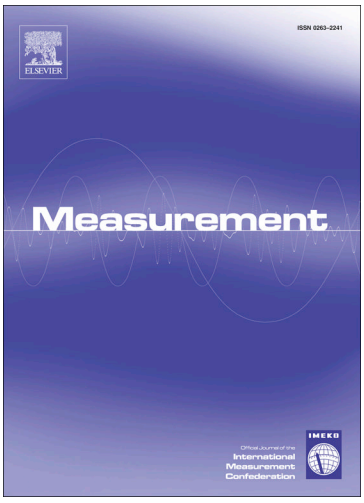

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Evaluation, ranking and positioning of measurement methods for pellet production

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ABSTRACT

Pellet production and consumption are steadily increasing as a renewable energy source. The production and combustion properties of pellets are defined by molecular structure and elemental composition of raw materials. Quality control tools are different in terms of areas they cover the pellet-production cycle, but considering the raw materials, they regulate only the origin but not the components. There are standardized methods for measuring the biomass and these methods are mainly capable to the pellet raw material qualification, too. Using these together with the control and diagnostics of production parameters, the finished pellet quality (parameters) can be forecasted with high accuracy. A novel evaluation methodology is proposed in the paper for the measurement and qualification of the raw material. The introduced evaluation ranks these methods, based on measuring device-needed, time-requirement and measurement complexity triad. Moreover, the proposed best measurement solutions are positioned along the pellet production chain.

1. Introduction

Pellets are special kinds of biomass-based biofuel. The speciality of this product is, that they have high energy density, low moisture content and uniform shape at the same time [1][2]. These features can provide nearly the same comfort level of application, as natural gas-based heating system [3].

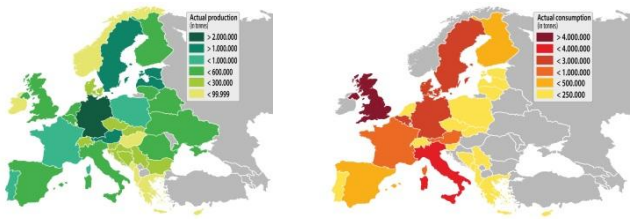

Fig. 1. European wood pellet production (left) and consumption (right) in 2015. [5]

Favourable characteristics of pellets are contributing to the continuously spreading of their consumption. It is evident by the fact, that over the past 15 years, nearly thirty-fold increase is measured considering the amount of consumed pellets in Europe [4][5].

In 2015, 50% of world production of wood pellets (14.1 million tons) happened in the EU, and in the same time 70% (20.3 million tons) was consumed here [6]. Distribution of the European pellet production and consumption in 2015 is presented in Fig. 1. Both the production and the consumption of pellet show a continuously growing trend. The annual amount of produced pellet in the EU has increased by 4.7% and the amount of consumed pellets by 7.8% from 2014 to 2015. [6][7]. The amount of consumed pellet is small percentage (0.6%) of the EU's primary energy consumption [8], but the pellets are valuable and evolving energy sources, which fits in the energy policy of the European Union according to security of supply, competitiveness, and sustainability aspects [9]. Since pellets are relative young energy sources, lots of questions arise about pellet production and

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