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ANALYSIS OF MARINE FUEL PRICES IN THE CONTEXT OF THE IMPLEMENTATION OF THE SULFUR DIRECTIVE

The article presents the economic analysis in the field of oil prices and fuel prices high and low sulfur marine. In addition, it presents a forecast of low sulfur marine fuel prices in the port of Antwerp, Rotterdam and Hamburg, taking into account the entry into force of the Directive sulfur for the years 2015-2021.

INTRODUCTION

Marine fuel used on ships, as defined in the law on the prevention of marine pollution by ships, means "any petroleum-derived liquid fuel intended for use or used on board a vessel, including fuel referred to carrying standard ISO 8217" [5].

In connection with the entry into force on 1 January 2015, the directive limiting sulfur limits on the sulfur content of marine fuels, shipowners were obliged to take action to adapt to the legislation.

Among the available solutions to reduce the amount of sulphur content of marine fuels, are used: the transition to fuelled LNG, scrubber and the use of ecological fuels with a low sulphur content.

The purpose of this development is the analysis of the price level of marine fuels with a particular focus on currently situation on the world market and the latest legislation from the scope of the protection of the marine environment. To perform the analysis, uses information obtained from Marine Bunker Exchange-MABUX and requirements contained in Directive 2012/33/EU on the sulfur content of marine fuels.

Sulphur directive, regulates the allowable level of sulfur content in marine fuels, gas oils, diesel fuels, and designates the permissible limits emissions of sulfur oxides to the environment by marine vessels. Emissions resulting from the combustion of marine fuels on ships are causing environmental pollution by sulfur dioxide and particulates. This affects directly the deterioration of human health and the environment as well as contributes to the formation of acid rain [1].

Regulations contained in the sulfur directive apply to special areas which include: the Baltic Sea, the North Sea and the English channel, and to other areas.

Figure 1 shows the allowable emissions of sulfur oxides to the environment that are generated during the combustion of marine fuels [1].

Shown in Figure 1, the limits relate to the areas of SECA and other areas. In MARPOL 73/78, SECA has been defined as "... the area where measurement of SOx emissions from ships is necessarily required in order to prevent, reduce and control pollution of the air by SOx, and their impact on land areas and air is subjected to careful observation"[4].

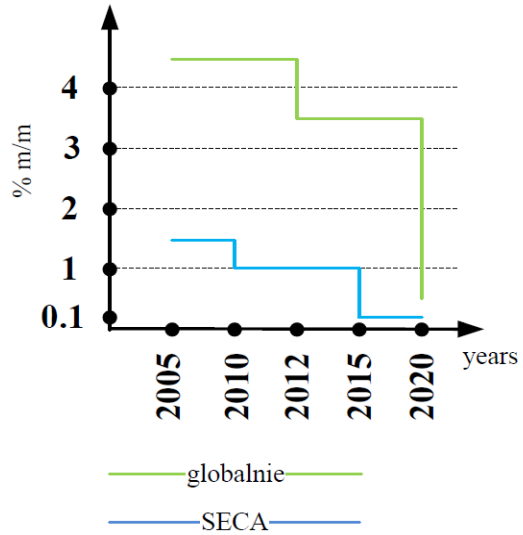

Fig.1. *Limits on the sulfur content of marine fuels [1]*

From 1 January 2015 limit the sulfur content of marine fuel for ships travelling in the area of SECA is 0.1%. In the case of other areas this level currently stands at 3.5%, and from 1 January 2020, will be lifted to the level of 0.5%. In addition, the global introduction of restrictions is strongly associated with a feasibility study of the availability of low sulfur fuel projects in seaports. If the projects will not be completed until 1 January 2018, then duration will be extended to 1 January 2025.

1. ANALYSIS OF THE SITUATION ON THE WORLD OIL MARKET

Crude oil is a mixture of liquid paraffin hydrocarbons (alkanes), aromatic (aromatic compounds) and naphthenic (cycloalkanes)[6]. Due to the fact that this is an extremely versatile product, characterised by a high energy value, has become an important natural energy resource of the world. Due to the still ongoing development, raise the standard of living of humankind consumption grows and becomes a strategic raw material in the functioning of economies in the world.

Among all of the world's largest exporters of crude oil include: Saudi Arabia, the USA and Russia. For the creation of a fair market, control of the world's oil, the Organization of the Petroleum Exporting Countries – OPEC [3]. Current marine fuels are strongly related to the quotations on the world market for crude oil. In the last quarter of 2014, there has been a significant fall in oil prices 90$/barrel. Factors

affecting directly for the reduction in the price of oil are: reduction of demand, reduction of import to the USA, due to produce too many raw materials from their own deposit of shale oil, overproduction crude oil in OPEC countries, sold out by investment banks branches involved in the trade of crude oil and the increase in value of the us dollar [7].

