

Path to responsible and sustainable growth

An overview of the relevance of green
ICT and how Singapore ICT companies
are contributing in this space

An initiative by

Knowledge Partner



F R O S T  S U L L I V A N



Message from CEO, IE Singapore

Technology has always played a crucial role in sharpening the competitive edge of businesses all over the world. Some of these technological breakthroughs have, however, led to the compromise of our environment in the form of carbon emissions, waste, and toxicity of consumer products. Fortunately, there is a growing consensus amongst industries today that Green considerations must accompany technological advancements.

The emerging Green economy is driven by processes, technologies, services and innovations across a growing span of industries. A recent study commissioned by the British Government tagged the value of the growing global Green economy in 2008 at £3 trillion (US\$8.97 trillion), despite the recession. Many companies have begun to take sight of their activities and started implementing Green practices into their work processes. Within the sphere of Green technology, Infocomm and Technology (ICT) is an obvious choice, and is at the forefront of this revolution.

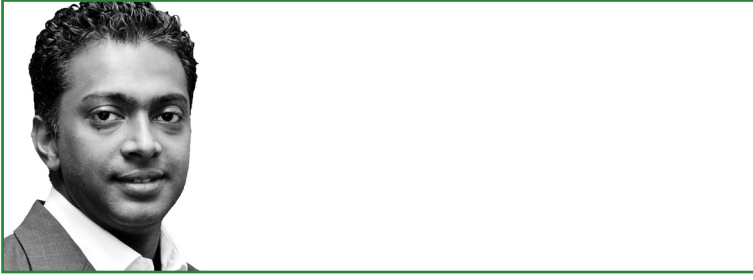
Global growth consulting company, Frost & Sullivan, estimates ICT-enabled energy efficient products will bring about US\$950 billion in cost savings by 2020. This is through the implementation of more energy efficient processes – whether by negating the need for conventional business travel through telepresence and virtual meetings, or allowing households to monitor their energy consumption. Green ICT can help to bring about smaller carbon footprints everywhere through breakthrough solutions that model forestry regulations, measure Greenhouse gas emissions, and record supply chain data such as energy use, labour practices and more.

Within Singapore's ICT industry, IE Singapore has identified building management solutions, e-services, and transport & logistics as promising areas where we can compete globally. We have recently set up a dedicated Green Programme Office (GPO) within IE to drive new initiatives to help Singapore-based companies to develop exportable Green solutions, identify promising export opportunities for our goods and services, and brand Singapore as a provider of complete solutions within the Green space.

To kick-start our efforts, we have engaged Frost & Sullivan to conduct a benchmark assessment of the capabilities of Singapore's Green ICT solutions providers. We will also continue to partner with the government agencies, trade associations and chambers to raise the level of awareness of Green ICT to Singapore-based companies and to explore potential opportunities. I look forward to the active role of Singapore companies in the Green economy, and I wish the ICT industry every success in the years to come.

Chong Lit Cheong

Chief Executive Officer
IE Singapore



Message from Partner and MD, Frost & Sullivan

With the political and corporate worlds realising the severity of human endeavours on the environment around us, the Green movement is increasingly gaining momentum. Regulations are being introduced globally to shrink our carbon footprint and as these come into effect, Green technologies and solutions will witness an increasing demand.

The Singapore government has taken numerous measures to position itself at the forefront of Green technologies. Having identified this vital field as a significant thrust area and earmarking significant resources for its development, the island state already has a growing reputation in the areas of alternative energy. It has attracted interest from some marquee players in sectors such as wind energy and solar energy.

Serving as a regional headquarter to several major global ICT vendors and service providers that offer Green portfolios, Singapore is earning great visibility in Green ICT. Adding to this is the encouragement being received from a number of local ICT firms. Having anticipated the burgeoning demand for sustainable ICT solutions, these firms have already started offering solutions, geared towards meeting their clients' objective of environment-friendly business growth. To give but a few examples, of such engagements by local ICT firms:

- a) In the area of Building Management Services, local firm CNA is deploying a range of Green initiatives to optimise energy usage and increase patient care standards, at Khoo Teck Puat Hospital, an upcoming full-service medical facility in Singapore.
- b) In the area of eServices targeted at the public sector, local firm CrimsonLogic has helped the government of UAE develop a single IT platform that would automate the entire judicial system, resulting in significant reduction in paper usage.
- c) In the area of Logistics, local firm InfoWave provided its range of mobile data terminals to a leading taxi cab operator, helping it to automate and enhance its fleet, while providing numerous energy savings at the same time through optimisation of distances travelled.
- d) In the area of eServices targeted at the private sector, local firm TrustedHub helped insurer NTUC Income switch from paper documents to digital documents, delivering significant energy savings in terms of warehousing and transportation costs, while also reducing processing time.

We, at Frost & Sullivan, are very excited to continue partnering with IE Singapore to further the awareness for Green ICT solutions and Singapore's Green ICT solutions providers.

Manoj Menon

Partner/ Managing Director, Asia Pacific
Frost & Sullivan



THE GREEN STORY

Climate change and energy costs have increasingly become major concerns for governments, businesses and individuals alike. It is no longer enough to just speak of the effects that these factors may have on our lives and on the world around us, but it has become imperative to proactively take on responsibility to mitigate their negative consequences. This has in essence led to the Green movement whereby governments, organisations and individuals are making efforts to curb the excesses that are taking a severe toll on our environment.

Governments take action

With this in mind, governments across the world are coming up with regulations and introducing initiatives to combat the rising carbon emission levels. A few of them are detailed below:

- 1) In 2007, the European Union (EU) announced its year 2020 target to cut down carbon emissions by 20% compared to the levels in 1990. The United Kingdom is aiming for an emissions reduction of 60% below 1990's levels by 2050. Germany is aiming for a 40% reduction below 1990's levels by 2020.
- 2) The United States (US) has a federal objective to reduce its GHG intensity level by 18% on 2002's levels by 2012. The US, although a signatory to the Kyoto Protocol, has neither ratified nor withdrawn from it. However, more than 400 US cities have adopted the protocol. In March 2009, Vice President Joe Biden announced plans to invest US\$ 3.2 billion in energy efficiency projects in the US.
- 3) In South Korea, the Green Growth Commission has announced that it will commit to spending of around US\$ 10 billion to develop environmental technology in the next 5 years.
- 4) In Australia, the government has proposed a long-term emissions target of 60% by 2050. In late 2009, Australia agreed to cut emissions by 5% below 2000's levels by 2020 and possibly by up to 20% if other nations show equal inclination.
- 5) 'Cap and Trade' legislations are being evaluated in certain countries that would place a price on companies that exceed their allocated quota of carbon emissions.
- 6) In December 2009, the United Nations Climate Change Conference was held in Copenhagen, Denmark. Proposals were tabled to reduce carbon emissions across the world. The Accord signed at the summit agreed that developed countries would raise funds of US\$ 30 billion from 2010-2012. Also, the Accord set a 'goal' to raise US\$ 100 billion every year globally to help developing countries cut carbon emissions. Countries representing almost 85% of total global emissions have pledged their participation.



