

# FUTURE OF THE POLISH ENERGY SECTOR IN CONSIDERATION OF THE EU ETS

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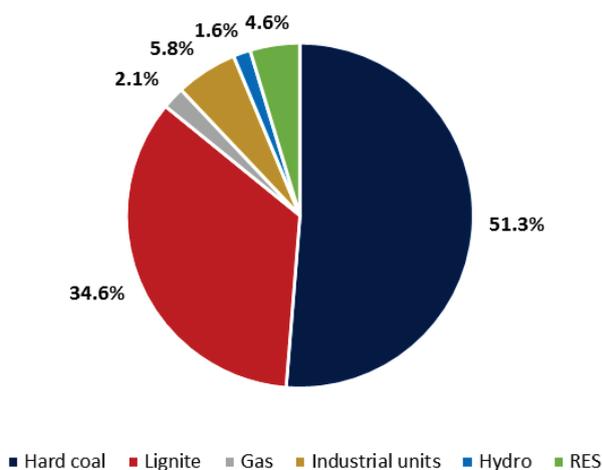
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## ABSTRACT

Presented paper analyses the possible future of the Polish energy power sector in consideration of European Emission Trading System (EU ETS). It also describes the legislation and mechanisms that influence the European carbon market with a focus on their implications towards the sector of energy production in Poland. First chapter describes the international agreements and mechanisms that are part of Polish legislation with a focus on Kyoto Protocol. In the second chapter the Directive 2003/87/WE with further amendments is being analysed with its most relevant articles impacting Polish energy sector. The third chapter presents recent changes to the system that shaped its structure and significantly impacted the market allowance price. In the fourth chapter the future outlook is being drawn based on further detailed description of changing EUA price, derogations to European Directives and possible emission levels.

## INTRODUCTION

The energy production in Poland is dependent on fossil fuels. The Energy Regulatory Office states, that in 2014, 51% of electrical energy had been produced by hard coal power plants, 35% by the plants fuelled with lignite and around 2% by gas combined heat and power plants (CHPs) (Fig. 1)



Source: Own study based on data from 2014 Annual Report of Energy Regulatory Office

Fig. 1. Electrical power production in Poland in 2014

Regardless fossil fuels dominance, the renewable sources (RES) are increasing their share every year mostly due to favourable European Union (EU) regulations and growing awareness of the changing climate. Fuel switch (from conventional to RES) is regarded as one of the best ways to achieve the emission reduction goal and given that over 75% of Polish power units are more than 20 years old, it is adequate to expect the forthcoming reforms and development of long term energy politics that will ensure the reliable and secure energy production for the future. The EU ETS that came into force in 2005 and was expected to significantly impact the energy system - in order that it becomes less emissive - did not give sufficient incentives for the change in the first years of its operation. However, in 2013, its 3<sup>rd</sup> phase commenced bringing substantial changes to the rules of allocation and trading of the allowances (EUAs). Moreover, the reduction target of EU and EFTA countries has been recently increased up to 40% (in comparison to emissions in 1990) and 21<sup>st</sup> Conference of Parties (COP) to the United Nations Framework of Climate Change (UNFCCC), held in Paris in December 2015, further reaffirmed the international goal of limiting global temperature increase below 2 degrees Celsius. Since Poland is considered an important part of international agreements, it is unavoidable for this country to neglect worldwide trends.

## KYOTO PROTOCOL

The Kyoto Protocol to the UNFCCC was adopted on 11 December 1997 in Kyoto, Japan and started operating on 16 February 2005<sup>1</sup>. As a side of the KP, Member States (MS) of the EU (at that time there were 15 of them) agreed to reduce their total emissions by 8% in the period of 2008-2012 compared to 1990 levels. The quantified emission limitation or reduction commitments for each MS were specified in Annex II of Council Decision 2002/358/CE and covered a number of gases further reported in CO<sub>2</sub> equivalent

<sup>1</sup> Due to Point 1 of Article 25 of Kyoto Protocol, it could enter into force no sooner than on the 90th day after the date on which at least 55 Parties to the Convention that were responsible in total for at least 55% of the total CO<sub>2</sub> emissions in the year 1990 have provided the UNFCCC with their instruments of ratification, acceptance, approval or accession. Last country that accepted the agreement and therefore enabled it to start being binding was Russia.

