

# Analysis of energy efficient and environmentally friendly technologies in professional laundry service

Vítězslav Máša · Petr Bobák · Pavel Kuba · Petr Stehlík

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**Abstract** Professional laundry service (i.e., doing laundry for hospitals, hotels, production plants, dormitories, and students cafeterias) is an industrial, energy intensive process. Electrical energy and natural gas are commonly used to heat water and drying air. However, much of the energy leaves the process in waste flows completely without any profit. Professional laundry service has also direct impact upon environment. Waste water is often contaminated with laundry detergents and natural gas flue gas is used as drying medium. Therefore, it is an energy intensive process and its energy consumption and related environmental impact are worth researching. This article presents the concept of professional laundry service and main energy efficiency measures that may be relevant for the process. Impacts of laundry process on environment along with financial aspects are assessed in this article, too. Financial parameters of any measure are crucial for laundry operators. However, every assessment of profitability of particular measure has to be substantiated by source operational data. These may significantly vary depending on local prices of energy, water, and human labor. This fact is presented using case study where the difference between real operational costs in three European countries is evaluated (Germany, France, and the Czech Republic). Successful research and development of energy efficient and environmentally friendly technologies must encompass three aspects of every technology, i.e., energy intensity, environmental impact, and financial aspects. This three-component approach and its application in laundry service

are unique and since they have not subject to any academic research yet, they are discussed in the conclusion of this article. Article is basically an overview of energy efficient and environmentally friendly technologies in professional laundry service and it must be asserted that it is a first of a kind in this area.

**Keywords** Energy efficient technologies · Environmentally friendly solutions · Operational costs · Laundry

## List of symbols

### Abbreviations and acronyms

CAP	Daily capacity (kg <sub>DL</sub> /d)
CZ	Czech Republic
CFD	Computational fluid dynamics
DE	Germany
DPY	Working days p.a. (d/y)
EEC	Electrical energy consumption (MWh <sub>e</sub> /y)
FR	France
FWC	Fresh water consumption (m <sup>3</sup> <sub>H<sub>2</sub>O</sub> /y)
GDR	German Democratic Republic
HPD	Working hours daily (h/d)
HEC	Heat energy consumption (MWh <sub>h</sub> /y)
IEA	International Energy Agency
NOE	Number of employees
P	Percentage
RFID	Radio frequency identification
SEEC	Specific electrical energy consumption (kWh <sub>e</sub> /kg <sub>DL</sub> )
SFWC	Specific fresh water consumption (kg <sub>H<sub>2</sub>O</sub> /kg <sub>DL</sub> )
SHEC	Specific heat energy consumption (kWh <sub>h</sub> /kg <sub>DL</sub> )
SMC	Specific moisture content of linen [kg <sub>H<sub>2</sub>O</sub> /kg <sub>DL</sub> ]
SW	Software

V. Máša (✉) · P. Bobák · P. Kuba · P. Stehlík  
Institute of Process and Environmental Engineering, Brno  
University of Technology, Technická 2896/2, 61669 Brno,  
Czech Republic  
e-mail: masa@fme.vutbr.cz