Governments across the world are passing regulations and starting initiatives to curb carbon emissions

THE NEED FOR GREEN ICT

ICT – friend or foe?

ICT has, in a short period of time, virtually transformed the way people live. From mobile phones to microchips to the Internet, ICT is pervasive and has become an integral part of everyday life. ICT has helped deliver sustained development in productivity and has ushered in a new age of economic growth the world over.

However, this unprecedented growth has been accompanied by an adverse impact on the environment. Literally millions of ICT devices ranging from personal devices like notebooks, PCs, mobile phones, office equipment to a vast array of backend hardware, networking and communications infrastructure, consisting of servers for applications, e-mail and web hosting, storage and backup systems, wired and wireless communication networks, Internet firewalls, and so on, each with their own power needs, translate to significant levels of power consumption, and consequently carbon emissions. The SMART 2020 report identifies that ICT is now responsible for around 2% of the total carbon emissions globally, not a number to be scoffed at, considering that it ranks ICT above the much-maligned airline industry in terms of carbon emissions.

Enter Green ICT

As the impact of ICT on the environment becomes increasingly non-trivial, a new branch of ICT solutions has gained in mindshare over the last few years – Green ICT – ICT solutions that are geared to reduce the ICT sector's own carbon emissions (termed 'Green of ICT' in some literature), and also, more crucially, can help in reducing the carbon emissions of other non-ICT related sectors as well (termed 'Green by ICT'). Described below are some key segments of Green ICT and the families of solutions included in each.

DATA CENTRES

- Virtualisation
- Thin Provisioning
- Data Deduplication
- Energy Management

LOGISTICS

- Supply Chain Planning Systems
- Transport Management Systems
- Warehouse Management Systems
- Manufacturing Execution Systems

eSERVICES

- Telecommuting/ Conferencing
- ePaper
- Online Media
- Shared Services

BUILDING MANAGEMENT

- HVAC Systems
- Energy Management
- Smart Windows
- Integrated Photovoltaics

While ICT has revolutionised the quality of life, there is a downside in its adverse impact on the environment

Green ICT holds the promise to make ICT more environment-friendly and more importantly, help other industries reduce their adverse impact on the environment as well

As per the SMART 2020 report, Green ICT solutions could deliver approximately 7.8 GtCO₂e by 2020, representing a very significant 15% of the total emissions in 2020 based on Business As Usual estimations. In economic terms, this carbon efficiency would equate to savings of close to US\$ 1 trillion by 2020. Given below is a breakdown of the impact of Green ICT by the four segments cited above:

POTENTIAL CARBON EMISSION SAVINGS BY ICT (BY 2010)			
Data Centres	166 MtCO ₂ e	Building Management	1.68 GtCO ₂ e
eServices	460 MtCO ₂ e	Logistics	1.52 GtCO ₂ e

Green ICT is offering a myriad of benefits to client firms that are not just limited to environment-friendly gains

Benefits of Green ICT

Green ICT solutions from the segments outlined above are already being adopted by clients in a range of industries. And most importantly, these benefits are not limited only to environmental benefits. As illustrated in the instances below, firms adopting Green ICT solutions achieve concrete business efficiencies and savings as well, in addition to a reduction in their adverse impact on the environment. This makes Green ICT a far cry from the 'white elephant' that it is sometimes mistakenly understood to be.

1. Elimination of paper usage (eServices): ePaper solutions that eliminate reliance on paper via increased usage of ICT help slow down deforestation and at the same time bring significant cost savings to companies in terms of lowered spending on paper and warehousing.
2. Route planning systems (Logistics): Optimising delivery routes helps reduce harmful carbon emissions, and also translates into considerable savings on fuel costs and time for the firm.
3. Energy Management Systems (Building Management.): Deploying such 'smart building' solutions helps reduce carbon emissions by optimising energy usage in the buildings and at the same time, confers cost savings as well as greater automation and control over building operations such as lighting, heating, ventilation, alarm systems, and access control.

US\$ 400 billion of economic stimulus packages globally allocated to Green technologies

27% of total venture capital in Q3 2009 flowed into Green technologies



SIZEABLE OPPORTUNITY IN GREEN AND GREEN ICT

While Green ICT does indeed make a strong case, it would be hard to convince business owners to invest significantly in it, without there being evidence of a sizeable opportunity and of significant spending pouring into the sector. This section presents some compelling figures and arguments for the business case in developing and adopting Green products and services and Green ICT in particular.

1. Green is 'Stimulating':

A report authored by economist Lord Nicholas Stern and presented at the G20 summit in 2009 estimated that almost US\$ 400 billion of the total US\$ 2.3 trillion in economic stimulus allocations announced by G20 nations are earmarked for clean or 'Green' technologies (of which Green ICT is a subset). This shows that the overall investment climate for Green technologies in general is very encouraging.

2. Green is the new darling of venture capitalists:

Green technologies have been among the fastest growing technology areas for a few years now, in terms of venture capital financing. Now, Green tech has outpaced traditional venture capital favorites, Software and Biotech, in terms of total size of investing as well. As per data released by the Cleantech Group, Green technologies raked in 27% of the total venture capital invested in the 3rd quarter of 2009, compared to 24% for Biotech.

The above points illustrate that Green technologies are finding favour from governments as well as from the investment community's soothsayers. Green technologies are here to stay and the heavy investment flowing into them is indicative of the large-scale adoption by client companies that is expected globally in the very near future.

What about Green ICT?