(CO<sub>2</sub> eq.) in order to enable the accurate determination of yearly reductions. Poland which was not part of the EU at that time, but a signatory to the UNFCCC since 1994 and to its KP since 2002, agreed on the grounds of the protocol to reduce its emissions by 6% in relation to the base year which was chosen to be 1988<sup>2</sup>. The initial greenhouse gas (GHG) inventory in Poland for the year 1988 equalled to 563 442 774 tCO<sub>2</sub> eq. and is being used to summarize the overall outcome of reduction mechanisms under the KP. Considering that it was eligible for the period of 2008-2012, and in the last year of its operation the total national emission of the GHG in Poland amounted to 399 268 970 tCO<sub>2</sub> eq., the estimated reduction was way higher than expected – exceeding 29%. The significant decrease is mostly attributed to political and economic change in the early nineties and thus transformation of the Polish economy (National Centre for Emission Management (KOBiZE), 2014). Other important factors that impacted the emission levels in Poland over that period were the world's economic crisis (peak in 2007) as well as further general economic slow-down (2009).



Fig. 2. Total Polish GHG emissions under Kyoto Protocol in 1988-2012 (Own study based on data from National Inventory Report 2014, KOBiZE)

Figure 2 shows how significant role in total GHG emissions stands CO<sub>2</sub> alone for. It is the main GHG emitted in Poland, and it is mostly generated by the energy sector (Fig. 3)

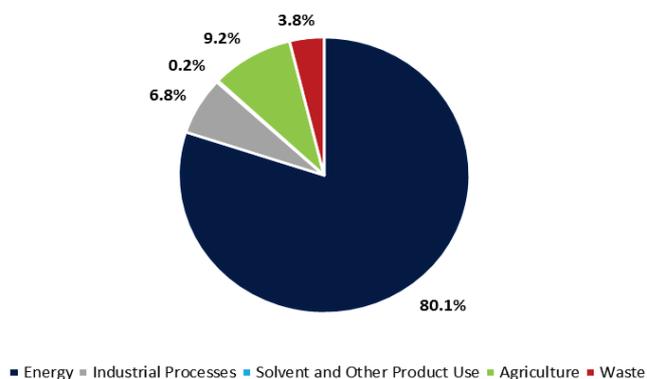


Fig. 3 Emission of greenhouse gases in Poland according to IPCC categories (without LULUCF) in 2012 ( Own study based on data from National Inventory Report 2014, KOBiZE )

The dominance of the energy sector in producing GHGs lies in its structure based mainly on hard coal and lignite, and thus a widely used process of fuel combustion which is highly emissive.

After expiration of first commitment period (2008-2012) of the KP, the UNFCCC has been organising high level meetings to further address the climate change and determine a new post-Kyoto agreement. In November 2012, during COP18 held in Doha, a new amendment to the KP was introduced proposing a follow-up in a form of a second commitment period in the years 2013-2020. As of 10 December 2015 it did not enter into force because only 58 Parties have ratified it. Aforementioned COP21 in Paris brought a lot of clarification for the future and obliged the Parties to unite in efforts of protecting climate. Among others, it established binding commitments by all parties to make nationally determined contributions (NDCs) every five years, committed all countries to report regularly on their emissions and stated the need of new mechanism under KP that would enable emission reductions in one country to be counted toward another country's NDC.

