Energy efficiency key to global climate change mitigation

Energy-efficient investments in wastewater management could dramatically reduce energy consumption and greenhouse gas emissions, according to the results of the study “Powering the Wastewater Renaissance.” Xylem, Inc., Vice President for Strategy and Business Development Al Cho discusses the key points of this landmark study.

Investment in currently available high-efficiency technologies could reduce electricity-related greenhouse gas emissions from the global wastewater sector by up to 50 percent, according to the report “Powering the Wastewater Renaissance,” a new study commissioned by the US company Xylem Inc. Adopting these technologies would have a significant effect on the greenhouse gas emissions responsible for fueling climate change – potentially equivalent to removing 11.4 million cars from the world’s roads, as reported by American Forests, a nonprofit organization based in the United States. The analysis also suggests that much of this reduction in electricity-related emissions can be achieved at a negative or neutral cost.

As a global water technology provider, Xylem confronts the intersections among water, climate, and sustainable development every day. The company launched the “Powering the Wastewater Renaissance” report to help decision-makers around the world understand the role the water sector can play in global climate change mitigation and adaptation.

One key insight from the report is that energy-efficient investments can offer low-cost abatement potential in the wastewater sector, offering a potential solution to the high-energy costs of global wastewater operations. Similar energy efficiency opportunities are commonly seen in sectors such as transportation, commerce, and manufacturing. These opportunities create a potential “win-win” situation for wastewater owners and operators. They can reduce both energy consumption and greenhouse gas emissions while meeting regulatory requirements and saving money.

The report also quantifies what most water professionals intuitively know: most wastewater systems could be more energy-efficient. In many cases, efficiency improvements can be achieved through investments that lower the utility’s total ownership costs. These energy efficiency investments can be abated with technologies that exist today. Furthermore, nearly 95 percent of this abatement can be achieved at zero or negative economic cost.

In the United States and Europe, the study focuses on abatement from the replacement of existing equipment, giving the relatively low rate of new wastewater plant construction. It found that the USA could abate nearly 40 percent of its 2015 electricity emissions, 72 percent of which would be at negative cost. Europe could abate 33 percent of its 2015 electricity-related emissions, 94 percent at negative cost.

In China, the country has been a global leader in deploying energy-efficient technologies in the wastewater sector, with a reported 80 percent reduction in energy consumption since 1990.

China presents an even more promising opportunity for investment. Nearly 60 percent of electricity-related emissions associated with current and planned wastewater infrastructure can be avoided, nearly all at zero or negative cost. Given growing public concerns about air and water pollution, coupled with strong government commitment to environmental remediation in the 13th five-year plan, adopting high-efficiency wastewater technologies in existing and planned infrastructure could significantly advance China's national objectives. Many other rapidly industrializing countries planning new wastewater treatment infrastructure in the upcoming years face similar opportunities for emissions reduction relative to baseline forecasts.

Across these regions, the largest abatement options exist in secondary treatment, which drives a significant portion of the total abatement potential across the stages of wastewater management. Within this step of the water management process, variable speed blowers and optimized aeration systems provide the greatest potential savings, offering abatement of more than 11 Mt CO2e (11 million tons of carbon dioxide equivalent) over the life of the equipment. This approach is adopted in the three core regions studied.

Beyond emissions abatement, these technologies provide highly attractive financial returns resulting from savings in electricity and maintenance costs over the life of the equipment. Globally, the net present value of the most attractive investments exceeds US$40 billion. For a sector that is often capital constrained, operational cost savings would be a new source of capital to support the renewal of water and wastewater infrastructure that could ultimately power the next wastewater renaissance.

Innovative financing and regulation

Two primary obstacles stand in the way of more widespread adoption. First, utilities are naturally conservative when considering new technologies and approaches, given the importance of complying with regulations and protecting public health as well as the environment. Second, utilities have a finite – and in many cases, inefficient – pool of capital and often choose products with a lower initial cost, even if this choice leads to higher lifecycle costs.

Given the inherent economics of investments in more efficient technologies, innovative financing mechanisms and public assistance programs can help to unlock abatement in the wastewater sector by giving utilities credit for saving energy. Manufacturers of equipment that work in other sectors, such as commercial real estate or industrial facilities, could also save significant energy, reducing national and local greenhouse gas emissions.

In the near future, it is also possible that a regulatory solution could emerge for energy efficiency in wastewater management. Standards for energy efficiency in specific components, such as circulating pumps, are already due to be announced in Europe and the United States. Similarly, regulations may also extend over time to other components or other jurisdictions and could also accelerate adoption of technologies that are more efficiently implemented.

Going forward, policymakers around the world cannot afford to ignore any meaningful opportunity to increase energy efficiency; this report suggests that they can start by accelerating the wastewater renaissance at home.

Top left: A municipal wastewater treatment plant on the shores of Lake Como in Italy reduced energy consumption 61 percent and operating costs by US$50,000 annually by installing Xylem’s Flxg 4500 mixers. Energy savings paid for the mixers in 13 months. Photo by Xylem

Top right: In early 2013, Heathrow installed two Flood Expert pump systems in the wastewater pumping station located at the airport’s cargo center. According to a competitive study conducted by Heathrow Airports Water Services Department, the Xylem solution reduced the station’s energy consumption by 50 percent. In addition, the non-clogging capabilities of the Flood Expert system eliminated the need for maintenance call outs during the first year of operations. Photo by Xylem

Bottom left-right: The Macanazawa wastewater plant on the Italian island of Sardinia, an island off the coast of Italy, reduced energy consumption and operating costs 20 percent by replacing old pumps with Xylem’s Flood Expert system. The solution met the needs of island residents and the pink flamingos that nest nearby is adjacent to the plant. Photo by Xylem

Author’s Note

Al Cho is vice president for strategy and business development at Xylem, Inc., and is also an editorial advisory board member of Water World.

References


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