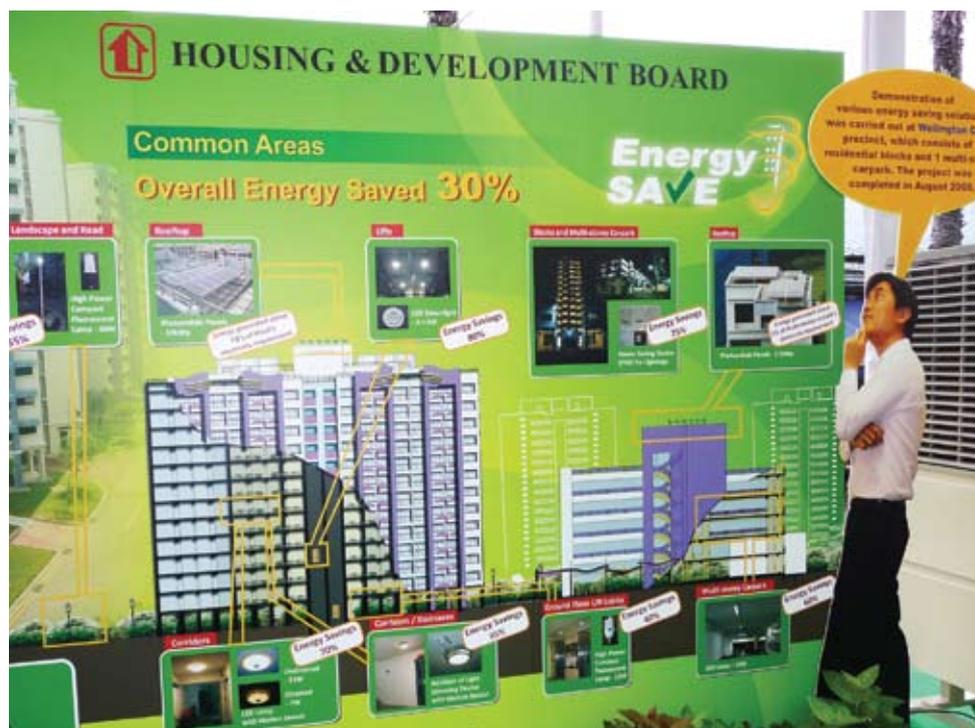
SAVING ON WATTS

Like many developed countries, Singapore relies on the burning of fossil fuels to meet our energy needs. As our population grows and economy develops, our energy demand will increase as well. In the bid to fight climate change, cutting down on energy use is critical.

This was why the Energy Efficiency Programme Office (EzPO) was formed in 2007 to increase energy efficiency in Singapore so as to reduce greenhouse emissions. Co-led by NEA and the Energy Market Authority (EMA), EzPO comprises several other government agencies as well. The programme office promotes and facilitates the adoption of energy efficiency in Singapore. This is done through four strategic thrusts — stimulating demand for energy efficiency, developing human and institutional capabilities in this area, promoting emerging energy-efficient technologies and innovation, and profiling and highlighting energy efficiency internationally through platforms such as the Singapore International Energy Week.

In Singapore, the key sectors contributing to energy consumption can be broadly classified as power generation, transport, industry, households and buildings. NEA actively promotes energy efficiency in households, industrial facilities as well as public sector buildings. In true 3P partnership spirit, NEA reaches out to government agencies, private companies, schools and grassroots to spread the energy-saving message to households through the 10% Energy Challenge. Launched in 2008, the challenge encourages Singaporeans to cut their energy use by 10% or more through the adoption of energy-saving habits.

Another key programme is the Energy Efficiency National Partnership (EENP), launched in April 2010 with 49 founding members. Jointly spearheaded by NEA, EMA and EDB, the programme reaches out to industry stakeholders, urging them to adopt an energy management system and measures to improve energy efficiency. To help the industry develop such practices, an EENP learning network has been developed, providing opportunities for the industry to learn about energy efficiency ideas, technologies, practices, standards and case studies through platforms such as conferences, workshops and seminars.



Top: The inaugural 10% Energy Challenge exhibition at Suntec Convention Centre, 2008.
Bottom: The Energy SAVE roadshow at Tampines, jointly organised by NEA, HDB and EMA in 2009.

In April 2012, a new Energy Conservation bill was passed in parliament. The resulting Energy Conservation Act will consolidate all energy efficiency-related legislation currently found in different acts. From 2013 onwards, the new act requires all large energy users in the industry and transport sectors consuming more than 15 gigawatt-hours of energy equivalent per year to appoint an energy manager. These companies also have to monitor and report energy use and greenhouse gas emissions, as well as submit energy efficiency improvement plans.