Focusing our lens closer on Green ICT, the story remains just as attractive. A study conducted by Frost & Sullivan end-2009 estimated the expected spending on Green ICT products and services over the next five years, classified by its four broad segments. The numbers are presented below:

ADDRESSABLE CUSTOMER SPENDING (BY 2014)			
Data Centres	US\$ 16 billion	Building Management	US\$ 14 billion
eServices	US\$ 19 billion	Logistics	US\$ 20 billion

Almost US\$70 billion of addressable market opportunities identified in Green ICT (as defined by the 4 segments shown) for the next 5 years

GREEN ICT SOLUTIONS FINDING ACCEPTANCE GLOBALLY

Both clients and vendors globally are warming to the idea of ICT solutions that are environment-friendly.

Among clients

Bellwether companies from a range of industries are fast realising that going Green is not a luxury item but rather a shrewd investment that can reap them quantifiable benefits in terms of cost efficiencies and optimisation of business processes. Also, it allows as well as gain corporate goodwill as they reduce their carbon footprints. Presented below are some instances of recent Green ICT implementations at major firms:

- 1) TeliaSonera, a major telecommunications services provider in Europe, deployed Cisco Systems' Telepresence Manager solution with the aim of reducing its business travel costs and while, reducing its carbon footprint at the same time. As a result of the deployment, TeliaSonera saved over 10,000 work hours annually and reduced its carbon emissions by almost 400,000 kg annually.
- 2) Kraft Foods, the second largest food products company in the world, deployed Oracle's Transportation Management and Supply Chain Management solutions with the aim of driving down the cost of transportation for its refrigerated networks and to achieve aggressive sustainability goals. The deployment helped Kraft shave away more than 500,000 transportation miles annually.
- 3) Alberici Constructors, one of the leading construction firms in the United States, implemented Johnson Controls' building Management System at its world headquarters, with the aim of making the building a model of sustainable design and construction. Post-deployment, the building proved to be 60% more energy efficient than a conventional building and achieved a Platinum certification from LEED, a widely recognised standard for environment-friendly buildings.

Among vendors/ service providers

The growing client interest in realising the business efficiencies and corporate goodwill that Green ICT can help achieve, coupled with the increasing number of emissions-related regulations that are coming up, have alerted global ICT majors to the opportunities in this space and they are responding by expanding their Green products/services portfolios. A sample of these ICT companies includes bigwigs such as IBM, Honeywell, Cisco Systems, Siemens, Johnson Controls, HP, Juniper Networks, BT, SAP, Oracle, Hitachi, Polycom and Schneider Electric.

Major firms from diverse industries are finding value in deploying Green ICT solutions

Heavyweights from the ICT industry are now offering Green ICT solutions to their customers

SINGAPORE AS A CENTRE OF EXCELLENCE FOR GREEN ICT

Singapore is well placed to develop as an important centre for Green ICT. This section elaborates on the key factors that support this idea:

1) Government focus on Green

The Singapore government has identified Green technologies as a key thrust area, with an expectation of around 18,000 new jobs created and S\$ 3.4 billion added to the country's GDP by 2015. An Inter-Ministerial Committee on Sustainable Development (IMCSD) comprising five ministries has been set up to achieve this. There are plans to give subsidies and incentives to companies that adopt Green technologies. Most importantly, a S\$ 680 million fund has been set up for R&D and manpower training in the field of sustainable technologies. As for Green ICT in particular, adopting a whole-of-government approach, International Enterprise (IE) Singapore works with relevant key government agencies to spearhead the development of this sector in Singapore and international markets. The ongoing efforts and key initiatives for the sector are outlined below:

Economic Development Board (EDB) Singapore

For some information-intensive businesses, data centres represent half of the corporate carbon footprint. Under EDB's Urban Solutions initiative, EDB is working jointly with IDA to encourage companies to use Singapore as a Living Lab to test-bed and further develop Green data centre solutions in Singapore. Efforts include the promotion of R&D, test-bedding and implementation activities, covering building, mechanical, software, hardware and services to deliver integrated solutions that will significantly lower energy consumption in data centres.

Infocomm Development Authority (IDA) Singapore

To help reduce the energy consumption and operating costs of data centres (DCs) and enhance their competitiveness, IDA is partnering other government agencies and industry to develop a Singapore Standard for Green DCs. A Green DC Standards Working Group under the industry-led Information Technology Standards Committee (www.itsc.org.sg) has been formed to drive the development of the standard.

The Green DC Standard will help organisations establish systems and processes necessary to improve the energy efficiency of their DCs. It will provide them with a recognised framework as well as a logical and consistent methodology to achieve continuous improvement in their DC facilities. This standard is being modelled after the ISO 50001 standard on energy management (currently under development by ISO) but will be specifically tailored to meet the needs of DCs in Singapore. The standard is expected to be published by end 2010.



Singapore's government has identified Green technologies as a key thrust area

International Enterprise (IE) Singapore

Green ICT is a key focus sector identified by IE Singapore for overseas expansion. Tasked to develop Singapore's external economic wing, IE Singapore would play the role of consolidating, promoting and bringing relevant connections to the four key sectors of data centres, buildings, logistics & e-services under its "Export of Green ICT initiatives". Taking a more holistic approach towards overseas promotion of Singapore's Green offering, IE Singapore has also recently formed a Green Programme Office to serve as IE Singapore's brain trust for the emerging Green Economy. Under the four main terms of reference – Think Tank, Promotion, Connection & Capability Building, the GPO aims to ready Singapore companies to make the most of this new business model. Among its recent efforts, IE Singapore:

- Initiated a CXO Green ICT workshop in Q4 2009 to educate local companies on Green ICT and its potential market opportunities.
- Kick-started the Green ICT Assessment with the objectives of assessing Singapore companies' capabilities in Green ICT and developing go-to-market strategies to penetrate overseas markets.
- Supported business associations and companies in several overseas Green-oriented missions and tradefairs.

Singapore Business Federation (SBF)

SBF inaugurated the Sustainable Development Business Group (SDBG) in January 2009 to facilitate commercialisation and adoption of energy efficient solutions and clean and Green technologies among Singapore firms. It also focuses on eco-city or Green urban solutions, sustainable manufacturing, sustainable transport and logistics and environmental pollution. As part of its remit, SBF-SDBG has undertaken the following efforts:

- Initiated a Green IT Survey in Q2 2008, to determine Singapore companies' current level of interests, adoption and implementation plans in Green IT & Computing.
- Published the Singapore Sustainable Development Industry Directory (now in its second year), featuring a comprehensive list of companies focused on Green practices and in the business of providing clean and Green solutions.
- Is a joint presenter of the Inaugural Green IT Awards 2010, aimed at recognising Singapore-based enterprises that champion holistic Green IT solutions.
- Led two business missions to China in late 2009 to explore Green business opportunities, resulting in the signing of two Memorandums of Understanding.

