Spring Singapore

Singapore Government
Integrity • Service • Excellence (http://www.gov.sg)

30 Sep 2013
NR/30/2013
Innovative Used Water Technologies Take Centre Stage In PUB-SPRING Joint Grant Call

$2.5 million awarded to seven local enterprises to develop solutions for used water sector

1. Seven local enterprises have been awarded $2.5 million to develop innovative used water treatment technologies following a competitive grant call by SPRING Singapore and PUB, Singapore's national water agency.

2. The seven SMEs and start-ups will develop applications for both industrial and domestic used water treatment, employing exciting technologies which include :

- A treatment solution for oily used water from food waste;
- A compact and anti-fouling membrane system for used water produced by the food & beverage industry; and
- A high durability and cost-competitive ceramic membrane for water purification.

3. Currently, Singapore produces 330 million gallons or more than 600 Olympic-sized swimming pools per day of used water. The amount of used water produced is expected to grow in tandem with the demand for water and to double by 2060. To keep pace with Singapore's rapidly growing used water sector, plans are underway to open a new water reclamation plant in Tuas at the heart of the Deep Tunnel Sewerage System (Phase 2), which will open up more avenues of opportunity for technology providers.

4. When fully developed, these technologies can enhance the efficiency of used water treatment processes and also reduce industrial water consumption through recycling used water. Used water solutions such as these are also increasingly needed to ensure that stringent water discharge standards in Singapore as well as internationally continue to be met.

5. Ms Chew Mok Lee, SPRING Singapore's Assistant Chief Executive, said, "SPRING Singapore collaborates with industry leaders such as PUB to support local SMEs in developing their technologies for a mutually beneficial outcome where the SMEs' innovations can meet PUB's needs. We encourage more large companies to partner us in supporting local SMEs and help validate the commercial value of these technologies. Such co-innovation gives large companies access to the latest innovations, while SMEs can build up their track record and capabilities for enhanced competitiveness."

6. Mr Harry Seah, PUB's Chief Technology Officer and EWI's Director of Technology Development, added, "Building up R&D capabilities in local water ecosystem has always been the key driver for EWI to grow Singapore water industry. With the complex nature of used water technology, the opportunity to test-bed is an important element which allows companies to put their innovations through the rigour of treating actual used water inflows. Technologies which pass this test can look forward to potential applications in future water reclamation plants or accelerate their commercial development in the industrial sector."

7. The inaugural PUB-SPRING joint grant call was launched in December 2012 with a dual-mission – 1) to support local SMEs and start-ups in developing and commercialising innovative technologies for our used water treatment systems, and 2) to explore test-bedding opportunities of technologies which can meet Singapore's future used water needs.

8. The joint grant call is administered through the Environment and Water Industry Programme Office (EWI) – an inter-agency outfit comprising PUB, SPRING, Economic Development Board and International Enterprise Singapore – which spearheads the growth of Singapore into a global hydrohub through a three-pronged strategy – 1) Capability Development, 2) Cluster Development and 3) Internationalisation of Singapore-based companies.

9. Details of the the seven grant awardees and the funding support for the PUB-SPRING joint grant call are in Annex 1.

About Environment and Water Industry Programme Office
The Environment & Water Industry Programme Office (EWI) was set up in May 2006 to spearhead the development of the environment and water industry. Led by PUB and working with partner agencies such as EDB Singapore, IE Singapore and SPRING Singapore, EWI adopts a three-pronged strategy with technology as a key driver. Our vision is to grow value-added (VA) contribution from the water sector from $0.5 billion (0.3% of GDP) in 2003 to $1.7 billion (0.6% of GDP) by 2015. For more information, please visit **www.ewi.sg (http://www.ewi.sg)** .

About PUB
PUB is a statutory board under the Ministry of the Environment and Water Resources. It is the water agency that manages Singapore's water supply, water catchment and used water in an integrated way.

PUB has ensured a diversified and sustainable supply of water for Singapore with the Four National Taps (local catchment water, imported water, NEWater, desalinated water). To provide water for all, PUB calls on all to play our part to conserve water, keep our water catchments and waterways clean and build a relationship with water so we can enjoy our water resources. If we all play our part, we can have enough water for all our needs – for industry, for living, for life. For more information, please visit **www.pub.gov.sg (http://www.pub.gov.sg)** .

Annex 1 - Details of Projects Awarded Under PUB-SPRING Joint Grant Call

1) Efficient Oily Used Water Treatment and Resource Recovery
By Envirotech and Consultancy Pte Ltd

Cost-effective method of purifying grease from food waste

Currently, few technologies are available in the market for the treatment of oily used water. These existing technologies are costly, require high energy consumption, and are operationally challenging to maintain. Envirotech and Consultancy, a spin-off from NUS, is developing an electrochemical treatment technology that can recover oily substances from food waste. The technology can be used on greasy food waste collected at various eateries. The concentrated grease that is produced can be used for biodiesel production as well.