## EU ETS

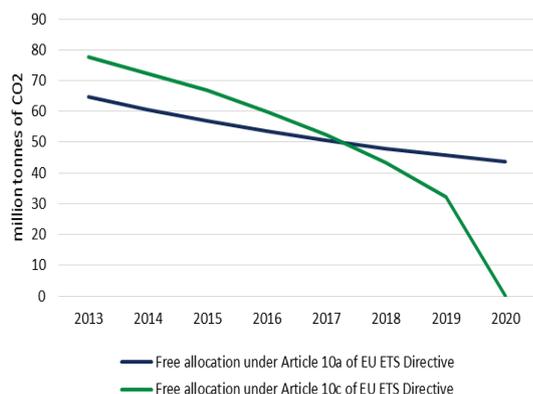
The EU ETS was introduced by Directive 2003/87/WE<sup>3</sup>. It was a measure created in order to fulfil and facilitate the KP to the UNFCCC. The whole system commenced in January 2005 by imposing emission caps on around 12 thousand energy units and other energy intensive industries. The “cap-and-trade” principle that underpins the system means that each participating installation is allowed for a certain number of allowances yearly within its limit (cap). Parties are allowed to trade the obtained European Union Allowances (EUAs) either to fulfil their caps or get manage the excess which provided them with additional outcome.

The EU ETS has been divided into three separate trading periods. The 1st trading phase in the years 2005-2007, which was commonly called “learning by doing” phase, determined rules for monitoring, reporting and verifying the emissions. Free allowances were attributed to each MS yearly on the basis of their needs stated in National Allocation Plans (NAPs). EUAs could not be transferred from this phase to subsequent ones. In the 2nd trading phase that overlapped with the KP commitment period (2008-2012), further rules and amendments were developed in order to ensure emissions reduction. Moreover, in 2009 Directive 2009/29/EC was presented introducing important changes for the 3rd trading phase (2013-2020). Starting in 2013, all attributed allowances were supposed to be sold through auctions. Additionally, the number of free allowances started decreasing with a linear coefficient of 1.47% yearly (with a base amount from the mid period of the 2nd trading phase). Thanks to important legal provisions imposed by

<sup>2</sup> According to Article 4.6 of the Decision 9/CP.2 of UNFCCC (United Nations Framework Convention on Climate Change, 1996)

<sup>3</sup> (European Parliament, Council of the European Union, 2003)

Directive 2009/29/EC some facilitating mechanisms for various countries to which the compliance to the new rules could pose an issue – such as countries dependent on fossil fuel, with respectively low GDP or outstanding reductions under KP – were put into force. Poland being a beneficiary of all of them receives additional freely allocated allowances under the points (b) and (c) of the article 10(2), the Article 10a and 10c. The exact number of freely allocated allowances that is planned to be attributed to the enlisted installations is to be found in Polish legal documents<sup>4</sup> (Fig. 4).



Source: Own study based on Cabinet of Ministers Regulations of 31 March 2014 and of 8 April 2014

Figure 4 Preliminary proposition of free EUA's allocation to the Polish energy sector pursuant the derogation mechanisms

Due to derogation mechanisms, over the 3<sup>rd</sup> trading phase Poland is entitled to receive 423.7 million of free allowances for power units, and 404.6 million EUAs for other installations that do not contribute to electrical energy production. Given that the actual allocation under the article 10c of Directive 2009/29/EC is conditioned by compliance with predefined conditions obliging companies to invest in modernisation and refurbishment and that this free share will decrease every year until 2020 when it will reach 0, the Polish energy sector will surely be affected by this change.

## RECENT ALTERATIONS TO THE EU ETS

In 2014 the European Commission (EC) presented new approach to raise the prices of allowances by the introduction of so called “back-loading”. The mechanism created to decrease a growing surplus of allowances proposed a withdrawal of the amount of 900 million EUAs in total from the auction calendars in 2014-2016. Following the final approval of this decision, 400 million allowances were eliminated from market in order to be released in 2019. The back-loading negotiations and final decision establishing the system triggered an important change in EUA price's trend. After a long period of severe decline, the prices started slowly going upwards. The increase though had

been evaluated as not substantial enough and did not address the problem of growing surplus of EUA's to the desired extent. With the ambitious reduction target of 40% in 2030, the EC found itself in need of proposing another mechanism that would influence the market in a way that it serves its purpose more effectively.

