Pamela Wolfe
Editor-in-Chief

Resource recovery transforms public cost into $$$

Water and wastewater treatment plants consume seven percent of the world's generated electricity. Tapping this renewable resource would significantly reduce energy costs and carbon footprint in many applications.

No longer should wastewater treatment plants be considered only an unavoidable public expense; the technology exists to produce clean energy and water, nutrients, and beneficial products from the ultimate of renewable resources – wastewater.

Generated by people, the resource flows 24-hours per day, seven days a week. This steady, reliable stream could generate profits on a regular basis for public coffers by its contribution to renewable energy. Or to be conservative, generate enough energy to reduce operating costs and transform a public cost into a public resource.

Seems too good to be true? It's already happening. "We're on the cusp of transforming from a wastewater industry into a water resource recovery industry," according to Jeff Eger, executive director of the Water Environment Federation (WEF). Eger explained that wastewater treatment plants are not waste disposal facilities, but rather water resource recovery facilities that have the potential to reduce the nation's dependence upon fossil fuel by producing and using renewable energy. This view reflects WEF's official position adopted by its Board of Trustees on October 14 during WEFTEC 2011, held in Los Angeles, California, USA.

According to WEF, "organic residual byproducts of wastewater treatment, also known as biosolids, should be recognized as biomass in general." Positioning biosolids within this category of renewable energy resources, in turn, should open up opportunities in government and commercial programs that fund biomass-derived energy projects.

Recovering energy is a growing trend in the wastewater sector in many countries. For example, since 2009, the Bekkelaget sewage treatment plant in Oslo, Norway, began producing biomethane (upgraded biogas) to fuel 80 public sector buses. In 2012, an additional 135 buses will be fueled by biomethane upon completion of a biogas plant that uses thermal hydrolysis process (THP) technology from the Norwegian company Cambi.

In Manchester, England, a major upgrade at the Davyhulme Wastewater Treatment Works also uses the Cambi THP that will double sludge treatment capacity and process biosolids for reuse as fertilizer by 2012, according to the principal contractor Black & Veach, a global consulting company.

The United Utilities' project will also process biosolids to produce biogas for use in a combined heat and power plant that will generate 10 megawatts of electricity, enough to fuel the treatment process and feed into the UK National Grid. By 2020, the UK expects 15 percent of its energy supply will come from renewable sources.

In Washington, D.C, a US$400-million biosolids management program includes a contract for Cambi to build its largest THP plant at DC Water's Blue Plains Advanced Wastewater Treatment Plant. A CDM-PC Construction joint venture will build the plant, which has a capacity of 400 tons of dry solids/day, 25 percent larger than the Davyhulme facility. Biogas produced from sludge will produce 14 megawatts of renewable electricity and Class A biosolids fertilizer product.

In Santiago, Chile, the water utility Aguas Andinas will produce 60 percent of its own power needs at its El Trebal facility, once its expansion project is completed in early 2012. Methane-rich biogas created by the digestion of sewage sludge will fuel three 2.7-megawatt Jenbacher biogas engines, provided by GE Power & Water. A consortium of Agbar and Degremont, both part of the French company Suez Environnement, are leading the project, touted as a solution to recycle waste, reduce energy costs, and improve the environment.

In Australia, the Gippsland Water Factory in Victoria treats up to 35 million liters of domestic and industrial wastewater per day, and then supplies the recycled water to a paper mill. This project helps the area preserve existing water supply for residential needs. Biogas produced by the treatment of the paper mill waste and plant sludge, plus a micro-hydro plant nearby, generates 20 percent of the treatment plant's power needs.

The recovery of excess nutrients, such as phosphorus and nitrogen, from sewage is also attracting significant interest for multiple reasons. Phosphorus reserves in North America, Russia, China, and Morocco are dwindling and mining the nutrient is increasingly costly and carbon-intensive. A key ingredient in fertilizers, phosphorus, cannot be substituted.

A nutrient removal technology developed by a Canadian company, Ostara Nutrient Recovery Technologies, Inc., removes struvite, a compound containing phosphorus and ammonia, from sewage and produces a slow-release fertilizer that improves the quality of agricultural runoff. In July 2011, a public-private partnership between Thames Water and Ostara started up a nutrient recovery facility at Slough Sewage Treatment Works that both parties consider a classic "win-win" situation. The UK water company reports that it pays a monthly fee for treatment capacity provided by the Ostara system, which is less than the maintenance costs incurred by the damaging build-up of struvite in pipes and valves. The project enables Thames Water to meet nutrient limits without investing in capital, avoid the use of chemicals, and reduce operational costs. The facility is expected to produce 150 tons per year of Crystal Green® fertilizer. An added benefit is a new revenue source for Thames Water.

In Belgium, a Veolia Water pilot plant at the Aquiris North Brussels sanitation facility has produced industrial-grade bioplastics from municipal wastewater using technology developed by AnoxKaldnes, its Swedish subsidiary. Leveraging its success, Aquiris is now fine-tuning the process.

In conclusion, new technology is emerging at a rapid pace and new applications of existing technology are creating resource recovery opportunities that will ultimately change how society views wastewater infrastructure.