

Ecological and Economic Evaluation of the Household Solid Wastes Using in Thermal Power Industry

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ABSTRACT

This paper aims to investigate theoretical and methodical basis and practical aspects of ecologic and economic appraisal of household solid wastes (HSW) use as energy resources in the thermal power industry. Scientific and methodical approach is developed as for the ecologic and economic grounding of expediency of HSW use as energy resources, based on the necessity of estimation optimum ratio between traditional energy resources and volumes of burnt up HSW on the basis of minimization general working expenses and ecologic and economic loss. Scientific and methodical approach is developed as for the estimation of overall factors and degree of their influence on calculation of optimum ratio while using traditional kinds of fuel and HSW, which takes into consideration differentiation of ecologic and economic expenses depending on the morphological composition of HSW, region of thermal power engineering company location and seasonal prevalence of heat provision.

Keywords: household solid wastes, energy resources, thermal power industry, traditional fuel.

JEL Classification: P 28, Q 53.

1. INTRODUCTION

Globalization processes lead to the irreplaceable nature energy recourses exhausting and large concentration of the industrial waste and also consumption that foresees to find the effective areas to use Household Solid Wastes (HSW) as energy resources. It enables to decrease the using of the nature fuel and energy resources (FER) and to accumulate the HSW on the municipal solid waste landfills. At the same time the destructive impact on environment is also reduced. Thus, such a concept makes for the importance and necessity to perform research concerning ecological and economic projects grounds of the HSW consumption in the thermal power industry according to "State energy strategy of Ukraine till 2030". Furthermore, waste prevention has been identified as one of the top priorities in the EU's Sixth Environment Action Programme (European Commission 2013b) as well

as in the proposal of the European Commission for the 7th Environment Action Programme and the Roadmap to a resource efficient Europe (EEA 2013a).

2. RESEARCH BACKGROUND

Waste-to-energy approach, which means incineration recovers energy from HSW and produces electricity and/or steam for heating, which is recognized as a renewable source of energy is widely analyzed in literature. Controlling, usage and forecasting of household solid waste in a sustainable way is reviewed by Batinic et al. (2011), Kumar et al. (2011), Cherian and Jacob (2012). Digestion-based waste-to-energy technology can be deployed to extract useful energy from biodegradable organic materials and from landfill gas that is captured to reduce pollutant and greenhouse gas emissions (Kaufman et al. 2010). Omran, A. (2016) based on 700 questionnaires considered recycling of solid wastes is as one the solutions to recover the waste generated and examined the restrictions that hinder residents from practicing recycling. Trang, P.T.T. (2017) determined the socio-economic factors influencing the waste generation of the households in the city by using Ordinary Least Square (OLS) regression. The results indicated that the average HSW generation in Thu Dau Mot was 0.76 kg/household/day.

Problem of prevention of the export of wasterelated problems into the future (e.g. 'clean' cycles and landfills requiring little after care is analyzed by Brunner (2013). Such scientists as O. Balatsky (1979), R. Berling (2002), A. Belousov (2004), N. Zinovchuk (2012) are devoted to the problems of effective HSW using as energy recourses with account for ecological aspects.

The analysis of the literature recourses and practical experience showed that theoretical and methodic questions of the ecological and economic grounds to use HSW as energy recourses reasonably, were not enough investigated until now. The main goal of this research is to improve scientific and methodic approaches to the ecological and economic evaluation to use hard domestic waste as energy recourses at heating enterprises.

3. METHODOLOGY AND APPLICATION FUNCTIONALITY

Energy-intensive HSW using in thermal power industry is connected with the additional load on the landscape. At the same time their receipts to the municipal solid waste landfills are reduced, that prevent from the harmful effect on environment. The heating enterprises are able to save on the fuel-and-power recourses, but on the other hand, there are some additional expanses on the keeping and running of the environmentally protected site. It foresees the necessity of ecological and economic grounds to use the energy-intensive HSW in the heat-and-power engineering. HSW as energy recourses enable to decrease integral negative impact on environment and provide the additional producing of the heating and electrical energy with the help of energy-intensive HSW.

Conducted analysis shows that the main heating and electrical energy producing cost are to purchase nature energy recourses. In order to minimize the traditional natural fuel consumption due to its partial replacement on HSW, one need to find their optimum quantity which should be reasonably added to the natural fuel (coal, gas etc.) taking into account technological process requests, in terms of economic viability and ecological safety. The size of HSW is determined in reliance on the whole