Market Stability Reserve (MSR) being a part of structural EU ETS reform, has been introduced in July 2015 and further approved by the Council of the EU in October 2015 (European Parliament, Council of the European Union, 2015). The European Parliament (EP) created and agreed on a mechanism regulating the auction volumes to adjust to 400 - 833 million frame. From the start of its operation on 1 January 2019 the allowances will be placed in and released from the reserve, whenever the total number being in circulation exceeds a certain threshold (the aforementioned framework). What is important to the mechanism of free allocation in Poland, the free allowances distributed to the MSs on the grounds of solidarity and growth under point (b) of the Article 10(2), the decision will not be included in the total volume of allowances from which 12% is going to be deducted pursuant to Article 1(5) of Decision 2015/1814 until 31 December 2025. Furthermore, EUAs allocated on the grounds of Articles 10a and 10c - will not be included in the reserve as well and will be treated separately from MSR mechanism. At the same time, all the unallocated allowances either set aside for new entrants or saved from plants closures are going to be placed in the MSR in 2020. Moreover the EUAs back-loaded from the market in the years 2014-2016 will be transferred to the reserve instead of being released, as previously stated, in the years 2019-2020 (European Commission, 2014).

## FUTURE OUTLOOK

In order to assess the future of Polish energy sector in consideration of EU ETS, three major factors must be taken into account. First of all, the future emission of the sector plays a vital role, because it determines the amount of allowances that power units will require. When the need for allowances is assumed, regulations need to be analysed in so that one can state the actual shortage of allowances that energy businesses will suffer from. Last but not least factor is the allowance price, because together with the shortage it contributes in assessment of costs borne by the energy sector due to the EU ETS. The described analysis, easy as an idea, is however a very complex problem which requires big number of assumptions all the steps on a way.

### Emission levels

Even though the emission were dropping in the recent years, reaching the lowest point in 2014, it is doubtful that such a linear trend will be preserved in the future.

<sup>4</sup> (Cabinet of Ministers (PL), 2014) (Cabinet of Ministers (PL), 2014)

