



CLEAN ENERGY INDUSTRY IN SINGAPORE



Flanders Investment & Trade

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1 CLEAN ENERGY INDUSTRY OVERVIEW

The Cleantech Industry is a strategic economic growth area of Singapore. In 2007, **SGD350 million was committed by the Singapore government to the clean energy industry** for the purpose of advancing research & development, and for capability development. **Singapore's Cleantech industry** can be broken into **two key sub-sectors – Clean Energy and Water Technologies**. It is estimated that **the clean energy industry itself would contribute around SGD1.7 billion to Singapore's GDP by 2015 and create 7,000 jobs in the various areas of solar power, fuel cells, wind power, energy efficiency and carbon services**. (The all-encompassing cleantech industry is predicted to contribute SGD3.4 billion to Singapore's GDP and generate 18,000 new jobs by 2015.)

Singapore's natural geography precludes it from adopting many natural alternative energy solutions:

- Tidal, wave and ocean thermal power are not feasible as most of the sea space is dedicated to the shipping, logistics and other port purposes.
- Hydroelectric power relies on the gravitational force of falling or flowing water, but Singapore lacks a major river system for that to be harnessed.
- Wind energy is also still a flimsy option for Singapore as the country's average wind speeds are too weak to justify the economic use of large wind turbines; furthermore, Singapore does not have sufficient land for commercial wind turbines.
- Geothermal energy is geographically impossible, as it is typically limited to the tectonic plate boundaries.

Given Singapore's limitations, **solar photovoltaic (PV) and biofuels have been determined to be the most viable options for renewable energy**. Singapore's location in the tropical Sunbelt allows it to receive **50% more radiation from the sun compared to Germany and Japan which are pioneers hubs in solar research**. This, in addition to Singapore's prevailing **strength as a semiconductor hub, expertise in silicon wafer fabrication and potency in precision engineering** resulted in a spontaneous move towards solar panel technologies and solar energy research to optimise its potential in Singapore.

Singapore has been **traditionally strong in its process and chemical industry**. Leveraging on these capabilities, biofuels is another renewable energy that Singapore has decided to concentrate its efforts on. Even though, headway into biofuels is slower compared to solar energy, the step towards biofuels is a promising proposition. Distinct from most other energy sources, **biomass (organic substances that stores solar energy through photosynthesis) can be converted directly into biofuels which does not add to the total carbon dioxide in the environment**. Presently, **global biofuel production constitutes about 1 per cent of a USD40 billion traded energy market (about 20 billion gallons annually)**. Based on current standards set by various governments for renewable energy use, this is expected to reach **144 billion gallons per year by 2022**.

2 FACTS AND FIGURES

2.1 ENERGY USAGE FACTS AND FIGURES

Singapore is one of the most densely populated (ranked 3rd in the world according to the population division of the United Nations). Singapore has an export-oriented economic policy. Export trade alone in 2012 amounted to SGD510.3 billion, nearly one and half times Singapore's GDP. For the case of Singapore, there is a **positive correlation between population growth, economic growth and electricity consumption** - as the economy and population grows (Tables 1 & 2), it results in more energy being consumed in the form of electricity (Table 3).

Population Growth	
Year	Population ('000)
2009	4,987.6
2010	5,076.7
2011	5,183.7
2012	5,312.4

Economic Growth	
Year	GDP per Capita (SGD)
2009	55,068
2010	62,230
2011	64,451
2012	65,048

Table 1: Population Statistics (Source: <http://www.singstats.gov.sg>)

Table 2: Economic Statistics (Source: <http://www.singstats.gov.sg>)

Total Annual Electricity Units Generated (GW Hr)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2009	3206.00	3034.00	3338.00	3390.00	3558.90	3571.63	3652.11	3656.78	3578.37	3711.34	3494.77	3606.51	41798.4
2010	3656.98	3373.63	3872.09	3800.06	3974.50	3740.29	3862.74	3857.16	3762.27	3928.92	3741.81	3795.96	45366.4
2011	3736.90	3366.06	3851.76	3768.22	4128.00	3965.20	4042.91	3935.69	3873.4	3839.99	3742.6	3747.69	45998.4
2012	3752.70	3655.77	3919.85	3850.41	4075.85	4005.87	4028.27	4040.88	3877.71	4040.15	3842.45	3846.11	46936.0

Table 3: Total Annual Electricity Units Generated (Source: <http://www.ema.gov.sg>)

Given that Singapore has no inherent natural resources for energy generation, the city state is **highly dependent on natural gas and fossil fuel imports to meet energy needs**. Over the years, Singapore has relied more on natural gas piped from Malaysia and Indonesia, as natural gas produces lesser carbon emissions per unit of electricity compared to fossil fuels. Consumption of electricity based on sales figures has been **growing annually at the rate of 5.2%, from 37,709 GWh in 2009 to 41,725 GWh in 2011**. Based on figures by the Energy Market Authority (EMA), the **industrial-related (16,775 GWh or 40.2%) and commerce- and services-related sectors (15,653 GWh or 37.5%) are the most energy intensive sectors. Electricity consumed by the industrial-related sectors rose by 6.7% per annum during 2009 to 2011** (refer to Figure 1).

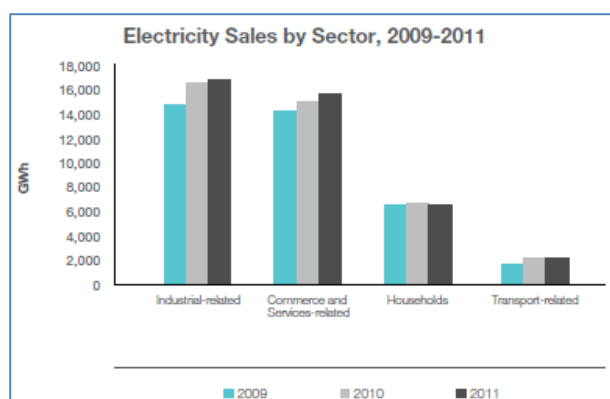


Figure 1: Electricity Sales by Sector (Source: <http://www.ema.gov.sg>)

2.2 EMISSION FACTS AND FIGURES

SINGAPORE'S EMISSIONS PROFILE

According to the International Energy Agency (IEA)¹, **Singapore contributes less than 0.2% of global emissions and ranks 123rd of 137 countries in terms of CO₂ emissions per dollar GDP** (Figure 2). However, when ranked **in terms of emissions per capita, Singapore ranks 27th out of 137 countries due to its high population density** (Figure 3). As such, Singapore cannot be complacent in its efforts to reduce its carbon emissions.

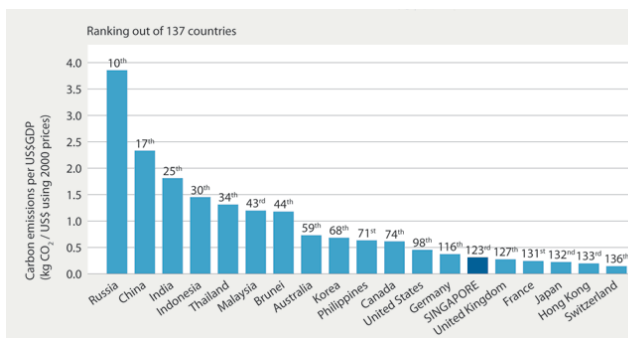


Figure 2: International Carbon Emissions Ranking (Source: Source: CO₂ Emissions from Fuel Combustion - 2011 Highlights © OECD/International Energy Agency, 2011)

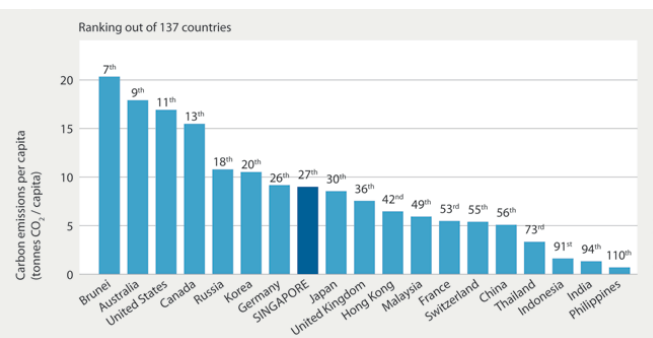
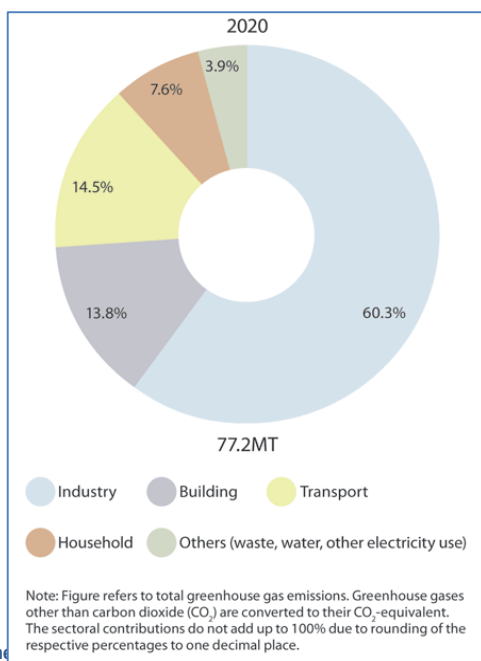


Figure 3: Emissions Per Capita (Source: CO₂ Emissions from Fuel Combustion - 2011 Highlights © OECD/International Energy Agency, 2011)

Singapore's geographical location along the East-West routes determined it to be a suitable port for the business supply network of oil storage and refining facilities for the Southeast Asia region, the Western Pacific, South Asia and Australasia. Inevitably, the oil refineries do contribute a large part to carbon emissions.



If nothing is done, it is projected that Singapore's business-as-usual (BAU) emissions will reach **77.2 million tonnes (MT) in 2020** (Figure 4).

Therefore, Singapore has to continuously improve its levels of energy efficiency, carbon emissions through progressive and collective efforts (in terms of technologies, solutions, better business practices and awareness) in the various sectors and not just merely in the Cleantech sector.

¹<http://www.worldenergyoutlook.org>

3 CLEAN ENERGY ECOSYSTEM IN SINGAPORE

3.1 GOVERNMENT AGENCIES

NATIONAL ENVIRONMENT AGENCY (NEA) <http://www.nea.gov.sg>

The National Environment Agency (NEA) is a statutory board under Singapore's Ministry for the Environment and Water Resources. The NEA develops and spearheads environmental initiatives and programmes through its partnership with the People, Public and Private sectors. The agency **promotes energy efficiency and conservation to improve air quality, reduce greenhouse gas emissions and help mitigate climate change**. The Energy Efficiency Programme Office (E2PO) integrates the overall efforts of the public, private and people sectors to improve energy efficiency.

ENERGY INNOVATION PROGRAMME OFFICE (EIPO) <http://www.ema.gov.sg/energyrnd>

The Energy Innovation Programme Office (EIPO), previously known as the Clean Energy Programme Office (CEPO) was formed in 2007 for the purpose of developing the potential of the Clean Energy Industry in Singapore and to integrate the different efforts of the government in various research and testbedding projects.

- *Clean Energy Research and Testbedding Programme (CERT)*: The **SGD17 million programme creates opportunities for private companies to collaborate with government agencies to develop and testbed clean energy applications and solutions using government facilities in Singapore**.
- *Solar Capability Scheme*: The **SGD20 million scheme was launched to help companies offset part of the capital costs involved in the installation of solar technologies in new buildings**.

The EIPO is led by the Singapore Economic Development Board (EDB)² and the Energy Market Authority (EMA)³, which is **responsible for planning and executing strategies to develop the energy sector in Singapore**. In 2011, the National Research Foundation dedicated an additional SGD195 million to EIPO for research projects.

NATIONAL CLIMATE CHANGE SECRETARIAT (NCCS) <http://www.nccs.gov.sg>

The National Climate Change Secretariat (NCCS) was established on 1 July 2010 under the Prime Minister's Office (PMO) to **develop and implement Singapore's domestic & international policies and strategies to tackle climate change**. Their responsibilities include **facilitating efforts to mitigate carbon emissions in all sectors, assisting Singapore in adapting to climate change effects, foster public awareness** with its stakeholders in the People, Public and Private (3P) sectors through outreach, engagement and education initiatives to create awareness and action on climate change, channel and grow and green growth opportunities arising from climate change by analysing emerging trends and developments, and working

²<http://www.edb.gov.sg>

³<http://www.ema.gov.sg>

with the research community to identify and explore technologies important to Singapore's emission reduction efforts.

3.2 COMMITMENTS TOWARDS SUSTAINABILITY DEVELOPMENT

The **Sustainable Singapore Blueprint**⁴ was officially launched in April 2009 by the Ministry of National Development and Ministry of Environment and Water Resources. The Blueprint complements the other existing environmental initiatives and outlines the strategies and initiatives suggested by public, private and public sectors to realise economic growth while maintaining a sustainable living environment over a period of twenty years. The Blueprint is based on a four-prong strategy approach:

1. Boosting Resource Efficiency
2. Enhance Urban Environment
3. Building Capabilities
4. Fostering Community Action

The goals specified under each strategy is supervised by the government and subjected to review every five years to take into consideration developments in cost measures, technology and public receptiveness. Given Singapore's limited access to renewable energy, energy efficiency is its core strategy to reduce emissions. Therefore, under resource efficiency, **the goal is for a 35% improvement in energy efficiency from 2005 levels by 2030.**

Even before the Copenhagen Climate Change Conference in 2009, Singapore made a **pledge to reduce emissions by 16% from the 2020 business-as-usual (BAU) level** (refer to Figure 4: Business-as-usual (BAU) Emission by 2020). Even though, it is not legally binding, Singapore remains committed and has implemented **mitigation and energy efficiency measures which should reduce emissions by 7% to 11% from the 2020 BAU level.**

3.3 INFRASTRUCTURE

CLEANTECH PARK⁵

CleanTech Park is the first eco-business park catered to house corporations related to clean technology products and solutions for urban settings in the tropics. Developed over 50 hectares of land, and located near Nanyang Technological University and Jurong Industrial Estate, the eco-business park enhances the integration between academia and businesses; from research & development to downstream manufacturing.

⁴<http://www.sustainablesingapore.gov.sg>

⁵<http://www.jtc.gov.sg/RealEstateSolutions/CleanTech-Park/Pages/default.aspx>

The Park itself is a **living lab for testbedding cleantech solutions by taking advantage of the natural elements**. The best location to capture sunlight for photovoltaic electricity generation was obtained utilising information from a solar exposure modelling concept for reducing solar radiation. Another modelling tool was also used to harness the prevailing wind directions by tapping on the natural environment to optimise building design and orientation in reducing building heat. Such eco-innovativeness has won CleanTech Park the Building and Construction Authority's Platinum Green Mark Award. The **Park's energy-efficient infrastructure and public amenities translates to about 40 percent reduction in energy consumption and decrease of 25 per cent for potable water usage, which in turn amounts to estimated annual savings of 40 percent for utilities**.

TESTBEDDING LOCATIONS

Environment & water is also one of the focus areas under the **Urban Solutions**⁶ Initiative promoted by the Economic Development Board of Singapore⁷ (EDB). To grow and develop these focus areas, EDB together with other Singapore government agencies encourage both local and foreign companies and organisations to collaborate with Singapore's research institutions and government agencies for R&D purposes and to utilise existing infrastructure as **"Living Laboratories" to testbed innovative new solutions & technologies for determining commercialise viability**.

There have been a number of testbedding locations in Singapore for the purposes of developing testing Clean Energy technologies and solutions. One such testbed for solar and biofuel was the **PulauUbin Micro-Grid Testbed** by the Energy Market Authority⁸. The purpose of the test-bed was to provide island businesses and residents an opportunity to **switch to a cleaner and more price competitive source of electricity instead of relying on diesel generators that are inconvenient, costly and pollutive**. The first stage of the testbed consisted of the construction of the micro-grid and the deployment of biodiesel and solar photovoltaic (PV) technology. Companies were then invited to testbed their clean and renewable energy solutions which included **advanced solar photovoltaic, micro-wind turbine and biomass technologies with the completed micro-grid infrastructure**.

There is also the **Punggol Eco-Town**⁹ to testbed energy, water and waste management technologies. 13 companies were selected by the Housing Development Board to testbed their technologies. For clean energy, there were **solar photovoltaic's, elevator energy regeneration systems, energy-efficient lighting in common areas and smart grid/meters**. Singapore's first solar leasing project that entails the **installation, operation and maintenance of two MWp solar photovoltaic systems was also implemented**. The solar energy generated is used to power lifts, lighting in common areas, and water pumps. The **model is expected to reduce energy consumption by 20% by 2015**.

3.4 RESEARCH & DEVELOPMENT

SOLAR ENERGY RESEARCH INSTITUTE (SERIS) <http://www.seris.sg>

⁶http://www.edb.gov.sg/edb/sg/en_uk/index/industry_sectors/environment_water/video/urban_solutions.html

⁷<http://www.edb.gov.sg>

⁸<http://www.ema.gov.sg/ubin-test-bed>

⁹<http://www.hdb.gov.sg/punggolecotown>

SERIS is Singapore's national institute for applied solar energy research. The Institute is located at CleanTech One – a six-storey two-towered building within Cleantech Park that houses various local and international organisations to create a diverse hub for clean technology. Sponsored by the National University of Singapore (NUS) and Singapore's National Research Foundation (NRF) through the Singapore Economic Development Board (EDB), the institute **conducts research, development, testing and consulting in the fields of solar energy conversion and solar building technologies that contribute towards a sustainable global energy supply and reduced greenhouse gas emissions.**

Their international multi-disciplinary team of scientists, engineers and architects **focus on materials, components, processes and systems for photovoltaic electricity generation and solar and energy-efficient buildings for tropical regions**, in particular for Singapore and South-East Asia, as well as India and China. The Institute **works closely with partners worldwide from small start-ups to industry leaders in the solar industry.**

INSTITUTE OF CHEMICAL AND ENGINEERING SCIENCES (ICES) <http://www.ices.a-star.edu.sg>

The Institute of Chemical and Engineering Sciences under the Agency for Science Technology and Research originated to provide highly trained R&D manpower, establish a strong science base and to develop technology and infrastructure to support future growth of Singapore's chemical industry. While the Institute is not solely specialised in areas related to biofuels, it has established **ties with many world leading laboratories, pilot facilities, and possess the necessary infrastructure to carry out research programmes in chemistry and chemical engineering sciences.** In 2010, one project pertaining to biofuel undertaken was a year-long collaboration with European aerospace and defence firm EADS¹⁰ to study the practicality of using microalgae as a renewable source of jet fuel for aircraft and to examine the conversion of algae oil for use as jet fuel. This is a significant study as microalgae is more competent than plants at transforming solar energy and carbon dioxide into fixed biomass, implying their long-term potential as an energy source across various industry sectors.

¹⁰<http://www.eads.com>

3.5 FOREIGN AND LOCAL COMPANIES

FOREIGN COMPANIES

The array of business opportunities in the surrounding regions had propelled many international Clean Energy companies set up offices and even operations in Singapore, to develop clean energy solutions customised to this under-served market made up of immense global potential. **Apart from solar energy and biofuel, there is also emphasis on development of smart grids, green buildings, energy efficiency services and carbon services.** Wind energy and tidal energy may not be directly relevant to Singapore's energy needs. However, Singapore in being a "wide-ranging" **hub allows international companies easy access to a combination of technology, markets, capital, talent and 'reach' to both penetrate and service the region's clean energy industry;** which will continue to grow due to climate change, technological advances and energy demands..

- *Renewable Energy Corporation* (<http://www.recgroup.com>) of Norway chose Singapore after screening over 200 possible locations, to build its integrated solar production facility in 2010, investing over SGD2.6 billion in its first phase of phase expansion. It is the largest single investment that a cleantech company has made in Singapore. The facility employs round 1,300 individuals and once fully developed can produce up to 1.5GW of solar products for the global markets.
- *Neste Oil* (<http://www.nesteoil.com>) started up the world's largest renewable diesel refinery in Singapore in November 2010. The Singapore refinery has a capacity of 800,000 t/a and costs around EUR550 million to build. The investment forms part of Neste Oil's strategic goal of becoming the world's leading renewable diesel producer.
- *Vesta Wind Systems* (<http://www.vestas.com>) is the world's leading wind technology company opened its regional headquarters in Singapore in 2007. The company had planned to invest SGD 500 million in Singapore over a period of 10 years to develop its largest R&D centre outside of Demark. Using Singapore as its Asia Pacific hub, Vestas had visibly increased its regional presence. There has been strong demand for wind power technology from countries such as Taiwan, India, Philippines, South Korea, Australia and New Zealand. There is also momentum for wind development in emerging countries such as Thailand, the Philippines and Vietnam.

LOCAL COMPANIES

Development of Clean Energy technologies and solutions often involves high initial investment outlay, long development time and risk. Hence, smaller homegrown companies may face greater difficulty in competing with the more established international players. But despite that, there are several homegrown companies in Singapore which have been successful in their ventures.

- *Sunseap Enterprises* (<http://www.sunseap.com>) is a designer and manufacturer of a wide-range of solar-powered applications and devices. SUNSEAP's product range includes custom-designed solar panels, lights, grid-connected systems, BIPV and stand-alone systems. The company was awarded a 20-year tender (worth SGD11 million) by HDB to design, finance, install, operate and maintain 1,400 solar panels for 44 residential blocks in Punggol.

- *Alpha Biofuels* (<http://alphabiofuels.sg>) is a biofuel producer which manufactures biodiesel from recycled cooking oil; a cleaner and cheaper alternative to petroleum diesel and can be for all diesel engines. Through government support and private sources, Alpha Biofuels developed the Alpha Biodiesel Micro Refinery, a compact and easy-to-operate refinery for converting a variety of waste oils into biodiesel. The micro refineries are now in several locations in Singapore and overseas. The one at Marina Bay Financial Centre was actually used to power the construction cranes of the billion dollar project.

4 GOVERNMENT INITIATIVES AND SUPPORT

4.1 FUNDS, INCENTIVE, TENDERS

There are many sources of funding and programs available in Singapore open to local and foreign companies to promote the growth of the alternative and renewable energy industry and its supporting businesses. More Information on funds and incentives can be found on http://app2.nea.gov.sg/funds_home.aspx and <http://www.spring.gov.sg>.

CLEAN DEVELOPMENT MECHANISM¹¹

NEA is the **appointed authority for Clean Energy Mechanism projects implemented which greenhouse gas emission reductions from the projects can be used to offset emissions of Annex I countries, such as Japan and the EU under the Kyoto Protocol**. NEA's role is to issue a Letter of Approval (LoA) for projects that meet the sustainable development criteria. The criteria includes environmental sustainability (meets NEA's Environmental Protection requirements, standards and regulations and produces measurable reductions in GHG emissions), Economic Sustainability (utilizes more efficient and/or environment-friendly technology) and Social Sustainability (improve quality of life by creating job opportunities, etc)

INNOVATION FOR ENVIRONMENTAL SUSTAINABILITY FUND¹²

With the vision of contributing to Singapore's long-term environment sustainability, NEA set up the Innovation for **Environmental Sustainability (IES) Fund valued at SGD20 million**. Given the objective of assisting Singapore-registered companies to embark on projects related to environmental protection and public health, the fund **concentrates on projects related to applied research or test-bedding / demonstration stages of technology development**.

SME ENERGY EFFICIENCY INITIATIVE¹³

\$17 million has been set aside by the Government for SPRING Singapore's SME Energy Efficiency Initiative. Under the initiative, there is Energy Audit (SMEs may use SPRING's Innovation and Capability Voucher to engage one of 11 prequalified Energy Service Companies to conduct an audit of their current energy usage and identify areas to improve their energy efficiency), Energy Monitoring System (funding to install systems for long-term continuous self-monitoring of energy consumption), Energy Efficiency Project Implementation (projects that involve optimising processes, redesigning workflows, or installing of energy-efficient equipment or technologies) and Energy Efficiency Thought Leadership (pilot training programme with McKinsey Capability Centre: Green Campus, to drive the sustainability of energy efficiency initiatives in the organisation.)

¹¹<http://app2.nea.gov.sg/grants-awards/energy-efficiency/clean-development-mechanism>

¹²http://app2.nea.gov.sg/funds_ies.aspx

¹³<http://www.spring.gov.sg/NewsEvents/PR/Pages/Government-Sets-Aside-17-million-to-Boost-Energy-Efficiency-in-SMEs-20130710.aspx>

GOVERNMENT RELATED TENDERS

All information on upcoming tenders related to government tenders can be found on <http://www.gebiz.gov.sg>. GeBIZ is the Singapore government's one-stop e-procurement portal. All the public sector's invitations for quotations and tenders are posted on GeBIZ. Suppliers can search for government procurement opportunities, download tender documents, and submit their bids online.

4.2 GOVERNMENT INITIATIVES

Moving towards energy efficiency and clean energy can be expensive; therefore the Singapore government has put forth the following initiatives to somewhat ease the transition.

TAX INCENTIVE – ONE-YEAR ACCELERATED DEPRECIATION ALLOWANCE FOR ENERGY EFFICIENT EQUIPMENT AND TECHNOLOGY¹⁴

Under the Income Tax Act, this tax **scheme allows companies to replace old, energy-consuming equipment with more energy efficient ones and to invest in energy-saving equipment**. Inefficient equipment not only incur high operating costs as they consume more energy, but also have a negative impact on the environment as a result of higher emission of pollutants to the environment. For energy-saving equipment approved by NEA, **companies can claim the full cost of such equipment as capital allowance in one year instead of the usual three years**.

GREEN LEASE

Green leases are believed to be an effective method to **derive CO2 savings (though minimising adverse environmental impact in areas such as energy, water and waste) for commercial property**. The Green Lease Concept has been established in several countries including Australia, United Kingdom and the USA, but it is a fairly new concept in Singapore which allows tenants to share the sustainability responsibility with the building owner via:

- Guidelines and resources on use of resource efficient equipment and recycling practices.
- Provision of tools to calculate energy consumption.
- Monitoring of tenants' energy use and incentives for reducing energy consumption.

The first green lease implemented in Singapore was at 313 & Somerset to encourage and enable its tenants to put in place green initiatives aligned with its own sustainability goals. The Punggol Eco-Town under HDB is another example in which green lease was used.

¹⁴http://app.e2singapore.gov.sg/Incentives/OneYear_Accelerated_Depreciation_Allowance_for_Energy_Efficient_Equipment_and_Technology.aspx

5 INDUSTRY TRENDS & OPPORTUNITIES

The Singapore government is firm in its strategies to reduce our energy intensity (per dollar GDP) by 35% from 2005 levels by 2030 through achieving greater energy efficiency and diversification. However, it is also aware that these efforts **should not undermine energy competitiveness and there should be sustainable economic growth for the country.**

5.1 GREATER AWARENESS AND ACCEPTANCE OF RENEWABLE ENERGY

In the poll on renewable energy¹⁵ conducted by GE Energy in 2011, it was revealed that a **large majority (9 in 10) of Singaporeans from a wide spectrum viewed renewable energy positively** (Figure 5).

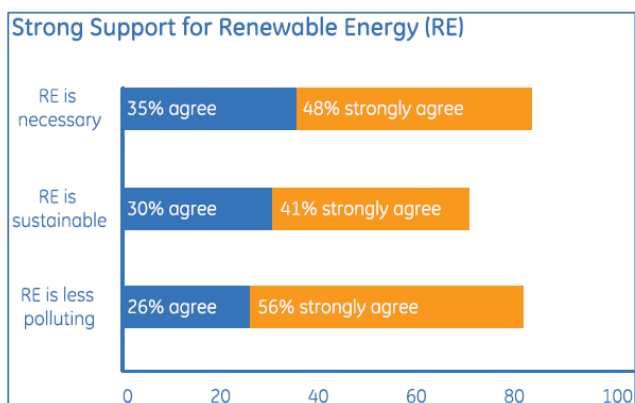


Figure 5: Support for Renewable Energy (Source: GE Energy)

It was shown that the respondents possess a good grasp of the causes of air pollution; correctly naming fossil fuels as one of the top pollutants. Even though, only **2 in 3 respondents could name sources of renewable energy unaided, 4 in 5 of the same respondents indicated that renewable energy was necessary for environmental sustainability.**

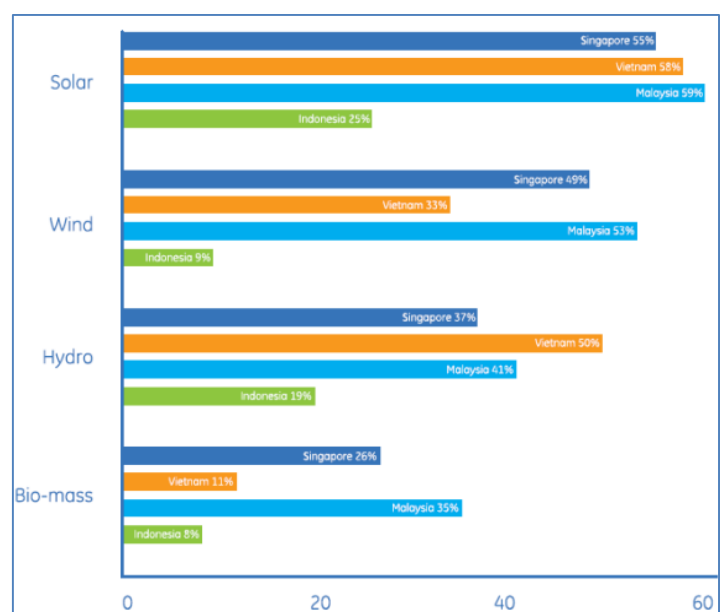


Figure 6: Awareness of Renewable Energy (Source: GE Energy)

Almost 75% of the respondents were also aware that renewable energy would be costly to install, but more than 50% believed that its maintenance cost would be justified in the long run.

For Singaporean respondents, awareness of solar as source of renewable energy was the highest, followed by wind and hydro energy respectively (Figure 6).