Singapore has a growing reputation in allied areas of alternative energy



Singapore Infocomm Technology Federation (SITF)

SITF has founded the Green IT Pro Tem as a start-up phase of the Green IT Chapter that aims to raise awareness in the industry regarding the adoption of environmentally conscious best practices. The team has formed three sub-committees:

- The Education for Sustainability Workgroup will drive the agenda for member education across issues relating to the Green Agenda, to demystify and to update members on current global and industry topics such as issues relating to climate change, operating models of the carbon economy and carbon trading, and the business case for Green IT.
- The Green Solution Innovations Workgroup will support members of SITF who provide solutions and tools for Green IT and Energy Efficiency, driving activities which will facilitate go-to-market collaboration to deliver end-to-end Green IT solutions to the marketplace, and provide a platform for solution providers to engage in go-to-market activities.
- The Green CIO Workgroup was defined in recognition that the marketplace for our members is partially dependent on the level of commitment of CIOs to adopting Green IT. It will seek to educate and engage CIOs through activities which will help CIOs better understand solutions and the business case for Green IT.

2) Singapore's exemplary standing in allied areas

Singapore's Green ICT prospects should also benefit from the island-state's growing reputation in allied areas of alternative energy. Singapore has already attracted interest from some marquee players from such sectors as wind energy, solar energy etc. For instance, Vestas Windy Systems, the world's largest manufacturer of wind turbines, set up its Asian headquarters in Singapore in the year 2006, with the intention of investing up to S\$ 500 million over 10 years in a full-fledged R&D centre here. Another example is the S\$ 150 million collaboration between Rolls Royce and Singapore consortium, EnerTek, to develop a commercially viable power system based on fuel-cell technology. Other instances include Peter Cremer's now under-construction biofuel plant and Singapore-based Solar Energy Power, which manufactures high-quality silicon solar cells for assembly into solar modules.

3) Presence of entrenched players in Green ICT technologies

Singapore serves as regional headquarters to several big global ICT vendors/ service providers that offer Green portfolios. This has increased Singapore's visibility in the region. In addition, there are several local ICT firms in Singapore that are responding to the growing demand for Green solutions by expanding their product/services offerings. Some of them are showcased in the next section.

SHOWCASING SINGAPORE'S GREEN ICT PLAYERS

Foreseeing the burgeoning demand for sustainable ICT solutions, several Singapore-based ICT players have already started offering solutions geared towards bringing their clients enhanced efficiency and savings, along with a reduction of adverse impact on the environment.

In the table given below, we present some Singapore-based ICT players and their Green capabilities as per the segments of Green ICT defined earlier in the paper:

SEGMENT	COMPANY	SERVICE OFFERINGS
Building Management	CNA	Energy Management Systems
	G-Energy	Consulting services on all aspects of Building Management
Data Centres	1-Net	Virtualisation; Energy Management; Thin Provisioning (coming soon); Data Deduplication (coming soon)
eServices	InfoTech	Shared Services
	TrustedHub	ePaper; Shared Services
	CrimsonLogic	ePaper
	Emerio	Shared Services
Logistics	InfoWave	Transport Management Systems

Presented next are four case studies, one from each of the four segments of Green ICT, to highlight instances where local Singapore firms have helped their clients achieve a host of Green as well as business benefits.



BUILDING MANAGEMENT SYSTEMS – A CASE STUDY

Towards an eco-friendly and connected hospital

(CNA Group Ltd.)

Client Context:

The client, Khoo Teck Puat Hospital, a 550-bed state-of-the-art facility in Singapore, is scheduled to open in early 2010, and is expected to be fully operational by 2012. The hospital is set to offer the full range of medical facilities with 19 wards, 2 Intensive care units, 90 consultation rooms and 8 operating rooms. The S\$ 800 million healthcare institution will be able to cater to some 600,000 residents in Singapore.

The hospital wishes to be the first building in South East Asia to adopt what has been termed 'Connected Real Estate Technology', which digitally converges various hospital subsystems onto a single network. When completed, the hospital intends to set a new building standard for future hospitals in the region.

CNA's Solution:

To achieve the client hospital's aims, CNA is leveraging on its powerful integration framework technology called LEAP Smart Facility System. Implementing the platform has enabled a number of features as detailed below:

- 1) The platform is able to pull together data from disparate hospital subsystems – even if they operate on different technologies and protocols. The platform is able to combine together such varied systems like video surveillance, access control, nurse call system, data centre equipment and energy management systems onto one unified Internet Protocol ('IP') network. This enables real-time visibility and control over the entire hospital's portfolio of subsystems.
- 2) CNA is working hand-in-hand with its subsidiary, GETC Asia Pte. Ltd. to implement a full spectrum of 'Green' initiatives aimed to create a clean, healthy, comfortable and energy-efficient environment in the hospital. Eco-friendly technologies that are being deployed include:
 - a) Germicidal UVC emitters for the air-conditioning system to eliminate bacteria, viruses and mould.
 - b) Titanium Dioxide for removal of odors and bio-aerosol.
 - c) Green fuel cell back-up power.
 - d) Rain-sensors for weather-responsive control.
- 3) The solution also allows for mobile terminals such as PDAs, tablet personal computers and notebook computers to be enabled to provide immediate access to patients' data and images from every point of care – covering the entire gamut of processes from patient registration to release.

CNA is deploying a range of Green initiatives at Khoo Teck Puat Hospital, an upcoming full-service hospital in Singapore

Expected Benefits:

Implementing CNA's solution would help the new hospital fulfill its vision of being an eco-friendly, 'hassle-free' and patient-centric healthcare establishment. The hospital is expected to achieve the following:

Green Benefits:

The **optimised energy usage** afforded to the hospital in the form of installations such as weather-responsive controls, should allow for a reduction in its energy consumption, which would in turn lead to a lower carbon footprint on the environment.

The **Green fuel cells** installed as back-up power sources should further contribute to a reduction in the attributable carbon emissions.