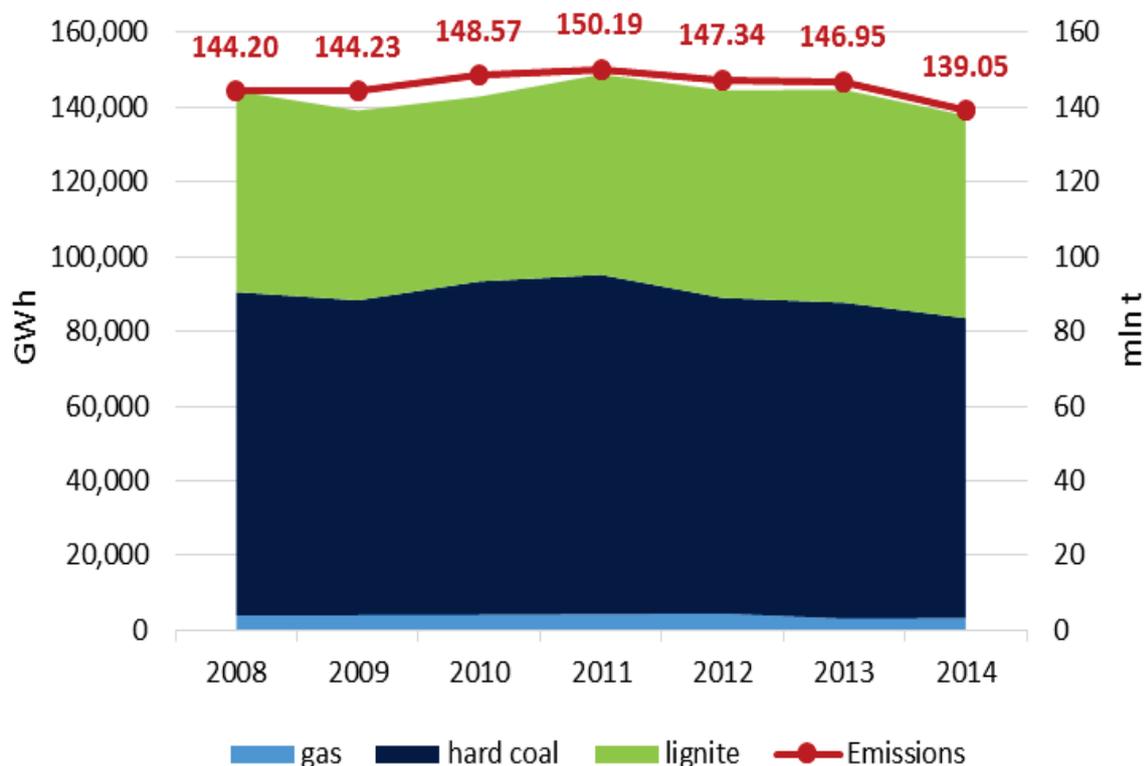


Fig. 5. Levels of energy production and emissions in the period of 2008-2020, Own study based on production data of PSE SA and emission data from ARE SA

In 2014 electrical energy production level was very low regardless of the good state of the national economy. This situation was mainly caused by the highest level of imported electrical energy (in 2014 the volume of imported energy was higher than export for the first time in a long time).

Moreover, according to PSE SA, the national company providing services of electrical energy transmission and maintaining security of the Polish Power System (TSO), regardless the significant decrease in produced energy, the demand is steadily growing since 2012. Given that the electrical energy production is closely related to consumption, one can expect that in the future the decreasing production trend will alter and the total volume of the energy produced will raise yearly. Furthermore, thorough analyses of national documents that address the future of Polish energy sector, such as legally binding *The Polish Energy Policy 2030* as well as a project of *The Polish Energy Policy 2050* confirms this theory. Both documents also state that even though slowly decreasing, the share of conventional power plants will remain significant. Hard coal and lignite are forecast to lose their importance, while gas fuelled plants will increase their capacity at the highest speed, alike wind turbines.

Aforementioned documents give actual prognostic data for years 2015 and 2020. For the purpose of proper visualisation of the data I evenly distributed values over the period (Fig. 9).

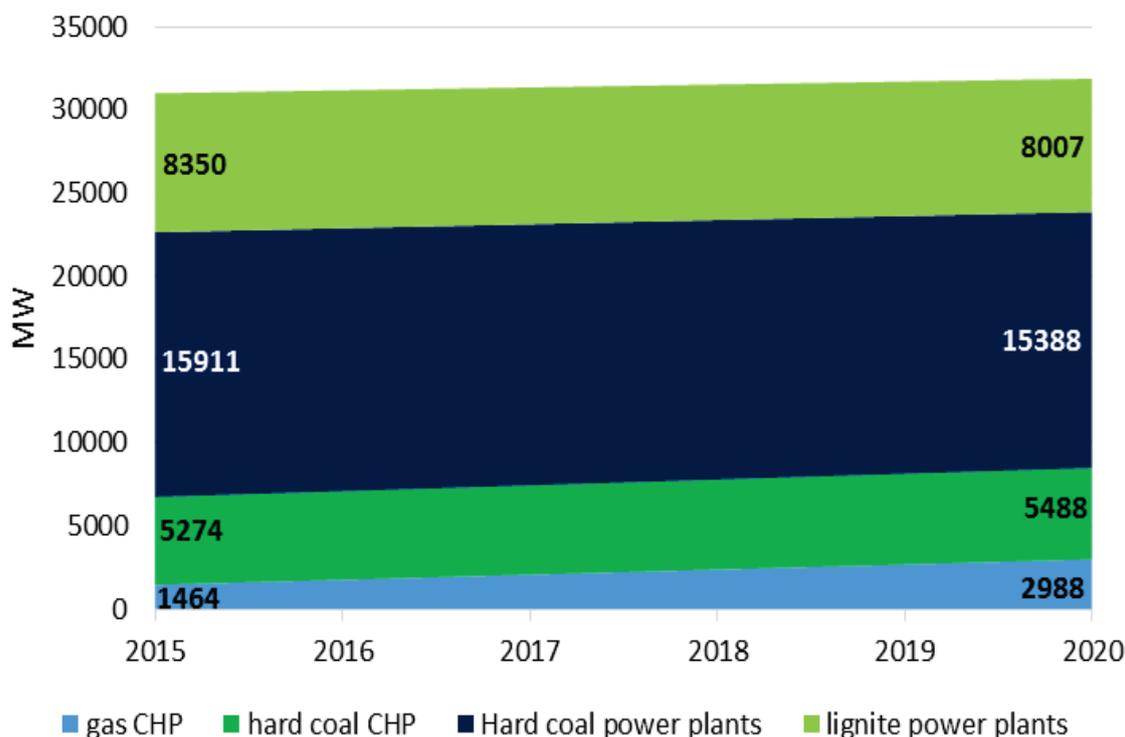
Due to increasing importance and presence of RES in Polish energy sector, the importance of conventional