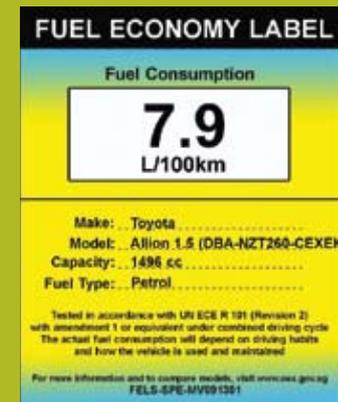
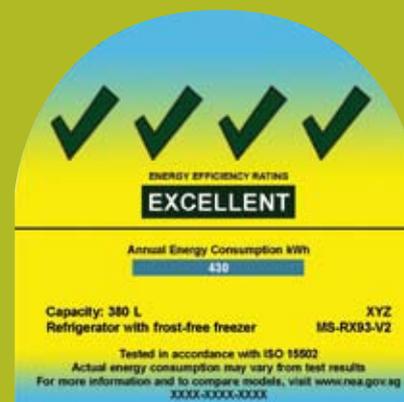
LABELLING FOR EFFICIENCY

It may be the cheapest refrigerator in the store, but if it comes with only two ticks on the energy label, it can easily cost you \$65 more in electricity bills every year. That is, if you compare it to a refrigerator with four ticks on the label.

Since 1 January 2008, all household air-conditioners and refrigerators sold in Singapore are required by NEA to have a label indicating their energy efficiency. By 2009, clothes dryers were added to the list too. These three household appliances are among the most energy-consuming appliances in a home.

Energy usage is usually a hidden cost when it comes to purchasing electrical appliances. The more inefficient an appliance, the more costly it actually is in the long run. By employing such a labelling scheme, called the Mandatory Energy Labelling Scheme, NEA makes energy conservation relevant to the average consumer. The message – reduce energy use, reduce utility bills. With the labels on these big-ticket items, consumers can now easily decide if the more costly but energy-efficient product beats the cheap inefficient appliance. This move also gives greater impetus to manufacturers to design better, more efficient goods.

To help consumers avoid high energy consumption and energy costs brought about by inefficient appliances, NEA introduced the Minimum Energy Performance Standards (MEPS) in September 2011 for household air-conditioners and refrigerators. MEPS removes models that fall short of minimum specified energy performance levels from the market. At the same time, consumers benefit from cost savings while suppliers are encouraged to import more energy-efficient appliances as technology improves.



A NEW WAY TO LIVE AND WORK

Just imagine. A home in an estate where energy-efficient features are integrated with the infrastructure. Or a workplace in an eco-business park with clean technology. This may very well be the norm in the near future.

Punggol Eco-Town and CleanTech Park are two flagship projects in Singapore which encapsulate the notion of sustainable development. Both projects are made possible thanks to close inter-agency collaboration and collective thinking.

Solar panels to power common area lighting and lifts, roof-top greenery, dedicated recycling chutes and a system to collect rainwater. These eco-friendly features can be found in Punggol Eco-Town, at Treelodge@Punggol which was developed in 2010. The town also serves as a test-bed for new environmental technologies such as integrated energy systems with a lower carbon footprint.

This project is driven by HDB, with the aid of working committees comprising representatives from URA, NParks and EDB, just to name a few.

NEA enters the picture when it comes to urban solutions and engaging residents to play a role in environmental protection. The agency contributes its experience and technical knowledge, and coordinates solutions for issues such as 3P partnership efforts, recycling and waste management. For instance, in the new public waste collection contracts for the eco-town, NEA requires the contractors to also collect recyclables from dedicated chutes.

On the industrial side, Singapore's first eco-business park, CleanTech Park, is another story in point. Companies that embrace environmental sustainability and "green" corporate social responsibility are welcome to set up here. Besides, the park is also dedicated to nurturing the growth of research and development relating to clean technology. In addition, this project contributes to Singapore's goal to be a "living laboratory" where companies can develop, test-bed and commercialise green and urban solutions.

The 50-ha park, which master plan was unveiled in 2010, is home to a host of eco-friendly features – efficient building design, a fuel cell plant for renewable energy, solar panel installations, as well as eco-concrete for roads and recycled construction materials for its buildings. Like Punggol Eco-Town, CleanTech Park is the result of several agencies working together. The project is jointly driven by JTC and EDB. Agencies such as NEA are consulted for their respective expertise.

A key thrust in CleanTech Park is to go beyond the provision of a sustainable shell. Tenants are also required to set up sustainable laboratories and offices, and incorporate green work practices on an ongoing basis. With NEA's support, JTC engaged the International Institute for Sustainable Laboratories, a non-profit organisation, to draw up a guidebook for tenants on good design practices. In the guidebook, specific strategies to achieve energy efficiency, as well as safe, healthy and eco-friendly workspaces, are laid out. These can help tenants to save on their energy consumption by as much as 50%. The development of the guide was funded largely by NEA under its Design for Efficiency Scheme.

Between eco-friendly homes and clean technology parks, sustainable development is now shown to be achievable, thanks to the combined efforts of public and private organisations in Singapore.



Top: Treelodge@Punggol is HDB's first eco-precinct.
Bottom from left: Energy-efficient lighting is used in Punggol Eco-Town; Chutes dedicated to recyclable waste are found in certain HDB estates; Artist's impression of CleanTech Park.
Opposite: A vision of what CleanTech Park will be like in the future.