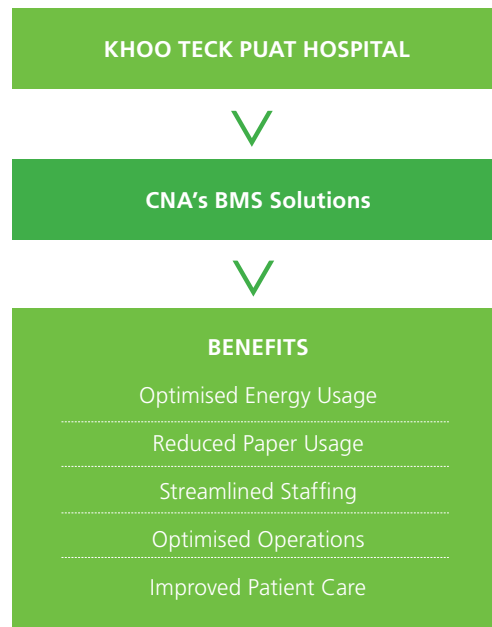
Increased digitisation of the processes should **free up paper usage**, thus increasing the environmental benefits.

The streamlined operations and processes should enable the hospital to **optimise its staffing resources** and therefore, result in lower energy usage.

Business Benefits:

Real-time visibility and control over the entire portfolio of hospital subsystems would enable **streamlined operations** and a resultant increase in productivity.

In addition, the increased usage of mobile technologies should lead to **improved levels of patient care and comfort**.



CNA's solutions are helping the client to its achieve aim of being an eco-friendly, hassle-free and patient-centric healthcare establishment. Its powerful integration framework is enabling real-time visibility and control over the entire portfolio of subsystems, while simultaneously resulting in energy optimisation



eSERVICES – A CASE STUDY

Single platform to optimise, automate and improve interactions with the judicial systems (CrimsonLogic Pte. Ltd.)

Client Context:

United Arab Emirates (UAE), providing more than 10% of the world's oil resources, is aiming to evolve itself into a leading business hub. UAE understands that one of the pre-requisites to achieve this status would be to provide citizens and businesses with an effective and transparent judiciary system. With this in mind, the Ministry of Justice identified that significant gaps remained in the delivery and administration of the policies being framed and there was a need to develop a single IT platform that would bring together the entire judicial ecosystem and provide automation, process improvement, business intelligence, and be able to achieve these objectives in an environment-friendly fashion.

The limitations in the existing system at the time are highlighted below:

- 1) Stakeholders need to make several trips to the courts. With limited operation hours and no electronic collaboration between departments and ministries, the opportunity cost of conducting business became uneconomical. From an environmental standpoint, the numerous trips and the associated fuel usage translated into significant carbon emissions.
- 2) Timely access to information was also an issue as searches for paper-based records were time-consuming. Storing large volumes of documents became a cause of concern as well since availability of warehouse space was a major constraint. Again from an environmental standpoint, the reliance on paper coupled with the energy usage attributable to maintaining the warehouses, meant substantial carbon emissions.

The stakeholders held the view that addressing these challenges would be crucial to improve the credibility and transparency of the existing judicial system. It was imperative that the government take actions to remedy the situation.

CrimsonLogic's Solution:

To deliver on the government's intent, CrimsonLogic proposed a multi-component eJustice programme for a comprehensive transformation that would increase the effectiveness and efficiency to enable various stakeholders to interact, share information and collaborate. The programme included not only the delivery of the technology platform, but also extends to process improvement, change management, service usage through effective marketing and programme management. After careful analysis and deliberation with the client, key services that would maximise the impact of the new system were identified. Some of the key services identified from the business process re-engineering exercise and implemented by CrimsonLogic included –

- a) eJustice Portal
- b) Document Management System
- c) Legislation Draft Publication System
- d) ePayment System and
- e) eArchival System

The client, United Arab Emirates (UAE) Ministry of Justice, was looking to restructure its interface with an entire judicial ecosystem to make it to be more efficient, automated and environment-friendly



Demonstrable Benefits:

The eJustice system has been a resounding success and an example of how a government can successfully leverage on IT to speed up industry-governing processes. The system has brought about significant benefits:

Green Benefits

The **near-elimination of paper usage**, in itself, has been a significant environment-friendly benefit of the exercise.

Reduction in fuel usage as the need for stakeholders to commute to and fro to judicial offices was done away with.

Decrease in manpower and the energy savings associated with it, as the optimised processes reduced the need for intensive manual supervision.

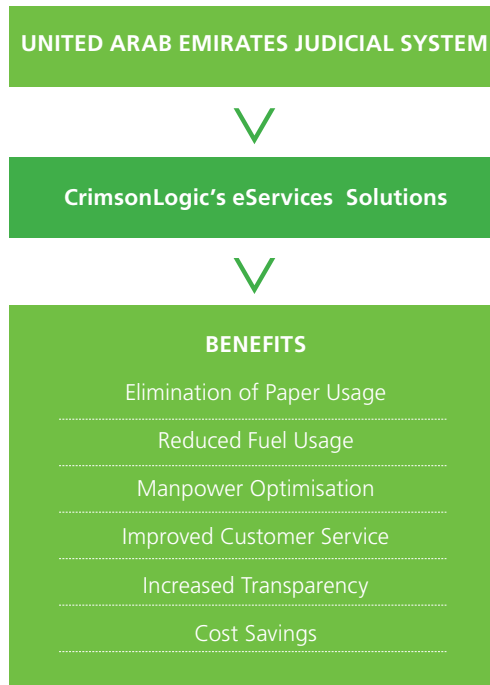
Other Benefits

Simple user interfaces minimised the need for training and ensured a quick migration to the new system.

Faster response time due to the electronic archival of documents. The average time needed to track and retrieve a case file was reduced from hours to mere seconds.

Cost savings owing to automated billing and collection through the ePayment module of eJustice. It resulted in accurate collection of revenues and simplified dealings with the public and the judiciary. These efficiency gains translated into substantial cost savings.

Increased transparency and accessibility afforded by the system served to promote trust in government processes.



Significant Green benefits were realised by the government in addition to meeting its core governance objectives

LOGISTICS – A CASE STUDY

Optimised operations coupled with Green benefits for major taxicab operator

(InfoWave Pte. Ltd.)

Client Context:

The client is a leading taxi cab operator in South East Asia with a fleet exceeding 15,000 taxis. The operator's customer contact centre caters to over 20 million taxi bookings annually and is regarded as among the best in the world.

The operator was looking to augment its advanced taxi booking system by using GPRS technology to connect to in-vehicle Mobile Data Terminals (MDTs) fitted into the taxis.

A MDT is a computerised telematics device used in a variety of vehicles such as public transit vehicles, taxi cabs, courier vehicles, commercial and military logistics. to communicate with a central dispatch office (in this case, the central dispatch office being the taxi operator's customer contact centre).