power is and will be decreasing. The analysis of the production data of PSE SA suggest that every year RES, together with industry power plants are getting the bigger share in overall electrical energy production and such a growing trend will remain in the future. Observed changes of the Polish energy sector and the ongoing refurbishment of conventional power plants which is a condition of acquiring freely allocated allowances, led me to conclusion that emission levels from conventional power plants will overall slightly decrease but will remain significant in the years to come.

#### Shortage of allowances

In order to predict the EU ETS costs incurred by conventional power system in Poland, freely allocated allowances need to be taken into account. As shown in Fig. 4, the ones planned for allocation on the basis of the Article 10c of EU ETS Directive will decrease until 2020 - until their number reaches 0. Nevertheless, there is one substantial condition that the units must fulfil. Concerned MS<sup>5</sup>, where in 2006 more than 30% of electrical energy was produced from a single fossil fuel, and GDP per capita at market price did not exceed 50% of average GDP per capita at market price of the Community, thus the ones eligible to receive allowances from this share, have to provide

<sup>5</sup> i.e. Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Lithuania and Romania

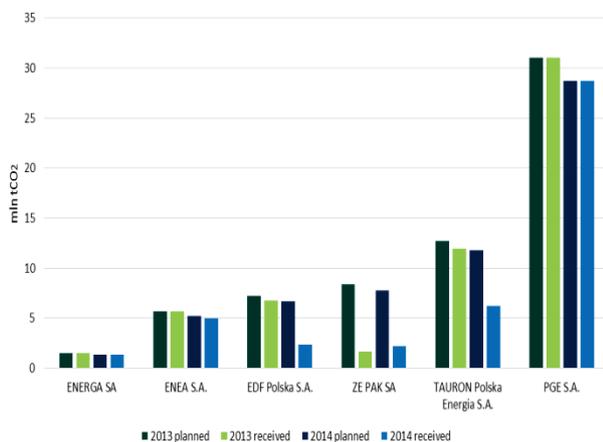


Source: Own study based on governmental project of the Polish Energy Policy till 2050

Figure 6 Conventional power capacity levels in Poland in 2015-2020

national plans setting out investments aiming at modernising their energy sector, which are to be financed by the value of free EUAs obtained.

So far, it is possible to analyse the actual number of received allowances in the years 2013-2014.



Source: Own study based on Regulation of Cabinet of Ministers of 8 April 2014 and 13 April 2015

Figure 7 Planned and actually received allowances due to derogation mechanism based on Article 10c of the EU ETS Directive in the years 2013 and 2014

Fig 7. shows the level of compliance for biggest energy corporations in Poland by presenting preliminary allocation with the actual one in given years. Those firms combined are preliminarily entitled to receive between 75% and 85% of all allowances from this share in the years 2013-2020, and might be used as

a benchmark to determine the assumed share of actually received allowances. So far, in 2013 they managed to receive 88.1% and in 2014 74.5% of the share. Analysing their results separately, ENERGA SA, ENEA SA and PGE SA managed to comply with the rules and received nearly whole planned share, while

others had bigger difficulties especially in the year 2014.

Regardless the compliance though, the energy sector will keep on receiving reduced numbers of allowances and in order to verify emission, companies will need to purchase them on the market.

