Energy efficiency of wastewater treatment plants. Overview of the literature and critical discussion of energy data


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CHALLENGE
Wastewater treatment plants (WWTPs) are one of the most expensive public industries in terms of energy requirements, accounting for more than 1% of the consumption of electricity in Europe. Although there is a large improving potential, energy efficiency measures are sometimes not adopted due to the impossibility to properly assess the energy performance of WWTPs.

Since the 2012 Energy Efficiency Directive was introduced energy audit has become a legal requirement also for water utilities. However, in the absence of fundamental and globally recognized approach evaluating WWTP energy performance, these policies could be economically wasteful.

OBJECTIVES
By assessing the literature, this study represents the first step in the development of a systematic methodology for evaluation and improvement of energy performance in WWTPs operation (Longo et al., 2016). Such a methodology is the main aim of the ENERWATER project, which objectives are:

- DEFINE a performance index adapted to the plant function.
- MEASURE by online detailed monitoring, including seasonal variation.
- ANALYZE and development of a methodology that can be used for normalization (standard).
- IMPROVE by correlation of measured variables with plant performance.
- TRAINING and guidance of WWTP auditors.

WHICH ARE THE VARIABLES THAT HAVE THE LARGEST EFFECT ON ENERGY CONSUMPTION?

Energy KPIs found are often not representative of the overall energy consumption: it is assumed that pollutants concentrations or effluent quality do not vary significantly among WWTPs.

THERE IS A CLEAR NEED TO ESTABLISH SUITABLE KPIs THAT ALLOW A COMPARABLE, REALISTIC AND UNIVERSAL FORM OF REPORTING ENERGY DATA

CONCLUSIONS
- This study represents the first step in the development of a systematic methodology for evaluation and improvement of energy performance in WWTPs operation.
- The large dispersion of the results shows that there is considerable room for improving the efficiency of WWTP operation.
- To achieve this aim, detailed monitoring of the WWTP operation is crucial and is expected to be more frequently carried out in the upcoming years.

References
Longo et al. (2016). Monitoring and diagnosis of energy consumption in wastewater treatment plants. A state of the art and proposals for improvement (submitted to Applied Energy)