Figure 2. shows the average prices of crude oil in the world since January 2014 until May 2015 years.

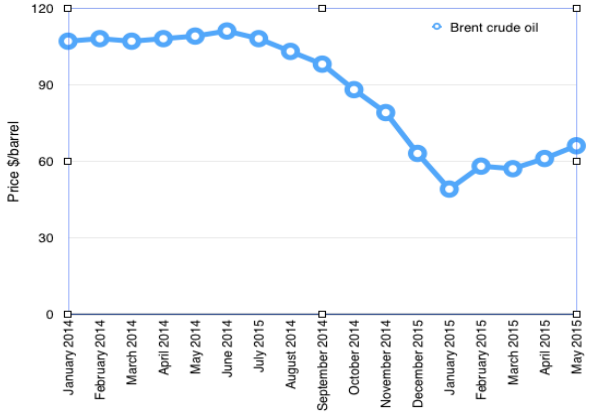

Fig. 2. *Average prices of oil in the world in the period from January 2014 until May of 2015 [8]*

At the beginning of January, 2014, the average price of crude oil was at 110$/barrel. The highest average price of oil, was recorded in June 2014, she then 115$/barrel. With respect to the base period was observed an increase of 4.5%.

The period from June 2014 to January 2015 brought a sizable decline in prices, which fluctuated in the range of 50 to 115 $/barrel. This situation was directly related to the overproduction of oil by OPEC countries produce significant amounts of oil by the USA with their own slate decks which USA reduced imports from other directions. In January 2015, was observed the lowest price level for the period. The average price of oil stood at that time at 50$/barrel. So significant decrease price means that the price of oil was lower by 54.5% in comparison with the average prices in January 2014 and about as much as 56.5% in comparison with the average prices in June 2014. In May 2015 average oil prices reached a level 65$/barrel, this means that the decline in prices 41% with respect to the base period.

2. ANALYSIS OF MARINE FUEL PRICES

The introduction on 1 January 2015, the provisions contained in the Sulfur Directive makes for shipowners carrying out transport in the area SECA, especially important are the price of marine fuels on the world market. In view of the above, it is necessary to change the way supply ships. This situation makes over the next few years, the price of low-sulfur marine fuels-LSFO will carry out a key role in marine fuels.

Depending on the amount of the sulfur content of marine fuel, we distinguish:

– Low Sulfur Fuel Oil - LSFO
– High Sulfur Fuel Oil – HSFO [2].

We analyzed the ports of the Baltic Sea, the North Sea. Figure 3 shows the average price of marine fuels in the port of Swinoujscie / Szczecin.

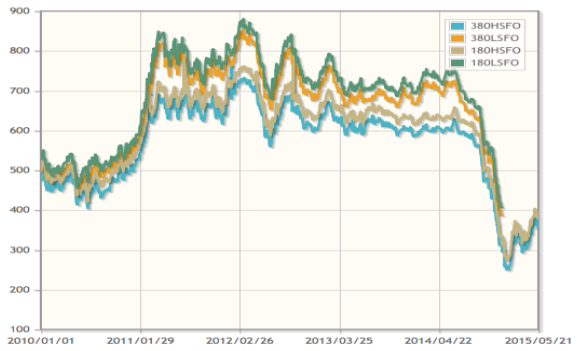

Fig. 3. *Fuel prices LSFO and HSFO in the port of Swinoujscie / Szczecin [8]*

Presented in Figure 3 the prices refer to the port of Swinoujscie/Szczecin for the period from 1 January 2010 to 21 may 2015.

Carried out an analysis of the average prices of fuels LSFO and HSFO in the port of Swinoujscie/Szczecin has shown that at the beginning of the period considered, i.e. January 2010 LSFO fuel prices ranged within 500-550 $/mton. In the same period the average HSFO fuel prices ranged within the 450-500 $/mton. This means that the average fuel prices were higher LSFO of 9,5% compared to fuel HSFO.

During the period under consideration the highest fuel prices LSFO noted in February 2012 and haughty 890$/mton and 750 $/mton for fuel HSFO. In the period from April to may 2014 2015 see a clear downward trend in average prices of fuels. Lowest fuel price LSFO was recorded at the end of January/February 2015 and amounted to about 290 $/mton, and for fuel HSFO 250$/mton, which means a decrease relative to the base period of approximately 52% (fuel LSFO) and 47% (fuel HSFO).

