'Cool' idea may potentialy cut one-third in tropical data centers' energy bills

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Nanyang Technological University (NTU) and Toshiba have developed an advanced cooling technology that will enable data centres in tropical countries to be more energy efficient, cutting energy bills by one-third.

Researchers are now test-bedding a new data centre that combines Toshiba's air cooling technology with NTU's advanced info-communications technology (ICT).

The innovative test-bed located in Singapore, aims to provide a sustainable solution for data centres operating in South-East Asia's tropical climate. This is done by using cutting-edge modular structure – container-sized modules which can stand alone or be combined together for more computing power – coupled with a smart cooling system.

This new cooling system makes use of the air outside the data centre for cooling purposes whenever feasible, such as when the outside air temperature is lower than the hot-air temperature inside the data centre. Most data centres use air-conditioning to cool their high speed computers round the clock, using re-circulated air regardless of its temperature, thus churning up a huge energy bill, as it takes more energy to cool down hot air.

The new ICT technologies developed by NTU will optimise the use of computer servers in the data centre by consolidating multiple applications from different servers into one server, then putting the other servers which are not in use into sleep mode, saving both electricity and

the energy needed to cool them.

Data centres, which house and maintain back-end information technology (IT) systems and data stores consisting of mainframes, servers and databases, typically consume 100 to 200 times more energy than office buildings and the energy cost is estimated to be around 50 per cent of an office's operating costs, according to the Department of Energy in the United States.

In Singapore, the capacity of data centres is growing at a rate of 15 to 20 per cent per year. Data from the Infocomm Development Authority (IDA) of Singapore shows that the top 10 largest data centres in Singapore in total consume an energy equivalent of 130,000 typical households - which is more than 10% of all households in Singapore.

If successful, the Toshiba-NTU advanced cooling technology can be implemented in Singapore and South-East Asia, which would result in significant savings of both energy and operating costs for governments and companies.

With energy costs ever rising, data centres around the world have an urgent need to reduce their energy consumption to cut costs and to conserve the environment. The technologies employed in this test-bed have already demonstrated impressive energy savings of up to 40 per cent as compared to conventional data centres in Japan. Simulations also indicate that the new system could reduce 2,800 tonnes in carbon dioxide emissions.

This new modular data centre prototype is managed by an international research team from Toshiba, Energy Research Institute @ NTU (ERI@N), and the university's School of Computer Engineering (SCE), under the Green Data Centre Innovation Challenge by the Singapore Infocomm Development Authority.

Professor Subodh Mhaisalkar, Executive Director of ERI@N, said that energy efficiency solutions for residential and industrial sectors are one of the key areas of research for his centre.

"Data centres, essential for our IT-intensive telecommunications, data transmission and financial sectors, represent one of the highest levels of energy utilisation in Singapore," Prof Mhaisalkar said. "These co-developed cooling solutions, leveraging NTU's expertise in sustainability engineering and technology, will allow us to significantly reduce the energy consumption in modern data centres. I believe that similar approaches and solutions will be adopted for use quite readily in our push to develop green and more energy efficient buildings."

Mr. Ryuji Maruyama, General Manager of Toshiba's Smart Community Division, welcomed the start of the test-bedding, as the transition to Big Data and cloud computing is bringing with it huge demands for energy needed to power and cool data centres.

"The Singapore Infocomm Development Authority has recognised that our modular data centre solution with outside air cooling technology can make a significant contribution to solving this problem. We are confident that our collaboration with NTU will result in a successful demonstration of our technology and position us to contribute to the development of the data centre sector in Singapore and its expansion throughout South-East Asia," Mr Maruyama added.

Associate Professor Ng Wee Keong, Associate Chair of Research from NTU's School of Computer Engineering, said that this is one of the first academia-operated green data centre in the world used for research purposes.

"The technologies under development for this test bed will spearhead Singapore's research in green data centre technological know-how. The

data collected will be available to researchers all over the world for further analysis, and to further establish Singapore an international hub for data centre research and deployment."

Provided by Nanyang Technological University