¹⁵<http://www.genewscenter.com/Press-Releases/GE-Energy-poll-indicates-that-more-than-9-in-10-Singaporeans-view-renewable-energy-positively-31ec.aspx>

5.2 GROWING SUBSECTORS - SOLAR

The usage of solar photovoltaic (PV) systems is gradually gaining more acceptance in Singapore over recent years. Adoption by both residential and non-residential has been steadily increasing. **From 2009 to 2012, there has been increase from 1942.53kWp to 9989.30kWp, an increase of 4 times** (refer to Table 4).

Installed Grid-Connected Capacity Of Solar Photovoltaic (PV) Systems (Solar Capacity kWp)			
	Residential	Non-residential	Total
2009	75.98	1866.55	1942.53
2010	111.63	3574.58	3686.21
2011	305.40	5632.70	5938.10
2012	790.70	9198.60	9989.30

Table 4: Installed Grid-Connected Capacity of Solar Photovoltaic (PV) Systems

The **solar irradiation in Singapore is a high average of 1,500 sun hours per year**, making it a suitable renewable energy option for Singapore. Nonetheless, there are still challenges to the use of solar energy in Singapore. Singapore is **small and has limited available land for the large scale deployment of solar panels**. Moreover, there is the issue of **intermittency given the presence of high cloud cover and urban shading**. Present solar technologies are also not able to generate baseload electricity reliably at competitive prices. As such, Singapore has to **invest in research and development to improve the functions and operations of solar systems and acquire inventive means of integrating solar energy systems into its urban environment**. This translates to **test-bedding and demonstration opportunities for foreign countries and corporations**.

Some of these opportunities include:

- Housing and Development Board's (HDB) initiative: Installation of solar PV panels on rooftops of high-rise public housing developments.¹⁶ The success of some of the pilot projects is likely to result in more tenders being issued.
- The Economic Development Board's (EDB) and PUB's floating photovoltaic (PV) project: Solar panel installations on water surfaces at our reservoirs¹⁷. Presently, there has only been 1 pilot project in Tengah reservoir. Singapore has a total of 17 reservoirs.
- The Solar Capability Scheme¹⁸ (SCS) was launched by EDB for the private sector to offset capital cost in installing solar technologies in the new energy-efficient buildings. EDB also launched the \$17 million Clean Energy Research and Test-bedding (CERT) platform that complements SCS targeting the public sector.

In Singapore, solar related companies range from small and medium companies that distribute, supply and install solar hot water and lighting systems for residential properties to large international companies such as Panasonic (Japan), Phoenix Solar (Germany), REC (Norway), Trina Solar (China), Yingli Green Energy (China) and Siemens (Germany) specialise in solar panels, wafers, film, cells, system, modules and

¹⁶<http://www.hdb.gov.sg/fi10/fi10296p.nsf/PressReleases/CD095A7BDE91C7014825775E001856EA?OpenDocument>

¹⁷<http://www.edb.gov.sg/content/edb/en/news-and-events/news/news-archives/2011/singapore-announces-regions-first-floating-photovoltaic-pilot-project.html>

¹⁸<http://www.edb.gov.sg/content/dam/edb/en/resources/pdfs/factsheets/Solar%20Capability%20Scheme%20Factsheet.pdf>

generators. The functions that these large international companies have in Singapore range from manufacturing, research and development to regional operating headquarters.

In terms of imports of solar related products for 2012 (Tables 5 and 6), the majority of the solar photovoltaic cells that are imported unassembled into Singapore, originate from Austria, China and the United States. For the solar photovoltaic cells that have been assembled into either modules or panels, they come mainly from Austria, Taiwan and China. Based on the data, it appears both **Austria and China dominate the Singapore market for imported solar photovoltaic cells.**

IMPORT OF UNASSEMBLED PHOTOVOLTAIC CELLS (NMB) HS CODE: 85414021		
	2012	
Country	Qty ('000)	Value (S\$'000)
Austria	8,349,353	136
China	4,070,299	1,446
Christmas Island	10	0
Denmark	1	1
France	112	1
Germany	112	11
Hong Kong	450	23
India	18,000	31
Japan	1	0
Korea, Rep of	1885	17
Malaysia	111,142	15
Mexico	9,124	7
Netherlands	282	4
Taiwan	132,096	218
Thailand	256	290
United States	432,516	190
Grand Total	13,125,639	2,388

Source: International Enterprise Singapore

Table 5: Import of Unassembled Photovoltaic Cells

IMPORT OF PHOTOVOLTAIC CELLS ASSEMBLED IN MODULES OR MADE UP INTO PANELS (NMB) HS CODE: 85414022		
	2012	
Country	Qty ('000)	Value (S\$'000)
Australia	6	0
Austria	184,120,239	2889
Canada	3	0
China	1,181,942	2738
Germany	6	1
Hong Kong	202	15
India	330,482	2628
Indonesia	30,969	2
Italy	1,485	11
Japan	8,806	274
Korea, Rep of	26	13
Malaysia	14,002	3
Mexico	18,359	19
New Zealand	2	1
Philippines	28	34
Portugal	1	1
Taiwan	26,750,827	22,801
United Kingdom	51	9
United States	2,819	303
Grand Total	212,460,255	31,745

Source: International Enterprise Singapore

Table 6: Import Of Photovoltaic Cells Assembled In Modules Or Made Up Into Panels

Belgium's experience and success in solar implementation and legislation would be beneficial to Singapore. From 2010 to 2011, electricity production from solar photovoltaic power increased from 560 GWh to 1,282.1 560 GWh. Moreover, in 2011, more than 700 MWp was connected to the grid; bringing the country's capacity to more than 1812 MWp¹⁹. In 2012, the installed capacity expanded to over 2600 MWp, nearly all of it grid connected, this meant that solar photovoltaic power covered 14% of the Belgium housing consumption²⁰. Around 80% of the photovoltaic capacity is installed in the Flemish Region; the remaining 20% is installed mainly in the Walloon Region. The reason for the successful implementation in the Flemish Region is the region's green certificate system that assures a minimum price for a number of years²¹. However, due to budgetary restrictions, the green certificate and tax advantages have been eliminated, thus the number of new solar panel installations has been reduced dramatically since 2013.

¹⁹ http://www.eurobserv-er.org/pdf/photovoltaic_2012.pdf

²⁰ http://www.apere.org/adf/sites/default/files/files/doc/130207_CP_Statistiques_Photovoltaique_2012.pdf

²¹ <http://www.iea.org/policiesandmeasures/pams/belgium/name.24374.en.php>

5.3 GROWING SUBSECTOR - BIOFUEL

Annual global biofuel production constitutes about 1 per cent of a USD40 billion traded energy market. Based on current standards set by various governments for renewable energy use, this is expected to reach 144 billion gallons per year by 2022. Singapore has a strong foundation in the process industry. Being the world's third-largest centre of oil refining, it occupies a central location in terms of product, flows, and logistics, which gives Singapore existing infrastructure to develop into a centre for Asian biofuel production.

Singapore has already **switched from fuel oil to natural gas which has lower carbon content per unit of electricity generated.** However, there are limits as to how much more we can reduce emissions by switching fuels, since natural gas already constitutes around 80% of Singapore's fuel mix for electricity generation. Hence, there is a need to consider a new source of fuel. **Biofuels would be an ideal alternative source of fuel; however it is presently underutilized due to a lack of sufficient levels of biofuel feedstock availability which makes it more expensive to produce than natural gas.** Singapore is home to Neste Oil's biofuel facility, which is one of the world's most advanced and largest commercial production facility using renewable feedstocks, but Neste uses fresh palm oil as its main feedstock and as such it is priced at a premium compared to traditional biodiesel given its quality. Hence, there is an **opportunity for companies able to develop a source of biofuel that rely on an abundant feedstock and is competitively priced.**

Based on import data, it appears that Singapore has yet to have any substantial imports of biofuels for widespread commercial use. This is likely attributed to the absence of government mandate and price subsidies for biofuel consumption in Singapore. The biggest biofuel refinery in Singapore is Neste Oils, but their production is meant for the export market in Europe and Americas. Peter Cremer (USA) and Natural Gas (Australia) both had originally set up large scale biodiesel plants in Singapore, but had to wind down after it became uneconomical to operate following the soar of palm oil prices. There are a few other international biofuel companies here such as Desmet Ballestra²² and Archer Daniels Midland (ADM)²³, but they do not have major production facilities for biodiesel in Singapore, and their offices here are mainly responsible for sales or operations relating to biodiesel for the region.

In terms of production for the local consumption, it is observed that the two players are homegrown companies - Alpha Biofuels and Bio Research, which operate on a waste-to-energy model. Alpha Biofuel produces biodiesel from used cooking oil, while Bio Research uses sewage oil, grease trap oils, waste cooking oils and palm acid oils.

Compared to Singapore, Belgium has more years of experience in large scale biofuel. There is also strong government involvement and mandate in favour of biofuels throughout the country. For this reason, there has been more research and headway into development of biofuel in Belgium. Recently, VIB and researchers from the Catholic University of Leuven have created a new strain of yeast that can produce ethanol from a wider variety of sugars from biomass and waste at increased fermentation efficiency, resulting in a more affordable second-generation ethanol.²⁴ There was also the partnership between VIB and Ghent University

²² <http://www.desmetballestra.com/>

²³ <http://www.adm.com>

²⁴ <http://eandt.theiet.org/news/2013/aug/gmo-yeast-biofuel.cfm>

(Belgium), the University of Dundee (UK), The James Hutton Institute (UK) and the University of Wisconsin (USA) to uncover a new gene in the biosynthetic pathway of lignin (major component of plant secondary cell walls that limits the conversion of biomass to energy) which can contribute to a more efficient conversion of biomass to energy.

5.4 OPPORTUNITIES FOR ENERGY EFFICIENCY TECHNOLOGIES & SOLUTIONS

A study¹ by International Energy Agency had concluded that **supply side energy efficiency technologies (57%) are more efficient than renewable energy technologies (23%) at reducing greenhouse gases**. In addition, the costs of implementing supply side energy efficiency technologies are cheaper than renewable energy technologies. Given this, there is much emphasis on energy efficiency technologies by the Singapore government.

Refining and chemical industries are carbon-intensive in nature, given the size of this industry in Singapore; the Singapore Government has been proactive in working with these industries to achieve higher levels of energy efficiency. On Jurong Island, where most of these plants are found, the **close proximity of the plants has enabled system-level energy efficiency options such as shared utilities and waste heat recovery**. Naturally, Jurong Island has become **a living lab for companies to develop and demonstrate innovative integrated solutions, such as tapping on waste heat to power productive processes**. The **environment also allows for companies to develop and test-bed carbon capture and utilization technologies, due to the availability of concentrated carbon dioxide streams**.

With the use of more energy efficient technologies and the development of natural gas and renewable energy, Belgium's average efficiency of the power sector has increased constantly since 1990 and reached 38 percent in 2009.

5.5 SINGAPORE AS A CARBON HUB

A lot of countries have already implemented strategies and guidelines to control the carbon emissions from businesses and industries. Developed countries with emission targets tend to purchase carbon credits through the UNFCCC/Kyoto Protocol Clean Development Mechanism (CDM) to fulfil their emission reduction obligations. **The CDM allows emission reduction (or emissions removal) projects in developing countries to earn certified emission reduction (CER) credits which can be traded and sold to industrialised countries to meet a part of their emission reduction targets under the Kyoto Protocol.**

Since its CDM's operation in 2006, more than 3,900 CDM projects worldwide have been registered and over 890 million CERs have been issued by UNFCCC as of March 2012. **Exceeding 82% of registered CDM projects have originated from the Asia-Pacific region. After India and China, the biggest sources of carbon credits originate from Southeast Asia.**

Singapore is the region's top commodities trading hub and host to many energy majors and traders, which form a large part of the clientele for carbon services companies. Carbon services companies have formed partnerships with these companies to access the regional market, develop low carbon projects, and transact in carbon credits. To date, there are around 30 carbon companies (low carbon project development;

consulting and verification services for clean development mechanism registration; carbon footprinting; and project financing and legal services) in Singapore.

The Economic Development Board²⁵ and International Enterprise Singapore²⁶ have been actively **attracting carbon trading and services companies to establish offices in Singapore through the Global Trader Programme²⁷ (GTP)** administered by IE Singapore. Companies under the GTP enjoy a **concessionary tax rate of 10% or less for their qualifying trading income.**

Belgium itself is a member of the United Nations Framework Convention on Climate Change and agreed to the cap emissions in accordance with the Kyoto Protocol in 2002. Singapore accepted the emissions cap in 2006.²⁸

5.6 EXPANDING ENERGY EFFICIENCY INTO OTHER SECTORS - GREEN BUILDINGS/ARCHITECTURE

Buildings play an essential part in energy efficiency. **According to the United National Environmental Programme (UNEP), buildings account for 40% of the total energy consumption and contribute 30% greenhouse gas emissions globally²⁹.** Accepting the effect that buildings have on the environment, the government and industries in Southeast Asia have undertaken steps to reform their approach to energy efficiency and utilization.

In Singapore, the Building and Construction Authority (BCA) has been instrumental in promoting environmental sustainability and energy efficiency in buildings through the BCA Green Mark Scheme and the Green Building Master plans. **The aim is to green 80% of the buildings in Singapore by 2030. Since the launch of the Green Mark Scheme in 2005, the number of green building has grown from 7 to 1,580 in 2012.**

Builder owners tend to have **other priorities in utilizing their capital and the tendency for them to willingly undertake loans for energy efficiency projects is low.** As for building developers of new buildings, those **which intend to sell the buildings after construction may not be keen to devote huge investments in energy efficiency features and architecture that benefit the building owners. As such, government mandate is often required.** In September 2012, three legislations were passed to address energy efficiency of existing buildings³⁰ in Singapore:

1. Achieve minimum Green Mark standard for existing buildings when a cooling system is installed or retrofitted.
2. Carry out three-yearly energy audit on building cooling systems.
3. Submit building information and energy consumption data annually.

²⁵<http://www.edb.gov.sg>

²⁶<http://www.iesingapore.gov.sg>

²⁷<http://www.guidemesingapore.com/industry-guides/trade/singapore-global-trader-scheme>

²⁸http://unfccc.int/files/essential_background/kyoto_protocol/status_of_ratification/application/pdf/kpstats.pdf

²⁹<http://www.unep.org/sbci/AboutSBCI/Background.asp>

³⁰http://www.bca.gov.sg/Newsroom/pr10092012_BCA.html

For new buildings and existing buildings with a gross floor area of 2,000m² or more undergoing major retrofitting works, developer and owners are required by the Building Control (Environmental Sustainability) Regulation to achieve minimum Green Mark standards - 28% energy efficiency improvement from 2005 codes. This will benefit buildings owners in the long run as the building can achieve between 20% and 40% energy savings over its lifetime.

To encourage energy efficient design, practices and retrofitting, a number of Incentive schemes under BCA were introduced:

- SGD20 million Green Mark Incentive Scheme for New Buildings (GMIS-NB)³¹
- Developers are provided cash incentives to achieve a Gold rating or higher³²
- SGD100 million Green Market Incentive Scheme for Existing Buildings (GMIS-EB)³³
- Green Mark Gross Floor Area Incentive Scheme (GMIS-GFA)³⁴
- Green Mark Incentive Scheme – Design Prototype (GMIS-DP)³⁵

Belgium and Singapore parallel each other in its move towards green architecture and building. Similar to the initiatives in Singapore, Belgium has an initiative know as the “Sustainability Checklist” started by the Flemish Infrastructural Fund for Personal Matters (VIPA). The “Sustainability Checklist” has to be completed to obtain subsidies under VIPA. The underlying purpose of this initiative is to save running costs for the subsidized, and to improve comfort for the occupants while implementing sustainability measures.

³¹<http://www.bca.gov.sg/greenmark/gmis.html>

³²http://www.bca.gov.sg/greenmark/others/GMIS_guide.pdf

³³<http://www.bca.gov.sg/greenmark/gmiseb.html>

³⁴<http://www.bca.gov.sg/greenmark/gmgfa.html>

³⁵<http://www.bca.gov.sg/GreenMark/gmisd.html>

AGENCY FOR SCIENCE, TECHNOLOGY & RESEARCH (A*STAR)

1 Fusionopolis Way #20-10 Connexis Singapore 138632

Tel: +65 6826 6111

Fax: +65 6777 1711

Email: contact@a-star.edu.sg

Website: <http://www.a-star.edu.sg>

Description:

The Agency for Science, Technology and Research (A*STAR) is Singapore's lead government agency dedicated to fostering world-class scientific research and talent for a vibrant knowledge-based economy. A*STAR actively nurtures public sector research and development in Biomedical Sciences, and Physical Sciences & Engineering, and spurs growth in Singapore's key economic clusters by providing human, intellectual and industrial capital to our partners in industry and the healthcare sector.

ECONOMIC DEVELOPMENT BOARD (EDB)

250 North Bridge Road #28-00 Raffles City Tower Singapore 179101

Tel: +65 6832 6832, +65 6832 6571

Fax: +65 6832 6565

Email: clientservices@edb.gov.sg

Website: http://www.edb.gov.sg/edb/sg/en_uk/index/industry_sectors/environment_water.html

Description:

EDB is the lead government agency responsible for planning and executing strategies to enhance Singapore's position as a global business centre and grow the Singapore economy.

ENVIRONMENT & WATER INDUSTRY DEVELOPMENT COUNCIL (EWI)

Ministry of the Environment and Water Resources, 40 Scotts Road, Environment Building, Singapore 228231

Tel: +65 6732 7733

Fax: +65 6731 9456

Website: <http://app.mewr.gov.sg/web/Contents/ContentsEWI.aspx?ContId=346>

Email: MEWR_ewi@mewr.gov.sg

Description:

The Environment & Water Industry Development Council (EWI) was set up administratively on May 06 by the Ministry of the Environment and Water Resources (MEWR) to spearhead the development of the environment and water industry.

NATIONAL ENVIRONMENT AGENCY

40 Scotts Road, Environment Building #13-00, Singapore 228231

Tel: +65 1800-2255 632

Fax: +65 6235 2611

Website: <http://www.nea.gov.sg>

Email: contact_nea@nea.gov.sg

Description:

The National Environment Agency (NEA) is the leading public organization responsible for improving and sustaining a clean and green environment in Singapore. The NEA develops and spearheads environmental initiatives and programmes through its partnership with the People, Public and Private sectors.

PUBLIC UTILITIES BOARD (PUB)

40 Scotts Road, #22-01 Environment Building Singapore 228231

Tel: +65 1800-2846 600

Fax: +65 6731 3020

Website: <http://www.pub.gov.sg>

Email: pubone@singnet.com.sg

Description:

As the national water agency, PUB is responsible for the collection, production, distribution and reclamation of water in Singapore.

ENERGY MARKET AUTHORITY

991G Alexandra Road, #01-29, Singapore 119975

Tel: +65 6835 8000

Fax: +65 6835 8020

Website: <http://www.ema.gov.sg>

Email: ema_enquiry@ema.gov.sg

Description:

The Energy Market Authority (EMA) is a statutory board under the Ministry of Trade and Industry. It was formed in 2001 as part of the government's efforts to liberalise the electricity market in Singapore. EMA is the regulator of Singapore's electricity and natural gas industries, it also serves as the Power System Operator. In 2009, EMA expanded its mandate to include industry development as one of its core functions.

NATIONAL CLIMATE CHANGE SECRETARIAT (NCCS)

55 Newton Road, #13-04/05 Revenue House, Singapore 307987

Tel: +65 6430 0600

Fax: +65 6430 0601

Website: <http://www.nccs.gov.sg>

Email: NCCS_Contact@nccs.gov.sg

Description:

The National Climate Change Secretariat (NCCS) was established on 1 July 2010 under the Prime Minister's Office (PMO) to develop and implement Singapore's domestic and international policies and strategies to tackle climate change. NCCS' areas of responsibility are to:

- facilitate efforts to mitigate carbon emissions in all sectors
- help Singapore adapt to the effects of climate change
- harness economic and green growth opportunities arising from climate change
- encourage public awareness and action on climate change

BUILDING AND CONSTRUCTION AUTHORITY (BCA)

5 Maxwell Road, #16-00, Tower Block MND Complex, Singapore 069110

Tel: +65 1800 3425222

Fax: +65 6534 0219

Website: <http://www.bca.gov.sg>

Email: bca_enquiry@bca.gov.sg

Description:

The Building and Construction Authority (BCA) is an agency under the Ministry of National Development, championing the development of an excellent built environment for Singapore. "Built environment" refers to buildings, structures and infrastructure in our surroundings that provide the setting for the community's activities.

BCA ACADEMY OF THE BUILT ENVIRONMENT

No. 200 Braddell Road, Singapore 579700

Tel: +65 6248 9999

Fax: +65 6258 0558

Website: <http://www.bcaa.edu.sg>

Email: bca_academy@bca.gov.sg

Description:

BCA Academy of the Built Environment is the education and research arm of Singapore's Building and Construction Authority (BCA). BCA Academy provides quality training and research programmes for the advancement of the building industry and the development of an excellent built environment.

SINGAPORE GREEN BUILDING COUNCIL

11 Bishan Street 21, #04-04A, Singapore 573943

Tel: +65 6634 5518

Fax: +65 6634 5528

Website: <http://www.sgbc.sg>

Email: enquiry@sgbc.sg

Description:

The Singapore Green Building Council (SGBC) was officially launched on October 28 2009, as the only non-profit organisation with a concerted private-public sector partnership to achieve a world-class and

sustainable built-environment in Singapore. Their key role is to advocate green building design, practices and technologies and drive environmental sustainability in the building and construction industry.

WASTE MANAGEMENT AND RECYCLING ASSOCIATION OF SINGAPORE (WMRAS)

Water Hub 80 Toh Guan Road East, Singapore 608575

Tel: +65 6515 0812

Fax: +65 6515 0813

Email: enquiry@swa.org.sg

Website: <http://www.swa.org.sg>

Description:

The Singapore Water Association aspires to play a role in efforts to profile and promote Singapore as a one-stop centre for all water-related services and water technology hub. The Association aims to provide a forum for collaboration and the inter-change of ideas and knowledge among member companies. In addition, it will be an arena for networking among members and dissemination of strategic information on emerging business opportunities and new technologies.

SUSTAINABLE ENERGY ASSOCIATION OF SINGAPORE (SEAS)

1 Cleantech Loop, #02-16 Cleantech One, Singapore 637141

Tel: +65 6338 8578

Fax: +65 6694 2178

Email: info@seas.org.sg

Website: <http://www.seas.org.sg>

Description:

SEAS aims to facilitate the business of its Member Companies, and thus developing Singapore as the Regional Centre for the promotion of Energy Efficiency Technologies and Services, showcasing of Renewable Energy Technologies, Carbon Asset Management and Trading as well as Clean Energy Finance.

SINGAPORE ENVIRONMENT COUNCIL

1E Cluny Road, #02-01, Singapore 259601

Tel: +65 6337 6062

Fax: +65 6337 6035

Email: info@sec.org.sg

Website: <http://www.sec.org.sg>

Description:

Established in 1995, the Singapore Environment Council (SEC) is an independently managed, non-profit, non-government organisation in Singapore. The Council is also an approved charity that can offer tax exemption to donors. SEC reaches out to the public through its educational, community and industrial arms. Since its inception, SEC has built strong partnerships with corporations, government agencies and other non-government organisations (NGOs). These partnerships are vital for sustaining environmental programmes that eventually lead to positive action and change. Over the years, SEC has given strength and bearing to the environmental movement here.

ENVIROASIA

Next Edition: 27 to 29 November 2013

Email: info@cemssvs.com.sg

Organizer:

CEMS (Conference & Exhibitions Management Services Pte Ltd)

1 Maritime Square, #09-43, HarbourFront Centre, Singapore 099253

Tel: +65 6278 8666

Fax: +65 6278 4077

Website: <http://www.cems.com.sg>

Email: info@cems.com.sg

EnviroAsia is an international environmental technology exhibition and conference that showcases environmental, ecological and clean technologies and solutions pertaining to waste, water, energy and air that help companies and organizations meet the increasingly stringent environmental standards and regulation. It is the only show that is officially endorsed by the Singapore's Ministry of Environment and Water Resources and the National Environment agency (NEA).

CLEAN ENERGY EXPO ASIA

Next Edition: 25 to 27 September 2013 (in Thailand)

Website: <http://www.cleanenergyexpoasia.com>

Email: info@koelnmesse.com.sg

Organizer:

KoelnmessePte. Ltd.

152 Beach Road, #25-05 Gateway East, Singapore 189721

Tel: +65 6500 6718

Fax: +65 6294 8403

Website: <http://www.koelnmesse.com.sg>

Email: sl.khoo@koelnmesse.com.sg

Clean Energy Expo Asia is a unique trading and knowledge-sharing platform bringing together the leading players in the Technology, Services, Finance and Government sector to address key issues in the areas of renewable energy, energy efficiency and sustainable development in the Asia Pacific region.

SINGAPORE INTERNATIONAL ENERGY WEEK

Next Edition: 28 October to 1 November 2013

Website: <http://siew.sg>

Email: ema_siew@ema.gov.sg

Organizer:

Singapore International Energy Week

991G Alexandra Road, #02-29, Singapore 119975

Tel: +65 6835 8000

Fax: +65 6835 8020

Website: <http://www.ema.gov.sg>

Email: ema_siew@ema.gov.sg

The Singapore International Energy Week (SIEW) is an annual week-long platform for energy professionals, policymakers and commentators to discuss and share best practices and solutions within the global energy space.

BEX ASIA 2013

Next Edition: 11 to 13 September 2013

Website: <http://www.bex-asia.com>

Email: bexasia@reedexpo.com.sg

Organizer:

Reed Exhibition Services

1 Changi Business Park Crescent #06-01, Plaza 8 @ CBP Tower A Singapore 486025

Tel: +65 6780 4671

Fax: +65 6588 3832

Website: <http://www.reedexpo.com.sg>

Email: ask@reedexpo.com.sg

BEX Asia is the platform for the sustainable built environment. It provides a one-stop sourcing solution for cutting-edge technologies in building design and architecture for the future of greener communities. BEX Asia brings together skilled professionals, key industry practitioners, specifiers and buyers from the region, to network and create business opportunities to build greener communities for a greener future.

PROCESSCEM ASIA

Next Edition: To be confirmed

Email: processcem@aspri.com.sg

Organizer:

Association of Process Industry (ASPRI)

26 Boon Lay Way, #01-88, Tradehub 21, Singapore 609970

Tel: +65 6560 5051

Fax: +65 6560 9692

Website: <http://www.aspri.com.sg>

Email: processcem@aspri.com.sg

ProcessCem Asia is an international exhibition and conference on Plant Construction, Engineering & Maintenance for the Process Industry. The show is a platform for companies in the process industry to showcase their capabilities, update, upgrade and network.

ECO WORLD 2010

Next Edition: To be confirmed

Email: enquiry@localglobal.sg

Organiser:

LOCAL GLOBAL EXHIBITION & TRADE PTE LTD

10 Bukit Batok Crescent, #04-07/08 The Spire, Singapore 658079

Tel: +65 6561 0328

Fax: +65 6561 0531

Website: <http://www.localglobal.sg>

Email: enquiry@localglobal.sg

Eco World 2010 is an international exhibition cum conference platform for both the private and public sector to promote and showcase environmental products and services, network and exchange ideas on sustainable development in the paradigms of economic, social and environmental.

9 PUBLICATIONS AND DIRECTORIES

- **Sustainable Development Industry – Singapore Directory**
<http://www.sbf.org.sg/public/publications/industrydirectory.jsp>
- **Waste Management and Recycling Association of Singapore Directory**
<http://www.wmras.org.sg/>
- **Singapore Environmental Industry Directory**
<http://www.greensingapore.com>
- **Singapore Green Building Council Certification & Member Directory**
http://www.sgbc.sg/green-certifications/online_catalogue
<http://www.sgbc.sg/membership/member-directory>
- **Singapore Green Labelling Scheme Directory**
http://www.sec.org.sg/sgls/sgls_directory

LISTS

- ALTERNATIVE ENERGY - BIOFUEL & BIOMASS
- RENEWABLE ENERGY
- SOLAR, PHOTOVOLTAIC, CELL POWER SYSTEM AND WIND ENERGY
- SUPPLIERS AND SERVICE PROVIDERS OF SOLAR RELATED PRODUCTS AND SERVICES
(EXTRACTED FROM SUSTAINABLE DEVELOPMENT INDUSTRY – SINGAPORE DIRECTORY
<http://greenportal.sg>)
- ARCHITECTS (GREEN ARCHITECTURE)
- CARBON (CDM, TRADING, OFFSET) COMPANIES
- WATER TREATMENT CONSULTANTS
- WATER TREATMENT RELATED SUPPLIERS
- WATER TREATMENT RELATED RESEARCH CENTRES & INSTITUTIONS

REPORTS

- MARKET SECTOR REPORT 2012 – WATER INDUSTRY
- TRADE SHOW REPORT - ECO WORLD 8 TO 10 APR 2010
- TRADE SHOW REPORT - CLEAN ENERGY 1 TO 3 NOVEMBER 2011
- TRADE SHOW REPORT - ENVIROASIA, CIA , ANALABASIA 22 TO 25 NOV 2011
- TRADE SHOW REPORT - SINGAPORE INTERNATIONAL WATER WEEK 1 TO 5 JULY 2012
- TRADE SHOW REPORT - BEX ASIA 11 TO 13 SEPTEMBER 2013

SINGAPORE - ALTERNATIVE ENERGY - BIOFUEL, BIOMASS

SHIMADZU (ASIA PACIFIC) PTE LTD

79 Science Park Drive, #02-01/08, Cintech IV, Singapore Science Park I, Singapore 118264

Tel: +65 6778 6280

Fax: +65 6779 2935

Email: prem@shimadzu.com.sg, sales@shimadzu.com.sg

Website: <http://www.shimadzu.com.sg>

Contact Person: Mr. Prem Anand

Designation: General Manager

Description Shimadzu also provides a broad range of high-precision testing and measuring technology that is essential for product development.

SINGAPORE EMULSION FUEL PTE. LTD.

