

Asia Alternative Energy Program



China

Energy Efficiency for Water/Wastewater Sector Scaling-Up: From Ad-hoc Studies to Creation of a “Watergy Fund”

Large and populated countries such as Brazil, China, India have been experiencing significant water demand increases in their cities (8 percent per year in measured cities). Consequently, wastewater treatment demand and water shortages have soared over the past few years. As a result, their Central and Local Governments have established policies that focus on accelerated wastewater treatment, preparing for an expected four-fold increase of treated quantities over the next 20 years.

Both water treatment systems and wastewater systems depend heavily on electricity. Electricity costs are the major operating costs, representing 50% in water and 60% in wastewater treatment.

Genesis of the Project: Identification of Energy Savings in 5 Hebei Water Plants

In 2001, ASTAE funded a series of missions in Hebei province, China, to identify potential cost-effective investments that could yield both water and energy savings. Five water plants were selected for further investigations in 2002 and a report was produced identifying ways and means to implement these savings. This report is published as an ASTAE publication under the title “*Energy Efficiency for Water/Wastewater Sector Initiative: Hebei Pilot Phase II*”.

The World Bank established the Asia Alternative Energy Program (ASTAE) in January 1992. ASTAE's goal is to incorporate access to energy, energy conservation and renewable energy options in the design of energy strategies and in lending operations for all the Bank's borrowers in the Asia region. ASTAE also supports the design and implements training in energy efficiency and renewable energy options to help formulate alternative energy policies and strengthen institutional capabilities, collaborate with donor agencies, and mobilize technical assistance funds in support of its work program. Find our reports at: www.worldbank.org/astae.

The consultants came-up with a series of recommendations based on International Best Practices and an adaptation to the Chinese plant conditions. The recommendations applied across all plants and fall under three broad defined categories: pumping systems, backwashing modifications, and biological process improvements. A summary of the expected benefits for each plant is given in the table below.

Aggregate investments proposed and expected benefits					
Project	Investment RMB (USD)	Water Savings M3/year	Energy Savings RMB (USD)	Pay-back Time (years)	FIRR %
Plant 1 Back-washing	13,000,000 (1,571,946)	1,825,000	12,012 (1,452)	4.2	29.04
Plant 2 Running Water	7,384,000 (892,865)	-	1,244,627 (150,499)	5.9	18.29
Plant 3 WWTP	2,616,713 (316,410)	-	835,718 (101,054)	3.1	38.38
Plant 4 WWTP	1,158,240 (15,694)	-	699,838 (84,623)	1.7	87.50
Plant 5 WWTP	4,135,950 (500,114)	-	1,000,000 (120,918)	4.2	27.35
Total	28,294,903 (3,421,389)	1,825,000	3,792,195 (458,548)	4.3	-

The study also noted that the financial performance could be further improved if Certified Carbon Reduction (CERs) could be emitted and certified according to Clean Development Mechanism (CDM) principles. This would reduce the average payback time from 4.3 to 3.8 years.

These recommendations and corresponding investments are currently being implemented in several of the plants studied above.

There are hundreds of similar plants in the country: scale-up is imperative!

What is relevant for Hebei plants is probably also relevant for many other in the China as well as in many other developing countries. However the

limitations of keeping doing case by case reviews as an ASTAE supported activity are obvious both for lack of funds and because of time constraints. Nonetheless, such review, identification and implementation of efficiency savings are a real need for which there is a demand and possibly a market.

Therefore, a scaling mechanism ought to be established to address the needs of such market. However, barriers exist, such as the development of risk mitigation mechanisms, the attraction and participation of public-private finance companies, and the development and nurturing of EMCs (Energy Management Companies) that would put emphasis on “Watergy” projects. The term “Watergy” refers specifically to energy efficiencies realized in the Water sector (water and wastewater management).

Such scale-up also requires establishing specific financing mechanisms because: (i) State banks may be unwilling to extend additional credit to municipalities; (ii) private sector financing is relatively absent for such a new initiative, (iii) Watergy projects still need to be streamlined and standardized to avoid the risk that municipalities embark on procurement of sub-standard components based only on purchasing cost, disregarding life cycle cost analysis. A proposed mechanism is the establishment of a “Watergy Efficiency Fund”. (see box below).

The Watergy Efficiency Fund (WEF)

Such Fund would actively promote cooperation between the Water and the Electric utilities to implement “Watergy” projects jointly.



Project management and operations would be handled by the Water Utility, and the Electric Utility would contribute to the equity and risk sharing, would undertake the measurement and verification protocols and both would share the rewards in an equitable manner. In two documented cases facilitated by the World Bank in India, the utilities have cooperated in such manner with encouraging results.



The WEF-funded Watergy Projects would have a certain advantage compared to classical CDM Projects as they would not require the long lead times (usually 4 to 5 years) and could be operational and generating CERs in less than a year given their simple technical implementation. Furthermore, monitoring and tracking for the most part is already in place, and as the staff of the target sites is usually well versed in baseline measurements. Finally, implementation of certification could be streamlined across similar water and water management plants.

“Watergy” Efficiency Fund (WEF) Concept

Financing: The Fund would start as a revolving debt fund. Later, project financial support would include equipment leasing, and payment for services. The Fund would be designed to be flexible in terms of product mix and terms to enable the Fund Manager to offer financial products demanded by commercial project financing. It is anticipated that eventually WEF may invest equity in carefully selected projects and EMCs. Loans and repayments would be made in hard currency.

Screening: Projects would be eligible based on the following criteria: a) the investment would be in the range of US\$200,000 to \$2,000,000 (to minimize transaction costs on the low side, and to limit exposure from a limited number of projects on the high side); b) the Project would have a short payback time (usually under four years); c) at least 50% of each project’s benefits would be derived from energy savings (capacity improvements that have ancillary energy savings benefits would not be eligible); and d) proposed technologies would have to be well proven and rely on off-the-shelf components.