

## News Article for RISUD Strategic Focus Area (SFA) Scheme

- |  | <b>Name</b>   | <b>Department</b> |
|--|---|-------------------|
| 1. <b>Principal Investigator:</b>  | <u>Prof. Xiangdong LI</u>                               | <u>CEE</u>        |
| 2. <b>SFA name:</b>  | <u>Urban Water Management</u>                           |                   |
| 3. <b>Project Title:</b>   | <u>New paradigm of Integrated Urbanwater Management</u> |                   |
| 4. <b>First Year Progress/<br/>Achievement</b><br><i>(in layman's language, no more than two A4 pages)</i> |   |                   |

Under an umbrella of urbanwater management, a strong research team was integrated with multiple expertise in advanced wastewater treatment technology; storm/grey water collection, treatment and reuse; energy and recourse recovery from wastes, solid oxide fuel cell (SOFC) technology; and life cycle analysis. This research team consists of 11 members from PolyU, HKU and UC Berkley, led by Prof. Xiang-dong Li.

A R&D research project entitled “Wastewater-derived Energy for Smart Towns” was financially supported by an ITF grant (\$8.9M) and collaborated with the Drainage Service Department of HKSAR Government since June 2016. One set of lab scale experiments have been completed, and one set of prototype system was designed, fabricated and installed in a local sewage treatment works and the commissioning tests were commenced in October of 2017 and has been conducting until the end of April 2019 to treat the real sewage effluent from a Chemically Enhanced Primary Treatment to further reduce organic and nitrogen pollutants to meet a much higher discharge standard. In the meantime, potential energy from the sewage sludge is recovered through an anaerobic digestion process to produce biogas containing 70% methane, and a SOFC system is driven by this biogas to generate electricity with a power output of up to 1 kW. Such an integrated sewage treatment system will allow the development of sewage treatment processes to move towards an energy neutralization direction. In addition, this prototype research also demonstrated that elemental sulphur can be recovered from the biogas of digested sewage sludge as a value-added product.

A research project for storm water harvesting was supported by an ECF grant to a team member, and a pilot scale onsite experiment has been conducting in the new development areas of New Territory of Hong Kong.

This water research team under the RISUD of PolyU has been collaborating with the State Key Laboratory of Urban Water Resource & Research in Harbin Institute of Technology (HIT) since 2013 in three major research areas of (1) Development

of innovative wastewater treatment technologies for synergy of water reuse, energy generation, and resource recovery; (2) Regional water pollution monitoring and simulation at a large scale with the aid of spatial remote sensing technologies; and (3) Heterogeneous transmission of environmental pollutants from air phase, of land/soil phase into water phase through the interface. Up to now, a total of 5 workshops have been conducted on a yearly basis, which strongly enhanced the multi-disciplinary research development between the two institutions.

This water research team has been actively involved with local government and industries to develop R&D projects through the University-Government-Industry Consortium for Sustainable Urban Development. So far, the two annual forums were conducted by the RISUD in April 2017 and April 2018, respectively.