5 Tuas Avenue 2 Singapore 639445

Tel: +65 6862 0138, 6862 0238

Fax: +65 6862 2201

Email: jeremy@sgef.com.sg, sales@sgef.com.sg

Website: <http://www.sgef.com.sg>

Contact Person: Mr. Jeremy Ng

Designation: Founder and CEO

Description Research and development of clean fuel technology. Manufacture and production of various types of clean fuel and performance chemicals for building and construction industry.

SOLVAY SINGAPORE PTE. LTD.

33 Ubi Ave 3 #07-23 Vertex Bldg, Tower B Singapore 408868

Tel: +65 6438 8886

Fax: +65 64388886 ENQUIRE NOW SEND FAX +65 64388222

Email: Kenneth.GOH@solvay.com, singapore@solvay.com

Website: <http://www.solvay.com>

Contact Person: Mr. Kenneth Goh

Designation: CEO

Description Wholly owned subsidiary of Solvay S.A. In Singapore, our business activities are mainly in Chemicals, Specialty Polymers and Processing.

WASTE TO ENERGY PTE. LTD.

80B Arab Street, Singapore 199577

Tel: +65 6222 3177

Fax: +65 6734 4530

Email: steve.peters@w2eglobal.com, info@w2eglobal.com

Website: <http://www.w2eglobal.com>

Contact Person: Mr. Steve Peters

Designation: Owner

Description Waste To Energy Pte Ltd (W2E) is a developer of biogas plants. They Design-Build-Own & Operate contracts to convert wastewater or organic solid waste (e.g cassava, palm oil mill effluent, municipal solid waste) for the production of renewal energy.

WILMAR INTERNATIONAL LIMITED

56 Neil Road Singapore 088830

Tel: +65 6216 0244

Fax: +65 6836 1709

Email: matt.morgenroth@wilmar.com.sg, info@wilmar.com.sg

Website: <http://www.wilmar-international.com>

Contact Person: Mr. Mathew Morgenroth

Designation: Group Technical Head

Description Wilmar's business activities include oil palm cultivation, oilseeds crushing, edible oils refining, sugar milling and refining, specialty fats, oleochemicals, biodiesel and fertilizers manufacturing and grains processing.

ADVANCED ENVIRONMENTAL TECHNOLOGIES PTE. LTD.

29 Senoko South Road S758083

Tel: +65 6854 9000

Fax: +65 6779 5400

Email: sales@advancedHoldings.com

Website: <http://www.advancedholdings.com>

Contact Person: Dr Wong Kar King

Designation: Managing Director

Description Advanced Holdings Ltd. ("Advanced") is as a specialist company which designs and supplies process equipment to cater to the different needs of its customers in the Chemical and Petrochemical, Oil and Gas, Power Generation and Micro-Electronics industries.

ALPHA BIOFUELS (S) PTE. LTD.

Factory Block #C01-05, No.2 Tuas South Ave 2, Singapore 637601

Tel: +65 6264 6696

Fax: +65 6260 2082

Email: allan.lim@alphabiofuels.sg, jack.ling@alphabiofuels.sg,
greenfuels@alphabiofuels.sg

Website: <http://alphabiofuels.sg>

Contact Person: Mr. Allan Lim, Mr. Jack Ling

Designation: Chief Executive Director, Chief Operations Officer

Description Alpha Biofuels (S) Pte Ltd is Singapore's first biofuel producer to make quality biofuels available locally.

Their products & activities are: •ALPHA BIODIESEL is manufactured from recycled used cooking oil in our Singapore plant. It is a cleaner and green

AUM BUSINESS CREATIONS PTE. LTD.

27 Changi Village Road, #01-23, Singapore 509925

Tel: +65 8223 5356

Fax: NA

Email: per.dahlen@aumbiz.com, opportunities@aumbiz.com

Contact Person: Mr. Per Dahlen

Designation: Managing Director

Description Aumgas Pte. Ltd. was the result after 12 months of intensive studies of potential Renewable Energy solutions for Southeast Asia carried out by AUM Business Creations Pte. Ltd. The aumgas Biogas Generator is the world's first small-scale, fully automated, fully automated, on-site Biogas Generator for turning Food Waste and Horticultural Waste into Cooking Gas and a 100% organic BioFertilizer.

BIOFUEL INDUSTRIES PTE. LTD.

51 Shipyard Crescent Singapore 627809

Tel: +65 6515 5315

Fax: +65 6316 1798

Email: eugene@biofuelindustries.sg

Website: <http://www.biofuelindustries.sg>

Contact Person: Mr. Goh Teik Liang

Designation: General Manager

Description Clean / Sustainable Energy -> Bio-diesel

BIOFUEL RESEARCH PTE. LTD.

3 Tuas View Close, Singapore 637491

Tel: +65 6515 6268

Fax: +65 6515 4560

Email: komms@biofuel.sg

Website: <http://www.biofuel.sg>

Contact Person: Mr. Kom Mum Sun

Designation: Founder &CEO

Description Biofuel Research is the first company in Singapore to pioneer a technology to convert waste cooking oil to biodiesel. Since their inception in June 2003, the company further reached a milestone in 2008 when they developed a waterless process to produce biodiesel from Vegetable Oil by-products (fatty acids/acid oils) and non food oils such as sewage grease.

COFELY SOUTH EAST ASIA PTE. LTD.

146B Paya Lebar Road #03-01, ACE Building Singapore 409017

Tel: +65 6440 1818

Fax: +65 6348 7138

Email: jhchin@cofely.com.sg, marketing@cofely.com.sg

Website: <http://www.cofelysea.com>

Contact Person: Mr. Chin Jien Hung, Mr. Frederick Lim

Designation: Project Development Director, Business Development Manager

Description At COFELY SOUTH EAST ASIA, they offer a unique combination of service expertise, from the design, implementation and management of energy & utility solutions, to the operational delivery of integrated facilities management, street lighting and commuter facilities.

CONTINENTAL CHEMICAL CORPORATION PTE LTD

2 Seraya Place, Jurong Island, Singapore 627857

Tel: +65 6425 1360

Fax: +65 6425 1232

Email: tek.eng.khoo@continentalcorp.ws, bioenergy@continentalcorp.ws.

Website: <http://www.continentalcorp.ws>

Contact Person: Mr. T.E. Khoo

Description Royal Chemie was incorporated in 2003 as a holding company of : PT. Eternal Buana Chemical Industries (EBCI) and PT. Eterindo Nusa Graha (ENG) and one petrochemical industry PT. Petrowidada (PWD).

ENED ASIA PTE. LTD./ECO-STEERING ASIA PTE. LTD.

1 Sophia Road #06-11 Peace Centre, Singapore 228149

Tel: +65 6887 5326
Fax: +65 68875906
Email: is@ened.asia
Website: <http://www.ened.asia>
Contact Person: Mr. Rolf C. Buschmann, Prof. Aux. UCLV
Designation: Director

Description EnEd Asia contributes to boost international growth markets of sustainable energy supply by doing active educational work. EnEd Asia does this in industrial nations and in threshold and transition countries likewise.
Eco-Steering Asia offers services of project developing and project managing of energy optimized buildings.

GOLDEN AGRI INTERNATIONAL PTE LTD

c/o 108 Pasir Panjang Road, #06-00 Golden Agri Plaza, Singapore 118535

Tel: +65 6590 0800
Fax: NA
Email: pili@goldenagri.com.sg, business@goldenagri.com.sg,
sustainability@goldenagri.com.sg
Website: <http://www.goldenagri.com.sg>
Contact Person: Ms. Lim Pi Li
Designation: Communications and Sustainability Manager

Description Golden Agri-Resources Ltd ("GAR") is the world's second largest palm oil plantation company with a total planted area of 464,300 hectares (including smallholders) as at 31 March 2013, located in Indonesia. It has integrated operations focused on the production of palm-based edible oil and fat.

JEBSEN & JESSEN CHEMICALS (S) PTE. LTD.

2 Corporation Road #03-06, Corporation Place, Main Lobby, Singapore 618494

Tel: +65 6305 3488
Fax: +65 6305 3461
Email: songhock_liow@jjsea.com, borja_aznar@jjsea.com,
info_jjchs@jjsea.com
Website: <http://www.chemicals.jjsea.com>
Contact Person: Mr. Liow Song Hock, Mr. Borja Aznar-Bonilla
Designation: Managing Director, Regional Marketing and Business Development Manager

Description Jepsen & Jessen Chemicals is an established regional provider of high-quality specialty chemicals and nutritional products. With a comprehensive product portfolio of over 500 chemicals, Jepsen & Jessen Chemicals serves a broad base of manufacturing industries in the ASEAN region. The company has an extensive programme in Quality Management, Environment, Health & Safety ensures reliability and sustainable development.

LERENO BIO-CHEM LTD.

149 Rochor Road, #05-13/15 Fu Lu Shou Complex, Singapore 188425

Tel: +65 6339 2822

Fax: +65 6339 0020

Email: tzeian@lereno.com, enquiry@lerenobc.com.sg

Website: <http://www.lerenobc.com.sg>

Contact Person: Mr. Lee Tze Ian

Designation: Senior Vice President & Head, Technical & Operations

Description The company has three key business components are Biofuels processing comprising of 1st & 2nd generation of Biofuels, Upstream businesses (feedstock & Bio-Resources development), Downstream businesses (process engineering, downstream Oleochemicals product.

OMNI-CREST ENGINEERING & CONSTRUCTION PTE. LTD.

No.61, Bukit Batok Crescent, #07-01 Heng Loong Building, Singapore

658078

Tel: +65 6265 3353, 6265 4309, 6265 4753

Fax: +65 6265 1171

Email: terence@omni-crest.com.sg, info@omni-crest.com.sg

Website: <http://www.omni-crest.com.sg>

Description Established in 2006, Omni-Crest Engineering & Construction Pte Ltd had been involved with maintenance activities of Petrochem & Process Plants. In recent years, they have also successfully qualified for the Pharmaceutical Industry and Nutrition Industry.

SINGAPORE - RENEWABLE ENERGY

AFFINITAS PTE LTD

15 Hoe Chiang Road, #26-02 Tower Fifteen, Singapore 089316

Tel: +65 6733 3178

Fax: +65 6733 9960

Email: alia@affinitas.com.sg, enquiries@affinitas.com.sg

Website: <http://affinitas.com.sg>

Contact Person: Ms. Alia Sahari

Designation: Programme and Business Director

Description Specialise in providing clean energy solutions in countries across Asia. They represent companies from all around the world and assist them in developing their businesses in the Asia. Initially, they focused on natural gas and in particular CNG as a means to provide a cleaner fuel for vehicles and industries in Asia. Now they have relationships with two cylinder manufacturers, one in Brazil and one in France. The company also represents a UK based provider of waste heat recycling products based around patented heat pipe technology and a provider of clean water solutions from the US.

ALPHA BIOFUELS (S) PTE. LTD.

Factory Block #C01-05, No.2 Tuas South Ave 2, Singapore 637601

Tel: +65 6264 6696

Fax: +65 6260 2082

Email: allan.lim@alphabiofuels.sg, jack.ling@alphabiofuels.sg,
greenfuels@alphabiofuels.sg

Website: <http://alphabiofuels.sg>

Contact Person: Mr. Allan Lim, Mr. Jack Ling

Designation: Chief Executive Director, Chief Operations Officer

Description Alpha Biofuels (S) Pte Ltd is Singapore's first biofuel producer to make quality biofuels available locally. Their products & activities are: ALPHA BIODIESEL is manufactured from recycled used cooking oil in our Singapore plant.

AUMADA PTE. LTD.

Blk 2, Balestier Road #01-695, Balestier Hill Shopping Centre, Singapore 320002

Tel: +65 6846 4774
Fax: +65 6846 4334
Email: james@aumada.com.sg, enquiry@aumada.com.sg
Website: <http://www.aumada.com.sg>
Contact Person: Mr. James Chua
Designation: Director

Description AUMADA provides energy saving hot water and heating solutions. Being an integrated part of a global network of energy saving specialists. AUMADA can offered the last design and technology for domestic, commercial, industrial and solar pool heating or spa applications.

BIOFUEL RESEARCH PTE. LTD.

3 Tuas View Close, Singapore 637491

Tel: +65 6515 6268
Fax: +65 6515 4560
Email: komms@biofuel.sg
Website: <http://www.biofuel.sg>
Contact Person: Mr. Kom Mum Sun
Designation: Founder &CEO

Description Biofuel Research is the first company in Singapore to pioneer a technology to convert waste cooking oil to biodiesel. Since their inception in June 2003, the company further reached a milestone in 2008 when they developed a waterless process to produce biodiesel from Vegetable Oil by-products (fatty acids/acid oils) and non food oils such as sewage grease.

BRAVEN ENERGY PTE. LTD.

Amadeo, 17 tannery Road, Singapore 347727

Tel: +65 6745 5377
Fax: +65 6836 3970
Email: salessg@bravenenergy.com
Website: <http://www.bravenenergy.com>

Description Braven is the Sole Stockist and Exclusive Distributor for the largest LED Lighting manufacturer in China – BYD. Braven offers renewable energy and energy-saving products: LED Lights, Complete Solar systems, Battery Energy Station, Green Batteries. They provide the most complete range of LED lights that are manufactured from Chip (IC) level to end-product.

CLEAN ENERGY HOLDINGS PTE. LTD.

205, Henderson Road, #02-01, Royal Silk Business Hub, Singapore 159549

Tel: +65 6633 9738
Fax: +65 6377 3116
Email: chris@ceh.com.sg, enquiries@ceh.com.sg
Website: <http://www.ceh.com.sg>
Contact Person: Mr. Christopher Sim
Designation: CEO

Description Clean Energy Holdings Singapore Ltd. is a technology-based company focused on the municipal solid waste proprietary incineration business. After more than 10 years of the long-term scientific research and experiments, we had developed a 'honeycomb grate incineration gasification' technology. A success of waste incineration and recycling and renewable energy resources achieving both environmental protection and increase the effectiveness of ergonomics .

CLIMATE RESOURCES EXCHANGE PTE. LTD.

3 Raffles Place # 07-01, Bharat Building, Singapore 048617

Tel: +65 6329 9748
Fax: +65 6552 3457
Email: v.kesava@climate-resources.com, info@climate-resources.com
Website: <http://www.climate-xchange.com>
Contact Person: Mr. Vinod Kesava, Mr. Kesava Shotam
Designation: Managing Director and Chief Executive Officer, Senior Managing Director and Chairman

Description Services at CRX include conducting (a) Feasibility Studies to determine whether a project(s) would qualify under CDM, (b) providing Carbon and/or Project Finance, and (c) Carbon Asset Management. CRX is currently developing the PDD for two Waste Heat Recovery Projects - one located in Goa, India and the other in Mozambique in Africa. Projects in the pipeline include: REDD project in PNG and in Central America are currently under negotiation while a PoA for micro project involving the use of solar energy to replace gas stoves in villages in the State of Maharashtra in India is on-going.

CONERGY ASIA & ME PTE. LTD.

120 Robinson Road, #12-01 Singapore 068913

Tel: +65 6849 5540

Fax: +65 6849 5559

Email: m.gozum@coenergy.com, info-apac@conergy.com

Website: <http://singapore.conergy.co>

Contact Person: Ms. Michelle Gozum

Designation: Director of Marketing

Description Asia Pacific and the Middle East, Conergy offers a broad range of solar energy solutions, serving customers from our regional headquarters in Singapore, satellite operations in Australia and India and representative offices in Thailand and the UAE.

CYCLECT ELECTRICAL ENGINEERING PTE LTD.

Cyclelect Building, 33 Tuas View Crescent, Singapore 637654

Tel: +65 6868 6000

Fax: +65 6863 6260

Email: tan.ew@cyclelect.com.sg, info@cyclelect.com.sg

Website: <http://www.cyclelect.com.sg>

Contact Person: Mr. Tan Ee Wei

Designation: Business Development Manager

Description The Cyclelect Group provides EPC and project management services for marine and land industries as well as renewable energy solutions for industrial buildings. The group comprises of four key companies, Cyclelect, Aeco, Mecflou and Chemcrete, with several subsidiaries and joint ventures.

CYGNUSPOWER PTE. LTD.

20 Bukit Batok Crescent, #03-10 Enterprise Centre, Singapore 658080

Tel: +65 6896 3131

Fax: +65 6899 3131

Email: contact@cygnus-power.com

Website: <http://www.cygnus-power.com>

Description The company specialises in Vertical Axis Wind Turbines.

ECOWISE HOLDINGS LIMITED

17 Kallang Junction, #04-03, Singapore 339274

Tel: +65 6536 2489

Fax: +65 6536 7672

Email: enquiries@ecowise.com.sg

Website: <http://www.ecowise.com.sg>

Contact Person: Mr. Low Kian Beng

Designation: Group Deputy Chief Executive Officer and Executive Director

Description Founded in 1979, ecoWise Group is a Singapore based renewable energy and integrated environmental solutions provider, which is principally involved in three major businesses namely, Resource Recovery, Renewable Energy and Provision of Integrated Environmental Management Solutions.

EMERGENT VENTURES INTERNATIONAL PTE. LTD.

77A, Boat Quay, Singapore 049865

Tel: +65 632 72490

Email: ashutosh@emergent-ventures.com, singapore@emergent-ventures.com

Website: <http://www.emergent-ventures.com>

Contact Person: Mr. Ashutosh Pandey

Designation: Chief Executive Officer

Description In Singapore, EVI provides end-to-end services from carbon accounting & management advisory and carbon offset procurement to environmental sustainability & risk management advisory as well as renewable energy services. EVI's services in Singapore provide strong linkage of environmental and sustainability issues with economic and social development aspects.

EQUATORIALE INTERNATIONAL PTE. LTD.

12 International Business Park, Cyberhub@IBP, #04-01, Singapore 609920

Tel: +65 6505 0300

Fax: +65 6505 0301

Email: jean.pers@swiber.com, kuekkien.yong@papeengineering.sg

Website: <http://www.swiber.com>

Contact Person: Mr. Jean Pers, Mr. Yong Kuek Kien

Designation: CEO and President, COO

Description Swiber provides offshore drilling services to the offshore oil and gas industry in the Asia Pacific region. Their offshore drilling business is a growing part of Swiber's business, particularly with the increasing extension of oil and gas activities into the deepwater and ultra-deepwater areas. This line of business is primarily operated through our subsidiary, Equatorial Drilling International.

GASHUB PTE LTD

No. 17 Woodlands Terrace, Woodlands East Industrial Estate, Singapore 738442

Tel: +65 6758 4393, 6758 4495

Fax: +65 6758 4541

Email: daniel@tp.edu.sg, sales@fuelcell.sg

Website: <http://www.gashub.com.sg>

Contact Person: Dr. Chen Yun Zhong

Designation: Senior Research Scientist

Description GasHub Pte Ltd ("GasHub") is incorporated with a vision to pioneer the development of Proton Exchange Membrane Fuel Cell Technology and commercialise it as a clean energy storage and delivery system for stationary and mobile power applications.

METECH RECYCLING (SINGAPORE) PTE. LTD.

65 Tech Park Crescent, Singapore 637787

Tel: +65 6264 4338

Fax: +65 6863 2035

Email: info@metechinternational.com

Website: <http://www.metechinternational.com>

Contact Person: Mr. Andrew Eng

Designation: Executive Director and Group President

Description Metech Recycling International Limited is a fully integrated provider of recycling and processing services for electronic waste with a global footprint. The Group provides services for recycling and processing electronic components and products, in order to extract ferrous and non-ferrous metals and plastics.

PRC GLOBAL PTE. LTD.

BLK 36-H, #02-45, Chancery Court, Dunearn Road, Singapore 309433

Tel: +65 9145 9147, 9456 3993

Fax: +65 6293 5162, 6296 9888

Email: infernofuel@gmail.com, combusto@gmail.com

Website: <http://www.infernofuel.com>

Contact Person: Mr. Ron Tan

Designation: Global Marketing Director

Description PRC Global Pte Ltd aims to mitigate global oil use and climate change by empowering the world to use less fossil fuel and lower GHG emissions. This in turn increases kilometres per litre and reduces GHG emissions and CO2. It provides combustion efficient enhancers for efficient use of fossil and biobased fuel (bioethanol/biodiesel). It conducts pilot projects to help reduce road traffic emissions, in major cities.

REEX CAPITAL ASIA PRIVATE LIMITED

16 Collyer Quay #20, Singapore 049318

Tel: +65 6818 9710

Fax: NA

Email: frederic.crampe@reexasia.com, inquiry@reexasia.com

Website: <http://www.reexasia.com>

Contact Person: Mr. Frédéric Crampé

Designation: Co-founder & Director

Description ReEx Capital Asia is a leading Clean Energy Investment Banking and Consulting Boutique specializing in the Asia Pacific region with headquarters in Singapore and representation in New Zealand, Indonesia and the Philippines.

RENEWPOWERS TECHNOLOGIES PTE. LTD.

141 Kaki Bukit Avenue 1, #04-00 Shun Li Industrial Park, Singapore 416005

Tel: +65 6741 7123

Fax: +65 6441 7379

Email: eddie@renewpowers.com, rpt@renewpowers.com

Website: <http://www.renewpowers.com>

Contact Person: Mr. Eddie Lee

Designation: Technical Sales Manager

Description Design, manufacture, install and sell environmentally renewable powers in domestic, commercial and industrial markets, as well as to develop support products.

SEAWIND ASIA PTE. LTD.

1003 Bukit Merah Central #03.03, Redhill Industrial Estate, Singapore 159836

Tel: +65 6274 3315

Fax: +65 6275 8272

Email: info@seawind.uk.com

Website: <http://www.seawind.uk.com>

Description The Seawind group has grown into an organisation providing services in the development, financing, engineering, construction and operation of wind energy projects. Seawind also develops, builds and operates its own wind power projects across the globe and is active in wind energy technology development.

SELETAR RESOURCES PTE. LTD.

18 Sin Ming Lane #07-03, Midview City, Singapore 573960

Tel: +65 6659 5416
Fax: +65 6659 5417
Email: info@seletar.sg
Website: <http://www.seletar.sg>
Contact Person: Mr. Tom Ng
Designation: Director

Description Seletar Resources Pte Ltd is currently involved in 4 areas of activities, namely: Water Resources, Resource Recovery, Renewable Energy and Alternative Fuel.

SN POWER HOLDING CHILE PTE. LTD.

Income At Raffles, 16 Collyer Quay #29-02, Singapore 049318

Tel: +65 6513 2189
Fax: +65 6534 1065
Email: nurzanna@snpower.com
Website: <http://www.snpower.com>
Contact Person: Nurzanna Mohamed Tahir
Designation: Office Manager

Description SN Power was established in 2002. Its owners are the Norwegian state entities Statkraft (60%) and Norfund (40%). The company's mission is to become a leading hydro- power company in emerging markets, contributing to economic growth and sustainable development.

UTICA PRIVATE LIMITED

Blk 101, Kitchener Road, #02-09, Jalan Besar Plaza, Singapore 208511

Tel: +65 6296 7787
Fax: +65 6296 7618
Email: kenneth@utica.sg, project@utica.sg
Website: <http://www.utica.sg>
Contact Person: Mr. Kenneth Chng
Designation: CEO

Description UTICA SG is a privately held Singapore-based alternative energy company in the production of sustainable electricity from diversified fuel sources including solar energy, hydroelectric, and wind power.

VOITH TURBO PTE. LTD.

10 Jalan Lam Huat, Singapore 737923

Tel: +65 6861 5100

Fax: +65 6861 5052

Email: Mar.Sluijs@voith.com, Li-Ping.Teo@voith.com,
sales.singapore@voith.com

Website: <http://www.sea.voithturbo.com>

Contact Person: Mr. Mar van Sluijs, Ms. Teo Li Ping

Designation: Managing Director, Regional Marketing Coordinator

Description Voith Turbo Pte Ltd. was registered in Singapore in 1988 as a wholly owned subsidiary of the Voith Group, an internationally renowned engineering company based in Germany. In 2008 Voith Turbo moved its Singapore regional headquarters into its own premises in 10 Jalan Lam Huat, covering a total area of 3,000 square metres of which 750 square metres are taken up by the workshop, service and testing area.

WASTE TO ENERGY PTE. LTD.

80B Arab Street, Singapore 199577

Tel: +65 6222 3177

Fax: +65 6734 4530

Email: steve.peters@w2eglobal.com, info@w2eglobal.com

Website: <http://www.w2eglobal.com>

Contact Person: Mr. Steve Peters

Designation: Owner

Description Waste To Energy Pte Ltd (W2E) is a developer of biogas plants. They Design-Build-Own & Operate contracts to convert wastewater or organic solid waste (e.g cassava, palm oil mill effluent, municipal solid waste) for the production of renewal energy.

WILMAR INTERNATIONAL LIMITED

56 Neil Road Singapore 088830

Tel: +65 6216 0244

Fax: +65 6836 1709

Email: matt.morgenroth@wilmar.com.sg, info@wilmar.com.sg

Website: <http://www.wilmar-international.com>

Contact Person: Mr. Mathew Morgenroth

Designation: Group Technical Head

Description Wilmar's business activities include oil palm cultivation, oilseeds crushing, edible oils refining, sugar milling and refining, specialty fats, oleochemicals, biodiesel and fertilizers manufacturing and grains processing.

WINDSIA ENERGY INDUSTRIES PTE. LTD.

120 Eunos Avenue 7, Richfield Industrial Centre, #01-01, Singapore 409574

Tel: +65 6748 9022

Fax: NA

Email: inquire@windsia.com

Website: <http://www.windsia.com>

Description Windsia is a system designer and integrator of innovative vertical (VAWT), horizontal (HAWT) axis wind turbine and solar photovoltaic (PV) power generation system. Besides that, Windsia also markets energy saving appliances. It provides solutions from a wide range of applications in small and medium-sized electrical equipment to appliances.

SINGAPORE - SOLAR, PHOTOVOLTAIC, CELL POWER SYSTEM AND WIND ENERGY

ASIATIC ENGINEERING PTE LTD

148-160 Owen Road, Singapore 218945

Tel: +65 6291 8282

Fax: +65 6296 9903

Email: yap.bautan@asiaticgroup.com.sg, asiatic@asiaticgroup.com.sg

Website: <http://www.asiaticgroup.com.sg>

Contact Person: Mr. Yap Bau Tan

Designation: Managing Director

Description Established in 1969, Asiatic have grown to be the leading building services solutions provider specialized in Pumps, Cooling Towers and PPR Pipe Systems.

AUMADA PTE. LTD.

Blk 2, Balestier Road #01-695, Balestier Hill Shopping Centre, Singapore 320002

Tel: +65 6846 4774

Fax: +65 6846 4334

Email: james@aumada.com.sg, enquiry@aumada.com.sg

Website: <http://www.aumada.com.sg>

Contact Person: Mr. James Chua

Designation: Director

Description AUMADA provides energy saving hot water and heating solutions. Being an integrated part of a global network of energy saving specialists. AUMADA can offered the last design and technology for domestic, commercial, industrial and solar pool heating or spa, as well as newly developed cluster housing and also individual landed homes.

CRIPTON ENVIRONMENTAL ENGINEERING (S) PTE LTD

400 Balestier Road, #02-37, Balestier Plaza, Singapore 329802

Tel: +65 6256 8804

Fax: NA

Email: info@pvtechsg.com

Website:

<https://sites.google.com/a/cryptonenvironmental.com.sg/cryptonenvironmental/home>

Contact Person: Mr. Philip Low

Designation: Managing Director

Description Cripton Environmental Engineering (S) Pte Ltd is a leading supplier of solar hot water systems, heat pumps and solar PV systems in building services and industrial applications. Cripton Environmental is a designer,

consultant and system integrator of a wide-range of environmental friendly, energy efficient applications and devices.

ELTEK POWER PTE. LTD.

No 3 Teban Gardens Crescent, Singapore 608920

Tel: +65 6773 2326

Fax: +65 6775 3602

Email: mike.soh@eltek.com.sg, Singapore.Eltek@eltek.com

Website: <http://www.eltek.com>

Contact Person: Mr. Mike Soh

Designation: Business Development Manager (Alternative Energy)

Description Eltek is a world leader in high-efficiency power electronics and energy conversion. As a global corporation, Eltek has customers in more than 100 countries across a variety of industries including telecom, rail and infrastructure, power generation and distribution, solar energy and electric vehicles.

ENERGYCORP GLOBAL PTE. LTD.

33 Ubi Avenue 3 #07-16 Singapore 408868

Tel: +65 6743 7584

Fax: +65 6743 7952

Email: michael.heng@energycorp-global.com, info@energycorp-global.com

Website: <http://www.energycorp-global.com>

Contact Person: Mr. Michael Heng

Designation: President & CEO

Description Support unique value innovations to harness renewable natural energy, and deploy developing technologies in clean, cost-effective alternative energy methods.

GRENZONE PTE. LTD.

Woodlands Spectrum 1, 2 Woodlands Sector 1 #05-14, Singapore 738068

Tel: +65 6579 0560

Fax: +65 6579 0561

Email: wongteckyeon@grenzzone.com, info@grenzzone.com

Website: <http://www.grenzzone.com>

Contact Person: Mr. Wong Teck Yean

Designation: Manager

Description One of the pioneer clean energy companies in Singapore. Projects include the Building and Construction Authority Zero Energy Building (ZEB@BCAA), commercial buildings (mostly green mark platinum buildings), institution and residential houses.

HOORAY ENERGY PTE. LTD.

Woodlands Spectrum 1, Woodlands Spectrum Sector 1, #05-14, Singapore 738068

Tel: +65 6515 5356

Fax: +65 6515 5276

Email: amir.surato@hoorayenergy.com, info@hoorayenergy.com

Website: <http://hoorayenergy.com>

Contact Person: Mr. Amir Surato

Designation: Manager

Description Hooray Energy is a Singapore based photovoltaic solar modules manufacturer. Hooray Energy focuses on manufacturing highly reliable low to medium wattage modules, customized modules and providing OEM services.