Another was analyzed port of Rotterdam. Figure 4 presents the average fuel prices LSFO and HSFO.

Fig. 4. *Average fuel prices LSFO and HSFO in the port of Rotterdam in the period from January 2010 to May of 2015 [8]*

Carried out an analysis of the average prices of fuels HSFO and LSFO in the port of Rotterdam has shown that at the beginning of the test period the average prices of fuels LSFO, haughty at 515$/mton and HSFO fuel – 420$/mton. The highest prices of LSFO fuel was in February 2012 and was then 800$/mton, rising in relation to the base price. 35%. However, the highest prices of fuel the HSFO was noted in March 2012 and amounted to 710$/mton, an increase in relation to the base price 17%. In January 2015, has seen the lowest price of fuel LSFO, which is about was 280 $/mton. In respect of the highest fuel prices LSFO from 2012, the price decreased by 65%. Similarly, HSFO fuel price obtained in January 2015 decreased by 66%.

The entry into force of the directive in the future may increase in the cost of marine low sulfur fuel. The current oil market situation causes that the current prices are relatively low. To predict the future situation on the market of low-sulfur marine fuels, created forecast for the price of marine fuels. The study takes into account the time interval between July 2015 to December 2021. The chart shows the simulation of the prices for the port of Antwerp, Hamburg and Rotterdam. The results shown in Figure 5.

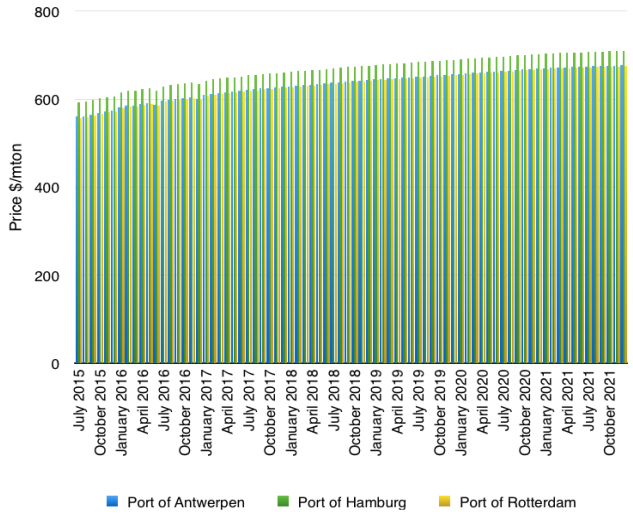

Fig. 5. *Forecast average fuel prices LSFO in the port of Antwerp, Hamburg and Rotterdam 2021 [8]*

On the basis of the study we can conclude that the average prices of low sulfur fuels are showing an upward trend. In the period from June 2015 until December 2021 year we can expect an increase in average prices of low-sulfur fuel. If we assume that in June 2015, the average price of fuel LSFO will be in the range of 585-$ 600/mton, grudniu202 year we can expect an increase in the average level of prices LSFO to the level of 620-650 $/mton, meaning the price increases by 6%.

CONCLUSION

Current prices of low sulfur fuels for the majority of shipowners are not drastic solution. Development of the maritime infrastructure, ensure the availability of fuels with a low sulfur content, will allow the use of solutions and to adapt to the environmental laws in General. No doubt, that the risk arising from the transition to power ships low sulfur fuel is a violent change in the oil market and the increase in fuel prices.

In practice, the shipowners decide to use technology of dual-fuel engines, allowing the use of two different fuel grades. This allows you to make savings on waters are excluded from the most recent regulations. The use of LSFO fuel is one of the alternatives used in shipping. However, it may become one of the most dangerous because of the unstable situation in the market price of marine fuels.

As is apparent from the above analysis, cheapest fuels are those with a high concentration of sulfur. Crude oil prices recently reaching the lowest level in years, causing instability in the market for marine fuels. Due to the fact that the Baltic Sea is becoming one of the most exploited of EU transport routes, it will be increasingly frequent subject of regulations on environmental protection and safety at sea, which may have a negative result in the condition of the ship owners, and thus the competitiveness of the Baltic Sea Region.

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Analiza cen paliw żeglugowych w kontekście wprowadzenia dyrektywy siarkowej

W artykule zaprezentowano analizy ekonomiczne z zakresu cen ropy naftowej oraz cen paliw żeglugowych wysoko i niskosiarkowych. Ponadto przedstawiono prognozę cen paliw żeglugowych niskosiarkowych w porcie Antwerpia, Rotterdam i Hamburg z uwzględnieniem wejścia w życie dyrektywy siarkowej na lata 2015-2021.

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