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ANALYSIS OF THE USE LEVEL OF SECONDARY ENERGY RESOURCES IN ENERGY SECTOR OF UKRAINE

Summary. *The features of the use of heat and combustible and heat secondary energy resources (SER) in the energy sector of Ukraine are considered. The data on the use levels of various types of combustible SER, as well as high-potential heat SER by types of utilization plants are presented.*

Key words: *secondary energy resources, combustible secondary energy resources; high-potential heat secondary energy resources, energy saving, use levels of secondary energy resources.*

Аннотация. *Рассмотрены особенности использования тепловых и горючих вторичных энергетических ресурсов (ВЭР) в энергетике Украины. Приведены данные об уровнях использования различных видов горючих ВЭР, а также высокопотенциальных тепловых ВЭР по типам утилизационных установок.*

Ключевые слова: вторичные энергетические ресурсы, горючие вторичные энергетические ресурсы; высокопотенциальные тепловые вторичные энергетические ресурсы, энергосбережение, уровни использования вторичных энергетических ресурсов.

Introduction. Energy saving problems are strategic ones for the energy sector of Ukraine. At the same time, among the technical energy-saving measures, one of the main directions is utilization measures. That is, we are talking about the use of "energy waste", the so-called secondary energy resources (SER). In view of this, the study of the use level of SER is one of the important aspects of the analysis of possible volumes of fuel and energy economy in the country.

The aim of the work is to analyze the features of the use of secondary energy resources in Ukraine.

Results and discussion. Table 1-3 show the materials of statistical reporting on the use of combustible and heat secondary energy resources (CSER and HSER) in Ukraine. As you can see from the table 1, the use degree of combustible SER in Ukraine is quite high. According to the data of the State Statistical Reporting in 2010, the use level of CSER was 86.9%. Attention is drawn to the fact that from 2010 to 2015 this level has hardly changed. So, if in 2010 level of CSER was 86.9%, then in 2015 - 85.9%.

Table 1

The use levels of CSER and high-potential HSER (HHSER) in Ukraine in the period 2010 - 2015 (in %)

Year	CSER	HHSER
2010	86,9	94,9
2011	86,2	95,4
2012	86,7	96,5
2013	86,5	95,8
2014	86,2	95,9
2015	85,9	95,4

According to the data given in table 2, the use level of various types of CSER in metallurgy is significantly different. So the use degree of secondary energy resources for blast furnace gas was 90.8% in 2011 and 92.8% in 2015. It is significantly lower for ferroalloy gas - 36.3% and 29.4%, respectively. The low use level of ferroalloy gas is known to be associated with the problems of cleaning gases from ferroalloy furnaces.

Table 2

The use level of various types of CSER (in %)

Type of CSER	2011	2015
Blast furnace gas	90,8	92,8
Converter gas	2,6	1,4
Ferroalloy gas	36,3	29,4
Black liquor	-	-
Logging waste	32,8	49
Woodworking waste	98,5	99,1
Other types	90,5	94,6
Total	86,2	85,9

Table 3

The use level of high-potential heat SER by types of utilization plants (in %)

Type of utilization plants	2011		2015	
	Utilization level from actual production	Utilization level from annual formation	Utilization level from actual production	Utilization level from annual formation
Power engineering plants	100	63,9	99,7	58
Boilers-utilizers	96,5	71,6	93,2	57,7
Dry coke quenching boilers	100	86,4	100	86,3
Converter gas cooling boilers	100	92,9	100	93,9
Evaporative cooling systems	83,3	62,9	97,5	63,1
Contact heat exchangers	95,2	58,1	96,9	69,6
Other plants	99,3	87,5	99,5	89,9
Total	95,4	72,7	95,4	63,3

The utilization degree of logging waste is relatively low. Although in the period from 2011 to 2015 there has been a noticeable increase of this degree

(from 32.8% to 49%). Record use levels are observed for wood waste - 98.5% and 99.1% respectively in 2011 and 2015.

According to the table 1, the use level of high-potential heat SER is slightly higher than that of combustible SER, and amounted to 94.9% and 95.4% in 2011 and 2015.

Table 3 shows data on the use degree of high-potential heat SER for different types of plants. As you can see, the use level of HSER from their actual production is quite high for all the considered plants. This level relative to the annual formation of HSER is noticeably lower.

In Ukraine, until recently, due attention was not paid to the use of low-potential HSER, the temperature of which does not exceed 200°C. This is due, in particular, to their significant diversity in temperature, delivery modes, physicochemical properties of their carrier, and the like.

At the Institute of Engineering Thermophysics of the National Academy of Sciences of Ukraine, work is being carried out concerning the use of both high- and low-potential HSER [1-10].

Conclusions. The use levels of different types of secondary energy resources in the energy sector of Ukraine differ significantly. Special attention should be paid to the development of utilization of low-potential HSER, the formation volume of which is about half of the formation of all SER types.

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