INTERLINK POWER SYSTEM PTE LTD

32 Ang Mo Kio Industrial Park 2, #04-13, Sing Industrial Complex, Singapore 569510

Tel: +65 6484 1406

Fax: +65 64841405, 64833816

Email: kmleung@interlinkpower.com.sg, admin@interlinkpower.com.sg

Website: <http://www.interlinkpower.com>

Contact Person: Mr. KM Leung

Designation: Managing Director

Description Established in 1993, Interlink is a regional sales organization in the ASEAN region as agents for Sharp Solar Products. Mr KM Leung is a certified Green Mark manager with vast experience and skills in developing efficient PV systems.

INTERSTATE TECHNOLOGIES ENGINEERING PTE. LTD.

Block 5049 Ang Mo Kio Industrial Park 2 #01-641 Singapore 569552

Tel: +65 6482 2346

Fax: +65 6482 2717

Email: enquiry@interstate.com.sg

Website: <http://www.interstate.com.sg>

Description Interstate Technologies Pte Ltd (ITPL) is a government-registered Building and Civil Engineering Main Contractor in Singapore.

KAMTEX INDUSTRIES (PTE.) LTD.

37, Tannery Lane, #06-06, Tannery House, Singapore 347790

Tel: +65 6744 5307, 6741 4939, 6547 4757

Fax: +65 6744 5306

Email: kamtex@kamtexindustries.com

Website: <http://www.solar.kamtexindustries.com>

Contact Person: Mr. Thomas Ong

Designation: Managing Director

Description Kamtex Solar is a division of Kamtex Industries Pte Ltd dealing with solar energy business & projects.

KIPP & ZONEN ASIA PACIFIC PTE. LTD.

10 Ubi Crescent, #02-93 Lobby E, Ubi Techpark, Singapore 408564

Tel: +65 6748 4700

Fax: +65 6748 6098

Email: Gene.phay@kippzonen.com, kipp.singapore@kippzonen.com

Website: <http://www.kippzonen.com>

Contact Person: Mr. Gene Phay

Designation: Area Manager

Description Kipp & Zonen is the worldwide authority in measuring solar radiation and atmospheric properties. Their passion for precision has led to the development of a large range of high quality instruments: from all weather resistant pyranometers to complete measurement networks.

MERIDIAN INDUSTRIES (ASIA PACIFIC) PTE LTD

150 South Bridge Road #B1-11, Fook Hai Building, Singapore 058727

Tel: +65 9185-5686

Fax: +65 6569 3076

Email: andrea@meridian-industries.com, sales@meridian-industries.com

Website: <http://www.meridian-industries.com>

Contact Person: Ms. Andrea Wei

Designation: Business Manager

Description Meridian Energy (Singapore) Pte Ltd is specialized in providing solar energy consultation and products for Southeast Asia, Europe, Africa and other regions in the world. All our products are backed up by world's leading solar energy technologies and mass

PHOENIX SOLAR PTE. LTD.

209 Syed Alwi Road, Singapore 207742

Tel: +65 6511 9339

Fax: +65 6511 9333

Email: christophe.inglin@phoenixsolar.sg, info@phoenixsolar.sg

Website: <http://www.phoenixsolar.sg>

Contact Person: Mr. Christophe Inglin

Designation: Managing Director

Description Phoenix Solar's extensive capabilities encompass management of turnkey PV solutions for commercial, institutional, industrial and residential solar projects.

PHOTOVOLTAIC TECHNOLOGY (SINGAPORE)

17 SENANG CRESCENT, SINGAPORE 416590

Tel: +65 6241 6673

Fax: +65 6445 9661

Email: pvtech@singnet.com.sg, info@pvtechsg.com, pvtech@singnet.com.sg

Website: <http://www.pvtechsg.com>

Contact Person: Mr. Jackson Chua

Designation: Managing Director

Description Photovoltaic Technology (Singapore) started in 2002 and is to date, one of Singapore's most established designers and producers of solar energy products.

REC SYSTEMS PTE LTD

3 International Business Park #03-01 Nordic European Centre, Singapore 609927

Tel: +65 6499 7500

Fax: +65 64997548

Email: droston.tang@recgroup.com, recsystems@recgroup.com

Website: <http://www.recgroup.com>

Contact Person: Mr. Droston Tang

Designation: Manager, Business Development

Description REC produces polysilicon, wafers, cells and solar panels for the solar industry, and silicon materials for the electronic industry. REC also engages in project development in selected PV segments.

RENEWPOWERS TECHNOLOGIES PTE. LTD.

141 Kaki Bukit Avenue 1, #04-00 Shun Li Industrial Park, Singapore 416005

Tel: +65 6741 7123

Fax: +65 6441 7379

Email: eddie@renewpowers.com, rpt@renewpowers.com

Website: <http://www.renewpowers.com>

Contact Person: Mr. Eddie Lee

Designation: Technical Sales Manager

Description Design, manufacture, install and sell environmentally renewable powers in domestic, commercial and industrial markets, as well as to develop support products.

ROBERT BOSCH (SEA) PTE LTD / SOLAR ENERGY DIVISION

11 Bishan St 21, Singapore 573943

Tel: +65 6571 2980

Fax: +65 6571 2981

Email: benjamin.pereira@sg.bosch.com, sales.se@sg.bosch.com

Website: <http://www.bosch-solarenergy.de>

Contact Person: Mr. Benjamin Pereira

Designation: Manager, Regional Sales

Description Bosch Solar Energy supplies first-class solar cells and modules with high annual yields, even at sub-optimal levels of sunlight. The fundamental basis for such excellent operation comprises state-of-the-art production equipment and highly effective processes.

SCHMID SINGAPORE PTE. LTD.

23 Tuas Avenue 10, Singapore 639149

Tel: +65 6591 7099

Fax: +65 6861 0932

Email: kenneth.th@asia.schmid-group.com, fong.al@asia.schmid-group.com

Website: <http://www.schmid-group.com>

Contact Person: Mr. Kenneth Thariyan

Designation: Trainer/Training Coordinator/Engineer

Description SCHMID has made a name for themselves worldwide as the technology leader in the photovoltaic, printed circuit board and flat panel display sectors. They offer not only innovative single solutions, but also the planning and development.

SINGAPORE OXYGEN AIR LIQUIDE PRIVATE LIMITED

16 Jalan Buroh, Singapore 619475

Tel: +65 6265 3788

Fax: +65 6265 1441

Email: Jacky.Chaberty@AirLiquide.com, info@soxal.com

Website: <http://www.soxal.com>

Contact Person: Mr. Jacky Chaberty

Designation: General Manager, Technical Operations

Description SOXAL (Singapore Oxygen Air Liquide Pte Ltd) is owned by Air Liquide, France, the world's leaders in the manufacture and application of gases which are used in every sphere of industry, science and medicine.

SOLARGY PTE. LTD.

20 Sin Ming Lane, #04-65 Midview City, Singapore 573968

Tel: +65 6570 9001

Fax: +65 6570 9002

Email: albert@solargy.com.sg, info@solargy.com.sg

Website: <http://www.solargy.com.sg>

Contact Person: Mr. Albert Lim

Designation: Managing Director

Description SolarGy Pte Ltd was founded by a team of practising professionals in the building construction industry who have over twenty years of experience in electrical installations and building architecture. They bring to bear their relevant experiences to apply the appropriate solar technologies and provide solutions to suit the specific energy requirements and creative architectural design.

SOLARWORLD ASIA PACIFIC PTE. LTD.

70 Bendemeer Road, Luzerne #06-01, Singapore 339940

Tel: +65 6842 3886

Fax: +65 6842 3887

Email: max.vonromatowski@solarworld.sg, sulin.gan@solarworld.sg, service@solarworld.sg

Website: <http://www.solarworld.sg>

Contact Person: Mr. Max von Romatowski, Ms. Gan Su Ling

Designation: Marketing Executive, Managing Director

Description SolarWorld group is one of the world's largest solar energy businesses with their core business is photovoltaics.

SUNSEAP ENTERPRISES PTE LTD

18, Boon Lay Way, Tradehub21 #06-135, Singapore 609966

Tel: +65 6795-2335/6
Fax: +65 6795 2325
Email: enquiries@sunseap.com
Website: <http://www.sunseap.com>

Description SUNSEAP is a designer and manufacturer of a wide-range of solar-powered applications and devices. SUNSEAP product range includes custom-designed solar panels, lights, grid-connected systems, BIPV and stand-alone systems.

SUNZHOU SOLAR SYSTEM (S) PTE. LTD.

200, Jalan Sultan, #01-10 Textile Centre, Singapore 199018

Tel: +65 6294 2642, 6296 7988
Fax: +65 6293 0797
Email: kpchan@sunzhousolar.com, info@sunzhousolar.com
Website: <http://www.sunzhousolar.net>
Contact Person: Mr. K.P. Chan
Designation: Director

Description Sunzhou Solar System (Singapore) specializes in Solar Power System installation from 300W to 2000W Energy saving for residential, commercial and villagers.

SUSTAINABLE POWER SOLUTIONS PTE. LTD.

#21-01 Centennial Tower, 3 Temasek Avenue, Singapore 039190

Tel: +65 6549 7401
Fax: +65 6549 7001
Email: <http://www.sustainable-power-solutions.com/en/contact/index.asp>
Website: <http://www.sustainable-power-solutions.com>

Description SPS is a Singapore based company dedicated to the delivery of environmentally-friendly and commercially-viable energy solutions for the world we live in. They specialized in marketing, engineering and quality assurance of solar products.

SOLID ASIA PTE LTD

57 Genting Lane Gani Building #04-00, Singapore 349564

Tel: +65 6844 2415

Fax: +65 6844 2417

Email: enquiries@solarasia.com

Website: <http://www.solidasia.com>

Contact Person: Mr. Peter-Jurgen Husnik

Designation: Independent Environmental Services Professional

Description SOLID is also heavily engaged in R&D and is collaborating with Universities, Agencies and other Energy Institutions to design more efficient solar systems.

SUN-MAX ENGINEERING PTE. LTD.

Block 1085 Eunos Avenue 7A #01-26, Singapore 409535

Tel: +65 6567 4311

Fax: +65 6841 5994

Email: shaw@sun-max.com

Website: NA

Contact Person: Mr. Shaw Chan

Designation: Executive Director

Description Clean / Sustainable Energy -> Solar Control Window Films and Solar Heating Equipment

SINGAPORE – ARCHITECTS (GREEN ARCHITECTURE)

2B ARCHITECTS

68 Tras Street, #02-01, Singapore 079007

Tel: +65 6227 7278

Fax: +65 6227 7178

Email: yewkee@2BArchitects.com.sg, admin@2Barchitects.com.sg

Website: <http://www.architecture2b.com>

Contact Person: Mr. Cheong Yew Kee

Designation: Principal Founder

Description 2B ARCHITECTS is committed to innovative and regionally appropriate architecture, with emphasis to integrate technology and art into sustainable design solutions. Their range of experiences includes residential developments, master planning, commercial projects and feasibility studies in Singapore, China and India.

ADDP ARCHITECTS LLP

59A Tanjong Pagar Road, Singapore 088480

Tel: +65 6220 1088

Fax: +65 6224 0280

Email: adminap@addp.sg, admin@addp.sg

Website: <http://addp.sg>

Contact Person: Mr. Lim Moon Leng John

Designation: Managing Partner

Description ADDP Architects LLP offers comprehensive scope of services including architectural and interior design, project administration and master planning. Since our formation, a strong base of expertise has been established for a wide spectrum of project types with accomplishments of an international profile. ADDP Architects LLP provides scope of services of the following project types: Residential, Commercial, Industrial, Institutional, Master Planning and Interior Design.

AEDAS PTE. LTD.

#11-01 Keppel Towers, 10 Hoe Chiang Road, Singapore 089315

Tel: +65 6734 4733
Fax: +65 6734 6233
Email: tony.ang@aedas.com, singapore@aedas.com
Website: <http://www1.aedas.com/Singapore>
Contact Person: Mr. Tony Ang
Designation: Managing Partner

Description Aedas is consistently strengthening and expanding its range of expertise across multiple sectors. The practice is currently a world-leading provider of architectural services for infrastructure, sports, cultural, mixed-use, residential, commercial, architecture, interior design, master planning, landscape, urban design and building consultancy within Asia, the Middle East, Europe and the Americas.

ARCHITECTS 61 PTE LTD

150 Beach Road, #23-01 Gateway West, Singapore 189720

Tel: +65 6737 5977
Fax: +65 6732 5439
Email: konghan@a61.com.sg, a61@a61.com.sg
Website: <http://www.a61.com.sg>
Contact Person: Mr. Kong Han Tah
Designation: Director (Projects)

Description Architects 61 is an architect firm located in Singapore, Kuala Lumpur, Malaysia and Shanghai, China. Their expertise is founded on high-rise, high-end and high-density development encompassing commercial offices, residential, hospitality amongst others.

ARCHITECTS TEAM 3 PTE. LTD.

Blk 93 Havelock Road#01-532Singapore 160093

Tel: +65 6467 2233
Fax: +65 6323 6885
Email: Joseph@at3s.com.sg, bd@at3s.com.sg
Website: <http://www.at3s.com.sg>
Contact Person: Mr. Joseph M Fermanes
Designation: Principal Designer

Description Architects Team 3 Pte Ltd has been in the forefront of designing and executing distinctive buildings that chronicle the physical development of Singapore. Most recently, Architects Team 3 has ventured into the green arena in which its first major work, the building at the Marina Barrage, has already become a significant icon in the Marina Bay area. It has since garnered several international awards and was conferred

Green Mark Platinum (Infrastructure).

AXIS ARCHITECTS PLANNERS PTE. LTD.

CITILINK Warehouse Complex #07-08, 102E Pasir Panjang Road, Singapore 118529

Tel: +65 6273 2771

Fax: +65 6227 3003

Email: william@axisarch.com.sg, office@axisarch.com.sg

Website: <http://axisarch.com.sg>

Contact Person: Mr. William Ong, Mr. Ling Siew Hwa

Designation: Founders

Description Since its inception, the company has completed numerous projects that range from large-scaled residential and commercial developments, award-winning mixed-use developments, showflat interiors and master plans in Singapore and abroad.

CPG CONSULTANTS PTE LTD

238B Thomson Road, #18-00 Tower B Novena Square, Singapore 307685

Tel: +65 6357 4988

Fax: +65 6357 4038

Email: vincent.loh@cpgcorp.com.sg, cpgbdcomms@cpgcorp.com.sg

Website: <http://www.cpgcorp.com.sg>

Contact Person: Mr. Vincent Loh

Designation: Senior Vice President, Business Development & Communications

Description CPG Corporation Pte. Ltd. (CPG Corp) is a leading infrastructure & building development and management services provider in the Asia Pacific region.

DCA ARCHITECTS PTE LTD

50 Market Street, #10-02/03, Singapore 048940

Tel: +65 6225 5366

Fax: +65 6225 4288

Email: enquiry@dca-architects.com

Website: <http://www.dca-architects.com>

Contact Person: Mr. Vincent Koo Tin Chew

Designation: Managing Director

Description Multi-discipline expertise in architecture design, interior planning, planning and urban design.

DP ARCHITECTS PTE LTD.

6 Raffles Boulevard, #04-100 Marina Square, Singapore 039594

Tel: +65 6338 3988

Fax: +65 6337 9989

Email: Jeremytan@dpa.com.sg, dparchitects@dpa.com.sg

Website: <http://www.dpa.com.sg>

Contact Person: Mr. Jeremy Tan

Designation: Senior Associate Director

Description DPA's Environmentally Sustainable Design department comprises architects, Green Mark professionals, environmental engineers and building scientists who work closely with design architects and M&E engineers to provide innovative green solutions. DPA has also been recognised by the Building and Construction Authority of Singapore as one of the architecture firms with the highest number of Green Mark Platinum and GoldPlus projects.

HOK INTERNATIONAL (SINGAPORE) PRIVATE LIMITED

100 Beach Road, #16-09 Shaw Tower, Singapore 189702

Tel: +65 6291 1911

Fax: NA

Email: jacqueline.holt@hok.com, carlos.gerhard@hok.com,
singapore@hok.com

Website: <http://www.hok.com>

Contact Person: Ms. Jacqueline Holt, Mr. Carlos Gerhard

Designation: Business Development Director, Vice President- Design Director

Description Ranked by Engineering News-Record as #1 Architecture/Engineering Firm and as a Top Green Design Firm.

ONG & ONG PTE. LTD.

510 Thomson Road, #11-00 SLF Building, Singapore 298135

Tel: +65 6258 8666

Fax: +65 6259 8648

Email: ong_tze_boon@ong-ong.com, info@ong-ong.com

Website: <http://www.ong-ong.com>

Contact Person: Mr. Ong Tze Boon

Designation: Group Executive Chairman

Description ONG&ONG now offers a parcelled cross-discipline integrated solution, encompassing all aspects of the construction business. They offer a three-pronged 360° solution. 360° Design encompasses urban planning, architecture, landscape, interiors and environmental branding (graphics). 360° Engineering offers civil, structural, electrical, mechanical and plumbing. 360° Management provides development,

project, construction and place management.

RSP ARCHITECTS PLANNERS & ENGINEERS (PTE) LTD

15 Scotts Road, #07-00, Thong Teck Buuilding, Singapore 228218

Tel: +65 6737 7544

Fax: +65 6733 9143

Email: lai_huen_poh@rsp.sg, rpsing@rsp.sg

Website: <http://www.rsp.com.sg>

Contact Person: Mr. Lee Kut Cheung, Mr. Lai Huen Poh

Designation: Managing Directors

Description RSP started out as small partnership, Raglan Squire and Partners in 1956. It has grown in scope and scale to become one of the largest and most established practices in Asia. RSP's strength lies in its total commitment to Excellence in Planning and Design.

SURBANA INTERNATIONAL CONSULTANTS HOLDINGS PTE. LTD.

168 Jalan Bukit Merah, #01-01, Singapore 150168

Tel: +65 6248 1288

Fax: +65 6273 9090

Email: jeffreyho@surbana.com, mails@surbana.com

Website: <http://www.surbana.com/en>

Contact Person: Mr. Jeffrey Ho

Designation: Managing Director, Urban Planning

Description Their value proposition lies in their expertise across the whole real estate value chain, encompassing architecture, engineering, project and construction management, urban planning, coastal engineering, infrastructure, sustainable design technologies and city management.

YANG ARCHITECTS PTE. LTD.

5001 Golden Mile Complex, #09-96 Beach Road, Singapore 199588

Tel: +65 6299 0090

Fax: +65 6295 5728

Email: yeoec@yangarchitects.com.sg, admin@yangarchitects.com.sg

Website: <http://www.yangarchitects.com.sg>

Contact Person: Mr. Yeo Eng Choon

Designation: Managing Director

Description The firm has grown and is engaged in numerous ventures - feasibility studies, residential developments and built and un-built works - in South East Asia, the Middle East and even Africa. The firm's portfolio encompasses large scale developments - master planning, condominium developments, industrial, commercial and institutional projects; and smaller scale interior designs projects.

SINGAPORE - CARBON (CDM, TRADING, OFFSET) COMPANIES

ASIA CARBON ESCO PTE. LTD.

140 Cecil Street, #06-01 PIL Building, Singapore 069540

Tel: +65 6225 1791

Fax: +65 6225 1562

Email: irfan@asiacarbon.com, sri@asiacarbon.com

Website: <http://www.asiacarbon.com>

Contact Person: Mr. Irfan L. Pawenneii, Mr. Thirumagan Sri

Designation: Carbon Advisory Services, Executive Director

Description Asia Carbon Global provides an integrated and seamless approach to the business of energy, environment and sustainable development. It focuses on initiatives that include the flexible market mechanisms of the Kyoto Protocol as well as the fast-growing opportunities presented by the voluntary markets. The company's commitment to sustainable development is further strengthened by the keen ability to recognize market opportunities in the midst of the challenges of climate change. This leads to the promotion of new initiatives that encourage energy efficiency, renewable energy, and resource conservation, all of which are designed to help alleviate socio-economic and environmental problems in local communities and countries, globally.

ADVANCED HOLDINGS LTD.

29 Senoko South Road, Singapore 758083

Tel: +65 6854 9000

Fax: +65 6779 5400

Email: sales@advancedholdings.com

Website: <http://www.advancedholdings.com>

Contact Person: Mr. Axron Lim Gwee Koon

Designation: Chief Operating Officer

Description Advanced Environmental Technologies Pte Ltd provides turnkey development of carbon sequestration projects and carbon credit supply. The company also explores opportunities for project investment and acquisition of relevant environmental technologies.

ATMD BIRD & BIRD LLP

2 Shenton Way #18-01, SGX Centre 1, Singapore 068804

Tel: +65 6534 5266

Fax: +65 6223 8762

Email: sandra.seah@twobirds.com, Singapore@twobirds.com

Website: <http://www.twobirds.com>

Contact Person: Ms Sandra Seah

Designation: Partner

Description TMD Bird & Bird LLP is a leading Singapore law practice comprising more than 30 lawyers. It has particular strength in intellectual property, corporate and commercial transactions, mergers and acquisitions, energy, dispute resolution and arbitration, construction law, environment law, employment, biotechnology and competition. ATMD has an extensive experience in energy regulatory work in Singapore. Its renewables and cleantech team advises commercial and public sector organisations on a wide range of legal issues within the sectors including advice on the use of carbon credits and trading schemes, solar and wind feed-in tariffs, unbundling of European energy supplies and protection and maximization of intellectual property assets.

BUNGE AGRIBUSINESS SINGAPORE PTE LTD

77 Robinson Road, #28-00 Robinson 77, Singapore 068896

Tel: +65 6227 0090

Fax: +65 6536 6136

Email: martha.fernandez@bunge.com

Website: <http://www.bunge.com>

Contact Person: Ms Martha Fernandez

Designation: Regional Manager

Description Bunge Agribusiness is a part of the Bunge Group specializing in the trading of in oilseeds & grains and their execution and distribution. Another business under the Bunge umbrella is its emissions group. Leveraging on Bunge's 180 year history in emerging markets and decades of experience in structuring complex financial transactions to pursue opportunities in emissions reduction credits, the Bunge Emissions Group focuses on acquiring rights to future credits from emission reduction projects that are still in early stages and on trading. It is supported by an advisory services team which provides expertise in assessing emission reductions. Bunge Emissions helps companies assess and manage their greenhouse gas emissions and develop emissions reduction projects. These projects can earn carbon credits, which the group then markets to other companies, thus creating economic incentives for investment in green technologies.

ECO ASIAN CARBON CONSULTING PTE. LTD.

10 Collyer, Ocean Financial Centre, Level 40, Singapore 49315

Tel: +65 6808 6499
Fax: +65 6808 6299
Website: NA
Contact Person: Ms Licia Phang
Designation: Director of Administration

Description Eco Asian Carbon is a leading Singapore based carbon credit management firm specializing in providing access to the global alternative energy markets. It is a brokerage and trading provider focusing on offering VCS verified credits in a wide range of offset projects. Eco Asia's clients receive access to a diverse range of tools, carbon credit services and offset projects ranging from wind to solar to hydro in both developed and emerging markets.

ECOWISE HOLDINGS LIMITED

17 Kallang Junction #04-03, Esmart Centre, Singapore 339274

Tel: +65 6536 2489
Fax: +65 6536 7672
Email: enquiries@ecowise.com.sg
Website: <http://www.ecowise.com.sg>
Contact Person: Mr. Fong Seok Phoy
Designation: Director, ecoWise International Pte. Ltd.

Description ecoWise Group is a Singapore based renewable energy and integrated environmental solutions provider principally involved in three major businesses: Resource recovery, renewable energy and provision of integrated environmental management solutions. The Group has been active in the renewable energy sector since 2004. ecoWise invests, develops and manages economically attractive renewable energy projects that yields environmental, social and economical benefits to the local community where it operates. The renewable energy arm also invests in tech companies that may have a technology ready for commercialization.

KPMG CORPORATE FINANCE PTE LTD

16 Raffles Quay #22-00, Hong Leong Building, Singapore 048581

Tel: +65 6213 3388

Fax: NA

Email: sharadsomani@kpmg.com.sg, sg-marketing@kpmg.com.sg,
rkar@kpmg.com.sg

Website: <http://www.kpmg.com/sg>

Contact Person: Mr. Sharad Somani, Mr Rahul Kar

Designation: Partner & Head - Global Infrastructure Advisory, Director, Climate Change And Sustainability Services

Description KPMG's Corporate Finance advisers provide organizations with necessary financing, and M&A advice. Its Sustainability Advisory team provides insights and strategies to help companies manage the business implications of climate change. The company helps its clients to develop strategies to embrace planned and likely changes in environmental regulations and to invest wisely in energy efficiency, renewable energy and trusted carbon offset and trading schemes. Where appropriate, clients are guided through the important tax, insurance and non-financial implications of their approach to dealing with climate change.

SINDICATUM CARBON CAPITAL (SOUTH EAST ASIA) PTE. LTD.

80 Anson Road, #28-02 Fuji Xerox Towers, Singapore 238874

Tel: +65 6732 8897

Fax: +65 6732 9767

Email: jay.mariyappan@sindicatum.com

Website: <http://www.sindicatum.com>

Contact Person: Mr. Jay Mariyappan

Designation: Managing Director, Climate Change Delivery

Description Sindicatum Sustainable Resources was founded in the United Kingdom in 2005. The company then went on to establish its business in China (2006), India (2007), South East Asia (2007) and in the United States (2007). In 2009 Sindicatum's headquarters was moved to Singapore. Sindicatum brings together strengths in development, finance and technology and the company finances and operates clean energy projects worldwide and produces sustainable resources from the utilization of natural resources and waste. Its long-term strategy is to create value from the mitigation of climate change and promotion of sustainable development through the beneficial utilization of natural resources and waste products. The sustainable resources which the company aims to create include, on a portfolio basis, clean energy and sustainable commodities such as bio-fuels and products manufactured from natural resources and agricultural waste, as well as environmental commodities.

TRICORONA CARBON ASSET MANAGEMENT PTE. LTD.

16 Raffles Quay #32-04, Hong Leong Building, Singapore 048581

Tel: +65 6499 1288

Fax: +65 6499 1299

Email: moe.oo@tricornase.com, singapore@tricornase.com

Website: <http://www.tricornase.com>

Contact Person: Mr. Moe Moe Oo

Designation: Managing Director

Description Tricorona is a world leader in the project-based emission reductions market with 150+ projects registered under the Kyoto Protocol's Clean Development Mechanism (CDM). It has an active player in the international carbon markets since 2004 and portfolio has successfully delivered 16.9 million Certified Emission Reductions (CERs). The emission reductions from CDM projects can be used by industrialized countries to meet their commitment under the Kyoto Protocol as well as by companies to meet their commitments in the European Union's Emission Trading Scheme. The company is also a supporter of the Gold Standard and a leading developer of Gold Standard CDM projects. The Gold Standard focuses on sustainability and stakeholder involvement and is recognized as the highest standard in the carbon market. Tricorona's projects have issued one third of all Gold Standard CERs issued to date.

DTZ FACILITIES & ENGINEERING (S) LIMITED

Block 750 Oasis, Chai Chee Road, Technopark@Chai Chee #01-01,

Singapore 469000

Tel: +65 6876 0088

Fax: +65 6538 8146

Email: philip.leow@dtz.com, saikuai.kwok@dtz.com, mail.sg@dtz.com

Website: <http://www.dtz.com>

Contact Person: Mr. Philip Leow, Mr. Kwok Sai Kuai

Designation: Head of Property Management (SEA), Senior Director (Property Management)

Description DTZ is a division of UGL Limited that provides outsourcing services to property users in Asia, North America, Australia, New Zealand and the Middle East, The business has an end-to-end model which includes corporate real estate advisory, integrated facilities management, engineering services, energy management and township management.

GREEN KONCEPTS PTE. LTD.

750A Chai Chee Road, #07-11, Technopark @ Chai Chee, Singapore
469001

Tel: +65 6245 9332

Fax: +65 6245 9332

Email: kenneth.lee@greenkoncepts.com, info@greenkoncepts.com

Website: <http://www.greenkoncepts.com>

Contact Person: Mr. Kenneth Lee

Designation: Founder & CEO

Description Green Koncepts is a green technology company offering a next generation cloud energy management platform. Founded in 2008, it provides innovative energy management solutions for businesses and building owners across various industry sectors. These solutions provide real time energy intelligence and control through a simple web based user interface delivered via a cloud framework. Green Koncepts provides visibility, in-depth analysis and the capability to manage and optimize energy usage, enabling clients to create energy policies that increase their business profits while achieving environmental sustainability goals.

WEB EARTH PTE. LTD.

40 Carpenter Street, Singapore 059919

Tel: +65 6223 9208

Fax: +65 6220 7928

Email: richard@webearth.com.sg, webearth@webearth.com.sg

Website: <http://www.webearth.com.sg>

Contact Person: Mr. Richard Outhwaite

Designation: Director

Description Web Earth Pte Ltd is an environmental and sustainability consultant that delivers solutions for creating eco-friendly buildings and infrastructures. The company was established as a response to client requests for holistic environmental solutions for their property developments to reduce energy and water consumption as well as carbon footprint. Web Earth delivers individual solutions to meet a project's specific needs, rather than simply carrying out a box ticking exercise.

WENERGY GLOBAL PTE. LTD.

305 Alexandra Road, #05-10, Singapore 159942

Tel: +65 6479 2146

Fax: +65 6479 8934

Email: info@wenergyglobal.com

Website: <http://www.wenergyglobal.com>

Contact Person: Ms Oesha Thakoerdin

Designation: Director Sustainability

Description WEnergy Global PTE LTD is a one-stop-shop-solution provider of renewable energy systems and technologies for energy-efficiency in buildings. Our company designs, procures and build power plants, such as Solar PV, Small Hydro Power, Wind and Biogas. We use Artificial Intelligence Systems in our Energy Consumption Optimizer (ECO) to reduce energy consumption in buildings. We also build, own and operate renewable energy power plants and work together with equity financiers and investors to ensure fair profitability in low/medium risk environments in emerging economies in Asia, Africa, Middle East and the Caribbean.

AGRINERGY PTE. LTD.