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Building Capacity

“The establishment of the SEI (Singapore Environment Institute) is significant on two counts. First, it is a major undertaking by Singapore to help transform our environmental workforce into a knowledge driven and skill intensive one. Second, it will also add to our overall efforts in positioning Singapore as a leading hub in environment management, knowledge sharing and technology transfer, thereby contributing to capacity building in the developing world.”

— Lim Swee Say, Minister for the Environment (2002 - 2004), at the opening of Singapore Environment Institute on 18 February 2003



SHARING SKILLS, KNOWLEDGE AND EXPERTISE

What was groundbreaking when the Singapore Environment Institute (SEI) was established under NEA in 2003 was this – it was no longer solely about meeting technical competencies internally. Instead, the full-fledged institute was to play a pivotal role in shaping Singapore’s environmental future, by building capacities both within NEA and in the industry. Its work was to help develop a knowledge-driven and skill-intensive workforce, enhance the country’s readiness to meet future environmental challenges and contribute to Singapore’s position as a leading environmental hub in the region.

The new institute had to identify existing gaps in environment training and education in Singapore and explore ways to plug these gaps by tapping on NEA’s wealth of expertise and experience. SEI also began forming strategic partnerships with other institutions and professional bodies to develop programmes which required a different set of competencies from those found in NEA. Within its first year of establishment, SEI had rolled out more than 150 courses, covering both technical operational issues and higher-level topics such as urban environmental management. Today, SEI continues to live up to its mission by setting trends in environmental education, nurturing and incubating the environment industry and integrating different fields and spheres of knowledge through strategic partnerships.

SETTING TRENDS FOR ENVIRONMENTAL EDUCATION

SEI scans the horizons constantly to make sure that it continues to stay ahead. It identifies new and emerging areas where skills and knowledge may be lacking and spearheads new initiatives.

This is reflected in the evolution of SEI’s programmes over the years. For instance, in 2003, the institute launched a professional speaker series where experts from the industry were invited to impart their insights and knowledge. In 2004, it collaborated with the meteorological service arm of NEA to introduce weather-related courses on topics including smoke haze and lightning risks. To bring environmental education to life, the institute launched the Programme for Environmental Experiential Learning (PEEL) in 2007. PEEL consists of a series of learning trails showcasing environmental facilities in Singapore and providing behind-the-scenes information on how Singapore manages and maintains a clean environment.

As energy concerns became more paramount, SEI collaborated with the Institute of Energy Economics, Japan, in 2007 and 2009 to co-organise a workshop on renewable energy in Tokyo so that local environmental professionals could learn from Japan’s experience in this area. In 2010, SEI expanded the workshop to cover such topics with a new partner, the Energy Conservation Center, Japan.

Incubating capacity in the environmental sector is crucial if Singapore is to be equipped with the necessary resources to adapt and cope with emerging environmental challenges. Through the Singapore Environment Institute and a bold industrial development agenda, NEA contributes to the growth of capacity in this sector, enhancing its pool of competencies, knowledge, skills and trained manpower.

With the recognition that environmental issues are more and more cross-cutting in nature, SEI launched a new platform in 2011, where global thought leaders in the fields of design, technology and environmental innovation are invited to give talks on solutions and ideas for environmental sustainability.

INCUBATING GROWTH

To fulfill its role, SEI nurtures and incubates a skilled workforce for the industry through its training programmes. The wide range of programmes it has launched shows the extent to which SEI has shaped the industry.

In 2003, SEI collaborated with Work Development Agency and the Singapore Pest Management Association to set up the first Approved Industry Assessment Centre to standardise and formalise the level of skills across the pest management industry and to upgrade the capacities of workers. SEI was also the Assessment Centre for Basic Food Hygiene.

Over the years, SEI has engendered and upgraded diverse competencies in the industry, from recycling and resource recovery to energy efficiency. Working with different partners, SEI has launched numerous certification courses, such as the Singapore Certified Energy



From top: Grassroot leaders taking part in a PEEL trail; PEEL Clean Water Trail in action; Participants visiting a waste management plant during the PEEL Clean Land Trail.

“In the past, we were a third-world country. We could go around and see what other developed countries were doing to manage their environment, and learn from them. Now that we are a first world country, we are facing the same issues as other developed countries – water, environment, waste, energy and so on. The situation nowadays is complex; it is no longer a linear, consequential kind of arrangement. The environment has become a global rather than localised issue. We can no longer have someone else to tell us what to do. In the past 40 years, we have done very well; we have accumulated our processes, our systems and our framework of environmental management. We have enough inner strength. Therefore we need to rely on the knowledge we have, think critically, leverage on sense-making in the environment. We must sense our surroundings, adopt new mindsets and be in tune with the development of Singapore.”

— Ong Eng Kian, Director, Singapore Environment Institute, NEA



Manager programme to help engineering professionals build up their capabilities in emerging management and energy engineering. Other initiatives include courses on pest management, food handling and environmental control and even workshops to educate the business community on environmentally sustainable work practices.

