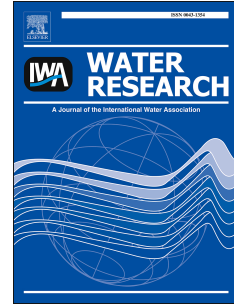


Accepted Manuscript

A systematic methodology for the robust quantification of energy efficiency at wastewater treatment plants featuring Data Envelopment Analysis

S. Longo, J.M. Lema, A. Hospido, M. Mauricio-Iglesias



PII: S0043-1354(18)30361-0

DOI: [10.1016/j.watres.2018.04.067](https://doi.org/10.1016/j.watres.2018.04.067)

Reference: WR 13774

To appear in: *Water Research*

Received Date: 19 January 2018

Revised Date: 24 April 2018

Accepted Date: 29 April 2018

Please cite this article as: Longo, S., Lema, J.M., Hospido, A., Mauricio-Iglesias, M., A systematic methodology for the robust quantification of energy efficiency at wastewater treatment plants featuring Data Envelopment Analysis, *Water Research* (2018), doi: 10.1016/j.watres.2018.04.067.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 **A systematic methodology for the robust**
2 **quantification of energy efficiency at wastewater**
3 **treatment plants featuring Data Envelopment**
4 **Analysis**

5 **S Longo*, J M Lema, A Hospido, M Mauricio-Iglesias**

6 Department of Chemical Engineering, Institute of Technology, Universidade de Santiago de Compostela, 15782 Santiago de
7 Compostela, Spain

8 *Corresponding author (E-mail: stefano.longo@usc.es)

9

10 **Abstract**

11 This article examines the potential benefits of using Data Envelopment Analysis (DEA) for conducting
12 energy-efficiency assessment of wastewater treatment plants (WWTPs). WWTPs are characteristically
13 heterogeneous (in size, technology, climate, function...) which limits the correct application of DEA. This
14 paper proposes and describes the Robust Energy Efficiency DEA (REED) in its various stages, a systematic
15 state-of-the-art methodology aimed at including exogenous variables in nonparametric frontier models and
16 especially designed for WWTP operation. In particular, the methodology systematizes the modelling process
17 by presenting an integrated framework for selecting the correct variables and appropriate models, possibly
18 tackling the effect of exogenous factors. As a result, the application of REED improves the quality of the
19 efficiency estimates and hence the significance of benchmarking. For the reader's convenience, this article is
20 presented as a step-by-step guideline to guide the user in the determination of WWTPs energy efficiency
21 from beginning to end. The application and benefits of the developed methodology are demonstrated by a
22 case study related to the comparison of the energy efficiency of a set of 399 WWTPs operating in different
23 countries and under heterogeneous environmental conditions.

Download English Version:

<https://daneshyari.com/en/article/8873788>

Download Persian Version:

<https://daneshyari.com/article/8873788>

[Daneshyari.com](https://daneshyari.com)