59 Mohamed Sultan Road, Sultan-Link # 01-08, Singapore 238999

Tel: +65 6933 5360

Fax: NA

Email: ben.atkinson@agrinergergy.com, singapore@agrinergergy.com

Website: <http://www.agrinergergy.com>

Contact Person: Mr. Ben Atkinson

Designation: Managing Director

Description Agrinergergy is a clean energy, carbon and sustainable land management project developer and consultant. We are specialists in sustainable land management, and are developing an innovative project in Indonesia that avoids deforestation and degradation of tropical forests, whilst in Australia we assist land owners and indigenous communities establish emission reduction and carbon sequestration projects.

CLIMATE RESOURCES EXCHANGE PTE. LTD.

3 Raffles Place # 07-01, Bharat Building, Singapore 048617

Tel: +65 6329 9748

Fax: +65 6552 3457

Email: v.kesava@climate-resources.com, info@climate-resources.com

Website: <http://www.climate-xchange.com>

Contact Person: Mr. Vinod Kesava

Designation: Managing Director & CEO

Description Climate Resources Exchange Pte. Ltd. (CRX) is a Singapore-based private enterprise founded by pioneers in the global carbon market who established the world's first CDM focused exchange and developed an auction model for the trading of carbon credits generated under the Kyoto Protocol's Clean Development Mechanism (CDM).

ENVIRONMENTAL RESOURCES MANAGEMENT (S) PTE LTD

120 Robinson Road #10-01, Singapore 068913

Tel: +65 6324 9636

Fax: +65 6226 1636

Email: Rosalind.Finney@erm.com

Website: <http://www.erm.com>

Contact Person: Ms Rosalind Finney

Designation: Principal Consultant

Description Environmental Resources Management (ERM) is a leading global provider of environmental, health, safety, risk, social consulting services and sustainability related services.

ERNST & YOUNG LLP

Level 18 North Tower, One Raffles Quay, Singapore 048583

Tel: +65 6535 7777

Fax: +65 6532 7662

Email: K.Sadashiv@sg.ey.com

Website: <http://www.ey.com>

Contact Person: Mr. K Sadashiv

Designation: Southeast Asia Leader, Climate Change and Sustainability Services

Description EY Singapore offers assurance, tax, transaction and advisory services to a wide-ranging clientele base consisting of multinational companies, private companies and public sector organizations. The Singapore firm is part of an integrated Asia-Pacific Area, which comprises over 29,000 people in 22 countries.

KYOTO ENERGY PTE. LTD.

50 Raffles Place, #32-01 Singapore Land Tower, Singapore 048623

Tel: +65 6248 4728

Fax: +65 6248 4531

Email: abraham.antony@kyotoenergy.net, michel.buron@kyotoenergy.net

Website: <http://www.kyotoenergy.net>

Contact Person: Mr Abraham Antony, Mr. Michel Buron

Designation: Regional manager - Maritime South East Asia, CEO and Chairman

Description KYOTOenergy provides services to a wide range of sectors in South East Asia such as the agro-industry (palm oil, tapioca), renewable energy, manufacturing sectors (textile, rubber, latex) and services sectors (banking, waste management).

SINGAPORE - WATER TREATMENT PLANT CONSULTANTS

ARUP SINGAPORE PTE LTD

10 Hoe Chiang Road, #26-01, Keppel Towers, Singapore 0689315

Tel: +65 6411 2500
Fax: +65 6411 2501
Contact Person: Mr. Tan Yoong Heng
Designation: Managing Director
Email: tan.yoonghen@arup.com, singapore@arup.com
Website: <http://www.arup.com>

Description Firm of designers, planners, engineers, consultants and technical specialists offering a broad range of professional services.

AURECON SINGAPORE (PTE) LTD

152 Beach Road, #22-02, Gateway East, Singapore 189721

Tel: +65 6256 6188
Fax: +65 6256 7188
Contact Person: Mr. Ben Moo, Mr. Steve Liew
Designation: Engineering Sciences Group Leader for Buildings, Country Manager (Singapore & Malaysia)
Email: ben.moo@aurecongroup.com, steve.liew@aurecongroup.com
singapore@aurecongroup.com
Website: <http://www.aurecongroup.com>

Description Aurecon provides engineering, management and specialist technical services for public and private sector clients globally.

BASLER & HOFMANN SINGAPORE PTE LTD

122 Middle Road, #06-02, Singapore 188973

Tel: +65 6339 9884
Fax: +65 6334 3063
Contact Person: Dr. Felix Gmünder
Designation: Managing Director
Email: felix.gmuender@bh.com.sg, basler-hofmann@bh.com.sg
Website: <http://www.bh.com.sg>

Description Project and quality management, infrastructure planning and environmental consultancy.

BLACK & VEATCH (SEA) PTE LTD

390 Havelock Road, #04-01 King's Centre, Singapore 169662

Tel: +65 6738 4022
Fax: +65 6738 2717
Contact Person: Ms Liew Yien Phin / Ms Wendy Koh
Designation: Project Director / Admin Support Coordinator
Email: liewyp@bv.com, KohKM@bv.com, bvsea@bv.com
Website: <http://www.bv.com>

Description The leading engineering design and consultancy company's core expertise is in the water industry. Its International Headquarters in Singapore manages its Asia-Pacific operations and will grow its strength from 50 to 120 over five years. Black & Veatch launched a Global Advanced Water Design Centre in February 2007, providing engineering design services to support its water projects globally.

CAMP DRESSER & MCKEE (CDM) INTERNATIONAL (S) PTE LTD

1 Maritime Square, #09-50, Harbourfront Centre, Singapore 099253

Tel: +65 6273 3311
Fax: +65 6842 9605
Contact Person: Mr. Chee Sai Kit
Designation: Principal Consultant
Email: singcdm@pacific.net.sg
Website: <http://www.cdm.com>

Description CDM is a global full service consulting, engineering, construction and operations firm helping public and private clients improve the environment and infrastructure.

CH2M HILL SINGAPORE PTE LTD

150 Beach Road, #34-00, Gateway West, Singapore 189720

Tel: +65 6391 0350
Fax: +65 6299 4739
Contact Person: Mr. Chan Hui Chng, Mr. Peter G. Nicol, Mr. Howie Tan
Designation: Project Manager, Senior Vice President (Global Business Development Director - Water Business Group), Project Manager - Water Business Group
Email: huchng.chan@ch2m.com, peter.nicol@ch2m.com, howie.tan@ch2m.com
Website: <http://www.ch2m.com>

Description Environment consultancy, architectural, engineering, procurement and construction management services. Provide strategically integrated project delivery services in field of water, environment, transportation, industrial facilities for Electronics & Advanced Technology, chemicals, Manufacturing and Life Sciences Customers.

CPG CONSULTANTS PTE LTD

238B Thomson Road, #18-00 Tower B Novena Square, Singapore 307685

Tel: +65 6357 4988

Fax: +65 6357 4038

Email: vincent.loh@cpgcorp.com.sg, cpgbdcomms@cpgcorp.com.sg

Website: <http://www.cpgcorp.com.sg>

Contact Person: Mr. Vincent Loh

Designation: Senior Vice President, Business Development & Communications

Description CPG Corporation Pte. Ltd. (CPG Corp) is a leading infrastructure & building development and management services provider in the Asia Pacific region.

DARCO WATER TECHNOLOGIES LTD

41 Loyang Drive, Singapore 508952

Tel: +65 6545 3800

Fax: +65 6545 3730

Contact Person: Mr. Thye Kim Meng, Mr. Calvin Thye Kim Fah

Designation: Managing Director, General Manager in Darco Systems (M) Sdn Bhd

Email: sales@darcowater.com, calvinthye@darcowater.com.my

Website: <http://www.darcowater.com>

Description Providing servicing and maintenance of ultra pure and waste treatment systems, process and engineering water treatment systems.

ENVIPURE PTE LTD

No. 2 Woodlands Sector 1, #03-16, Woodlands Spectrum 1, Singapore 738068

Tel: +65 6880 3000, +65 6880 3039

Fax: +65 6880 3039

Contact Person: Mr. Vincent Wong

Designation: Chief Executive Officer

Email: vincent.wong@envipure.com, sales@envipure.com

Website: <http://www.envipure.com>

Description Envipure is an environmental engineering company dedicated to provide customers with technological solutions to safeguard the environment and public health, to meet industrial process water needs and to generate renewable energy. Their know-how and proprietary technologies are focused in air and odor pollution control, water and waste-water treatment and generation of climate-friendly renewable energy through mini-hydro, biogas and solar-PV.

FONG CONSULT PTE LTD

29 Tai Seng Avenue, Natural Cool Lifestyle Hub, #03-03, Singapore 534119

Tel: +65 6748 4668
Fax: +65 67483119
Contact Person: Ms. Janet Gan
Designation: Admin & Accounts Manager
Email: janet.gan@fongintl.com, fongco@fongintl.com
Website: <http://www.fongintl.com>

Description Civil and structural engineering firm with over 30 years of expertise in planning, design and supervision of projects in various Civil and Structural Engineering disciplines.

GE BETZ SINGAPORE PTE LTD

10 Tanjong Penjuru Crescent, Singapore 608973

Tel: +65 6267 4878
Fax: +65 6264 0763
Contact Person: Ms Jiranat Sumanont
Designation: Country Manager
Email: jiranat.sumanont@ge.com
Website: <http://www.gewater.com>

Description: The company provides water treatment, wastewater treatment and process systems solutions.

HYFLUX LTD

202 Kallang Bahru, Hyflux Building, Singapore 339339

Tel: +65 6214 0777
Fax: +65 6214 1211
Contact Person: Ms Olivia Lum, Mr. Wong Fu Long
Designation: Group CEO, Vice President (Investment)
Email: olivia_lum@hyflux.com, fulong_wong@hyflux.com, admin@hyflux.com,
contact_us@hyflux.com
Website: <http://www.hyflux.com>

Description Specialist in manufacturing of customized, membrane based water treatment systems for both industrial and municipal markets.

ION EXCHANGE ASIA PACIFIC PTE LTD

45, Cantonment Road, Singapore 089748

Tel: +65 6515 8997

Fax: +65 6515 8959

Contact Person: Mr. Anil Manocha, Mr. E. Sivashankar

Designation: CEO, Country Manager

Email: anil@ieiap.com, siva@ti-sg.com, ieiasiapacific@ionexchange.co.in

Website: <http://www.ieiasiapacific.com>

Description Ion Exchange Asia Pacific Pte. Ltd. is a Singaporean water treatment company established in 2003 AND specializing in Filtration, Demineralization, Condensate polishing, Reverse Osmosis, Ultrafiltration, Waste Water, Sewage Treatment etc.

KONZEN ENVIRONMENT PTE LTD

Waterhub, 82 Toh Guan East, #C2-11, Singapore 608576

Tel: +65 6464 0478

Fax: +65 6464 0479

Contact Person: Mr. Yeong Wai Cheong

Designation: CEO

Email: yeongwc@konzengroup.com, info@konzengroup.com

Website: <http://www.konzengroup.com>

Description KONZEN is a group of companies providing total solutions in the water industry.

METAX ECO SOLUTIONS PTE. LTD

No.28 Third Lok Yang Road, Singapore 628016

Tel: +65 6265 9422

Fax: +65 6266 2971, +65 6265 6630

Contact Person: Mr. Tan Sian Gwan

Designation: Managing Director

Email: tansg@metax.com, mail@metx.com

Website: <http://www.metax.com>

Description Listed on the Singapore Exchange in 2006, Metax Engineering Corporation Limited ("Metax Engineering") is an environmental engineering company that provides engineering, procurement and construction ("EPC") services for water and wastewater treatment and hydro-engineering projects.

NALCO PACIFIC LIMITED

2 International Business Park #02-20, The Strategy Tower 2, Singapore 609930

Tel: +65 6505 6868
Fax: +65 6316 1172
Contact Person: Mr. Marc Besserer
Designation: Director, IVM/NGES
Email: mobesserer@nalco.com, <http://www.nalco.com/ap/contact.htm>
Website: <http://www.nalco.com/ap>

Description Provide innovative solutions combining chemicals, equipment and services. They serve many industries including municipal, oil and gas, power generation.

PAN ASIAN HOLDINGS LIMITED

2 Tractor Road, Singapore 627966

Tel: +65 6267 7227
Fax: +65 6268 9679
Contact Person: Mr. Douglas Chee Beng Choon
Designation: General Manager (Project Sales)
Email: douglaschee@panasian.com.sg, pawater@panasian.com.sg
Website: <http://www.pawater.com.sg>

Description Integrated water piping systems and engineering design solutions provider. Supplies a wide range of products for the transmission and distribution of water. Offers a comprehensive range of products and services for water purification and wastewater treatment. Public utilities service providers for the rehabilitation of pipeline infrastructure and technical consulting.

PENTAIR WATER ASIA PACIFIC PTE LTD

18 Boon Lay, #04-111, Tradehub21, Singapore 609966

Tel: +65 6795 2213
Fax: +65 6795 2215
Contact Person: Mr. YC Foo
Designation: Regional Manager
Email: yc.foo@pentair.com, singapore.sales@pentairwater.com
Website: <http://www.pentair.com>

Description Pentair is a leading provider of water solutions addressing the world's water scarcity issues and delivering quality drinking water to homes, businesses and communities. With the broadest offering of water pumps, filters, systems and solutions, Pentair helps each step of the water process.

VEOLIA WATER SOLUTIONS & TECHNOLOGIES (SEA) PTE LTD

5 Loyang Way 1, Singapore 508706

Tel: +65 6549 1648, +65 8310 2618

Fax: +65 6546 2547

Contact Person: Mr. Laurent Besson, Ms.Mathilde Baillet

Designation: Managing Director (Shared Resources Platform, South East Asia), Marketing & Communications Coordinator (SEA)

Email: laurent.besson@veoliawater.com, mathilde.baillet@veoliawater.com

Website: <http://www.veoliawaterst-sea.com>

Description Present in South East Asia (SEA) for over 20 years, Veolia Water Solutions & Technologies (VWS) is the world leader in Design & Build and a specialized provider of technological solutions in water treatment.

SINGAPORE - WATER-RELATED RESEARCH INSTITUTIONS/CENTRES

DHI-NTU WATER & ENVIRONMENT RESEARCH CENTRE & EDUCATION HUB

200 Pandan Loop, Pantech 21, #08-03, Singapore 128388

Tel: +65 6777 6330

Fax: +65 6777 3537

Contact Person: Dr. Ole Larsen, Dr. Tan Soon Keat

Designation: Co-Centre Director, Co-Centre Director

Email: ola@dhigroup.com, ctansk@ntu.edu.sg, info@dhi-ntu.com.sg

Website: <http://www.dhi-ntu.com.sg>

Description: DHI-NTU Water & Environment Research Centre and Education Hub (DHI-NTU Centre) was jointly established by DHI Singapore (DHI) and Nanyang Technological University (NTU) in October 2007, with the support from the Environment & Water Industry Development Council (EWI). The DHI-NTU Centre was set up as part of the Environment and Water Research Programme. The Centre serves to build manpower capabilities on urban water management and water technology, and strengthen the water and environment industry via development of innovative solution and management technologies for water.

NANYANG TECHNOLOGICAL UNIVERSITY - NANYANG ENVIRONMENT AND WATER RESEARCH INSTITUTE (NEWRI)

50, Nanyang Avenue, Block N1-B3b-29, Singapore 639798

Tel: +65 6790 6813

Fax: +65 6791 0756

Contact Person: Prof. Ng Wen Jern

Designation: Head of Division (Division of Environmental and Water Resources), Exec-Director

Email: WJNg@ntu.edu.sg, ExecDir-NEWRI@ntu.edu.sg

Website: <http://www.ntu.edu.sg/NEWRI>

Description: The NEWRI Ecosystem, underpinned by NTU's education programmes which provide manpower for the EWT industry, facilitates a contiguous value chain in terms of research, translation, development, and application so that research can reach and benefit industry with greater frequency.

NGEE ANN POLYTECHNIC - ENVIRONMENTAL & WATER TECHNOLOGY CENTRE OF INNOVATION

Blk 34 #01-01, 535 Clementi Road, Singapore 599489

Tel: +65 6460 7026

Fax: +65 6467 4185

Contact Person: Mrs Tam-Lim Li Phin, Mdm Rose Mary Bleeme

Designation: Director, Administrative Assistant

Email: tlp3@np.edu.sg, rmd1@np.edu.sg, coi_ewt@np.edu.sg

Website: <http://www.np.edu.sg/coi/ewt/aboutus/Pages/default.aspx>

Description: With more than 25 years' experience in applied research and development as well as consultancy work in various aspects of environmental engineering and water technologies with the industry, Ngee Ann polytechnic partnered with SPRING Singapore

in setting up the Centre of Innovation in Environmental & Water Technology (COI-EWT) to provide technology support to local enterprises.

NUS - ENVIRONMENTAL RESEARCH INSTITUTE (NERI)

National University of Singapore, #02-01, T-Lab Building (TL) , 5A Engineering Drive 1, Singapore 117411

Tel: +65 6516 7543
Fax: +65 6872 1320
Contact Person: Dr Ong Choon Nam, Dr Ong Say Leong
Designation: Director, Deputy Director
Email: eridir@nus.edu.sg, eseongsl@nus.edu.sg
Website: <http://www.nus.edu.sg/neri/>

Description: NERI's mission is to coordinate, integrate and facilitate research and educational initiatives across NUS. Building on the strengths of NUS Faculties, Schools and Research Centers and Institutes, initiatives are formulated to address critical environmental topics. NERI coordinates focused recruitment of eminent scholars, faculty, fellows and graduate students to expand NUS' capabilities in key environmental areas.

REPUBLIC POLYTECHNIC - TECHNOLOGY DEVELOPMENT CENTRE (ENVIRONMENT)

9 Woodlands Ave 9, Singapore 738964

Tel: +65 3100 1351
Contact Person: Mr. Chan Wei Long
Designation: TDC Manager (Environment)
Email: chan_wei_loong@rp.edu.sg, enquiry_tdc@rp.sg
Website: <http://www.rp.sg/tdc/environmental/index.html>

Description: Republic Polytechnic - Technology Development Centre (Environment) has academic staff with relevant environment science and technology expertise that includes membrane bioreactor technology, phytoremediation, biomass gasification, environmental impact assessment, biofilm bioreactor technology and power electronics. Capabilities developed include equipping the labs with the state of art equipment for water/wastewater treatment, analytical chemistry and instrumentation units, as well as the capability for analysis of carbon, nitrogen and heavy metals.

RESIDUES & RESOURCES RECLAMATION CENTRE (R3C)

Nanyang Technological University, N1-B3b-18, 50 Nanyang Avenue, Singapore 639798

Tel: +65 6790 4100
Fax: +65 6792 7319
Contact Person: Prof Rainer Stegmann, Assoc. Prof Wang Jing-Yuan, Ms Melissa Chong
Designation: Director, Co-Director, Administration Executive
Email: mrainer@ntu.edu.sg, jywang@ntu.edu.sg, cmelissa@ntu.edu.sg
Website: http://www3.ntu.edu.sg/r3c/R3C_research.html

Description: The Residues and Resource Reclamation Centre (R3C) provides a platform for wastes management research and development, especially for resource recovery and remediation. Its main aim is to support the Singapore industry in developing novel and appropriate technologies for the local and regional markets on urban waste

management. The center sets out to be a world-class resource recovery and remediation research center and research hub for Asia. It will gather experts in R3 and related key disciplines from NTU as well as industrial and international research partners.

SINGAPORE-DELFT WATER ALLIANCE (SDWA)

National University of Singapore, Block E1 Level 08-25, No 1 Engineering Drive 2, Singapore 117576

Tel: +65 6516 6852, +65 6516 4929

Fax: +65 6778 1087

Contact Person: Dr. Jeff Obbard, Dr. Ooi Seng Keat, Dr. Stéphane Bayen

Designation: Director, Senior Research Fellow, Cluster Head Coastal & Offshore

Email: jeff.obbard@nus.edu.sg, sk.ooi@nus.edu.sg, scip0153@nus.edu.sg, sdwa@nus.edu.sg

Website: <http://www.sdwa.nus.edu.sg>

Description: Singapore-Delft Water Alliance is multi-national, interdisciplinary research Centre of Excellence for Water Knowledge involving PUB (Singapore), National University of Singapore and Deltares (The Netherlands), established through an initiative of the National Research Foundation in Singapore. SDWA is hosted by National University of Singapore and provides research home to scientists and engineers from all partner organizations.

SINGAPORE MEMBRANE TECHNOLOGY CENTRE

N1-01b-42, Block N1, Nanyang Avenue, Singapore 639798

Tel: +65 6790 5272

Contact Person: Dr. Anthony Gordon Fane, Dr. Wang Rong, Dr. Adrian Yeo

Designation: Director-Mentor, Co-Director, Research Fellow (External Relations)

Email: agfane@ntu.edu.sg, rwang@ntu.edu.sg, adrianyeo@ntu.edu.sg

Website: <http://smtc.ntu.edu.sg/Pages/default.aspx>

Description: The Singapore Membrane Technology Centre (SMTC) was established in January 2008 to do fundamental and applied research in membrane technology. In particular, it has a mission to be a world-class research centre in membranes for the Environment and Water Technology industries (EWT).

SINGAPORE UTILITIES INTERNATIONAL PTE LTD - CENTRE FOR ADVANCED WATER

40 Scotts Road, #22-02, Environment Building, Singapore 228231

Tel: +65 6731 3330

Fax: +65 6736 1207

Contact Person: Dr. Paul Stefan Klose, Dr. Zhang Lifeng

Designation: Department Manager for Water Resources Management at the CAWT, Senior Research Scientist

Email: psklose@cawt.sui.com.sg, lfzhang@cawt.sui.com.sg, gen-enquiry@sui.com.sg

Website: NA

Description: Singapore Utilities International Pte Ltd is a wholly owned registered subsidiary of the Public Utilities Board of Singapore. SUI employs the expertise of its own Centre of Advanced Water Technology (CAWT) to develop and test new technologies for

commercialization in the water supply, wastewater treatment and water recycling fields to support its clients' programmes for optimizing their operations.

PUB'S WATER HUB

80 Toh Guan Road East, Singapore 608575

Tel: +65 6885 2555

Fax: +65 6885 2526

Contact Person: Mr. Ng Han Tong William, Ms. Florence Chong

Designation: Director, Senior Assistant Director

Email: ng_han_tong@pub.gov.sg, florence_chong@pub.gov.sg,
vickneswaran_danabal@pub.gov.sg

Website: <http://www.pub.gov.sg/waterhub/Pages/default.aspx>

Description: WaterHub together with PUB's Technology and Water Quality Office (TWQO) aims to become a vibrant water research and development incubator center for the water industry. As part of their R&D cornerstone, they aspire to increase water resources, keep water costs competitive as well as manage water quality and security. WaterHub is the choice location for company that wants to start-up in Singapore as it offers a comprehensive infrastructure, the availability of shared facilities, easy start-up options and established networking with the water industry.

Well-known companies such as Siemens Water Technologies, Nitto Denko Corporation, Optiqua Technologies and Memsys have chosen WaterHub as their launch pad to expand and set up their R&D centers in Asia.

SINGAPORE - WATER TREATMENT RELATED SUPPLIERS/SERVICE PROVIDERS

ACME PUMP (ASIA) PTE LTD

48a Changi South street 1, Singapore 486114

Tel: +65 6545 7735
Fax: +65 6545 3411
Contact Person: Mr. Cheoh Kim Yam
Designation: Managing Director
Email: acme_sin@acmepump.com
Website: <http://www.acmepump.com>

Description Design and manufacture of centrifugal pumps and pumping systems for various industries ranging from water treatment, petro-chemical, chemical, public works, HVAC, steel, irrigation and fire fighting.

AMCO HI-TECH INTERNATIONAL PTE LTD

71 Toh Guan Road East, #01-05, TCH Tech Centre, Singapore 608598

Tel: +65 6567 2221
Fax: +65 6565 6562
Contact Person: Mr. Alex Chew
Designation: Director
Email: alexchew@amco.com.sg, sales@amcopress.com
Website: <http://www.amcopress.com>

Description Stainless steel press fitting for drinking water, oil and gas.

ASAHI KASEI PLASTICS SINGAPORE PTE LTD

78 SHENTON Way, #07-02/03, Lippo Centre, Singapore 079120

Tel: +65 6324 3011
Fax: +65 6324 3808
Contact Person: Mr. Yi Hosang
Designation: General Manager
Email: yi.hb@om.asahi-kasei.co.jp
Website: <http://www.asahi-kasei.co.jp/membrane/index.html>

Description Asahi Kasei manufactures hollow fiber membranes which are used for MBR, drinking water plants, water reuse plant and RO pretreatment in desalination plant, under the brand – MICROZA.

CPP GLOBAL PRODUCTS

27 Defu Avenue 2, Singapore 539526

Tel: +65 6280 0900
Fax: +65 6282 3918
Contact Person: Mr. Robin Liow
Designation: General Manager
Email: robin@cpp.com.sg, sales@cpp.com.sg
Website: <http://www.cpp.com.sg>

Description End-to-end solutions provider for gas/water/sewage piping installation.

LEY CHOON GROUP HOLDINGS LIMITED

No 4 Sungei Kadut Street 2, Singapore 729226

Tel: +65 6757 0900
Fax: +65 6757 0100
Contact Person: Mr. David Toh, Mr. Francis Koh
Designation: Project Director, Director
Email: davidtoh@leychoon.com, franciskoh@leychoon.com, admin@leychoon.com
Website: <http://www.leychoon.com>

Description

The Group's Underground Utilities Infrastructure works include installation of water pipes, NEWater pipes, gas pipes, electricity cables, fiber optic cables, sewer pipeline and telecommunication networks.

MEMSTAR TECHNOLOGY LTD

10 Science Park Road, #02-10 The Alpha Singapore 117684

Tel: +65 6775 2512
Fax: +65 6775 2513
Contact Person: Dr Jianping Jiang
Designation: Marketing & Sales Director
Email: jjp@memstar.com.sg, singapore@memstar.com.sg
Website: <http://www.memstar.com.sg>

Description Memstar Technology Ltd is a high-tech company listed on the main board of the Singapore Exchange (SGX), specialized in the manufacture and application of hollow fiber membranes and membrane products.

PIPELINE SERVICES PTE LTD

7 Neythal Road, #01-05, Singapore 628574

Tel: +65 6262 6253

Fax: +65 6265 6940

Contact Person: Mr. Glen O'Grady, Ms. Chua Hui Ching

Designation: Managing Director, Business Development Manager

Email: glen@pipelineservices.com.sg, huiching@pipelineservices.com.sg,
info@pipelineservices.com.sg

Website: <http://www.pipelineservices.com.sg>

Description Pipeline Services is provider in the Pipeline Rehabilitation industry.

O LINER TECHNOLOGY PTE LTD

Blk 52 Ubi Ave 3, #02-27 Frontier, Singapore 408867

Tel: +65 6742 8138

Fax: +65 6742 8236

Contact Person: Mr. Dennis Kong, Mr. Eileen Foo

Designation: Managing Director, Administrative and Accounts Manager

Email: dk.oliner@yahoo.com, eileen.foo@gmail.com

Website: <http://www.oliner.com.sg>

Description O Liner has also successfully completed many projects involving potable water, waste water, oil and gas pipeline rehabilitation.

WINSTON ENGINEERING CORPORATION (PTE) LTD

1 Joo Koon Way Singapore 628942

Tel: +65 6863 3338

Fax: +65 6898 3338

Contact Person: Mr. Sam Chin

Designation: Regional Marketing Manager

Email: sam@winstonengineering.com.sg, marketing@winstonengineering.com.sg

Website: <http://www.winstonengineering.com>

Description Provide pumps for applications requiring municipal & plumbing works, sewerage treatment, waste water disposal, air conditioning and the oil, gas and petroleum industries as well as covering general industrial pumping applications such as chemical transfer.

MARKET SECTOR REPORT 2012

– WATER INDUSTRY IN SINGAPORE

1 OVERVIEW

Singapore is a small tropical country with abundant amounts of rain; however its population still faces the challenge of being self-sufficient in its water supply. **Singapore is ranked 165th out of 173 countries in terms of water available per capita according to the World Bank statistics.** Two water supply agreements were signed with Malaysia to supplement its own water production till 2061; however any disagreement between the two countries can potentially threaten the continuity of the agreements or result in a steep price increase. As such, Singapore has already begun to undertake steps and initiatives towards self-sufficiency. Presently, **around 60 percent of Singapore's water originates from local catchment areas and imports from Malaysia, 30 percent from NEWater and 10 percent from sea water. Ideally, by 2061, 20 percent of Singapore's water supply should be derived from the local catchments, while the remaining 80 percent from NEWater and desalinated water.**

Global demand for sustainable fresh water has become a critical concern. In Asia, which is home to almost 3 billion individuals, the lack of clean water, environmental destruction and urban overcrowding are persistent and serious problems. With the growing urgency for innovative solutions, the water industry with its vast opportunities has been gaining momentum. The strong growth is believed to contribute significantly to economic growth; as such **Singapore has identified the Water & Environment sector as a key growth area.** To spearhead the growth, the **National Research Foundation (NRF)¹** had committed **SGD330 million over 5 years to encourage R&D in this sector in 2006. In 2011, another SGD 140 million has been invested.**

The **Environment and Water Industry Development Council (EWI)²** was set up under the Ministry of the Environment and Water Resources to develop the Water & Environment sector in Singapore. EWI together with the Economic Development Board (EDB), Public Utilities Board (PUB), Agency for Science, Technology & Research (A*STAR), International Enterprise (IE) Singapore, Nanyang Technological University (NTU) and National University of Singapore (NUS) seeks to nurture and grow local environmental companies into future international players, **utilize Singapore's capabilities to expand into China and the Middle East markets, support companies and research institutions by cultivating an ecosystem that supports their development of innovative and sophisticated water technology, and also attract major foreign water companies to establish their R&D, engineering, manufacturing and headquarter operations in Singapore.** It is targeted that **by 2015, the number of jobs in Singapore's water industry would reach 11,000; value-adding S\$1.7 billion, up from S\$0.5 billion in 2003³.**

¹ <http://www.nrf.gov.sg>

² <http://app.mewr.gov.sg/web/Contents/ContentsEWI.aspx?ContId=434>

³ Economic Development Board (EDB)

2 WATER RESOURCES MANAGEMENT FACTS AND FIGURES

Based on the **United Nations' World Water Development Report⁴**, by 2050 chronic or recurring shortages of freshwater will affect one in four people worldwide. The rate of urbanization calls for immediate actions to tackle water shortage challenges. According to the report by the **Asia Society Leadership Group on Water Security 2009⁵**, while the rural population in Asia remains constant till 2025, the urban population will increase by 60 percent. Singapore's year-on-year industrial production index went up by 39.4% in January 2010 and 7.8% in 2011.