### EUA prices

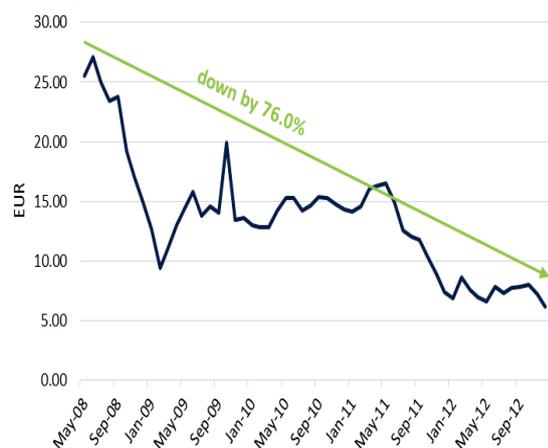
The idea behind carbon pricing states that allowance price should directly reflect the markets fundamentals closely related to the marginal costs of emissions reduction. The price of 1 tonne of CO<sub>2</sub> represented by EUA allowance has been significantly changing in the past years (Fig. 5, Fig. 6)

During the 1<sup>st</sup> trading phase, in April 2006, prices extremely plunged and almost reached zero by the end of 2007. In the core of this situation lied substantial over-allocation since the start of its operation which caused a limited efficiency of the mechanism during the 1<sup>st</sup> phase. In the broader context, during those three years, the EU ETS failed to convince emissive companies to change their behaviour into more environmentally focused.

In this paper, the analysis of the price of EUA alteration in the years 2008-2015, was made based on

daily stock quotes taken from BlueNext, secondary EEX market and ICE Daily Futures. Using weighted average, daily and monthly average prices were obtained. Futures prices were taken into account due to the fact that majority of transactions concerning EUA take place on Futures markets.

Over the 2<sup>nd</sup> trading period, carbon market experience a massive decline in EUA price reaching 76% down in value when comparing monthly average prices calculated in May 2008 and December 2012. During this time, the average daily prices varied between 92.73 €/tCO<sub>2</sub> on 1 July 2008 and 5.71 €/tCO<sub>2</sub> on 4 December 2012 (Fig. 5)

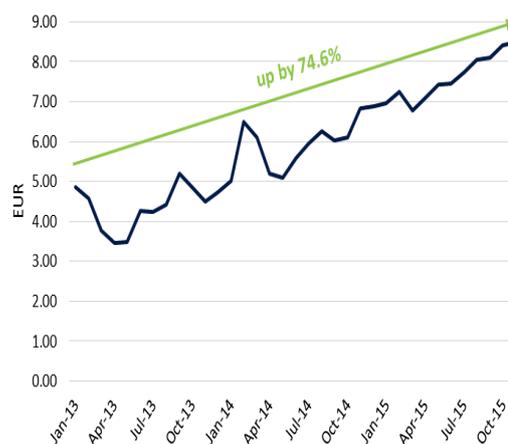


Source: Own study based on data from CIRE.pl

Figure 8 EUA prices in the 2nd trading phase of the EU ETS (2008-2012)

The decline was market's response to over-allocation and thus rapidly growing surplus. The economic crisis in the years 2008-2009 caused major cuts in industry production and overall energy demand. Under those circumstances, the overall volume of energy demand needed to be re-evaluated. While the economy was being hindered, emission levels fell accordingly, which allowed companies to store extra allowances. They were banked and transferred into 3<sup>rd</sup> trading phase what contributed to further fall of EUA prices. Other factors influencing this significant drop, were renewable policies (i.e. popular feed-in-tariffs for RES) and the incorporation of the Kyoto credits into EU ETS

The beginning of the 3<sup>rd</sup> trading phase did not bring the alteration in declining trend. Eventually, EUA price reached the lowest level since the commencement of the 2<sup>nd</sup> period in April 2013, when the average allowance price was around €3.47. To address the disastrous consequences of this significant drop, EC started looking for alternative ways to "repair" the system and allow it to serve its purpose.