INTEGRATING DIFFERENT FIELDS

Synergy is the word when it comes to environmental education. Every institution has its own set of expert knowledge and skills. To have a comprehensive training framework for both NEA and the industry, SEI has been leveraging on the knowledge base of local and international agencies and organisations through training partnerships. This approach also ensures that SEI can integrate different sources of knowledge and contribute to the renewal of the industry's skills.

Since its beginnings, SEI has signed a considerable number of Memorandums of Understanding (MOU) with different groups ranging from local educational institutes, government agencies and international organisations. The Sydney Institute, Institute of Technical Education and the Civil Service College are just some of its partners. A noteworthy MOU on training was inked in 2005

with NParks, PUB, National University of Singapore, Nanyang Technological University, Ngee Ann Polytechnic and Singapore Polytechnic. The programme, known as Singapore Environmental Training Programme (SETP), brings the different agencies together to promote Singapore's efforts through training and technology transfer to the region and beyond.

Apart from such collaboration, SEI also actively promotes the sharing of knowledge regionally and internationally through workshops, seminars and international programmes organised in partnership with various international organisations and agencies such as United Nations Development Programme (UNDP), Asian Development Bank (ADB), Japan International Cooperation Agency (JICA), Korea International Cooperation Agency (KOICA), Hanns Seidel Foundation (HSF), Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and so on. SEI has hosted many official visits of foreign dignitaries as well. Through these visits, the institute exchanges points of view and information on environmental management with officials from other parts of the world.



Clockwise from top: Signing of SETP in 2005; Signing of MOU between ITE and NEA in 2010; NEA CEO, Andrew Tan (right) with Paul Bennett (centre), in a 2011 lecture on design thinking for the environment, moderated by Professor Kristin Wood from Singapore University of Technology and Design (left); Visionary environmental thinker, Michael Braungart, at a lecture organised by SEI and Centre for Liveable Cities in 2010; Energy study workshop in Japan organised by SEI for industry executives in 2010; Learning about innovative environmental solutions from Kitakyushu in 2012.

More than ever, SEI is focused on partnering environmental experts, academia and governments to develop programmes that impart insights on critical issues. Distinguished speakers and renowned global thought leaders are also invited regularly to share their view on pertinent topics. These programmes are set up to explore relationships between discrete fields such as technology, design thinking and the environment, so as to catalyse innovation.

RISING UP TO NEW CHALLENGES

As environmental issues become progressively complex, environmental education and inquiry need to evolve so as to keep pace with these issues. In the case of SEI, the additional challenge is to ensure that NEA and the industry in Singapore have the necessary competencies to excel in this new playing field.

“When it comes to addressing future needs and challenges, we have to first assess if we have the competencies to meet them. If not, we have to start building the capacity now. We are here basically to fill in gaps that the industry is not able to address now, and get things started. The necessary expertise may not reside with NEA, so one of our key strategic thrusts is to partner centres of excellence outside of NEA. This way, we can shorten our learning curve by adapting their solutions to our context,” shares Ong Eng Kian, Director of SEI.

This approach has been consistently employed by SEI. For example, when the government began promoting the use of compressed natural gas (CNG) vehicles in the early 2000s, SEI assessed that the local industry was in its infancy and lacked the competencies to support the operation and maintenance of CNG vehicles. The institute invited members of the industry to undertake a trip to Australia, where the use of CNG was well-established, to study the operations and management of CNG refilling stations and equipment. One of the industry partners who went on the trip eventually set up the first CNG station in Singapore. Another example is SEI’s joint seminar on waste management and recycling with Kitakyushu City, one of the most advanced cities in Japan in terms of pollution control, waste management and recycling. Representatives from both public and private sectors took part in the seminar held in 2012 and benefitted from Kitakyushu’s sharing.

“Moving forward, it is no longer basic technical training that we are talking about. We want to promote thought leadership, and we have to look at issues that are nexus in nature, such as sustainable development and climate change,” says Annie Tan, Deputy Director of the Environmental Learning Centre under SEI.

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SEI has also launched intensive efforts to document NEA’s knowledge, practices, capabilities and expertise since 2011. This includes capturing the experiences and perspectives of pioneer environmental engineers and officers who have contributed to Singapore’s environmental management. The undertaking allows SEI to distill essential knowledge and lessons learnt from Singapore’s environmental journey and build a rich resource base that future NEA officers may benefit from. With these in place, SEI can also shape the direction of environmental inquiry, nurture thought leadership and find better solutions for the future.

Says Tan of her work, “Knowledge is growing at a fast speed. Issues are evolving at a fast pace. We have to keep at the forefront of issues. It’s no longer enough to be relevant. We can become obsolete by being relevant only. So we have to be forward-looking, resourceful and responsive to constantly transform and meet the new demands. It is exciting, it’s challenging. This is the environment we are in.”



“The challenge is how we are going to chart our future. We need to scan the horizon and be constantly on the lookout, reach out to different partners, stakeholders, knowledge partners and institutions. There is no single outfit that addresses all the issues. Traditionally, we have been looking at operational issues. Now we are moving into broader contexts, going upstream to look at innovation and strategic issues. We are moving away from a technical training kind of institution to a knowledge-based institution.”