Water Resource Management in Singapore							
		Unit	2007	2008	2009	2010	2011
Demand & Conservation	Domestic water consumption per capita	Litres/day	157	156	155	154	153
	No. of lifestyle events held at reservoirs and waterways (cumulative)	-	74	95	139	288	474
	No. of ABC (Active, Beautiful, Clean) Water Projects Completed (cumulative)	-	1	2	3	15	23
Access	Improved drinking water sources (includes piped water into premises, public tap/standpipe, borehole/tube well, protected dug well, etc)	% access	100	100	100	100	100
	Improved Sanitation (includes flush/pour flush toilets or latrines connected to a sewer, septic tank, etc)	% access	100	100	100	100	100
System Efficiency	Test meeting World Health Organisation (WHO) drinking water quality guidelines	%	100	100	100	100	100
	Unaccounted for water	%	4.4	4.4	4.6	5.2	5.0
	No. of leaks per 100 km of portable water pipelines	-	7	7	7	5.9	6.7
	No. of sewerage disruptions per 1,000 km of sewers	-	21	19	17	15	14
	Flood prone areas (Based on data over a financial year from 1 st Apr of the year to 31 st Mar of the following year, 2009 figure is estimated based on data)	Hectares	98	79	67	56	48

⁴ <http://unesdoc.unesco.org/images/0012/001295/129556e.pdf>

⁵ <http://asiasociety.org/files/pdf/WaterSecurityReport.pdf>

	available as of Dec 2009)						
Supply	No. of Reservoirs	-	14	15	15	17	17
	Sales of potable water in Singapore	Mil m ³	264.2	271.4	277.8	281.0	281.3
	-Domestic						
	-Non-domestic						
	Sales of industrial water	Mil m ³	49.2	66.0	72.0	96.4	197.2
Volume of used water treated	Mil m ³	29.3	23.7	21.9	24.5	23.1	
		Mil m ³	536.2	516.0	515.5	542.1	558.0
Source: Ministry of Environment and Water Resources (Singapore)							

Table 1: Water Resource Management Statistics

Water Sales in Singapore (Million M³ /year)							
	2001	2006	2007	2008	2009	2010	2011
Sales of Potable Water	455.3	448.9	455.5	462.6	468.0	476.1	478.4
- Domestic	248.6	256.3	264.2	271.4	277.8	281.0	281.2
- Non-domestic	206.7	192.6	191.3	191.2	190.2	195.1	197.2
Sales of NEWater	NA	29.6	49.2	66.0	72.0	96.4	102.4
Sales of Industrial Water	NA	40.8	29.3	23.7	21.9	24.5	23.1
Source: Ministry of Environment and Water Resources (Singapore)							

Table 2: Water Sales

3 WATER MANAGEMENT IN SINGAPORE

3.1 REGULATORY BODIES

Public Utilities Board⁶ (PUB) is the main government agency under the **Ministry of Environment and Water Resources**⁷ which oversees the planning and development of Singapore's water resources. As a national water agency, it administers the integration of Singapore's water supply, water catchment and used water. PUB is also responsible for the collection, production, distribution and reclamation of water in Singapore (The Water Loop). An extension of its role includes using water as part of beautifying Singapore's landscape and in turn improving the quality of life. In 2006, at the Global Water Awards, PUB was named Water Agency of the Year. In 2007, it won the Stockholm Industry Water Award.

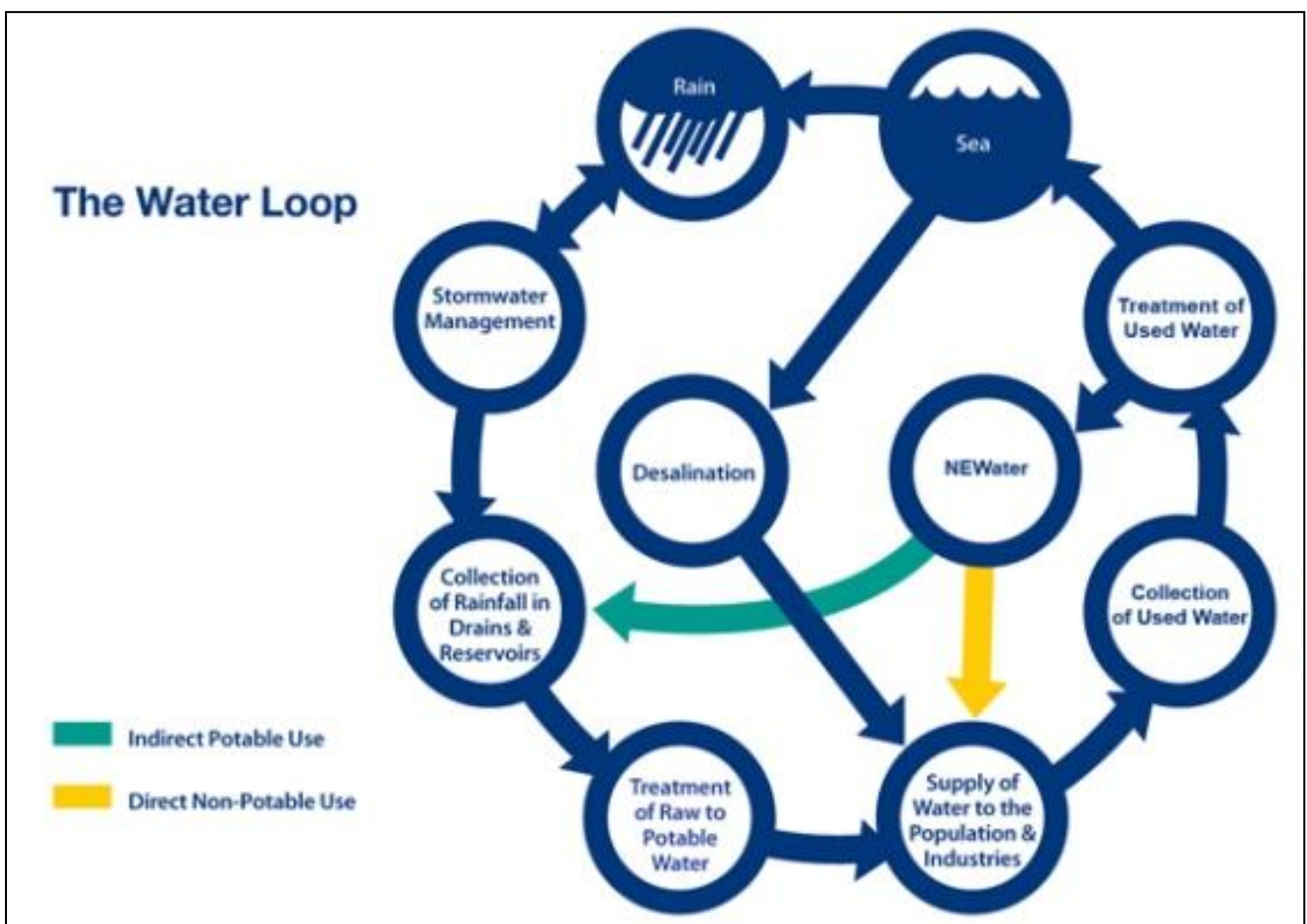


Figure 1: The Water Loop (Source: <http://www.pub.gov.sg/about/Pages/default.aspx>)

⁶ <http://www.pub.gov.sg>

⁷ <http://app.mewr.gov.sg>

3.2 SINGAPORE WATER SUPPLY

Presently, Singapore obtains the water for its population through 4 sources known as the **National Four Taps**⁸:

FIRST TAP – LOCAL CATCHMENT AREAS

Rainwater is collected through a network of drains, canals, rivers and storm water collection ponds and then channelled to Singapore's 17 reservoirs for storage. With the opening of the Marina, Punggol and Serangoon reservoirs in 2011, Singapore's water catchment area now occupies two-thirds of Singapore's land surface. Utilising technology capable of treating water of varying salinity, PUB hopes to channel water from rivers and rivulets near the coast to increase Singapore water catchment area to 90% by 2060.

SECOND TAP – IMPORTED WATER

Singapore has been buying from Johor, Malaysia, under 2 bilateral agreements. The first agreement just expired in August 2011, while second agreement will end in 2061.

THIRD TAP – NEWATER

High-grade reclaimed water from treated used water, which has been purified using advanced membrane technology. The reclaimed water meant for consumption purposes has undergone more than 65,000 scientific tests and exceeds World Health Organisation (WHO) requirements⁹. Presently, 30% of Singapore water need is satisfied through NEWater. The target is for NEWater to meet 50% of Singapore's future water needs by 2060.

FOURTH TAP – DESALINATED WATER

The fourth tap began with the opening of PUB's first public-private partnership (PPP) project - Singspring Desalination Plant in 2005. Sea water undergoes a pre-treatment process followed by reverse osmosis similar to the production of NEWater. The water obtained is then mixed with treated water prior to being supplied to homes. The plant is one of the biggest seawater reverse-osmosis plants in the region and produces 30 million gallons of water a day (136, 000 cubic meters). The second desalination plant which is scheduled to be completed in 2013 will be able to produce 70 million gallons of water a day.

⁸ <http://www.pub.gov.sg>

⁹ http://www.who.int/water_sanitation_health/dwq/en/

4.1 SINGAPORE'S GREEN PLAN 2012

The **Singapore's Green Plan 2012**¹⁰ was conceived through the contributions from the People, Private and Public (or 3P in short) sectors in 2002 to ensure Singapore's environmental sustainability. It is a 10-year plan that has 6 focus areas, of which water is one of the main focuses. Each focus area under the Singapore's Green Plan has its own set of targets and goals.

SINGAPORE'S GREEN PLAN 2012 TARGETS	
Targets	Progress & Outcome
Expand the water catchment areas from 50% to 67% of Singapore's land surface	Singapore's water catchment area grew to two-third with the opening of Marina, Punggol and Serangoon reservoirs in 2011. PUB had also successfully enhanced the water catchment infrastructure via the Reservoir Integration Scheme in 2007 ¹¹ at a cost of SGD 18 million. This scheme which connects the various reservoirs through a series of pumping stations and pipelines allowed for improved storage efficiency as excess water from one reservoir could be channelled to another.
Boost the water supply to 25% of Singapore's water demand	The target was achieved with the successful implementation of desalination and water reclamation as one of Singapore's national taps. 30% of the Singapore's water demand was met with the operation of the fifth and largest NEWater plant in Changi in May 2010.
Continuously meet international water quality standards	The quality of Singapore's drinking water has consistently met and exceeded WHO standards.
Decrease level of domestic water consumption to 155L per person per day by 2012	Following a series of water conservation & awareness programmes, the target was achieved in 2010. The current water consumption per capita is 153 and there are new targets to decrease it to 147 litres by 2020 and 140 litres by 2030 under the Sustainable blueprint by the Inter-Ministerial Committee on Sustainable Development (IMCSD) ¹² . One programme that has been attributed for the decrease is the 10 Litre Challenges ¹³ targeted at getting every individual to reduce daily water consumption by 10 litres. For the challenge, PUB together with community organisations formed Water Volunteer Groups to conduct household visits to create

¹⁰ <http://app.mewr.gov.sg/data/ImgCont/1342/sgp2012.pdf>

¹¹ <http://app.mewr.gov.sg/data/imgcont/1233/040-051%20Water.pdf>

¹² <http://app.mewr.gov.sg/web/Contents/ContentsSSS.aspx?ContId=1292>

¹³ <http://tenlitres.sec.org.sg>

	awareness on water conservation and to facilitate the installation of water-savings devices e.g. products carrying the Water Efficiency Label ¹⁴ .
Promote 3P (Public-Private-People) partnership to encourage importance of water conservation and develop shared responsibility for Singapore’s water resources	To emphasize its “Conserve, Value, Enjoy Water” message, PUB uses different platforms and community outreach programs to connect and educate its 3P partners. To synergize the idea of water conservation and urban living, Active, Beautiful, Clean (ABC) Waters programme was started. Under the program, drains, canals and reservoirs are open up for recreational activities and events to cultivate a sense of ownership and stewardship for the cleanliness and preservation of these catchment areas. Over 20 projects have been implemented by PUB under the programme. It is estimated that more than 130 projects (900ha of reservoirs and 100km km of waterways) would have realised by 2030.

4.2 URBAN SOLUTIONS – ENVIRONMENT & WATER

Environment & water is also one of the focus areas under the **Urban Solutions**¹⁵ Initiative promoted by the Economic Development Board of Singapore¹⁶ (EDB). To grow and develop these focus areas, EDB together with other Singapore government agencies encourage both local and foreign companies and organisations to collaborate with Singapore’s research institutions and government agencies for R&D purposes and to utilise existing infrastructure as “**Living Laboratories**” to tested innovative new solutions & technologies for determining commercialise viability (refer “[Testbedding](#)” section).

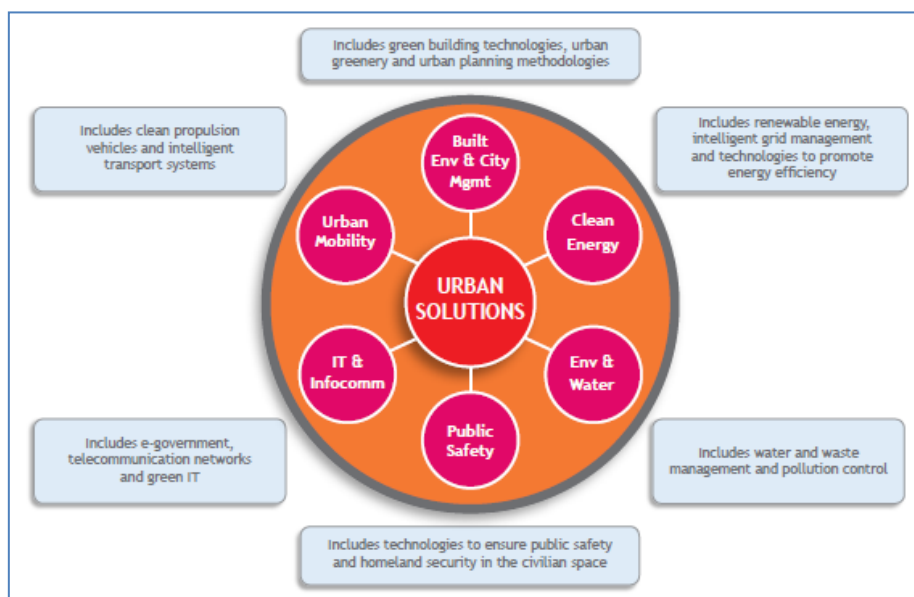


Figure 2: Urban Solutions Focus Areas¹⁷

¹⁴ Water Efficiency Labeling Scheme (WELS) is a grading system of 0/1/2/3 ticks to reflect the water efficiency level of a product. Currently, taps and mixers, dual-flush low capacity flushing cisterns (LCFCs), urinal flush valves and waterless urinals are labeled under this Scheme. The more ticks a product has, the more water-efficient it is.

¹⁵ http://www.edb.gov.sg/edb/sg/en_uk/index/industry_sectors/environment_water/video/urban_solutions.html

¹⁶ <http://www.edb.gov.sg>

¹⁷ <http://www.edb.gov.sg/etc/medialib/downloads/industries.Par.71647.File.tmp/Urban%20Solutions%20Brochure.pdf>

4.3 SUSTAINABLE DEVELOPMENT BLUEPRINT

The **Sustainable Singapore Blueprint**¹⁸ was officially launched in April 2009 by the Ministry of National Development and Ministry of Environment and Water Resources. The Blueprint which complements the other existing environmental initiatives outlines the strategies and initiatives suggested by public and public sectors to realise economic growth while maintaining a sustainable living environment over a period of twenty years. The Blueprint is based on a four-prong strategy approach:

1. Boosting Resource Efficiency
2. Enhance Urban Environment
3. Building Capabilities
4. Fostering Community Action

The goals specified under each strategy is supervised by the government and subjected to review every five years to take into consideration developments in cost measures, technology and public receptiveness. Consequently, the public is updated of the progress in achieving these goals. One of the goals for water is to **open up 900 ha of reservoirs and 100km of waterways for recreational activities by 2030.**

¹⁸ <http://www.sustainablesingapore.gov.sg>

5 ECOSYSTEM & INFRASTRUCTURE

5.1 WATERHUB¹⁹

For Singapore's water industry to be successful and flourish; there needs to be an eco-system and infrastructure that can support and allow for collaborations, testing, research and development. As such, the Waterhub was launched in 2004 as a platform for PUB and the water industry to leverage on for Technology, Learning and Networking purposes. The Environment and Water Industry Programme Office (EWI) and PUB's Technology and Water Quality Office (TWQO) are important strategic partners for the Waterhub's R&D objectives - to increase Singapore's water resources towards water self-sufficiency, ensure that water is fair and competitively priced while maintaining water quality and security. Other priorities of the Waterhub include to assist in 'from conceptualization to market' for water products by supporting the advancement of new water products in terms of R&D and test-bedding opportunities.

Collaborations with PUB foster a favourable environment proximate to test-bedding sites, comprehensive infrastructure, availability of shared facilities, straightforward start-up options, analytical services for research, and established networking with the water industry. Renowned companies such as Siemens Water Technologies (<http://www.water.siemens.com>), Optiqua Technologies (<http://www.optiqua.com>), Nitto Denko Corporation (<http://www.nitto.com>) and Memsys (<http://www.memsys.eu>) have strategically used the Waterhub to launch their R&D centres in Asia. To raise industry standards and professionalism of the water industry, Waterhub deliberately partners with organizations like Singapore Society for Trenchless Technology (SgSTT), Singapore Water Association (SWA) and academic institutions to develop capabilities and talents. It also **works closely with the Ministry of Foreign Affairs under the Singapore Cooperation Programme Umbrella²⁰ to share Singapore's knowledge in water resources and management with developing countries.** The WaterHub is also a Regional Water Knowledge Hub of the Asia-Pacific Water Forum.

5.2 CLEANTECH PARK²¹

CleanTech Park is the first eco-business park catered to house corporations related to clean technology products and solutions for urban settings in the tropics. Developed over 50 hectares of land, and located near Nanyang Technological University and Jurong Industrial Estate, the eco-business park enhances the integration between academia and businesses; from research & development to downstream manufacturing. The Park itself is a living lab for test bedding water solutions e.g. a hydrology system for conveyance, collection and use of storm water. Several major international water-related companies such as DHI Water & Environment – company from Denmark specialised in water and environment research and consultancy (<http://www.dhigroup.com>) and Sinomem – company from China specialised in water purification (<http://www.sinomem.com>) have already moved into the premises. Nanyang Environment & Water Research Institute (NEWRI) is also one of the main tenants.

¹⁹ <http://www.pub.gov.sg/waterhub/Pages/default.aspx>

²⁰ <http://www.scp.gov.sg>

²¹ <http://www.jtc.gov.sg/Industries/Clean%20Technology/Pages/Clean-Tech-Park.aspx>

Singapore has become a **precursor and early adopter in environmental technology and solutions such as NEWater and the Deep Tunnel Sewerage System**. Water technologies originating from Singapore's R&D efforts are exported overseas, while foreign companies adapt the expertise acquired in Singapore to their projects worldwide. EDB estimates that Singapore's Water Industry ecosystem constitutes **over 100 local and international water companies**.

Singapore's positioning as a prime research test bedding base for new water technologies and launching platform to penetrate into the regional market attracts major industry players. EWI's successful record in attracting foreign companies to set up operations in Singapore includes **Black & Veatch** (<http://www.bv.com>). Its Asia Pacific operations are managed by its international headquarters in Singapore. In 2007, Black & Veatch inaugurated its Global Advanced Water Design Centre and Centre of Excellence in Desalination to support its global water projects. Two other prominent foreign companies with considerable investments in Singapore's water industry are **GE Water & Process Technologies** (<http://www.gewater.com>) and **Siemens Water Technologies** (<http://www.water.siemens.com>). GE Water committed SGD130 million over 10 years to set up a Global Water R&D Centre at the National University of Singapore (NUS) that focuses on R&D in water treatment & system integration, fundamental chemical and membrane application ion-exchange technology. Siemens Water made Singapore its global R&D headquarters and had established a SGD50 million Global Water Technology Research Centre. Other leading water companies that have looked upon Singapore as a strategic platform include **Nitto Denko Corporation** from Japan (<http://www.nitto.com>), **Marmon Water – KX Technologies** from the United States (<http://www.marmon.com>), and **Veolia Water** from France (<http://www.veolia.com/en>).

Singapore has witnessed the emergence of many promising local water companies such as **Hyflux** (<http://www.hyflux.com>). Hyflux has become a leading environmental solutions provider, housing one of Asia's largest commercial R&D centre for membranes and materials technology, 10 research laboratories, a knowledge centre, an innovative process development centre, a materials and membrane products development centre, advanced machining, prototyping and industrial design functions. The company also won the contract to construct the **world's largest reverse osmosis seawater desalination plant (project value: about SGD632 million) with a capacity of 500,000 cubic metres per day in Algeria**. **Keppel Seghers** (<http://www.keppelseghers.com>) is another company creating waves in Singapore and overseas. In 2002, Keppel Corporation's Keppel Integrated Engineering together with the Belgian company – Seghers Better Technology Group formed Seghers Keppel Technology Group. The merged entity was renamed Keppel Seghers in 2005. Keppel Seghers is a forerunner in providing comprehensive environmental solutions ranging from consultancy, design and engineering, technology and construction to operations and maintenance of facilities. Keppel Environmental Technology Centre (KETC) was established in 2007 to advance its R&D efforts in water, wastewater and waste-to-energy areas. The company had partnered with Singapore Refining Company to construct a demonstration plant on Jurong Island to produce desalinated water using waste heat. Its internationalization efforts include its participation in the **development of the Sino-Singapore Eco-city in Tianjin**. It was also awarded around **S\$3.2 billion worth of contracts in Qatar** to set up the biggest greenfield wastewater treatment and reuse facility, the **first international solid waste facility designed to treat up to 2,300 tonnes of mixed solid waste and 5000 tonnes of construction and demolition waste per day** in the Middle East.

7 FUNDS, INCENTIVES, PROJECT TENDERS

There are many sources of funding and programs available in Singapore open to local and foreign companies to promote the growth of the water management industry and its supporting businesses. More Information on funds and incentives can be found on http://app2.nea.gov.sg/funds_home.aspx.

7.1 FUNDS & INCENTIVES

WATER EFFICIENCY FUND²²

The Water Efficiency Fund (WEF) was set up by PUB as a means to create symmetry between the rising water demand and environmental conservation by promoting community involvement initiatives for water conservation and to persuade companies to adopt more efficient means of managing their water demand.

WATER EFFICIENCY MANAGEMENT PLAN²³

Launched by PUB, the Water Efficiency Plan under the 10% Challenge²⁴ was intended to encourage non-domestic customers improve their efficiency in water consumption and consequently reduce cost. Through the recommended Water Efficiency Management Plan, customers will reduce effectively operational costs by using water more efficiently. Customers can in fact utilize the Water Efficiency Fund to implement their water saving initiatives as proposed in the plan.

INNOVATION FOR ENVIRONMENTAL SUSTAINABILITY FUND²⁵

With the vision of contributing to Singapore's long-term environment sustainability, NEA set up the Innovation for Environmental Sustainability (IES) Fund valued at SGD20 million. Given the objective of assisting Singapore-registered companies to embark on projects related to environmental protection and public health, the fund concentrates on projects related to applied research or test-bedding/demonstration stages of technology development.

THE 3P PARTNERSHIP FUND²⁶

The 3P Partnership Fund is a co-payment program to encourage organizations, companies and individuals from the People, Private and Public (3P) sectors to work together to develop innovative and sustainable environmental initiatives that promote environmental ownership amongst the local community. Projects should be **related to environmental education or community involvement in environmental activities** pertaining to Clean Air, Climate Change & Energy Efficiency, Clean Water, Towards Zero Landfill, Dengue

²² <http://www.pub.gov.sg/Conserve/Incentives/Pages/default.aspx>

²³ <http://www.pub.gov.sg/Conserve/Pages/WaterEfficiencyManagementProgrammeWaterAudit.aspx>

²⁴ The 10% Challenge was introduced earlier by PUB to encourage the non-domestic sector such as hotels, schools, commercial and government office buildings, etc to work towards becoming Water Efficient Buildings and save 10% of their monthly water consumption.

²⁵ http://app2.nea.gov.sg/funds_ies.aspx

²⁶ http://app2.nea.gov.sg/funds_3pfund.aspx

Fever Surveillance & Control, Singapore Litter-Free, Food Hygiene, Clean Public Toilets and Other Public Health.

7.2 WATER-RELATED TENDERS

Information on upcoming tenders related to the water industry can be found on <http://www.pub.gov.sg/tenders/forthcoming/Pages/DevelopmentContracts.aspx> (specific to PUB) and <http://www.gebiz.gov.sg> (include tenders from other government agencies as well). The tenders for PUB are updated on a quarterly basis and called over the next 15 months divided into two sections. The **first section is for tenders in construction services valued above SGD \$200,000**. The **second section is for goods, services and maintenance works over SGD 200,000, as well as information technology services at SGD \$70,000**.

8 INDUSTRY TRENDS & OPPORTUNITIES

8.1 SINGAPORE AS A GLOBAL HYDROHUB

Singapore is a small country, but its growing status as a global hydrohub allows it to reach out to major water markets regionally as well as worldwide. Flemish companies wanting to export their water solutions can leverage on the hub's reputation and capabilities to penetrate into new markets, gain new knowledge and experience firsthand the trends that will "move" the market.

WATER IS AN EMERGING SECTOR

Water has been perceived to be to the next generation's biggest business opportunity. While many countries are still largely focussing on traditional sectors of finance, manufacturing and retail, Singapore has made the environmental and water sector one of its key growth sectors. The aspiration is to become a **Global Hydrohub which controls 3% of the global water market by 2015** through R&D, engineering and manufacturing. Singapore also aims to **increase value-added contribution from the water sector from S\$0.5 billion (0.3% of GDP) in 2003 to S\$1.7 billion (0.6 of GDP) by 2015, employ around 11,000 individuals in the professional and skilled categories.** It was reported that in **2011, there was already over S\$130 million worth of value-add committed; 460 jobs will be created when the projects are entirely realised.**

GEOGRAPHICAL LOCATION

Singapore's locality makes it an ideal hub for companies with a keen interest to penetrate the Asian water Industry and reach out to a wealth of growing economies. **Water demand in Southeast Asia alone is growing at 30 percent annually. Within the last six years, the number of Singapore-based companies to over 100. In a global market valued at \$614 billion in 2011, these companies have obtained international projects worth around S\$9 billion.**²⁷ Turning its weakness into its strength, Singapore has effectively built a profitable water industry through investments in water management and treatment research and technologies. Based on the present momentum of the water industry, it is projected that the water industry will **grow at 7.5% annually to \$22 billion by 2016.** As a validation for Singapore's success in water management, Singapore's national water agency - **PUB was awarded the prestigious 2007 Stockholm Industry Water Award**, one of the highest accolades for the international water sector.

SINGAPORE INTERNATIONAL WATER WEEK²⁸

The Singapore International Water Week which inaugurated in 2008 is a testament of Singapore's commitment towards developing into a Global Hydrohub. The event is a global 'stage' for policymakers, industry leaders, experts, academics and practitioners to address industry concerns, showcase the advancements and technologies, and commemorate accomplishments in the international water industry. The 2012's edition experienced a new high of SGD13.6 billion in value for the announcement of projects, awarded tenders, investments and R&D MOUs made at the event.

²⁷ <http://www.channelnewsasia.com/stories/singaporebusinessnews/view/1206217/1/.html>

²⁸ <http://www.sjww.com.sg>

A 'MODEL' TO FOLLOW

In recent news²⁹, the United Nations had commended that Singapore's water treatment process and water consumption pricing were ideal models for countries to follow. Singapore was singled out particularly for its use of treated waste water as a source of safe drinking water (NEWater) and PUB's pricing water system (tiered tariff system in which a water conservation tax penalises higher water usage consumers and a separate monthly sanitary appliance and waterborne fee is imposed to offset the cost of treating used water and for operating and maintaining the public sewer system) which incorporates conservation and recycling. The World Health Organisation (WHO) has also chosen **PUB's Water Quality Office as a WHO Collaborating Centre for safe drinking water management and integrated urban water management.**³⁰

8.2 RESEARCH & DEVELOPMENT

Singapore's water R&D program is a holistic approach that covers the complete water cycle which includes rainfall, reclaimed water and desalinated water, but the main objectives remain to expand and diversify Singapore's water resources, improve water quality and security, decrease cost of water treatment and ultimately grow Singapore's water industry.

Partnering enables participating parties to divide R&D cost and associated risk which has led to significant innovations and progress in polymeric membrane materials used in seawater desalination and water reuse for Singapore. Therefore, for R&D collaborations, foreign research institutions & organisations can benefit from the environment and water funding schemes such as EWI's Incentive for Research and Innovation Scheme³¹ and Technical Pioneer Scheme and EDB's Innovation Development Scheme³². Flemish organisations sharing similar R&D objectives can consider such international R&D partnerships.

