

Featured Investment: In-Pipe Technology

Taming wild sewer systems

In August 2009 Aqua Resources Fund Limited ("Aqua") announced that it had invested up to \$5 million in exchange for approximately 24% of the fully diluted share capital of In-Pipe Technology Company LLC, a limited liability company registered in the State of Illinois, U.S. ("In-Pipe"). The transaction completes in two tranches: the first completed on 6<sup>th</sup> August 2009 with Aqua investing \$3 million for 16% of the fully diluted share capital of In-Pipe, and the second tranche involving investment by Aqua for an additional \$2 million is due to complete on or before 6<sup>th</sup> August 2010 subject to the satisfaction of certain performance related conditions by In-Pipe. In-Pipe provides engineered biological solutions for the pre-treatment of wastewater at strategic locations throughout the sewer collection system and at the wastewater treatment plant.

This investment follows Aqua's two previous investments completed this year: the investment in bio-treatment provider Bluewater Bio International announced in April and the joint venture agreement with Ranhill Group announced in March. This latest investment fits well with Aqua's strategy as it not only adds an attractive set of technologies focusing on pre-treatment solutions for wastewater but also expands Aqua's diversification with In-Pipe's coverage of the United States and new partnerships in Mexico, Asia and the Middle East.

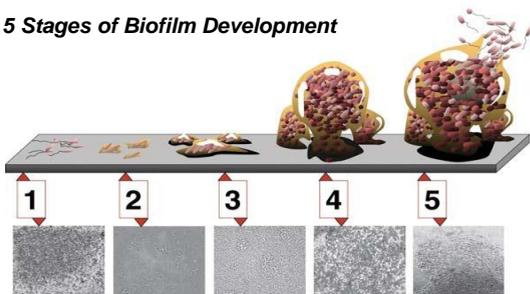
Benefits of In-Pipe's process

In-Pipe's patented process is a major breakthrough - representing a fundamental shift and substantial improvement in the methods and economics of wastewater treatment. In-Pipe begins its proven process by treating wastewater upstream in the sewer system, rather than passively waiting until the wastewater arrives at the waste water treatment plant (WWTP). This enables In-Pipe to take full advantage of the natural retention time in the sewer, and the vast surface area of sewer pipes for beneficial contact with the wastewater.

Since In-Pipe uses natural biological methods that work with the treatment plant's own processes, In-Pipe is a sustainable solution both environmentally and economically.

In-Pipe's process consists of introducing natural bacteria to treat the biofilm which grows in the underground pipes leading to the WWTP.

5 Stages of Biofilm Development



Stage 1: Initial Attachment; Stage 2: Irreversible Attachment; Stage 3: Maturation I; Stage 4: Maturation II; Stage 5: Dispersion

Utilising continuous dosing, the added bacteria become the dominant organisms and within a period of time, convert the biofilm on the walls of the system piping into a controlled, beneficial biological population, creating a pre-treatment reactor that selectively inhibits the growth of sulphate reducing bacteria (SRB) that produce unpleasant odours. They also metabolise fats, oils, and grease (FOG) in the collection system and at the WWTP. The enhanced biofilm acts as a biological reactor and provides beneficial treatment in the collection system by accelerating metabolic conversions and thereby reduces organic, nitrogen, and solids loads entering the WWTP. The bacteria are distributed throughout the collection system, stored in battery powered panels, and are automatically dispersed into the wastewater on an engineered basis.



G2 Panel (Closed)



G2 Panel (installed in pump station)

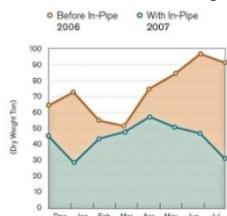
In-Pipe's market opportunity is based on the volume of wastewater, expressed in the industry as millions of gallons per day (MGD), which can be treated biologically. A bottom-up calculation based on In-Pipe's business model would yield a US municipal market of approximately \$1.6 billion annually with a world-wide market that may exceed \$20 billion annually. Opportunities in the industrial markets may double or triple these estimates. As an example, GlaxoSmithKline produces in excess of 4 billion gallons of wastewater annually, which it treats and discharges – this is comparable to a WWTP that treats in excess of 12 MGD for a community with a population of 120,000.