— Annie Tan, Deputy Director, Environmental Learning Centre, SEI



DEVELOPING THE INDUSTRY

Not so long ago, parents would admonish kids who would rather play than study with the dire threat, “Do you want to be a road sweeper one day?”

For years, the environment industry has been seen as a low-skill, unsophisticated sector, despite how essential its services are to our daily lives. But this is changing as the industry undergoes a makeover, thanks to increasing global attention on environmental issues, the steady upgrading of the industry over time and the government’s efforts in developing and promoting local environmental companies. More are also realising that a thriving environmental industry is a key component to sustainable urban solutions and systems.

Alongside a training regime, NEA also pursues an agenda to further develop the industry in different ways. The agency works closely with industry associations to develop different sectors in a systematic manner, upgrading the professionalism and image of the industry. In 2009, this strategy received a boost when NEA set up a dedicated office to focus on industry development and promotion.

To these ends, NEA engages companies actively for feedback on their needs. It collaborates with multiple government agencies to drive home the importance of the environmental sector. For instance, one of the challenges faced by the waste management industry is the access to industrial land. Whether land is allocated to an industry is generally based on its economic yield. The waste

management sector, though critical to a sustainable city, does not present high economic returns. Thus, when the land needs for such companies are juxtaposed against more lucrative sectors, priority is often given to the user with more economic potential. To address this issue, NEA initiated the formation of a committee in 2011 with agencies such as URA, JTC and EDB to evaluate the allocation of land to waste management and recycling companies.

NEA has also implemented steps to liberalise aspects of its functions and encourage the development of expertise outside the government, as in the case of Waste-to-Energy (WTE) incineration plants. At the turn of the 21st century, the government felt that the operation of WTE incineration plants could become more efficient if it was privatised. In 2001, the government called for an open tender for a developer to design, build, own and operate a WTE incineration plant. However, given the high capital outlay and risks of uncertain profit, no developers came forth.

In 2004, NEA made another call for developers to undertake the project, this time with revised conditions and attractive conditions in place to encourage developers to come forth. This time, a number of proposals came in. The tender was eventually awarded to Keppel Seghers Engineering Pte Ltd for its competitive bid. Singapore’s first private incineration plant was thus built and operations began in 2009. Today, following the successful divestment of Senoko Incineration Plant in 2008, about 40% of the incineration capacity in Singapore is now managed by the private sector.

NEA also administers a number of funds to develop and upgrade the industry. The Environment Technology Research Programme, for example, provides assistance to organisations in undertaking research and development projects relating to resource recovery from waste. The Design for Efficiency Scheme encourages investors to integrate energy and resource efficiency in the design stage of their developments while the Innovation for Environmental Sustainability Fund supports projects that use technology to address Singapore’s environmental challenges.

These efforts taken by NEA have set in motion a long-term drive to vitalise and energise Singapore’s environment industry.



“My vision for NEA is transform the entire environment industry, as it is perceived now to be dirty and low-value add, to first-world standards. And our industry can help position Singapore as a hub for environmental solutions in the region and be a model for others. It is a really very new area — developing the clean environment industry. Singapore is a city-state; there is a limit to how companies can grow here. I hope to see more Singapore-based companies being groomed as world champions and compete with other companies, scale greater heights and bringing back returns to Singapore’s economy. By having professional and world-standard companies, it will also facilitate the work of NEA in creating a liveable and sustainable environment for Singapore citizens. The other part of the equation is that people must come in to complement it. So I would like citizens to come forward and call the environment their home, and treat the environment as they treat their home. If we can see all these things, we can see more successful environmental management in Singapore, and that will be a success formula to showcase to other parts of the world.”

— Dalson Chung, Director, Industry Development & Promotion Office, NEA



“To produce 1 tonne of glass, 1.2 tonnes of raw materials are needed. But a tonne of waste glass yields a tonne of glass. And using recycled glass saves energy and raw materials, while reducing the need for mining, which impacts the environment.”

– Patrick Ng, Executive Director, P & R Resource Management

ONE MAN’S WASTE IS ANOTHER MAN’S RESOURCE

You may have seen this 30-second operation near a coffee shop in your neighbourhood – two workers pick up a case of some 200 used glass bottles, dump them at one go into a container, and 15 seconds of noise later, the work is complete.