MEMORANDUMS OF UNDERSTANDING

R&D efforts is paramount to Singapore's ascend towards becoming a Global Hydrohub. In order to be perceived as a frontrunner in proprietary solutions for the global water sector and to strengthen the intellectual capital foundations for Environmental and Water Technologies, Singapore has been establishing networks with research institutions overseas and bidding to host international technical conferences and shows. Memorandums of Understanding (MOUs) to collaborate on developing technologies have also been signed with renowned international research institutions, agencies and companies. The latest MOU to be signed is between PUB and Mitsubishi Heavy Industries (MHI)³³ for R&D of integrated water infrastructure for used water treatment and reclamation. MHI's first initiative under the terms of the MOU will be a test-bedding project at PUB's Jurong Water Reclamation Plant to be completed in the third quarter of 2013.

²⁹ <http://www.asiaone.com/News/Latest%2BNews/Singapore/Story/A1Story20120313-333152.html>

³⁰ http://apps.who.int/whocc/List.aspx?cc_subject=Water+%26+sanitation&

³¹ <http://www.nuhs.edu.sg/research/funding/funding-opportunities/physical-sciences-grants/nrf-environment-and-water-industry-development-council-incentive-for-research-and-innovation-scheme.html>

³² http://www.sedb.com/etc/medialib/downloads/forms_2008.Par.0001.File.tmp/AssisSchemesProgramme.pdf

³³ <http://www.siww.com.sg/media/mhi-snd-pub-sign-mou-advanced-water-treatment-recycling-technology>

PUB partners with both the private sector and research institutions. Its in-house research arm – the Centre for Advanced Water Technology conducts research on water analytics, advanced water technologies and water resources management. Presently, Singapore’s Water R&D ecosystem which consist of 25 research institutions and corporate laboratories have already proceeded with R&D projects valued at SGD221 million.

Research professionals and talents are being groomed locally and attracted from overseas to strengthen the credibility of R&D for Singapore’s water industry. The **NUS Environmental Research Institute (NERI)**³⁴ was set up by National University of Singapore (NUS) with the purpose of extracting Environmental and Water Technologies (EWT) knowledge from across NUS. One of the research centres housed within NUS is the **Singapore-Delft Water Alliance (SWDA)**³⁵. Set up by NUS, PUB and Netherlands-based research and specialist consultancy - Delft Hydraulics (<http://www.wldelft.nl>) and supported by EWI, the SDWA carries out research on aquatic systems, smart sensing, engineering and technologies related to the urban water cycle. It also offers Masters and PhD training in areas of Hydraulic Engineering and Water Management.

Similarly, Nanyang Technological University (NTU) formed **Nanyang Environment & Water Research Institute (NEWRI)**³⁶ to bring together EWT capabilities in NTU. Also supported by EWI, NEWRI houses the **Singapore Membrane Technology Centre (SMTC)**³⁷ headed by the distinguished membranes expert Professor Anthony Fane, the **DHI-NTU Water & Environment Research Centre & Education Hub**³⁸ set up with DHI Water & Environment (Denmark-based international consultancy and research organisation) and the **Residues & Resources Reclamation Centre (R3C)**³⁹. NEWRI’s research into the areas of membranes, environmental management, biotechnology, waste management has also led to other collaborations with Japan-based producer of carbon fibre - **Toray** (<http://www.toray.com>) and Singapore-based conglomerate - **Sembcorp** (<http://www.sembcorp.com>).

TEST BEDDING

The chance to conduct on-site real-time testing under actual conditions is fundamental for the effective development of commercially viable water technologies and solutions, therefore one of the most desirable aspects of water R&D in Singapore is the **availability of test bedding opportunities and sites which covers PUB’s network of waterworks, NEWater plants, water reclamation plants, reservoirs and storm water canals for companies and organisations to trial run their developments and solutions before launching to the global market.** The desired outcome would be a mutually beneficial relationship whereby local and foreign companies can **tap on each other’s expertise and resources to conceptualise and produce water technologies and solutions that can be potentially exported to emerging countries worldwide.**

Test bedding opportunities are offered to both the private sector companies as well as research institutions. Given the small size and compactness of Singapore, companies do not have to travel far to do their test-

³⁴ <http://www.nus.edu.sg/neri>

³⁵ <http://www.sdwa.nus.edu.sg>

³⁶ <http://www.ntu.edu.sg/NEWRI>

³⁷ <http://smtc.ntu.edu.sg/Pages/default.aspx>

³⁸ <http://www.dhi-ntu.com.sg>

³⁹ http://www3.ntu.edu.sg/r3c/R3C_research.html

bedding. Singapore had become a **pioneer in membrane systems as a result of PUB opening up its national water infrastructure to test bed the latest water technologies**. Consequently, this led to the expansion of water reclamation in the form of PUB's NEWater plants.

A total of 35 R&D projects and 20 test bed projects were approved for testing utilising PUB's facilities in 2011. For used water treatment projects, testing can be carried out at PUB's water reclamation plants at Changi and Ulu Pandan. Projects related to portable water can be conducted at PUB's Waterworks and NEWater factories. NEWater factories are also used as facilities to research and test membrane technology. NGK Water Environment Systems (<http://www.ngk.co.jp>), Black and Veatch (<http://www.bv.com>), Dayen Environmental (<http://www.moyaasia.com>) and PUB utilises the Bedok NEWater Factory to test ceramic membrane technology on treated used water under tropical conditions. Singapore catchments and waterways are also important tested sites under urban conditions, e.g. the Punggol Eco Park & Waterway Test bedding project by the Singapore government with **Panasonic** (<http://www.panasonic.asia>) for urban solutions in the HDB (Housing and Development Board⁴⁰) setting⁴¹ and also the desalination test project at Marina Barrage with **Memsys Clear International Pte Ltd** (<http://www.memsys.eu>).

8.3 INDUSTRIAL WATER

Rapid industrialisation globally combined with more stringent water discharge measures imposed by governments as well as heightened corporate social responsibility have consequently led to the global industrial water sector becoming one of the fastest growing segments of the global water demand. Based on findings by Global Water Intelligence⁴², the **global industrial water sector contributes up to 25% of the water demand, only second to agricultural water sector**⁴³. It is estimated that the global industrial market is presently worth **US\$20 billion and expected to expand 7.3% annually till the year 2017**.

The growth of the global market is propelled mainly by the competition for water use given that water in reality is a fixed resource from a global perspective that does not increase with population growth or industrialisation. Hence, innovative water solutions and technologies are required to manage rising competition from other competing uses. All industries to some extent require extensive amounts of water in their processes and operations. Industries such as food & beverage, oil & gas and chemicals are especially water intensive. Water is required for processes, in the manufacturing of products and also for permitted water discharge back into the water sources it originated from. In many developing countries, industrial growth is limited by the availability of water for industrial use. It is foreseeable that this has steered the demand for equipment used to treat and produce water for industrial use. The **market for water technologies used in the industrial sector is predicted to grow at 7 to 8% annually to reach US\$17.6 billion by the year 2016**. The fastest growth would be from **oil and gas sector, at an annual rate of over 24%**.⁴⁴ Global oil giant Shell expects fresh water use for energy to double by the year 2030.

⁴⁰ <http://www.hdb.gov.sg> - The Housing & Development Board (HDB) is Singapore's public housing authority and a statutory board under the Ministry of National Development. HDB plans and develops public housing towns that provide Singaporeans with quality homes and living environments.

⁴¹ <http://www.panasonic.asia/news.html>

⁴² <http://www.globalwaterintel.com>

⁴³ <http://www.siww.com.sg/industrial-water-solutions-forum>

⁴⁴ <http://www.siww.com.sg/media/singapore-international-water-week-2012-focus-industrial-water-solutions-and-successful-commer>

Singapore has conventionally focussed on the municipal water sector. However, with higher profit margins expected from the industrial water sector and major manufacturing companies (7 top pharmaceutical and biotechnology companies have invested in 30 commercial-scale manufacturing facilities in Singapore. They include Abbott, GlaxoSmithKline, Lonza, Merck Sharp & Dohme, Novartis, Pfizer, Roche and Sanofi) and processing companies (Singapore is one of the major petroleum refining centres in Asia. The three main refineries here are ExxonMobil, Shell, Singapore Refining Corporation⁴⁵) that have factories and operations based in Singapore, the potential market for industrial water would prove to be a profitable test bed for water companies to utilize or promote their technologies to the rest of the world.

8.4 MANAGING THE WATER DEMAND

In the case of Singapore, obtaining a sufficient water supply will only address part of the problem. To ensure the sustainability of any effective water solution, it is only prudent to manage the demand for water. Singapore's PUB has water conservation programs to **reduce the per capita domestic water consumption from 165 litres in 2003 to 140 litres by 2030 (it is 155 litres presently)**⁴⁶. Steps to achieve this goal include regulations that water usage is 100 percent metered and the equipping of water-saving devices such as water saving toilets and taps. **Effectively managing the demand side of water would present opportunities to water-related industries**, such as, companies producing metering devices and solutions. Metering can help water utility companies become more efficient, safer, and more profitable as it can be used to monitor which area has the greatest need and potential. Some studies have shown that meters can help users save an estimated 15% of water by providing feedback on how much water is used. Ultimately, this would determine a non-bias approach towards charging of water and using scarce water resources more sustainably.

8.5 FLOOD MANAGEMENT

Being an island at the equator, it is inevitable that Singapore experiences plentiful rainfall (annual average – 2,400 mm) during the monsoon periods. Our drains presently are sufficient to manage the rainfall majority of the time. However, excessively heavy rainfall can exceed the normal capacity that the drains are designed for, resulting in flash floods. Urbanization has contributed to the worsening of flooding conditions in recent years. And this is particularly a major problem for low-lying areas such as where the main city centre is built on. Costly damages in terms of property and goods, as well as traffic inconveniences have resulted from the flash floods.

Acknowledging this as problem, PUB decided to commit S\$750 million over the next 5 years on improving flash flood safeguards and canal capacity expansions through more superior drainage design standards (30% to 45% increase from the current Code of Practice on Surface Water Drainage). But the real challenge would be that drainage expansion for many areas may not be feasible given the site constraints of existing developments and infrastructures such as buildings, sewers and even NEWater pipelines. Singapore would

⁴⁵ http://www.edb.gov.sg/edb/sg/en_uk/index/industry_sectors/energy/industry_background.html#Link3

⁴⁶ Ministry of Environment and Water Resources (<http://app.mewr.gov.sg>)

then have to go beyond conventional methods and develop solutions at ‘source’ (where the rainwater falls) and at ‘receptor’ (where the rainwater flows to). This is where flood risk management knowledge and technical experience from Flanders would be useful, given that Flanders had flooding experiences and confronted with urban constraints similar to Singapore. In last two decades, there have been major floods in the Flanders, such as the Dender basin in 1999 and 2003. Moreover, practically all Flemish cities which historically originated along rivers and low lying floodplains are now densely populated or industrialized.⁴⁷

8.6 DESALINATION

Desalination is Singapore’s fourth tap. Given that Singapore is surrounded by the sea, it only makes sense to produce desalinated water to satisfy Singapore’s water consumption. The goal is for desalinated water to meet 30% of Singapore’s water demand by 2060 (presently, only 10%), eliminating the need to buy water from Malaysia. In 2005, the SingSpring Desalination Plant in Tuas was opened. The SingSpring Desalination Plant is one of the largest seawater reverse-osmosis plants in Asia and can produce 30 million gallons of water a day. There will be a second desalination plant which is able to produce up to 70 million gallons of water a day. The targeted date of completion for the larger plant is in the year 2013.

The foremost issue with desalinated water is that it is substantial more costly to produce compared NEWater. The higher treatment cost for desalination is attributed to its intensive energy consumption. Hence, PUB supports continuous R&D efforts through funding, MOUs and other partnerships to determine more efficient means of energy consumption for desalination treatment. One of the latest news is that Israeli-based water treatment company, Desalitech, would be working with PUB to test a new desalination reverse osmosis technology which promises to lower treatment cost given less energy use. The test bed site for this would be at the Kranji NEWater Factory⁴⁸.

⁴⁷ <http://www.safecoast.nl/editor/databank/File/Flood%20management%20Flanders.pdf>

⁴⁸ <http://www.channelnewsasia.com/stories/singaporelocalnews/view/1191239/1/.html>

AGENCY FOR SCIENCE, TECHNOLOGY & RESEARCH (A*STAR)

1 Fusionopolis Way #20-10 Connexis Singapore 138632

Tel: +65 6826 6111

Fax: +65 6777 1711

Email: contact@a-star.edu.sg

Website: <http://www.a-star.edu.sg>

Description:

The Agency for Science, Technology and Research (A*STAR) is Singapore's lead government agency dedicated to fostering world-class scientific research and talent for a vibrant knowledge-based economy. A*STAR actively nurtures public sector research and development in Biomedical Sciences, and Physical Sciences & Engineering, and spurs growth in Singapore's key economic clusters by providing human, intellectual and industrial capital to our partners in industry and the healthcare sector.

ECONOMIC DEVELOPMENT BOARD (EDB)

250 North Bridge Road #28-00 Raffles City Tower Singapore 179101

Tel: +65 6832 6832, +65 6832 6571

Fax: +65 6832 6565

Email: clientservices@edb.gov.sg

Website: <http://www.edb.gov.sg>

Description:

EDB is the lead government agency responsible for planning and executing strategies to enhance Singapore's position as a global business centre and grow the Singapore economy.

ENVIRONMENT & WATER INDUSTRY DEVELOPMENT COUNCIL (EWI)

Ministry of the Environment and Water Resources, **40 Scotts Road, Environment Building, Singapore 228231**

Tel: +65 6732 7733

Fax: +65 6731 9456

Email: MEWR_ewi@mewr.gov.sg

Website: <http://app.mewr.gov.sg/web/Contents/ContentsEWI.aspx?ContId=346>

Description:

The Environment & Water Industry Development Council (EWI) was set up administratively on May 06 by the Ministry of the Environment and Water Resources (MEWR) to spearhead the development of the environment and water industry.

NATIONAL ENVIRONMENT AGENCY

40 Scotts Road, Environment Building #13-00, Singapore 228231

Tel: 1800-2255 632

Fax: +65 62352611

Website: <http://www.nea.gov.sg>

Email: contact_nea@nea.gov.sg

Description:

The National Environment Agency (NEA) is the leading public organization responsible for improving and sustaining a clean and green environment in Singapore. The NEA develops and spearheads environmental initiatives and programmes through its partnership with the People, Public and Private sectors.

PUBLIC UTILITIES BOARD (PUB)

40 Scotts Road, #22-01 Environment Building Singapore 228231

Tel: 1800-2846600

Fax: +65 67313020

Website: <http://www.pub.gov.sg>

Email: pubone@singnet.com.sg

Description:

As the national water agency, PUB is responsible for the collection, production, distribution and reclamation of water in Singapore.

WASTE MANAGEMENT AND RECYCLING ASSOCIATION OF SINGAPORE (WMRAS)

Water Hub 80 Toh Guan Road East, Singapore 608575

Tel: +65 6515 0812

Fax: +65 6515 0813

Email: enquiry@swa.org.sg

Website: <http://www.swa.org.sg>

Description:

The Singapore Water Association aspires to play a role in efforts to profile and promote Singapore as a one-stop centre for all water-related services and water technology hub. The Association aims to provide a forum for collaboration and the inter-change of ideas and knowledge among member companies. In addition, it will be an arena for networking among members and dissemination of strategic information on emerging business opportunities and new technologies.

SINGAPORE WATER ASSOCIATION

Water Hub 80 Toh Guan Road East, Singapore 608575

Tel: +65 6515 0812

Fax: +65 6515 0813

Email: enquiry@swa.org.sg

Website: <http://www.swa.org.sg>

Description:

The Singapore Water Association aspires to play a role in efforts to profile and promote Singapore as a one-stop centre for all water-related services and water technology hub. The Association aims to provide a forum for collaboration and the inter-change of ideas and knowledge among member companies. In addition, it will be an arena for networking among members and dissemination of strategic information on emerging business opportunities and new technologies.

SINGAPORE ENVIRONMENT COUNCIL

1E Cluny Road, #02-01, Singapore 259601

Tel: +65 6337 6062

Fax: +65 6337 6035

Email: info@sec.org.sg

Website: <http://www.sec.org.sg>

Description:

Established in 1995, the Singapore Environment Council (SEC) is an independently managed, non-profit, non-government organisation in Singapore. The Council is also an approved charity that can offer tax exemption to donors. SEC reaches out to the public through its educational, community and industrial arms. Since its inception, SEC has built strong partnerships with corporations, government agencies and other non-government organisations (NGOs). These partnerships are vital for sustaining environmental programmes that eventually lead to positive action and change. Over the years, SEC has given strength and bearing to the environmental movement here.

11 INDUSTRY RELATED EVENTS

SINGAPORE INTERNATIONAL WATER WEEK

Next Edition: 7 to 11 July 2014

Website: <http://www.siww.com.sg>

Email: info@siww.com.sg

Organizer:

Singapore International Water Week

Singapore Changi Airport Terminal 2, Level 3, #038-017, Singapore 819643

Tel : +65 6542 8660 ext 152

Mobile: +65 9736 6864

Fax : +65 6542 8683 / 6546 6062

Website: <http://www.siww.com.sg>

Email: ruthcheah@siww.com.sg

The Singapore Water Expo is an international platform for water solutions. Hosting companies from worldwide, the event is held in conjunction with the World Cities Summit Expo; gathering policymakers, industry leaders, experts and practitioners to interact, tackle challenges, showcase their expertise and technologies, explore business opportunities and honour accomplishments attained in the water industry.

For last 2 consecutive years, FIT has participated as an exhibitor under the Flanders Pavilion together with several Flemish companies at the Singapore International Water Week. For more information, please refer to the latest tradeshow report – Singapore International Water Week 1 to 5 Jul 2012.

ENVIROASIA

Next Edition: November 2013

Website: <http://www.enviro-asia.com>

Email: info@cemssvs.com.sg

Organizer:

CEMS (Conference & Exhibitions Management Services Pte Ltd)

1 Maritime Square, #09-43, HarbourFront Centre, Singapore 099253

Tel: +65 6278 8666

Fax: +65 6278 4077

Website: <http://www.cems.com.sg>

Email: info@cems.com.sg

EnviroAsia is an international environmental technology exhibition and conference that showcases environmental, ecological and clean technologies and solutions pertaining to waste, water, energy and air that help companies and organizations meet the increasingly stringent environmental standards and regulation. It is the only show that is officially endorsed by the Singapore's Ministry of Environment and Water Resources and the National Environment agency (NEA).

CLEAN ENERGY EXPO ASIA

Next Edition: 12 to 14 September 2012 (in Thailand)

Website: <http://www.koelnmesse.com.sg>

Email: info@koelnmesse.com.sg

Organizer:

Koelnmesse Pte. Ltd.

152 Beach Road, #25-05 Gateway East, Singapore 189721

Tel: +65 6500 6700

Fax: +65 6294 8403

Website: <http://www.cleanenergyexpoasia.com>

Email: c.hor@koelnmesse.com.sg

Clean Energy Expo Asia is a unique trading and knowledge-sharing platform bringing together the leading players in the Technology, Services, Finance and Government sector to address key issues in the areas of renewable energy, energy efficiency and sustainable development in the Asia Pacific region.

PROCESSCEM ASIA

Next Edition: To be confirmed

Website: <http://www.processcemasia.com>

Email: processcem@aspri.com.sg

Organizer:

Association of Process Industry (ASPRI)

26 Boon Lay Way, #01-88, Tradehub 21, Singapore 609970

Tel: +65 6560 5051

Fax: +65 6560 9692

Email: processcem@aspri.com.sg

Website: <http://www.aspri.com.sg>

ProcessCem Asia is an international exhibition and conference on Plant Construction, Engineering & Maintenance for the Process Industry. The show is a platform for companies in the process industry to showcase their capabilities, update, upgrade and network.

ECO WORLD 2010

Next Edition: To be confirmed

Website: <http://ecoworld.com.sg>

Email: enquiry@localglobal.sg

Organiser:

LOCAL GLOBAL EXHIBITION & TRADE PTE LTD

10 Bukit Batok Crescent, #04-07/08 The Spire, Singapore 658079

Tel: +65 6561 0328

Fax: +65 6561 0531

Email: enquiry@localglobal.sg

Website: <http://www.localglobal.sg>

Eco World 2010 is an international exhibition cum conference platform for both the private and public sector to promote and showcase environmental products and services, network and exchange ideas on sustainable development in the paradigms of economic, social and environmental.

12 PUBLICATIONS AND DIRECTORIES

- **Sustainable Development Industry – Singapore Directory**
<http://www.sbf.org.sg/public/publications/industrydirectory.jsp>
- **Waste Management and Recycling Association of Singapore Directory**
<http://www.wmras.org.sg/membership/member-listing/>
- **Singapore Environmental Industry Directory**
<http://www.greensingapore.com>

ECO WORLD 2010 - SINGAPORE

DE BEURS IN HET KORT

Venue:	Suntec International Conference and Exhibition Centre, Hall 401, Singapore
Show Organiser:	Local Global Exhibition and Trade Pte Ltd 10 Bukit Batok, Crescent No. 04-07/08 The Spire, Singapore 658079 Tel: + 65 6561 0328 Fax: +65 6561 0531 Email: enquiry@localglobal.sg Website: http://www.localglobal.sg
Products:	Products relating to sustainable development e.g. Alternative bio fuel, solar energy, recyclable byproducts, waste and water treatment technology, Lifestyle, Education and various technologies.
Frequency:	Unconfirmed
Dates and Duration:	8 to 10 April 2010 (3 days)
Scope:	International
Exhibitors:	Number of exhibitors: 38 Number of foreign exhibitors: 21 Number of Belgium/Flemish exhibitors: Nil Exhibitor profile: Mainly manufacturers of Eco Energy, (Electrical and

	Electronic Products, Energy and Power, Energy Consultation, Electricity Suppliers & Power Generators), Eco Construction, (Architecture / Construction Materials, Fiber Materials, Pump, Valves & Fittings), Eco Technology, (Environmental IT Systems, Cleaning Equipment, Services, Materials & Technology, Energy Saving Equipment), Eco Waste, (Waste Management and Waste disposal/Recovery Technologies).
Participation by FIT:	Tradeshaw visit
Visitors:	<p>Attendance figures: Figures unavailable</p> <p>Number of foreign visitors: Figures unavailable</p> <p>Visitors' profile: Government Ministries, Environmental Authorities & Agencies, Environmental Consultants and Specialists, Building / Facility Managers, Health and Safety Authorities, Industrial Consultants and Contractors, Office Buyers / Handling Professionals, Building and Construction Authorities are the target visitors.</p>
Trade show's dedicated website:	http://ecoworld.com.sg
Exhibitors' list:	http://ecoworld.com.sg
Next edition's dates:	To be confirmed

TRENDS EN APPRECIATIE VAN DE BEURS

According to organizers, Eco World 2010 was conceptualized as an international event focusing on technology related to “Green Connect” – “Environmental-ECO Lifestyle”, “Green Business” and Corporate Social Responsibility”, biodegradable and eco-friendly raw materials, recycles products and packaging, eco-friendly materials for construction and fitting, green decorative materials, personal lifestyle and beauty products. Exhibitors were expected from Asia, the Middle East, US, UK and Europe.

However, in actuality, the exhibition was relatively small with less 50 exhibitors. Foreign exhibitors were mainly made up of associations and foreign embassies. Much of the exhibitors from the private sector were local companies. Moreover, the speakers of the 2-day conference were mainly local as well. Therefore, it did not appear that the tradeshow had much international exposure for companies interested to penetrate the international market. In fact, there was not much media publicity given or created for the event.

TRADE SHOW TRENDS

This is the first time the Eco World exhibition is being held in Singapore; therefore there are no figures for comparison.

VIEWS BY EXHIBITORS AND VISITORS

There did not seem to be a very positive response from exhibitors. According to the exhibitors spoken to, the tradeshow does create some form of exposure to them; however they were not certain that this would translate to sales, as many of the trade visitors did not appear to be from relevant sectors they were targeting. In fact, the tradeshow was open to the public on the third day. In summary, the event did not truly achieve its aim to be an industry choice sourcing ground.

PRODUCT BREAKDOWN AT THE TRADE SHOW:

No specific product breakdown at the show.

PRESENCE OF NATIONAL PAVILIONS AND THEIR IMPORTANCE

Only 1 national pavilion from Singapore. Majority of the private companies excluding associations which participated were from Singapore.

INFORMATION ON AND APPRAISAL OF TRADE SHOW SIDE EVENTS (CONFERENCES, WORKSHOPS, SEMINARS, PARTNERING EVENTS...)

The Eco World tradeshow was held in conjunction with the Eco World Conference, “The Green Business – Sustaining a Platform for a Better Tomorrow.” The conference featured several speakers from related industries from both the public and private sector. On the first day of the conference, , the audience had an opportunity to hear about the developments, opportunities and challenges relating to the environment industry local and regionally from representative of government agencies such as the Economic Development Board and international Enterprise during the earlier half. This

sharing from the earlier half was quite informative and useful to many in the audience. But as the conference progressed to the later half, many of the speakers appeared to be more interested in selling their products or brand rather than focus on sharing their knowledge. In fact, many of the topics covered did not seem relevant to the subject of the conference, which perhaps lead to more than half of the audience leaving by the second half.

Furthermore, the conference was poorly organized. It started late; had an inexperienced emcee; there was a lack of materials, speakers' notes & presentation were poorly organized. Overall, the conference appeared unprofessional and amateurish, which should not have been the case, given that this was a paid conference for many participants.

TRENDS WITHIN THE SECTOR ON A NATIONAL AND INTERNATIONAL SCALE, ESPECIALLY FOR WELL-DEFINED TARGET SECTORS PRESENTING OPPORTUNITIES

The Environmental and Alternative Energy industries are targeted sectors in Singapore. The sectors are developing fast in Singapore and have attracted many large, well-known companies to set up offices in Singapore.

Singapore has identified the Clean Energy industry as a strategic growth area for its economy; therefore it has aims to be a global hub for the development and manufacturing of clean energy products to be exported globally. To achieve this aim, a comprehensive blueprint consisting of R&D, developing manpower, grooming of Singapore-based enterprises, branding the industry internationally, and growing a vibrant industry ecosystem was implemented together with a funding of S\$350 million from the government. Given Singapore's location at the equator, solar energy is a key interest area. Resources are also being dedicated to towards biofuels, wind energy, tidal energy, energy efficiency and carbon services. It is expected that by 2015, S\$1.7 billion would be contributed by the clean energy industry to Singapore GDP. To date, the city-state has attracted leading industry players such as Renewable Energy Corporation, Solar World Group and Vestas Wind Systems of Denmark.

In terms of the environmental industry, the lack of clean water and environmental destruction have been persistent problems across the globe. Given the mounting emphasis on water and the environment, Singapore aims to transform itself into a 'Global Hydrohub' – a front-runner in R&D and provider of water solutions. Apart from the water industry, Singapore is developing its capabilities and establishing itself in the areas of waste management and recycling. Presently, Singapore has only one land-fill site at Pulau Semakau, it is inevitable that Singapore would have to towards innovative waste recycling and treatment solutions to reduce its reliance on the landfill.

UPCOMING SPECIALIST THEMES AND OTHER SIDE EVENTS IN THE NEXT EDITIONS, IF AT ALL

None as of present.

PARTICIPATION BY FIT

Tradeshaw visit.

RECOMMENDATION

The Eco World tradeshow would not be recommended to any companies at present for several reasons. Foremost, this is the first time that the show has been organized in Singapore; it would be difficult to ascertain presently how the show would grow in terms of size and credibility. Presently, the show is still relatively small in size and not exactly international in appeal and exposure.

In terms of personal opinion, the show was poorly executed despite being its inaugural show. Many of the tradeshow staff lacked direction and the logistics appeared to be done last-minute – directories were not given upon registration, badges were not ready, the conference started late, etc. Furthermore, there was not much pre-show publicity provided for the show. Henceforth, there was a rather poor turnout of relevant companies visiting the tradeshow to source for products.

Therefore, in conclusion, participation for this tradeshow would not be encouraged unless there are considerable improvements evident in future shows.

* PLEASE NOTE THAT RECOMMENDATIONS ARE MADE ON A PERSONAL BASIS AND DO NOT IN ANY WAY IMPLY AN OBLIGATION OF ANY KIND. *

CLEAN ENERGY EXPO 2011 - SINGAPORE

DE BEURS IN HET KORT

Plaats:	Suntec Singapore, 1 Raffles Boulevard, Suntec City, Singapore 039593, Tel: Hall 401
Beursorganisator:	Koelnmesse Pte. Ltd., 152 Beach Road, #25-05 Gateway East, Singapore 189721, Tel: +65 6500 6700, Fax: +65 6294 8403, Website: http://www.koelnmesse.com.sg , Email: info@koelnmesse.com.sg
Producten:	Solar energy, energy efficiency, biomass/biogas/bio fuel, geothermal energy, other clean energy products and service.
Frequentie:	Annual
Data en duur:	1 to 3 November 2011 (3 days)
Karakter:	International Tradeshow
Exposanten:	> 170 exhibiting companies Exhibitor Profile: Mainly manufacturers and service providers (refer to products)
FIT-deelname:	No
Bezoekers:	5,283 trade participation Figures for foreign visitors presently unavailable Power / Energy Companies, Oil / Coal Companies, Energy Investors, Energy Crop Farm Owners, Project Developers/ Consultants, Suppliers / Component Manufacturers, Universities and Research Institutions, Government Agencies / Policy Makers, Bio fuels Producers, Banks/ Venture Capital Firms, Automotive and Transport Companies, Equipment and Technology Solutions Providers, Utilities/ Electricity Providers, Legal Experts and Consultants, Solar Distributors and Installers, Urban/ City Planners, Suppliers / Component Manufacturer, Universities and Research Institutions, Government agencies / Policy Makers, Media
Beurswebsite:	http://www.cleanenergyexpoasia.com
Exposantenlijst:	http://www.koelnmesse.com.sg/iebms/oep/oep_p1_exhibitors.aspx?sessionid=fbofa1fh5ejnfd3ejn
Data volgende editie:	To be advised

TRENDS EN APPRECIATIE VAN DE BEURS

BELANG VAN DE BEURS

Clean Energy Expo Asia is the main event in the Asia Pacific region that brings together the major players in the renewable energy and energy efficiency industry to a single platform for the purpose of exchanging experiences, knowledge and technology updates that may in time to come revolutionize the energy industry. This year is the third edition of the Clean Energy Expo in Singapore.

