

Best Practices for Sustainable Wastewater Treatment: Initial Case Study Incorporating European Experience and Evaluation Tool Concept

The primary goal of the WERF research program known as the *Optimization Challenge* is to identify, promote, and support wastewater operations that achieve treatment objectives while reducing the resources expended. The quickest path to improvement is to identify the leaders in this area, study what they are doing, and find ways to adapt their “tried and true” methods to more facility operations. European wastewater facilities are highly motivated to develop new energy initiatives due to the high rates they pay for electricity (relative to electric rates in the U.S.). There is a wealth of information already developed and in practice at European wastewater plants from which North American facilities can learn. Zeroing in on areas where greatest performance improvement can be made can jumpstart efforts into energy efficiency and energy production programs in North America.



Aerial view of Strass im Zillertal facility, Austria. Reprinted with permission from *Abwasserverband Achenal-Inntal-Zillertal*.

Can Wastewater Operations Meet Water Quality Targets Without a Big Power Bill?

Located near Innsbruck, Austria, the Strass im Zillertal facility is one of the best performing wastewater treatment plants in Europe. Through successive optimization efforts, Strass engineers were able to transform this facility into one that produces more energy than it requires for operations. The Strass im Zillertal facility is energy independent.

Operations personnel at the plant made conscious decisions to produce more energy than was needed to power the treatment process. This report includes a case study on the steps used and the success that Strass plant operators achieved. The plant staff made changes, analyzed results, and implemented new processes over the course of a decade. The change from energy consumer to producer required discipline to stay focused on the end goal of net energy production.

The following chart chronicles the path the operators at the Strass Wastewater Treatment Plant followed to become energy producers. The process begins in 1996, when the plant was producing slightly more than half (4,200 kWh/d) of its overall energy requirement (7,359 kWh/d). Through a series of energy-related upgrades which included improvements to the aeration system, the anaerobic digesters, and the cogeneration equipment, the operations staff made steady gains in the amount of electricity produced by the plant and in their overall energy efficiency of the treatment process. By 2005, the plant was producing energy – 8,500 kWh/d and requiring only 7,869 kWh/d.

North American facilities can learn from the ideas and practices already in use at European wastewater plants.

BENEFITS

- Provides a concise summary of European energy and resource conservation programs and European Energy Conservation Manuals for wastewater treatment plants.
- Identifies best practice benchmarks for energy conservation and energy production at wastewater treatment plants.
- Analyzes sustainable operations to highlight specific components that led to the goal of producing excess energy after meeting all plant energy needs.
- Develops an approach to translate the success factors to plants in North America.

RELATED PRODUCTS

Integrated Methods for Wastewater Treatment Plant Upgrading and Optimization (O4CTS5)

State of the Science Report: Energy and Resource Recovery from Sludge (OWSO3R07)

An Economic Framework for Evaluating the Benefits and Costs of Biosolids Management Options (O4CTS2)

LCAMER – An Assessment Tool for Managing Cost-Effective Energy Recovery from Anaerobically Digested Wastewater Solids (O1CTS18UR)

CHEApet – Carbon Heat Energy Assessment Plant Evaluation Tool (OWSO4R07c)

AVAILABLE FORMAT

Soft cover, online PDF, and four-page case study on the Strass im Zillertal Wastewater Treatment Plant (OWSO4R07b).