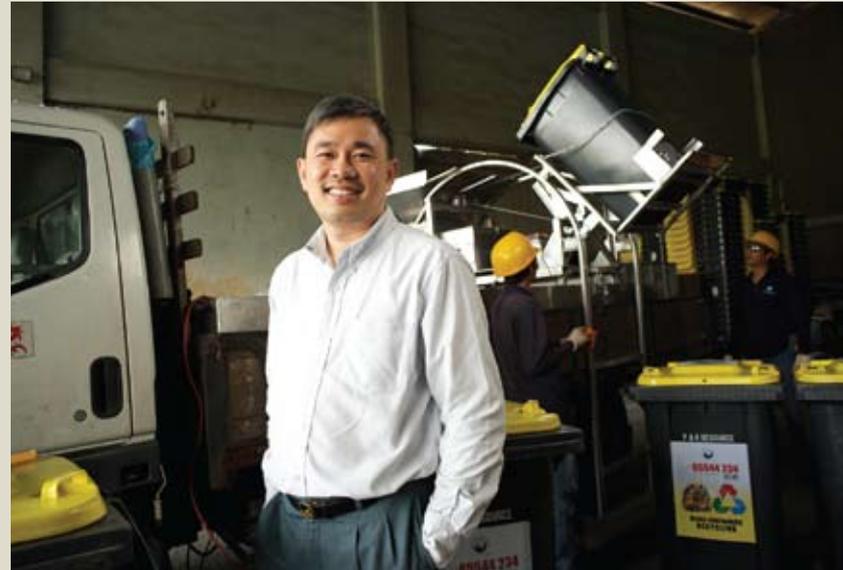
The humble container, a glass-crushing device, is playing a key role in increasing the rate of glass recycling in Singapore, thanks to the efforts of a local company and Singapore Polytechnic, as well as the support of NEA’s Innovation for Environmental Sustainability (IES) Fund.

First, though, why the fuss about glass? Most of us don’t think twice about chucking that jam jar or drinks bottle down the chute. But, unlike most waste we generate, such as food, paper and plastics, glass cannot be destroyed during incineration. What goes in as glass comes out as glass. In 2010 alone, 60,700 tonnes of glass were sent to Semakau Landfill, shortening the landfill’s lifespan.

Yet the rate of glass recycling in Singapore is still rather low, at only 24% in 2010. The problem lies in the fact that the material is cheap and collection is arduous. Unlike metals, the incentive to recover waste glass on a large scale is not as financially rewarding. Getting households, commercial and industrial premises to put aside used glass for recycling is a challenge. The most immediate hurdle? Waste glass collection is a noisy, back-breaking and time-consuming process that is potentially unprofitable if inefficient.

But to the intrepid businessmen at P & R Resources, waste glass is a resource. Having been in the line of glass manufacturing support for many years, they are convinced that glass recycling makes good business and environmental sense. Teaming up with Singapore Polytechnic, the company convinced NEA to fund its research to tackle the problem of collecting waste glass, starting with commercial premises. Says Patrick Ng, Executive Director of P & R Resources, “As a commercial entity, we don’t have strong research and development skills. As a statutory board, NEA is able to fund the research and development. And Singapore Polytechnic provided the skills and know-how.” Supported with a grant from the Innovation for Environmental Sustainability Fund, the team began researching in 2009.

The students and educators at Singapore Polytechnic soon identified key problems with the process. “The workers had to lift a heavy load of about 70 kg above their heads and dump it into a container. It’s not only laborious, it is also very noisy. After collection, at the plant, the glass would be lifted by a forklift and dropped to crush the glass, so as to facilitate



the transport to Malaysia, where the glass is processed. So we thought of crushing it on-site. This also means that fuel can be saved as more glass can be contained. We also thought that if the glass could be stored vertically in containers, it would be more efficient,” shares Dr Ng Khee Yang, the project’s key consultant in Singapore Polytechnic.

Crushing waste glass on-site proved to be a challenge. The crushed glass had to be of the right size. Too fine, and it would be unusable, and too big, it would have to be crushed again. Noise and safety had to be considered too – the amount of noise caused must not be a public disturbance, and the mechanism must not release glass shards or dust into the surroundings.

The polytechnic students eventually came up with the winning design, which used several rotating hammers with joints to crush the bottles as they were loaded into a container. The joints allowed whole cases of bottles to be dumped in without jamming up the device. “The crushing mechanism is very important because it is the bottleneck of the operation,” says Dr Ng. “So once we were able to clear this crushing mechanism, we went on to the problem of lifting the case to the vehicle.” Various solutions were proposed for lifting, including a vacuum and forklift system, before a commercially feasible procedure was developed. After three years of research and development, the team finally came up with a safe system that shaved the operation to a mere 30 seconds to collect and crush 75 kg of glass.

A sound procedure alone is never enough. To their dismay, P & R often found food waste, plastic bags and such in the containers meant for waste glass. “This created a lot of problems for us, especially since we are not a general waste collector!” Patrick Ng points out, “Here NEA plays a key role. We approached NEA to educate the food and beverage outlets. At first, not a lot of the outlets were receptive to recycling. But NEA is more persuasive as a government agency, and it helped us solve these teething problems and encourage more businesses to recycle their glass waste.” With an efficient system in place and NEA’s support, P & R Resources is the biggest player in Singapore’s glass recycling today.



“We are close to the region, we have a very good legislative framework in Singapore and doing business here is easy. So we want to attract these companies to position here and partner our companies to step out to other countries. NEA plays a role in attracting some of these big companies. When we have work visits to other countries, NEA comes along. It’s always helpful when you have government agencies with you, because you are seen as one Singapore.”

– Guah Eng Hock, Chairman, Waste Management and Recycling Association of Singapore

A PARTNERSHIP TO MANAGE WASTE

“In whatever we do, there is the presence of MEWR and NEA. There is a lot of collaboration,” says Guah Eng Hock, Chairman of the Waste Management and Recycling Association of Singapore (WMRAS). As far as industry associations go, WMRAS is a new kid on the block, having been set up only in 2001. And that, too, came about at the encouragement of former Minister for the Environment Lim Swee Say.