Clean Energy Expo Asia is held in conjunction with the annual Singapore international energy week (SIEW). Organized together with the energy market authority, the event is made up of a series of energy-focused conferences, exhibitions and networking sessions with various energy industry leaders.

Similar to the show's previous edition, sustainable mobility was once again featured at Clean Energy Expo Asia. Trade participants had the opportunity to view vehicles offered by by EV World, such as the Aquawatt, the Green Fleet Solutions, SeaLegs and YikeBike, which use hydrogen fuel cell and had zero emission.

EVOLUTIE VAN DE BEURS:

This year's tradeshow was on par in terms of size with last year's edition. In terms of exhibiting companies, the number is almost similar to previous year. It is observed that there are slightly more trade visitors this year.

PERSOONLIJKE APPRECIATIE/INDRUK VAN DE LAATSTE EDITIE

- Productsegmentatie op de beurs (spreiding/producthallen/algemene hal?)

There was no particular segregation by product or services.

- Aanwezigheid van landenpaviljoenen plus belang

There were in total 6 country pavilions – Singapore, Switzerland, Canada, Europe, Japan and Taiwan. The Singapore pavilion was the largest country pavilion given that this event was held in conjunction with the Singapore International Energy Week and strongly supported by the Sustainable Energy Association of Singapore (SEAS).

For Flemish companies that would be interested in the trade show, it is good to know that there was an European pavilion, hosted by Eurocham (the European Chamber of Commerce; see www.eurocham.org.sg).

- Info/appreciatie van randactiviteiten (conferenties, seminars, matchmaking,...)

Events co-located included:

CLEAN ENERGY EXPO ASIA 2011 CONFERENCE – ENERGY FOR THE FUTURE:

The program for the conference is developed jointly with the Asian development Bank and the Sustainable Energy Association of Singapore. The focus of the conference was on the business, finance, policy and commercialization aspects pertaining to renewable energy, energy efficiency and sustainable development in the Asia pacific region. It was feedback that there were robust discussions and dialogue among attendees and experts.

EUROPE BUSINESS FORUM - ENERGY EFFICIENCY: BUSINESS OPPORTUNITIES AND MARKET POTENTIAL

The Forum brought together industry leaders in the energy efficiency market from Asia Pacific to share their views and experiences in pursuing environmentally sustainable strategies for their companies, while seizing new market opportunities.

- de evolutie van de sector

According to Frost & Sullivan, global investment in green technologies is expected to reach US\$800 billion by 2012. Latest analysis also estimates the global market for traditional environmental goods and services, renewable energy and emerging low-carbon activities to grow 45% by 2015.

Based on the findings of the Asian Development Bank, presently US\$100 of the total US\$500 billion in the global clean technology market is contributed by Asia. It is foreseeable that Asia's clean energy market will grow in the future given the region increasing contributions to sustainable development and use of green technology to manage the consequences of fossil fuel depletion, rising energy cost due to increased fuel demand, global warming and urbanization. Governments in Asia have also rapidly injected more funds into projects related to green energy and climate sustainability e.g. green infrastructure, using low-carbon and renewable power, ensuring energy efficiency, as well as controlling water usage and waste generation.

Stringent government policies and heavy investments in green energy are believed to raise the level of commitment in the public and private sectors. In this part of the region, Australia, Japan and South Korea are leading the "green" trend". Emerging powerhouses like China and India have the highest emission intensity index of 1.51 and 1.17 respectively; therefore both countries are attempting to balance their rapid industrialization/urbanization with public and private investment in all areas of the environment sector including renewable energy, waste management and green technologies.

AANBEVELING

The tradeshow will mainly appeal to producers and suppliers of alternate, renewable and clean energy, as well as related service providers who are mainly keen in leveraging Singapore's infrastructure, global connectivity and government support (Clean Energy is a key growth sector in Singapore) to penetrate the Asia Pacific region.

While the show is still considered to be in its infancy, with the support of the Singapore government, the tradeshow has grown into a prominent platform for showcasing technological innovation, knowledge sharing and project development in Asia. The show is likely to grow further given Asia's ascension in the global Clean Energy Industry. Already more than half the world's solar and wind energy equipment is manufactured in Asia.

An important thing to note is that Clean Energy Expo is a specialized tradeshow for the environmental sector; it focuses mainly on renewable and alternative **energy** technologies and solutions. For companies and individuals keen on observing the general developments for the environmental sector in the Asia Pacific region, they should instead consider other tradeshows such as Enviroasia (<http://www.enviro-asia.com>).

* Please note that recommendations are made on a personal basis and do not in any way imply an obligation of any kind. *

FIT-SINGAPORE, 11 NOVEMBER 2011

EVIROASIA 2011, CIA 2011, ANALABASIA 2011 - SINGAPORE

DE BEURS IN HET KORT

Plaats:	Suntec Singapore, 1 Raffles Boulevard, Suntec City, Singapore 039593, Hall 401
Beursorganisator:	CEMS (Conference & Exhibitions Management Services Pte Ltd), 1 Maritime Square, #09-43 HarbourFront Centre, Singapore 099253, Tel: +65 6278 8666, Fax: +65 6278 4077, Website: http://www.cems.com.sg , Email: info@cems.com.sg
Producten:	Enviro Asia: Products & services for Clean Energy, Waste Sector, Emissions Control Management, Water Sector, CIA & AnalabAsia: Process engineering technology & process control, automation, instrumentation, scientific technologies, analytical & laboratory technology and services.
Frequentie:	Bi-annual
Data en duur:	22 to 25 November 2011 (4 days)
Karakter:	International Tradeshow
Exposanten:	> 300 exhibiting companies from 28 countries (For Enviroasia, Analab2011 and CIA2011) Exhibitor Profile: Mainly manufacturers and service providers (refer to products)
FIT-deelname:	No
Bezoekers:	Trade visitors: Figures for 2011 presently unavailable. 4,755 trade visitors from 45 countries (2009 figures) Figures for foreign visitors presently unavailable, 1,123 (24%) were from overseas (2009 figures) EnviroAsia: Biotechnology Professionals / Pharmaceutical & Health Care Specialists, Building & Construction Authorities, Chemical and Petrochemical Processing Professionals, Electrical / Electronics Manufacturers, Estates & Facilities Managers, Food & Beverage Manufacturers and Processors,

Government Ministries, Municipalities, Environmental Authorities and Management Consultants, Health & Safety Authorities & Enforcement Agencies, Industrial Contractors, Pulp & Paper Manufacturers, Rubber & Plastics Products Manufacturers, Transportation, Storage and Handling Professionals, Waste & Management Control Authorities, Waste and Water Management and Recycling Professionals, Waste Processing Industry Professionals

CIA & AnaLabAsia: Trade visitors are from Biotechnology / Life Sciences, Chemical Manufacturing, Distributor / Manufacturer's Representative, Electrical / Electronics Manufacturing, Engineering & Contracting, Environmental Management, Food & Beverage Processing, Machinery & Precision Equipment Manufacturing, Oil & Gas Refining, Oil & Gas Production, Petrochemical Processing, Pharmaceutical Manufacturing, Pulp & Paper Production, Research & Development, Rubber & Plastics Products Manufacturing, Steel Mills / Mining, Trade Association / Government Agency / Academia / NGO, Utilities (Electrical / Gas / Pipelines), Waste Management

Beurswebsite: <http://www.enviro-asia.com>, <http://www.cia-asia.com>, <http://www.analab-asia.com>

Exposantenlijst: <http://bmp.cia-asia.com>

Data volgende editie: To be advised

BELANG VAN DE BEURS

EnviroAsia2011 brought together innovative equipment, technologies and services for managing waste, water and air pollution. The exhibition also featured sustainable development opportunities and energy efficiency solutions and showcased environmental, ecological and clean technologies and solutions pertaining to waste, water, energy and air that help companies and organizations meet the increasingly stringent environmental standards and regulations.

EnviroAsia was held together with 2 other tradeshows CIA (Controls Instrumentation Asia) and AnaLabAsia. CIA showcased the process engineering innovations and solutions for the chemicals, food, petroleum/energy, waste and water industry sectors. AnaLabAsia, on the other hand, is the tradeshow for business in the analytical technology, laboratory technology, biotechnology and diagnostic industry.

EVOLUTIE VAN DE BEURS:

Compared to the previous two editions, EnviroAsia this year was substantially smaller in terms of the number of Environment related exhibiting companies. It was observed that there were substantially more companies with fields related to AnaLabAsia and CIA. In its previous edition in 2009, there were in total more 431 exhibitors from over 31 countries at the combined tradeshow, but this year, there were only more than 300 exhibitors from 28 countries; quite a substantial decrease.

PERSOONLIJKE APPRECIATIE/INDRUK VAN DE LAATSTE EDITIE

There was no particular segregation by product or services. In fact, there was also no distinction between the 3 tradeshows at all, which was rather confusing for trade participants looking for a particular type of products or services.

There were in only 2 country pavilions at the tradeshow – Germany (German State of Baden Württemberg) and Singapore (mainly constituting of members from Singapore Manufacturing Association).

Events co-located included:

Process Plant and Safety Conference:

The two-day conference catered to CEOs, CTOs, Directors and Managers of Sustainability, Environment, Environmental Policies, Energy Efficiency, Clean Technology, Engineering, Operations, R&D, Innovation, Power, Utilities, Energy Investors and Consultants. The main focus of the conference was on how investing in sustainable development and energy efficiency can benefit companies. Also covered at the conference were plant and component requirements for plant automation at the design and planning stage to ensure longer shelf life and enhanced safety levels.

Sustainable Development Through Energy Management Conference:

The one-day conference touched on sustainable plant design, new technologies in plant energy management. The conference also examined case studies from industry leaders Ricoh and Mantech, and present constructive topics like insights into Life Cycle Assessment (LCA), carbon footprinting of products, and services and sustainable design for plants, among others.

For Environmental Sector:

According to Frost & Sullivan, global investment in green technologies is expected to reach US\$800 billion by 2012. Latest analysis also estimates the global market for traditional environmental goods and services, renewable energy and emerging low-carbon activities to grow 45% by 2015.

Based on the findings of the Asian Development Bank, presently US\$100 of the total US\$500 billion in the global clean technology market is contributed by Asia. It is foreseeable that Asia's clean energy market will grow in the future given the region increasing contributions to sustainable development and use of green technology to manage the consequences of fossil fuel depletion, rising energy cost due to increased fuel demand, global warming and urbanization. Governments in Asia have also rapidly injected more funds into projects related to green energy and climate sustainability e.g. green infrastructure, using low-carbon and renewable power, ensuring energy efficiency, as well as controlling water usage and waste generation.

Stringent government policies and heavy investments in green energy are believed to raise the level of commitment in the public and private sectors. In this part of the region, Australia, Japan and South Korea are leading the "green" trend". Emerging powerhouses like China and India have the highest emission intensity index of 1.51 and 1.17 respectively; therefore both countries are attempting to balance their rapid industrialization/urbanization with public and private investment in all areas of the environment sector including renewable energy, waste management and green technologies.

For R&D sector

The Asian region is considered a force to be reckoned with in the field of research and development attributing to its market growth in recent years and continual advancements in terms of infrastructure and talent development. The region has already overtaken Europe to become the second largest global investor (with 32% global market share) in terms of domestic expenditure on R&D. Global expenditure on R&D is estimated to grow by 3.6% to reach almost US\$1.3 billion in 2011. 35.3% of this would be contributed by Asia. Global market for pharmaceutical contract manufacturing is also predicted to increase to almost US\$31 billion by 2012. Much of the growth is believed to be attributed to Asia.

AANBEVELING

Most of the exhibitors present at the both tradeshows were producers and/or service providers. EnviroAsia is a platform for Flemish manufacturers or service providers of products and services related to clean energy, waste management, pollution and emission control and water treatment. EnviroAsia has the backing of the Waste Management and Recycling Association of Singapore. Whereas, CIA and AnalabAsia would be relevant to Flemish manufacturers or service providers process engineering technology & process control, automation, instrumentation, analytical & laboratory technology and services. The tradeshows were strongly supported by associations locally. For the CIA and AnalabAsia tradeshows, The Singapore Manufacturing Association lent their support; majority of the exhibiting companies for the Singapore Pavilion were members of the Singapore Manufacturing Association.

Based on observations, it was a relatively small tradeshow despite having all 3 tradeshows together. There were also not many tradeshow visitors during our visit. In fact, several of booths did seem rather quiet with no visitors. Of the trade visitors observed, most of them were local rather than foreign delegates and companies. One major complaint of the tradeshow is that there was no proper segregation between the three tradeshows which made it rather confusing and difficult to

differentiate between which companies were dealing with environmental related products and which specialised in laboratory or engineering related products and services.

Given that there were three co-located tradeshows, the theme of the tradeshow was rather “general”; there was no clear specialisation for any of the individual tradeshows. As such, some of the exhibiting companies actually showcased products applicable to multi-industries whether environmental, laboratory or engineering e.g. water purification systems and waste filtration technologies which can be used for healthcare or process industries such semi-conductor companies.

* Please note that recommendations are made on a personal basis and do not in any way imply an obligation of any kind. *

FIT-SINGAPORE, 28 NOVEMBER 2011

SINGAPORE INTERNATIONAL WATER WEEK & WATER EXPO - SINGAPORE - 2012

THE TRADE SHOW... AT A GLANCE

Venue:	Basement 2, Sands Expo & Convention Center (Marina Bay Sands)
Show organiser:	Experia Events Singapore Changi Airport Terminal 2, Level 3, #038-017, Singapore 819643 Tel: 65 6542 8660, Fax: +65 6542 8683, Email: ruthcheah@siww.com.sg
Products:	Products and services for: catchment Management, Clean Transport, Climate Change and Flood Control, Consultancy and Engineering Services, Dam & Hydro Power, Desalination, Disposal & Recycling, Eco-Products, Environmental Control & Protection, Equipment/Control/System/Instrumentation, Infrastructure, other Products & Services for the Water Industry, Plant Development & Maintenance, Point of Use, Pumps and Process System, Sanitation, Sludge Handling and Treatment, Waste Control & Management, Wastewater, Collection/Treatment, Water Distribution
Frequency:	Previously annual (to be biannual after 2012)
Dates and duration:	2 to 4 July (Water Expo), 1 to 5 July (Singapore International Water Week)
Scope:	International trade show
Exhibitors:	Over 750 companies Mainly manufacturers and service providers, as well as some distributors from Singapore.
Participation by FIT:	Product sample booth
Visitors:	18.554 trade visitors From 104 countries and regions
Website:	http://www.siww.com.sg
Exhibitors' list:	http://www.siww.com.sg/water-expo-2012
Next edition's dates:	2014 (exact dates tbd)

LEADING TRENDS AND OVERALL JUDGEMENT OF THE TRADE SHOW

IMPORTANCE OF THE TRADE SHOW

The Singapore International Water Week 2012 is an international platform for water solutions. The event gathered policymakers, industry leaders, experts and practitioners to interact, tackle challenges, showcase their expertise and technologies, explore business opportunities and honor accomplishments attained in the water industry.

This theme of this year's show was "Water Solutions for Liveable and Sustainable Cities". It was intended to reinforce the urgency to integrate sustainable water management strategies into the urban planning process. Apart from the Water Expo which showcases the latest technologies and innovations for Water Solutions, there was the Water Leaders Summit where more than 300 global water leaders from the government, corporate, academia and international organizations congregate to discuss and explore ideas in tackling the current global water challenges. The focus this year was on the industrial water sector.

It is estimated that the show achieved a new record of SGD13.6 billion in total value for the announcement of projects, awarded tenders, investments and R&D MOUs made at the event.

TRADE SHOW TRENDS

This year is the first time that the Singapore International Water Week is held at Marina Bay Sands - within 17,000 square meters of covered exhibition space on a single level. According to the organizers, the show has grown by almost double since its inaugural show in 2008 in terms of the number of exhibiting companies. Compared to the last year, there were around 100 more companies participating. Indeed, it was observed that there were relatively more foreign companies participating than previously.

There is no specific product segregation with the hall for the Water Expo Tradeshow. However, in conjunction with the environmental theme of the Singapore International Water Week, there were several other tradeshow events ongoing in separate halls such as Wastemet Asia, Liveable Cities Summit and CleanEnviro.

There were in total 16 country & group pavilions. The pavilions included: Australia, Belgium, Canada, China, Germany, Israel, Japan, Korea, Singapore, State of Illinois, Switzerland, Taiwan, The Netherlands, Trenchless Asia 2012, United Kingdom and Water Environment Federation (WEF). This is the first time that State of Illinois and Trenchless Asia are participating.

There were many co-located events which included meetings, conferences, workshops, networking events, ceremonies and technical tours. Some major events that took place include:

Lee Kuan Yew Water Prize

The award honours outstanding contributions towards solving global water problems by either applying technologies or implementing policies and programmes which benefit humanity.

Water Leaders Summit

The annual meeting brought together key policymakers and industry leaders of the water world to engage in dialogues and discussions which focus on sustainable water solutions in a changing urban environment.

Water Convention

The Water Convention was a platform for industry experts, regulators, academics to interact and share ideas on a wide range of water challenges.

Business Forums

Business forums offered an extensive spread of business networking, partnership formation and lucrative deal-making opportunities across markets covering the Americas, Australia, China, India, Japan, Korea, Middle-East & North Africa and Southeast Asia.

Industrial Water Solutions Forum

According to Global Water Intelligence, the industrial and waste water equipment market is expected to grow at 7.5% annually (demand growing fastest for the oil and gas sectors at 24%) over the next 5 years to \$22 billion in 2016. Therefore, the theme of the forum is “Towards Water Sustainability in the Industry Sectors”. The forum offered an overview of the key water challenges of the industrial sectors and how solutions could transform them into new opportunities.

TechXchange Workshop

This is the second year that the “by invitation” event has been held. Titled “Explore the New Wave of Opportunities in Water Technologies”, the event is targeted at innovators and investors. The workshop included business pitches from innovators, targeted business matchmaking, panel discussions and prototype displays at the Water Expo.

The Economic Development Board of Singapore estimated that nearly SGD700 million had already been allocated to develop Singapore’s cleantech industry through five key pillars – R&D, developing manpower, grooming Singapore-based enterprises, branding the industry internationally and growing vibrant industry ecosystem. Moreover, the country is home to more than 70 international renowned water companies which include Nitto Denko, GE Water, Hyflux, Keppel Seghers and Siemens Water.

The target is to develop Singapore into a “Global Hydrohub” by 2015. The realization of this would contribute around SGD1.7 billion to Singapore’s GDP. Jobs in this sector (majority of which are in the professional and skilled categories) are expected to double to about 11,000. Also part of Singapore’s Global Hydrohub vision is for the country to be self-sufficient in its water supply by 2061 with 20 percent of its water supply derived from the local catchments, while the remaining 80 percent would be from Newater and desalinated water. Government agencies such as International Enterprise Singapore, the Singapore Economic Development Board, SPRING Singapore and Public Utilities Board jointly lead the Environment & Water Industry Program Office to initiate programs and schemes that will fortify Singapore’s position as a Global Hydrohub for sustainable water solutions. In fact, presently, Singapore’s Water R&D ecosystem consist of 25 research institutions and corporate laboratories which have already proceeded with R&D projects values at SGD221 million.

PARTICIPATION BY FIT

This year is the second time that FIT has participated as an exhibitor at the Water Expo; the following Flemish companies were present:

- Prime Water
- Remi Claeys
- Reditech
- Waterleau
- VLAKWA - Vlaams Kenniscentrum Water

FIT-SINGAPORE, 13/07/2012

SINGAPORE - BEX ASIA 2013

DE BEURS IN HET KORT

Plaats:	Marina Bay Convention Centre, Halls A&B, Marina Bay Sands
Beursorganisator:	Reed Exhibitions Singapore, 51 Changi Business Park, Central 2, #07-01, Singapore 486066, Tel: +65 6789 8800, Fax: +65 6789 7711, Website: http://www.reedexpo.com.sg , Email: bexasia@reedexpo.com.sg
Producten:	ACMV, Adhesives, Air Conditions, Architectural Art Glass, Aluminum Panels, Automation Systems, Awnings, Blinds, Building Material, Building Energy Auditing Software Products, Cable Management System, Car Parking Solutions, Carpet, Ceiling systems, Concrete Products. Certification, Clean Fuel, Coating, Decoration Solutions, Decorative & Furniture Fittings (Surfaces), Decking Systems, Drainage Materials and Systems, Engineered Wood, Energy Management, Engineering Services, Escalators, Electrical components, Electric Water Heater, Elevators, Emergency Power Device, Energy Board, Expansion, Fabrics, Fans, Faux Alabaster Fittings, Fire-Rated Door, Flooring Systems, Framing Systems, Furniture, Glass, Grilles, Hardware, Home Environmental Solutions, Insulations, Interior Decorations, Landscape, Laminates, LED, Lifts, Lighting, Louvers, Metal Coating, Panels, Pedestal, Pipes, Polyurethane, Power Systems, Roofing, Sanitary Ware, Sealants, Security & Authentication System Software, Sound Absorption Building Materials, Stainless Steel Systems, Switches, Sunscreens, Sustainable Source Timber, Tiles, Wall, Wall Coverings, Water Heaters, Water Piping Systems, Water Proofing, Wiring and Accessories, and many more.
Frequentie:	Annual
Data en duur:	11 to 13 September 2013 (3 days)
Karakter:	International Tradeshow
Exposanten:	306 participating companies from 32 countries: Australia, Belgium, Canada, China, Denmark, Europe, France, Germany, Holland, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Kuwait, Liechtenstein, Malaysia, Nigeria, Portugal, Singapore, Spain, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, United Kingdom, United States Exhibitor Profile: Refer to products
FIT-deelname:	No

Bezoekers: 9023 trade visitors from 57 countries

Figures for foreign visitors presently unavailable

Agents/Distributors, Architects, Consultants, Contractors, Developers, Engineers, Estate Managers, Facility Managers, Government Agencies, Interior Architects, Interior Decorators, Interior Designers, Maintenance Managers, Manufacturers Project Managers, Property Managers, Quantity Surveyors, Statutory Board, Officers Traders/ Retailers.

Beurswebsite: <http://www.bex-asia.com>

Exposantenlijst: <http://www.bex-asia.com/e-Directory>

Data volgende editie: October 2014

TRENDS EN APPRECIATIE VAN DE BEURS

BELANG VAN DE BEURS

Build Eco Xpo (BEX) Asia is a major event for the building and construction industry in Singapore. The event centers on green building architecture, products, practices and technologies for environmental sustainability. Industry leaders, practitioners and professionals from all over the world are gathered together to network, exchange information, learn and explore business opportunities within this region.

The show is a one-stop platform for sourcing building materials, energy efficiency systems, sustainable design and architecture for sustainable communities. For this year, given the increased market demand for sustainable building and infrastructure, three new product categories were added – green interiors, sky rise landscaping and HVAC (heating, ventilation and air-conditioning). This reflects a new trend for the green building industry which was previously focused mainly on the macro and brick-and-mortar industry.

Located in the same hall as BEX Asia is the World Engineering Expo. While BEX Asia 2013 offers green solutions for residential and commercial properties, the World Engineering Expo focuses on larger issues like infrastructure, industrial developments and climate change. Together, they complement each other to provide a comprehensive platform of thought leadership and practical architectural, design and engineering solutions for the industry in the region.

EVOLUTIE VAN DE BEURS:

In 2012, there were in total 8113 trade visitors from 52 countries, of which around 20% of them were overseas visitors. The number of trade visitors for 2013 increased to 9023 (11.22% increase) from 57 countries.

In terms of exhibiting companies, there were 282 companies from 28 countries in 2012. In 2013, there were 306 participating companies from 32 countries; an increase by 8.5%.

In 2012, there were 4 country pavilions; it is the same for 2013. The only difference is that Japan replaces Portugal.

PERSOONLIJKE APPRECIATIE/INDRUK VAN DE LAATSTE EDITIE

There was no particular segregation by product or services. Exhibiting companies from both BEX Asia and the World Engineering Expo were together in the same hall.

There were in total 4 country pavilions this year – Singapore, Taiwan, Japan and Malaysia. This is the first time that the Japan External Trade Organisation (JETRO - government affiliated organization, works not only to help Japanese SMEs promote regional collaborations and maximise business potentials) is participating as a country pavilion with more than 15 Japanese companies and delegates.

Events co-located included:

The International Green Building Conference:

The International Green Building Conference (IGBC) is typically held in conjunction with BEX Asia. This conference is a key part of the Singapore Green Building Week (SGBW) and serves as a platform for global industry players, practitioners and academics, to congregate and share cutting-edge ideas and best practices. Participants also get to see how Singapore's efforts to reduce her carbon footprint and improve energy efficiency and indoor air quality have helped to "green" the Singaporean lifestyle. The conference focuses on a different theme every year, all aimed at propelling the green building and construction industry.

World Engineers Summit

This is the first time that the World Engineers Summit has been organised in Singapore. Organised by The Institute of Engineers Singapore (IES), the theme of the summit was "Innovative and Sustainable Solutions to Climate Change". Engineers from multi-disciplines and environmental specialists from all over the world congregated to share ideas and insights on climate change. The event included the World Federation of Engineering Organisations General Assembly 2013 and committee meetings.

World Engineering Expo

The World Engineering Expo located in the same hall as BEX Asia had exhibitors providing innovative technologies and solutions pertaining to environmentally friendly, energy efficiency and sustainable solutions.

100% Design Singapore:

100% Design Singapore is a curated exhibition catered to interior designers, architects, and retailers; featuring the latest design-led interiors in Southeast Asia; which includes furniture, lighting, bathrooms, floor and wall coverings.

Construction industry in Singapore (Source: BCA <http://www.bca.gov.sg>)

The building and construction industry is expected to remain strong for 2013. Due to the stream of public projects, a robust demand of between SG\$26 to SG\$32 billion is expected for this year, keeping up with SG\$28.1 billion in 2012. It is believed that this level of demand will be sustained over the next few years.

Public Sector (2013): The demand from public sector works (public housing and major infrastructure construction mainly for mass rapid rail construction) is expected to contribute around 53% of the overall industry demand – between SG\$14 to SG\$17 billion.

Private Sector (2013): In view of sluggish economic growth and increasingly uncertain economic outlooks, the demand from the private sector is a conservative forecast of between SG\$12 to SG\$15 billion for 2013. It is predicted that the private sector will also adopt a more cautious stance when it come to new construction investments.

Forecast for 2014 and 2015: The average construction demand for 2014 and 2015 is likely to be SG\$20 to SG\$28 billion per annum. While slower economic growth is expected in the coming years, the strong pipeline of housing and infrastructure construction projects planned by the Government to meet the needs of its population is likely to sustain the construction industry. Moreover, the high amount of construction contracts awarded in 2011, and the sustained levels of demand in 2012-2013 are expected to translate into construction activities spread into the next 1 to 2 years.

Green Buildings in Southeast Asia (Source: BCA Centre for Sustainable Buildings)

'Sustainable buildings' was acknowledged as the specific area of interest for collaboration in 2007 under the United Nations Environment Programme (UNEP). Singapore had signed UNEP 2 Memorandums of Understanding in 2009 and 2011 to establish a framework for collaboration in capacity building projects for sustainable building policy development in the region. The BCA Centre of Sustainable Buildings in Singapore was as such designated as a Centre collaborating with the UNEP.

In Southeast Asia, countries are experiencing rapid urbanisation and economic growth, which puts pressure on the built environment and infrastructure, and also results in increased levels of building related energy consumption and GHG emissions. Having accepted the impact that buildings have on the environment and national energy security, Southeast Asian countries have begun to restructure their approaches to energy efficiency and utilisation. As such, the consultancy, Roland Berger, estimates that by 2020, Southeast Asia could potentially increase overall energy efficiency by 12 to 30 per cent, resulting in savings of US\$15 billion to US\$43 billion.

These national plans for energy efficiency are supported by regulations, fiscal initiatives, market based mechanisms and other public outreach projects.

- Thailand: The Energy Efficiency Revolving in Thailand provides capital at no cost to Thai banks to fund energy efficiency projects, while the Ministry of Industry provides subsidies for the implementation of energy conservation measures.
- Malaysia: Malaysia sets energy management requirements for large energy users, while the Installation Code of Practice on Energy Efficiency and Use of Renewable Energy in non-residential buildings.
- Brunei: Brunei is in the process of developing its own green building rating tool, but they have already established the Brunei Green Building Council.
- Singapore: Singapore will be releasing its third Green Building Masterplan sometime in the third quarter of 2013.

Country	Green building rating tools
Brunei Darussalam	Under development
Indonesia	GREENSHIP
Malaysia	Green Building Index, GreenRE
Philippines	BERDE, GREEN
Singapore	Green Mark
Thailand	TREES, TEEAM
Vietnam	LOTUS

AANBEVELING

This tradeshow would appeal particularly to Flemish manufacturers and service providers keen on penetrating Singapore's construction and building industry. The tradeshow is supported by the Construction Authority (BCA). As per previous years, most of the exhibiting companies are not newcomers and have experience in Singapore projects or are currently already supplying their products and services in Singapore.

Many of the exhibiting companies have experience working with either BCA or HDB on various projects of differing levels of development and also many have benefitted from or been awarded

BCA's Green Mark and Green Product certification. Therefore, this implies an opportunity for Flemish companies who lack exposure in Singapore to gain value market research by networking with these companies. Flemish companies can also network with these companies to explore potential collaboration in leveraging the existing infrastructure.

This year is the first year that the World Engineers Summit has been organised in Singapore by The Institute of Engineers Singapore (IES). Therefore, it was observed that there were a substantially larger number of conference and tradeshow attendees who visited BEX Asia as well. The official statistics from the organisers confirm this.

* Please note that recommendations are made on a personal basis and do not in any way imply an obligation of any kind. *

FIT-SINGAPORE, 23 SEPTEMBER 2013

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