InfoWave's Solution:

Working alongside its local partner, ST Electronics, InfoWave provided its Waveon 738P range of MDTs to the taxi cab operator. The MDT device has been successfully installed in more than 10,000 taxis in the operator's fleet to date. The installation of the feature-rich Waveon 738P device has enhanced the operator's taxi fleet in a number of ways:

- 1) The MDT enables taxi drivers to receive taxi booking orders and respond to the calls quickly and efficiently.
- 2) Leveraging on the GPS receiver in-built into the MDT, the taxi operator's customer contact center is able to automatically select taxis closest to the calling customer's location.
- 3) The MDT comes equipped with a wide-screen TFT display that facilitates prompt display of booking reminders and digital maps for navigation to the customer's pick-up point quickly, thus reducing the waiting time for the passenger, and at the same time, reducing the wastage of fuel.
- 4) In the case of an emergency, the driver can transmit alerts via the MDT back to the taxi call center to ask for help to be dispatched immediately.
- 5) The MDT comes equipped with a text-to-speech feature that allows text messages such as pick-up locations displayed onto the terminal to be converted into speech. This feature enhances safety by ensuring that the driver's attention is not unnecessarily diverted off the road.

The client is a leading taxi cab operator looking to augment its state-of-the-art taxi booking system

InfoWave's Waveon 738P range of Mobile Data Terminals (MDTs) helped automate and enhance the taxi operator's fleet, and simultaneously facilitated numerous Green benefits

Demonstrable Benefits:

The Waveon 738P solution provided by InfoWave resulted in a number of benefits for the taxi operator. Some of them are highlighted below:

Green Benefits

Energy savings accrued from in-built features in the MDT – The device has an ON/OFF button at the centre of the touch screen display to allow the driver to switch off the screen when it is not in use. This enables the terminal to go into a power-saving mode, thus not drawing on the car battery. In addition, the vehicle tracking and location mapping capabilities of the GPS are functional even when in power-saving mode.

Reduction in fuel usage as the navigation features in the MDT helped optimise the distance traveled to reach customers' pickup points. In addition, the remote updating features in the system eliminated the need for drivers to take their taxis all the way to the taxi centres for taximeter and software updates, effecting further fuel savings.

The taxi operator also achieved **optimisation of staffing resources** as the solution led to manpower savings of 25% in the first year, accompanied by the associated environmental benefits.

Business Benefits

The **average number of jobs** dispatched and completed rose by close to 70%. The number of drivers completing ≥ 10 jobs/ day increased manifold.

Call booking volume increased by more than 100% within a year of the implementation due to the more efficient booking and dispatch cycle.

Booking cycle time was reduced by about 40%, allowing for more calls to be handled.

Network communication costs went down by 50%.

LEADING TAXICAB OPERATOR



InfoWave's MobileData
Terminal (MDT) Solution



BENEFITS

Reduced Fuel Usage

Manpower Optimisation

Reduced Communication Cost

Increased Call Booking Volume

Reduced Booking Cycle-time

Increase in Dispatched Jobs

Post-implementation, the taxi operator saw significant improvement in business metrics as well as savings in fuel costs and manpower



eSERVICES – A CASE STUDY

Eliminating paper usage to achieve streamlined and eco-friendly operations

(TrustedHub Pte Ltd)

Client Context:

The client is NTUC Income, a leading insurance firm in Singapore, with more than a million policyholders, looking to streamline and optimise its documentation process, and cut down on paper usage. Traditionally, NTUC Income had stored all its insurance policy documents in warehouses. Other than the large-scale usage of paper that is non-beneficial to the environment, there were **numerous inefficiencies with the existing arrangement** as highlighted below:

- 1) Over their lifetime of storage and handling (extending into decades in the insurance industry's context), the paper-based documents were prone to severe wear and tear. Even with humidity control systems in place in warehouses, there were chances of documents becoming illegible and invalid due to fading and mould-formation.
- 2) With the rising real estate costs, NTUC Income was finding it a strain to maintain its extensive warehouse facilities for document storage.
- 3) Issuing new policies was a time-intensive process extending into weeks. Documents needed to be sent from branch offices to headquarters by mail, where they were then routed to relevant departments for data entry, review and approval. This translated to **substantial energy spend in terms of fuel costs** over the lifetime of a document.
- 4) Since there was only one legally acceptable original copy of every document, access was restricted to just one person at a time.

TrustedHub's Solution:

NTUC Income contracted the services of TrustedHub Pte. Ltd., a Singapore-based provider of lean & Green Business Process Outsourcing solutions. TrustedHub delivered the following solutions:

- 1) Digitised all of the insurance firm's documents, ensuring full compliance with Singapore's statutory guidelines for digitisation. This meant that the digitised documents were legally binding and acceptable in Singapore's courts of law, in effect, replacing the paper-based originals.
- 2) Housed the digitised documents in its own off-site storage centre, providing the full range of document security, processing and disaster recovery services.

Operations involved large-scale usage of paper. Transporting documents back and forth resulted in substantial fuel costs. In addition, there were significant energy costs involved in maintaining warehouses

TrustedHub's solution helped NTUC Income turn its operations 'lean and Green', eliminating paper usage and associated environmental ills

Demonstrable Benefits:

The services rendered by TrustedHub resulted in a number of benefits and efficiencies for the insurance firm. Some of them are highlighted below:

Green Benefits

The **near-elimination of paper usage**, in itself, has been the most significant environment-friendly benefit of the exercise.

The insurer benefited from the **optimisation of its staffing resources**. The firm was able to free up 10 out of the 14 support staff required to run the earlier manual system, and assign them to other more useful functions after re-training and re-tooling them with new skill sets. In addition, online access to digitised documents allowed staff to telecommute, further bringing down energy usage.

Substantial **reduction in warehousing energy needs** as digitisation of documents eliminated the need for physical storage of policy documents.

Reduction in fuel costs as the repeated trips between warehouses and branch offices to transport the physical documents have been eliminated.