The waste management and recycling industry began flourishing in earnest after the government began to liberalise the sector in the late 1990s. This growth is reflected in WMRAS’ expanding membership over the years, from a mere 20 or so companies to over 100 in 2012.

Since its establishment, WMRAS has matured together with NEA, forging close ties as they work jointly on several fronts. Once a year, a dialogue between WMRAS and the CEO of NEA is held, during which the public and private sectors share thoughts and perspectives. This closeness is crucial to the industry, as Guah explains, “NEA is the agency for public waste collection contracts. It plays a very big role in policy-setting – in terms of allocation of land for waste management companies, in terms of tender policy, whether they go for the cheapest or best-sourcing. These are issues that affect our members and the industry. We constantly engage NEA in these issues, which are brought to the table and openly discussed, and it has led to revisions in tender policies for the betterment of the industry.”

Ironing out operational matters is not the only motivation for this close partnership. Both WMRAS and NEA share similar objectives – to develop and grow the industry. “Basically, we want to increase the competencies and skills of the workers,” shares Guah. “There is a whole Workforce Skills Qualifications training road map for the industry, covering several levels such as safety, operational familiarity with equipment and identifying hazardous materials. The development of the courses is led by the Workforce Development Agency, with inputs from WMRAS and NEA.”

What interest both parties more, however, is putting Singapore’s

waste management and recycling solutions on the map. The reason for this is simple. “If we look at the Singapore market, it is still a very limited market. So if we want the industry to grow, we need to sell our services and technology overseas. For example, there are companies in Europe with well-tested and developed models which cannot be imported wholesale into Asia. They need good local partners who understand the culture of the region,” Guah elucidates. “We are close to the region, we have a very good legislative framework in Singapore and doing business here is easy. So we want to attract these companies to position here and partner our companies to step out to other countries. NEA plays a role in attracting some of these big companies. When we have work visits to other countries, NEA comes along. It’s always helpful when you have government agencies with you because you are seen as one Singapore.”

To put Singapore’s urban solutions in the limelight, WMRAS has made several moves. Recognising the huge demand for waste management capabilities in Asia, WMRAS successfully courted the International Solid Waste Association (ISWA), a leading non-profit organisation promoting sustainable waste management, to open in Singapore a regional training centre for the industry. The MOU to effect this centre, the first of its kind outside Europe, was inked in 2010 between NEA, WMRAS and ISWA. Says Guah, “ISWA has a huge knowledge base. And our waste management industry is still at a very nascent stage, so we stand to benefit from this. Singapore can also help ISWA to reach out to Asia. And NEA has very good relationships with its counterparts in Southeast Asia, so it can interest more people in the centre’s activities.”

This synergy between NEA and WMRAS is further demonstrated in WMRAS’ tradeshow for the industry, WasteMET Asia, which aims to be the leading show for waste management and recycling technologies. The show inaugurates in 2012, at the same time and venue NEA launches its flagship environmental event, CleanEnviro Summit Singapore.



Beyond Our Shores

Since Singapore's independence, it has transformed from a polluted, insanitary place to one of the most liveable cities in the world. The lessons and expertise we have built up give us a robust foundation to face future challenges and to contribute towards common ground globally to address the world's environmental issues.

Across the world, demand for environmental solutions is also growing as more countries realise the importance of a clean environment and invest in environmental management technology and systems. In 2004, the global environment market was estimated at US\$548 billion and projected to grow to US\$800 billion by 2015, according to a report commissioned by the United Kingdom government.¹ Asia is expected to lead the growth in terms of needs and expenditure.

Singapore can play a role in sharing our environmental knowledge and solutions with the rest of the world. In the past four decades, Singapore has built up a reputation for having a sustainable environment and nurtured networks with multiple governments to share environmental practices. Now is the time for Singapore to ride on the foundation that it has built and reach out to the world.

REACHING OUT

As a small city-state, reaching out to the world is a long-established strategy in Singapore's national development, from cultivating diplomatic relations to building our economy. Going forward, this strategy is a key thrust in our environmental management sector.

Since the formation of NEA, the agency has actively taken part in international environmental events such as workshops, conferences, trade shows and seminars. At such events, Singapore's track record in environmental management is presented to participants from other countries. Close collaborative relationships are also cultivated with international organisations such as WHO and the World Bank. NEA also established a business unit in 2010 to provide consultancy services on environmental management to other governments.



Opening of ISWA/WMRAS World Congress in 2008, officiated by Dr Yaacob Ibrahim.

“For many young Singaporeans, I think the environment has a certain appeal. They are now more aware, because of all the global issues centred on the environment. We want to give them a chance to do something here, and beyond Singapore, meaning what Singapore can do as a reference for other cities in the region. We are not saying that our solutions are the best, or necessarily at the forefront. But we have overcome our own challenges, and we are together with other cities, having to confront a common set of challenges going forward, so let's find ways to deal with that. If we give ourselves some reputation to uphold, it raises the bar and we have to work harder towards these goals. We also give Singaporeans at large a greater sense of pride in the country and a greater sense of ownership.”