Improving the Economics of Wastewater Treatment

Municipalities around the world face the task of treating growing volumes with increased organic loading in the wastewater produced by increasing populations and industrial growth. This is often coupled with environmental pressures to improve plant performance and water quality either for direct discharge or beneficial water reuse applications. These growing demands must be met with an aging infrastructure and a tightened or reduced budget. User fee increases are viewed as politically unattractive. However, public expectations for improved performance and services continue to escalate despite the universal push towards reducing taxes and therefore municipal budgets. Capital investments in new infrastructure are particularly difficult to fund, and cities often find themselves unable to borrow the money required to build or repair the required facilities. These economic dynamics are particularly manifested in the public utilities department, and are especially acute in the area of wastewater treatment.

The capital expenditures required and operation and maintenance costs (O&M) associated with wastewater collection and treatment system can be a very large portion of the utilities department's budget. The In-Pipe process reduces overall operating costs by directly offsetting hard costs including money spent on chemicals, sludge handling and disposal, remediation/cleaning labour or energy usage.

In-Pipe bacteria decreases the organic loading and increases bio-availability, hence reducing the aeration energy input required in the activated sludge process. Furthermore, there is also a substantial reduction in sludge production which represents a significant cost saving as it reduces WWTP's tipping fee costs to dispose of residual sludge. Last but not least, the technology used by In-Pipe eliminates noxious odours, corrosion and FOG, thereby extending the life of the infrastructure and avoiding new capex by being able to utilise the existing system.



**Total Sludge Reduced, Tons  
35 MGD Facility Served  
by In-Pipe Technology**

**Crown Point Wastewater Treatment Plant, Crown Point, IN\***

The City of Crown Point selected In-Pipe to improve the treatment capacity at its WWTP without additional capital expenditures. In-Pipe's goal was to reduce the quantity of waste sludge for disposal, improve operating efficiency, and control odours at the plant.



In-Pipe has serviced Crown Point for more than 18 months. Increased microbiological activity in the collection system and the plant provided significant benefits to Crown Point by way of increased efficiency and prolonged life of the existing infrastructure. By utilising the vast collection system, In-Pipe improves the economics of wastewater treatment.

**Crown Point WWTP: Key data\***

Service Objectives:	Performance Summary:
<ul style="list-style-type: none"> <li>Reduce Sludge Disposal</li> <li>Increase Organic Capacity</li> <li>Reduce Energy Consumption for wastewater aeration</li> </ul>	<ul style="list-style-type: none"> <li>57% Sludge Reduction</li> <li>60% Decreased DO for wastewater aeration</li> <li>36% Increased Volatile Solids Destruction</li> </ul>
<p><b>Financial Payback: \$190,000</b></p> <p>Crown Point's Estimated Savings:</p> <ul style="list-style-type: none"> <li>\$74,100 Sludge Hauling</li> <li>\$65,700 Polymer Usage</li> <li>\$45,800 Energy Usage</li> <li>\$ 5,000 FOG Control</li> </ul>	<ul style="list-style-type: none"> <li>50% Decreased KWH Usage for wastewater aeration</li> <li>\$1.2m deferred capital expense from reduced anaerobic digester and increased plant capacity</li> </ul>

Source: Crown Point and In-Pipe data

**About FourWinds Capital Management (Aqua's investment manager)**

FourWinds is a specialist in global commodities and natural resources with products investing across energy, metals, agriculture, timber, water, waste, and alternative energy.

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**Fundamentals of Aqua Resources Fund**

Listing date:	24 <sup>th</sup> July 2008
Ordinary shares outstanding:	72,464,340
Latest adjusted NAV (30 June 2009):	EUR 0.9371
Number of investments/countries/continents:	3 / 5 / 3

**About the Fund**

Aqua Resources Fund Limited is an LSE-listed investment fund (H20) managed by FourWinds Capital Management, investing in the full value chain of global water. The strategy combines direct investments in projects, companies, and infrastructure across water-related business areas. [www.AquaResourcesFund.com](http://www.AquaResourcesFund.com)

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