Business Benefits

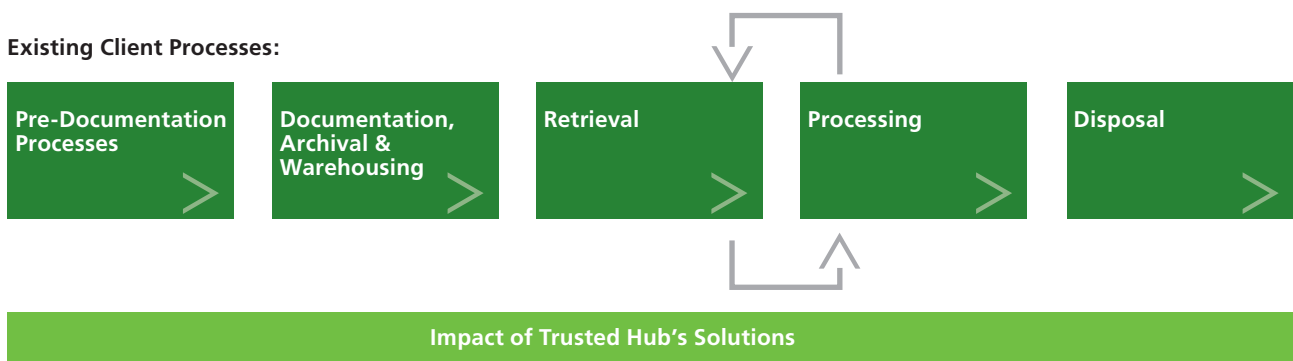
Cheaper storage costs for digital documents as opposed to paper-based documents. These storage cost savings are expected to soar even further as hard disk prices fall while real estate prices get bid up in Singapore.

Faster processing of applications, with the time taken to issue a new policy reduced from weeks to just three days.

Increased productivity amounting to savings of more than S\$10 million as the firm was able to better re-engineer its processes.

Reduced threat of losing documents to natural calamities or accidents as the insurer is now able to grant multiple access points for the documents.

Existing Client Processes:



- Reduced paper consumption
- Elimination of paper warehouse
- Leaner client organisation
- Recycling of redundant paper
- Reduced transportation

== **Net Reduction in Carbon Footprint**

ANNEX

SINGAPORE'S GREEN ICT PLAYERS

In this section, some of the local ICT players have been profiled, highlighting their:

- Products/ Services portfolios that are Green in nature,
- Continuing efforts and initiatives to be Green and
- Instances of client work where they have helped companies reduce their Carbon footprints in addition to delivering on their business objectives.

These companies represent a diverse cross-section of the Green ICT vendor ecosystem, spanning segments such as eServices, Building Management Systems, Logistics, as well as Data Centres.



CNA Group Limited

Founded in 1990, CNA is in the business of delivering vital control and automation solutions to buildings and industrial plants across the Asian region. The firm has thrice been recognised as among Singapore's Top 50 companies and has won several energy efficiency honours.

Product/ Services Portfolio

CNA's flagship product, SIRIUS, provides a flexible platform to integrate disparate building systems and facility management systems. The product's energy management applications include weather responsive controls, daylight harvesting, lighting sweeps and demand-controlled ventilation. These are complemented by CNA's other Green building technologies such as fuel cells, UVC emitters, air catalysts and high-end filtration and fan systems. The firm is also involved in training professionals in the adoption of Green building technologies, for instance, providing Green Mark training at the BCA Academy.

Green Initiatives

CNA has built considerable visibility in the Green space, having delivered papers in several conferences and conducted seminars for organisations such as World Energy Council, NEA, BCA, PUB, JTC, ASHRAE and several educational institutions such as NUS and NTU, and some local polytechnics.

Client Work

CNA bundles 'Green Consultancy' services along with its control and automation solutions for its clients to help them lower their carbon footprints and win prestigious awards like the BCA Green Mark and ASEAN Energy Efficiency Awards. For instance, CNA helped Seagate win the Green Mark Platinum Award, helping Seagate shave off 31% from its electricity bills, equivalent to CO2 emission reduction of 23,637 tons a year.

CrimsonLogic Pte. Ltd

Founded in 1988, CrimsonLogic provides end-to-end eGovernment solutions in trade facilitation, judiciary, tax, healthcare and IT security. The firm has delivered eGovernment projects in more than 20 countries and has won numerous awards and accolades.

Product/ Services Portfolio

For more than two decades, CrimsonLogic has been providing solutions to governments globally to help them collaborate with citizens in an effective seamless and sustainable fashion. Its flagship solutions include TradeNet (a nationwide electronic trade network in Singapore), Electronic Filing System (EFS) and eStamping. Together, these solutions have helped governments expedite processes for citizens and concurrently save millions of paper sheets every year.

Green Initiatives

CrimsonLogic has seen the increasing need from countries to cut back on their "paper submission" procedures, not only to save administrative time, but to conserve natural resources. With this in mind, CrimsonLogic is continuing to invest in the development of sustainable solutions that enable users and government to enjoy ease of administration in a paperless mode.

Client Work

Since its inception in 1988, CrimsonLogic has worked with governments in more than 20 countries across Asia, Middle East, Latin America and Africa. CrimsonLogic has delivered leading eGovernment solutions to optimize workflow and increase operational efficiencies, enhancing the country's competitiveness and generating enormous savings in terms of time and costs.

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Emerio Globesoft Pte Ltd

Founded in 1997, Emerio is an IT Services and Outsourcing company offering Application Services, Infrastructure Services and Business Process Outsourcing. Emerio was voted among Singapore's Top 50 companies in 2009 and was featured consistently among top global Outsourcing firms.

Product/ Services Portfolio

Emerio offers deep industry knowledge and business process expertise in Application Services, Infrastructure Services and Business Process Outsourcing serving clients in Banking, Government, Logistics, Manufacturing, Pharmaceuticals and Technology. The firm has developed a proprietary analytics-driven methodology called EABC that helps its customers achieve year-on-year reduction in operational costs and the environmental benefits associated with them through effective resource and capacity optimisation.

Green Initiatives

Foreseeing the nascent, but growing demand for 'Green' solutions in the region, Emerio continues to invest significantly in R&D to develop solutions that helps its clients achieve their aims of reducing operational costs, while simultaneously reducing their carbon footprints.

Client Work

Providing managed services to a global IT manufacturing and services company, Emerio was able to use its EABC methodology to reduce the client's cost of operations by over 27% in just a 4-month period. In another engagement, Emerio delivered an integrated waste management system, enabling the client to electronically archive records, saving immensely on printing costs. These are instances where Emerio's solutions have helped clients achieve significant cost savings and consequently, a reduction in the carbon footprint as well.

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G-Energy Global Pte. Ltd.