Source: Own study based on data from CIRE.pl

Figure 9 EUA prices in the 3rd trading phase of the EU ETS (2013-2015)

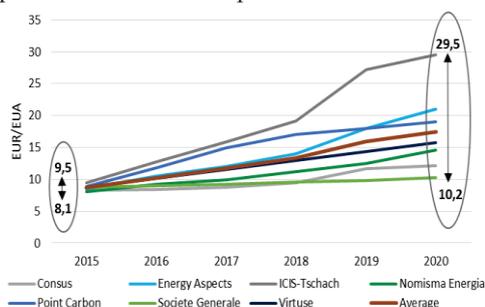
In May 2013 when the back-loading started being discussed, the situation substantially changed. Accordingly to the rules of the mechanism, the auction volumes were yearly reduced starting from 2014, when the legally binding decision came into force as an amendment to the EU ETS Auctioning Regulation (European Commission, 2014). This regulation, together with the discussed introduction of the MSR served as triggers to change the declining trend and enabled the EUA price to remain on the path of growth. An analysis of monthly average prices between January 2013 and November 2015 shows the significant rise of 74.6% (Fig. 6).

2014 brought an important change in forecasts of EUA prices and trends for the next years. Due to back-loading decision, discussion over the MSR introduction, all important agencies following alterations on the market and handling prognoses of prices for forthcoming years, have changed their predictions. As an example, on 30 June 2014, Consus forecast of EUA price was said to be €6.90 in 2016, while on 27 November 2015, the same company published the results that rise the value up to €8.50 (CIRE, 2015).

The website <http://carbon-pulse.com> gathers information on forecasts from a list of institutions and publishes it quarterly. What can be found there are results presented by the companies, such as:

- BNEF
- Commerzbank
- Consus
- Energy Aspects
- ICIS Tschach
- Merkedskraft
- Nomisma Energia
- Point Carbon
- Societe Generale
- Vertis
- Virtuse

Fig. 7 presents the prices given by enlisted institutes that provided a forecast for every year over the period of 2015-2020. Among those companies whose results were not presented in Fig 7, BNEF published his results for 2015, 2017 and 2020 which were equalled to €9, €14 and €30 respectively. Commerzbank, Markedskraft and Vertis on the other hand abstained from providing long-term prognoses and stopped their forecasts at 2016 thus they are not included on the chart as well but their results ranged between €8.5 and €10.3 in 2016 which is around the average for this publication of carbon-pulse.com from 9 October 2015.



Source: Own study based on publication of carbon-pulse.com from 9 October 2015

Figure 10 October forecast of EUA price in the period of 2015-2020

While the rising trend is being preserved by all agencies, when it comes to its strength, the institutions are divided. The most sceptical ones, i.e. Societe Generale and Consus, predict a growth of merely €2-4 in the next 5 years. The highest values on the other hand are given by ICIS-Tschach, who forecast the EUA price in 2020 to be €29.5.

## CONCLUSION

The energy sector in Poland being responsible for around 90% of the country's CO<sub>2</sub> emissions is very vulnerable to any changes in climate politics and the EUA price. The amount of CO<sub>2</sub> released to the atmosphere is strictly related to the volume of electrical energy produced. Considering that the energy production depends on various aspects, such as the state of the economy, the volume of energy that is being imported or exported, weather, developing technology, and many others, one can see how complex the forecasting is. It is impossible to predict the future accurately, but in order to prepare for what the upcoming years will bring, past and recent data, together with actual legislation need to be carefully studied. In energy sector there is no one good scenario, and it is always a matter of assessing various advantages and drawbacks from economic, technological and legal point of view. Social issues are also of importance. One thing is certain though, its development should be planned carefully and with the highest attention, because investments in new power sources, especially conventional ones, take time and a lot of funds, not to mention that stable energy sector is crucial for the economy to develop. It is hard to

imagine that the energy sector in Poland will remain the same in the years to come and many of the aspects mentioned in this paper - climate change politics, severe rules of the EU ETS and changing allocation methods or increasing EUA prices – are not drawing a favourable scenario thus should be widely discussed by the policy makers.

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