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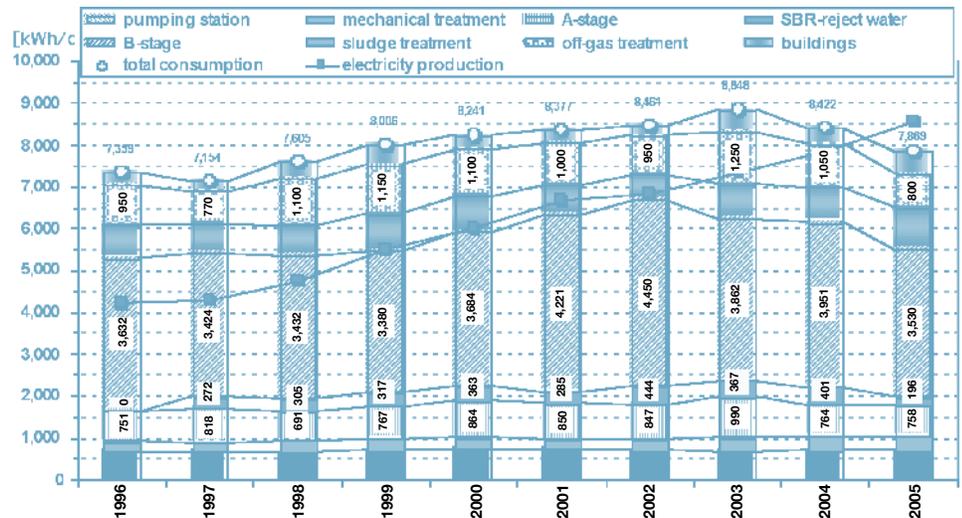


Applying the Research Findings

WERF subscribers can use the Strass approach documented in the report to improve energy efficiency and recovery at their facilities. The lessons learned that contributed to the success of optimization efforts at Strass include:

- A highly educated, well-paid work force that was motivated, trained, and experienced
- A high level of automation which allowed for a smaller, specialized operations team
- The use of advanced process analysis tools
- The tolerance for process risk and in-depth understanding of processes deployed, including the use of novel treatment processes
- The ability to quantify gains

In a parallel research project (OWSO4R07c), the research team is developing a tool to analyze wastewater treatment processes for energy efficiency and recovery. The new tool, Carbon Heat Energy Assessment Plant Evaluation Tool (CHEApet) provides an estimation of overall energy, heat and carbon relationships based on wastewater treatment plant data. The tool also calculates carbon footprints using different approaches. The tool highlights areas where the largest potential gains in sustainability are possible and allows users to optimize plant operations by running successive 'what-if' scenarios to achieve efficiency goals.



Energy Demand of Individual Processes at Strass WWTP and Electricity Generation Over a Decade of Improvement. Reprinted with permission from Abwasserverband Achenal-Inntal-Zillertal.

CONTRACTOR

George V. Crawford, P. Eng.
CH2M HILL

RESEARCH TEAM

Dimetri Katehis, Ph.D.
Hannah Wilner
CH2M HILL

Bernard Wett, Ph.D.
University of Innsbruck, Austria

Mark van Loosdrecht
University of Delft, Netherlands

TECHNICAL REVIEW COMMITTEE

Robert K. Bastian
U.S. Environmental Protection Agency

Shahid Chaudhry
California Energy Commission

Stephen Constable, P.E.
DuPont Engineering Technology

David Cooley
Hampton Roads Sanitation District (HRSD)

Glen Daigger, Ph.D., P.E.
CH2M HILL

Joh Kang
TetraTech, Inc.

Roger Middleton
Black and Veatch

ISSUE AREA TEAM

John Barber, Ph.D.
Eastman Chemical

Shahid Chaudhry
California Energy Commission

Stephen Constable, P.E.
DuPont Engineering Technology

David Cooley
Hampton Roads Sanitation District (HRSD)

Glen Daigger, Ph.D., P.E.
CH2M HILL

Robert F. Kelly
Infilco Degremont, Inc.

Melanie S. Masek, P.E.
DuPont Engineering Research & Technology

Arthur J. Meyers, Jr., Ph.D., Retired
Hsiao-Ting Ong, P.E.
City of San Jose

Ali Oskouie, Ph.D.
Metropolitan Water Reclamation District of Greater Chicago

Steven M. Rogowski, P.E.
Metro Wastewater Reclamation District of Denver

Gary Shimp
Black and Veatch

Rob Simm
Stantec Consulting, Inc.

David W. Tucker
City of San Jose

Darius Vosooghi, Ph.D., P.E.
City of Los Angeles

Milind Wable, Ph.D., P.E.
CDM

James Wheeler, P.E.
U.S. Environmental Protection Agency

John Willis, P.E.
Brown and Caldwell

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