Founded in 2005, G-Energy is a leading Energy Services Company (ESCO) providing energy optimisation services to building clients across Asia. Accredited by Energy Sustainability Unit (ESU) of Singapore, it is also certified to provide training for Singapore Certified Energy Managers (SCEM) and Green Mark Manager/ Professional courses by Building & Construction Authority (BCA).

Product/ Services Portfolio

G-Energy services include Audit, Test & Commissioning, Energy Remote Monitoring, Optimisation Design, Training, Performance Contracting & Retrofit and carbon trading. The company specialises in energy savings and acquisition, and analysis of mechanical and electrical engineering data relating to the operation of buildings.

Green Initiatives

G-Energy is accredited by the Energy Sustainability Unit (ESU) of Singapore. The firm is engaged with three Key Qualified Personnel (KQP) and a professional team of Green Mark Managers (GMM), Green Mark Managers Professional (GMP) and GBI Facilitators. In 2009, G-Energy also received an award for Customer Value Enhancement through Energy Efficiency Solutions for Building from Frost & Sullivan, a global growth consulting company.

Client Work

G-Energy has several award winning projects to its credit in the region. The firm was appointed by Tuas Power Supply Private Limited as an official Energy Consultant in 2007, to assist its clients in reducing energy consumption. Such partnerships are indicative of G-Energy's favourable reputation among clients. In 2008, the company achieved two first-of-their-kind foreign Green Mark Consultancy projects – G-Tower (Malaysia) and Tuan Sing (Shanghai, China).

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InfoTech Global Pte Ltd

Founded in 1995, InfoTech is an IT Services company with varied offerings in Business & Information Management Consulting, Technology Solutions Provisioning, Systems Integration and Outsourcing Services.

Product/ Services Portfolio

InfoTech has invested significantly in training its solution developers to work on power-efficient solutions from vendors like IBM, Cisco, and APC Schneider. The solutions offered by InfoTech span Green IT products such as Blade servers, Virtualisation and Precision Cooling. InfoTech also educated current/potential customers on how Green IT solutions can help them realise cost savings and simultaneously reduce their carbon footprint.

Green Initiatives

InfoTech is running several in-house initiatives towards the aim of becoming Greener itself. The firm recently adopted a smarter back-office solution to reduce paper usage. The office buildings are being retro-fitted with double glazed windows to reduce cooling requirements. Majority of InfoTech's offshore data centre servers have been replaced by energy-efficient Blade servers. InfoTech is a member of the Green IT chapter of SITF.

Client Work

InfoTech has designed and implemented Green Data Centres for several clients. It aims to begin capturing exact benefits measurements (in terms of cost savings and carbon footprint reduction) for future assignments.

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InfoWave Pte Ltd.

Founded in 2002, InfoWave is a leading provider of telematics products, solutions and services, with presence in Asia Pacific, Europe and the Middle East.

Product/ Services Portfolio

InfoWave offers a wide range of telematics products (vehicle trackers and mobile data terminals) and solutions (fleet management and taxi dispatch). These products and solutions are targeted at both corporate and government clients in industries such as transportation, logistics, public safety, homeland security and defense, helping them track their fleets, mobile assets and field operations.

Green Initiatives

InfoWave's products are tested and certified to conform to international standards of safety, quality and environmental regulations such as CE, RoHS and eMark. The firm intends to continue investing in R&D of energy-efficient solutions. Moving forward, InfoWave intends to organise its sales and marketing efforts towards consciously promoting its solutions as Green, in light of growing demand from key markets for such solutions.

Client Work

InfoWave has worked with several fleet owners with the explicit aim of becoming Greener, reducing expenses and generating higher margins. InfoWave's solutions have helped clients improve their fleet efficiency, reduce fuel consumption and decrease vehicle operating costs, benefits that add towards a Greener environment. Studies undertaken by InfoWave's clients have shown reduction in average travel time of up to 15% fuel savings of up to 15% and fleet utilisation improvement of up to 13%, all supporting a Greener environment by decreasing carbon footprints.

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TrustedHub

Trusted Hub Ltd

Founded in 2001, TrustedHub has grown into one of the leading providers of Business Process as a Shared Service (BPaaS) in Asia. The firm specialises in processing documents into e-versions that are legally binding.

Product/ Services Portfolio

TrustedHub provides Lean & Green Business Process Outsourcing solutions and services by running clients' middle office data processing functions in its shared service environment. The firm helps companies image and store their documents through its Singapore Evidence Act compliant processing and hosting systems. The other key thrust of the firm is in utilising lean methodology in data processing to eliminate waste and improve productivity.

Green Initiatives

TrustedHub continues to educate clients and invest significantly in R&D to develop solutions and shared services that help companies reduce space, equipment, energy and manpower requirements in performing their tasks, leading to cost savings as well as considerable benefits to the environment.

Client Work

TrustedHub has helped several clients reduce their paper by switching to electronic documents. TrustedHub enabled NTUC Income go digital in 2002 with more than 20 million documents being converted into image files resulting in savings of more than \$1 million over 5 years. The firm was also instrumental in establishing the first paperless Singapore polyclinic in Bt Batok digitising more than 127,000 patient records. The considerable paper savings achieved in both cases helped cut down on paper usage as well as eliminate warehousing and transportation costs, reducing the carbon footprint significantly.



A MEDIACORP Enterprise

1-Net Singapore Pte. Ltd.

1-Net Singapore is a wholly-owned subsidiary of Mediacorp Technologies, is a leading provider of Infocomm technology solutions. The company was one of the pioneers of broadband development in Singapore.

Product/ Services Portfolio

1-Net provides a range of full-featured hosting and related services tailored to meet the entire spectrum of hosting needs within their telco-grade hosting environment, monitored and managed 24/7 by a dedicated team of engineers. Along with managing telco-class internet data centres, 1-Net also provides domestic and international connectivity, managed security, media delivery services and consultancy.

Green Initiatives

1-Net has been continuously investing in R&D to develop and deliver products and solutions that would help drive business growth and cost savings for the customers, reducing their energy consumption and carbon emissions. Resulting cost savings in energy expenditure are in turn passed on to the customers. 1-Net underwent a technical assessment study sponsored by the Japanese government which rated its data centre operations as environment-friendly.

Client Work

1-Net has an established clientele which includes AT&T, KDDI, SISTIC, Keppel Corporation, Esplanade, Singapore Airlines, Singapore Institute of Management, HP, Toshiba and IDA Singapore. They have benefitted immensely in terms of cost and energy savings from 1-Net's data centre solutions over the years.



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