For further information, please contact Janet Lee, tel : 9141 9489, email : **Envirotech.sg@gmail.com**

2) Separation of Heavy Metal in Used Water by Polarized Electrodialysis
By Wisewater Pte Ltd

Novel technology to separate metals from industrial used water

Inherent metal compounds found in industrial used water can potentially pose serious health hazards and disrupt biological processes in the treatment of used water. Conventional treatment processes use chemical treatment, have high-energy consumption, and usually result in incomplete removal of metal contaminants or even product toxic sludge.

Wisewater Pte Ltd, a Singapore start-up, is developing a novel water purification technology that can separate the metals from the contaminated industrial used water by attracting charged metal ions at the electrodes. The technology will have a cheaper operating cost compared to existing solutions while having higher removal efficiency and purity outputs.

For further information, please contact Roger Rosche, tel: 9068 3499, email : **roger_rosche@yahoo.com**

3) Membrane Based E-Fenton Technology for On-Site Phenol Removal from Pharmaceutical Waste Water
By Joyce River Hi-Tech Technologies Pte Ltd

Removing drug residuals from pharmaceutical used water

Phenolic compounds are widely used in pharmaceutical industries. Although their level of toxicity is lower than heavy metals, they can inhibit or disrupt the biological treatment processes in used water treatment. Current processes to break down phenolic compounds are ineffective as phenols are highly soluble and stable in nature.

Joyce River is developing a membrane-based technology that destructs phenols in a highly efficient, proprietary process. The technology will help to effectively treat pharmaceutical used water, and has high potential, given that the industry is witnessing rapid expansion in emerging markets with strong overall growth.

For further information, please contact Chen Jiu Hua, tel : 9712 6694, email : **checjh@hotmail.com**

4) Breakthrough Low-cost Ceramic Membrane Bioreactor
By Ceraflo Pte Ltd

Disruptive ceramic membrane technology

Regulations on the discharge of treated used water to water-bodies are being tightened and more vigorously enforced in developed nations around the world, and membranes are widely used to achieve the required discharge standards. Currently, polymeric membranes are most commonly used due to its affordability and availability. However, it is acknowledged that ceramic membranes are more durable and perform better than polymeric membranes.

Ceraflo, a Singapore-based start-up, is proposing to develop ceramic membrane solutions that can be produced with superior performance

but at a similar system cost to polymeric materials. The proposed ceramic membrane also requires less cleaning and offers a longer operating lifespan. These features alone could reap huge benefits and reduce operating costs for membrane users. Ceraflo intends to validate its membrane technology at PUB's water reclamation plants.

For further information, please contact Joseph Foo, tel : 9738 2121, email : **joefoo@ceraflo.com**

5) Integrated Sludge-To-Energy Recovery using Low Temperature Vacuum Evaporative Filtration Method
By Ecowise Technologists & Engineers Pte Ltd

Reducing sludge volume efficiently

Wet sludge – a by-product from the treatment of used water -- is collected from PUB's water reclamation plants for incineration and disposal daily. If treated correctly, this sludge contains residual energy that can become a viable energy resource.

EcoWise is putting up a solution to convert wet sludge into dry biomass fuel, which can be combusted in a co-generation system to capture and convert the residual energy into electricity and steam. The electricity can be used to offset the energy requirements for sludge treatment, and steam can be provided to potential downstream customers.

For further information, please contact Thomas Poon, tel : 9105 6638, email : **thomaspoon@ecowise.com.sg**

6) Compact & Anti-Biofouling MBBR for Used Water Treatment
By Mattenplant Pte Ltd

Anti-biofouling membrane treatment system for beverage industries

Beverage industries consume large quantities of water, and have complicated production parameters and processes. Used water from this industry can thus be greatly contaminated, making treatment using conventional methods challenging. In particular, biofouling is a prevailing issue when applying membrane technologies, and there are no efficient solutions available currently.

MattenPlant is proposing to develop modular treatment systems using anti-biofouling membranes for the treatment of used water from the beverage industries. If successful, the anti-biofouling properties will lower operating costs of membrane systems significantly while producing a stream of high-quality treated water that can be re-used. The proposed technology is likely to be test-bedded at existing PUB sites. This project will be done in partnership with the Centre of Innovation (Environmental and Water Technology) at Ngee Ann Polytechnic.

For further information, please contact D S Chua, tel : 6759 2977, email : **dschuan@mattenplant.com**

7) An Anerobic Moving Bed Biofilm Reactor coupled with low-energy aerobic MBR for Treatment of High Strength Industrial Used Water
By Tritech Engineering and Testing Pte Ltd

Energy-efficient used water recycling systems for industries

Used water from industries in Singapore contains various contaminants which can lead to serious water pollution if not treated sufficiently. One global trend is the treatment of industrial used water at the factory premises ('at-source' treatment), which can then be recycled on-site to reap the benefits of reduced water consumption.

Tritech is proposing a low-energy reactor system that treats industrial used water generated within the factory premises. Controlled by a sensor grid, the system can accurately control operating parameters. This optimises the treatment process and reduces the energy consumption of the treatment process, making it attractive for adoption by industries. The proposed system will likely be test-bedded at existing PUB sites.

For further information, please contact Jeffrey Wang, email : **tritech@tritech.com.sg**