— Andrew Tan, CEO, NEA

¹ UK Centre for Economic and Environmental Development. 2006. *Emerging Markets In the Environmental Industries Sector* November 2006. United Kingdom: Department of Trade and Industry.



More importantly, NEA has also started the bid to export Singapore's environmental solutions to the region and the world by promoting our local industry. In 2010, NEA formed the Clean Environment Industry Committee with EDB and other agencies. The objective was to transform Singapore into a vibrant global environment hub which will offer innovative cost-effective solutions to meet global and local needs.

Overseas mission trips are regularly organised by NEA to identify opportunities where Singapore-based environmental companies can be showcased. As the facilitator, NEA matches the needs of other countries with the solutions offered by Singapore-based companies. This work, combined with NEA's efforts to develop the local industry, has led to a growing number of Singapore-based companies gaining a foothold in overseas markets. One such example is a \$1.7 billion project for solid waste management that Keppel Seghers secured in Qatar, given its track record in constructing Singapore's first private WTE incineration plant.

BRINGING THE WORLD TO SINGAPORE

When the world beats a path to Singapore to look for solutions, we know that Singapore has arrived as an environmental hub.

NEA has been sharing knowledge and solutions with other countries via courses and seminars. NEA collaborates with foreign embassies, governments and international organisations to roll out training programmes that are relevant to the needs of these international participants. These programmes provide in-depth presentations on Singapore's environmental strategies to demonstrate linkages between nation-building, economic development and environmental sustainability, and also impart technical knowledge and expertise. Officials and participants come from a long list of countries, including Afghanistan, Bangladesh, India, the Republic of Korea, Thailand, Malaysia and Iran.



Prime Minister of the Kingdom of Thailand, Samak Sundaravej (centre), on a visit to Tiong Bahru Market in 2008.

NEA has hosted and facilitated numerous regional and international events related to the environment since its formation. Forums, conventions, regional working group discussions and trade fairs are just some of them. The environment event to watch out for is the CleanEnviro Summit Singapore, held in July 2012. This event is the result of careful research to identify existing gaps in regional environmental shows, so as to come up with a distinctive and relevant event.

CleanEnviro Summit Singapore is poised to play a key role in promoting Singapore's standing as an environmental hub. The event is diverse in its offerings. Besides profiling the capabilities of local clean environment companies, the event also consists of a high level summit for leaders in the clean environment sector. These leaders come from different parts of the world, including Germany, China, the Middle East and the United Nations. A closed door roundtable for regulators and a trade show curated by WMRAS, WasteMET Asia, also form part of the event.

EXPORTING SINGAPORE'S DNA

From Qatar and Brunei to China and India, Singapore has been busy sharing its experience in environmental management with other countries on a much larger scale than ever. More and more, we are stepping out, and exporting our DNA in sustainable development to other countries. Singapore government agencies are actively providing insights and consultancy, working together with other governments on environmental projects, and even bringing our local companies overseas to showcase their competencies.

For example, sharing our experience in managing solid waste with senior government officials from Kerala, India, in 2010, and conducting a feasibility study on the cleaning up of Cooum River in Chennai during the same year. Or, supporting the successful bid of a home-grown company to design and build a waste management facility in Brunei.

The project that takes the cake however, is an exciting eco-city in Tianjin, China. Located on wasteland which had seen years of chemical pollution, the site comprises abandoned salt pans, a deserted beach and a huge waste water pond. Transforming this into a liveable, environmentally friendly and resource-conserving city is a visionary, ambitious undertaking by the Chinese and Singapore governments. When completed in the 2020s, the city will serve as a model for sustainable development. Multiple government agencies from Singapore are involved, such as the Ministry of National Development, Ministry of Trade and Industry and MEWR. Every agency chips in to provide its competencies, from urban master planning to public housing development and water management.

When it comes to environmental management, NEA is the primary consultant. The agency collaborates closely with the Chinese government, sharing its experience in diverse areas such as pollution control, solid waste management and development planning. The advice helps the city planners to put in place infrastructure and policies to meet key environmental performance indicators. Some of these indicators are ambient air quality, noise pollution control, carbon emission, domestic waste generation and overall recycling rate. NEA also provides inputs on guidelines for green construction and co-chairs a task force with the eco-city's Environment Bureau to explore the implementation of a pneumatic waste conveyance system in the city.

Our local environment industry is also active in imprinting its mark on the eco-city. For example, Alpha Biofuels signed a Memorandum of Understanding (MOU) with the Sino-Singapore Tianjin Eco-City Investment and Development Co., Ltd in 2011 to implement an organic waste gasification and biodiesel-from-used-cooking oil system. Another company, LHT Holdings, also signed an MOU to establish a wood waste recycling plant to manufacture eco-wood products. This will help developers to achieve green building standards through the use of recycled materials.

Through these exciting projects, Singapore is able to learn from other countries, build its capacities further, and contribute to a better environment elsewhere in the world.

