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Zarządzanie finansami firm – teoria i praktyka

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LOW-CARBON TECHNOLOGIES INVESTMENT DECISIONS UNDER UNCERTAINTY CREATED BY THE CARBON MARKET

Summary: Emissions trading promises to meet an environmental goal in the most cost-effective way by ensuring that the market price of carbon is equal to the lowest marginal abatement cost amongst all controlled sources. European Union Emission Trading Scheme has been functioning since 2005. Next years have proven the significant uncertainty generated by the implementation and architecture of EU ETS that impedes business long-term planning. This uncertainty results from EUAs long-term as well as short-term price volatility, system vagueness, entities reporting duties, fraud and taxation. Some of described types of uncertainty can be removed due to system perfecting. On the other hand – EUAs price instability is ingrained in the system nature. The uncertainty augments the cost of transactions and impairs the realization of the Coase theorem and thus undermines EU ETS. Thereof the asking if imposing carbon taxes would be more cost effective way of achieving environmental goals is still reasonable.

Keywords: carbon market, emission allowances, investment decisions, uncertainty.

1. Introduction

International initiatives for reducing Green House Gases (GHGs) emission has resulted in establishing European Union Emission Trading Scheme (EU ETS), the largest carbon market in the world. Many enterprises (including Polish companies) has been obliged to certify their CO₂emission by surrender emission allowances that are traded on this market. In the face of this obligation enterprises have a choice – they can either reduce their emission by investing in low-carbon technologies or sustain emission level (or augment it) and surrender higher number of allowances. This article aims at presenting uncertainty created by EU ETS that low-carbon technologies investment decisions come under.

2. The origin and the architecture of carbon market

As society acknowledged emission of GHGs as undesirable, international initiatives have emerged for emission reduction. The most important is Kyoto Protocol, which signatories obliged themselves, among others, to reduce emission by at least 5% below 1990 levels in the commitment period 2008 to 2012¹. Quantified reduction commitment (percentage of base year or period) for Poland under the Kyoto Protocol accounts for 94%². Under the Treaty, countries must meet their targets primarily through national measures. However, the Kyoto Protocol offers them an additional means of meeting their targets by way of three market-based mechanisms. Kyoto mechanisms are:

- emissions trading – known as “the carbon market”,
- clean development mechanism (CDM),
- joint implementation (JI).

This article focuses on carbon markets, thus other mechanisms will be presented briefly: Joint Implementation (JI) and Clean Development Mechanism (CDM) are mechanisms that allow a country with an emission reduction or limitation commitment under the Kyoto Protocol to earn Emission Reduction Units (ERUs) from an emission-reduction or emission removal project in another country that signed the Kyoto Protocol – JI, or earn certified emission reductions (CERs) from an emission-reduction or emission removal project in developing countries – CDM³. Both ERUs and CERs represent the successful emissions reduction equivalent to one tone of carbon dioxide equivalent (tCO₂e).

Emissions trading has its theoretical background in the Coase theorem [Graczyk 2002, p. 94-95]⁴. The theorem states that proper assignment of property rights to any good, even if externalities are present, will allow bargaining between the affected parties such that an efficient solution will be obtained no matter which party holds the rights (two assumptions are made: transaction is costless and damages are accessible and measurable) [Callan, Thomas 2007, p. 65]. As GHG's emission is an externality, the market for GHG's reduction has been established and GHG's emissions allowances have become new commodity being traded for the purpose of efficient reduction of GHG's emission. Poland, as a European Union member, joined European Union Emission Trading System.

¹ Art. 3. Kyoto Protocol to the United Nations Framework Convention on Climate Change, United Nations 1998, <http://unfccc.int/resource/docs/convkp/kpeng.pdf> (22 November 2011).

² Annex B to Kyoto Protocol to the United Nations Framework Convention on Climate Change, United Nations 1998. <http://unfccc.int/resource/docs/convkp/kpeng.pdf> (22 November 2011).

³ Art. 6 and Art 12 Kyoto Protocol to the United Nations Framework Convention on Climate Change, United Nations 1998, <http://unfccc.int/resource/docs/convkp/kpeng.pdf> (22 November 2011).

⁴ Its political background is more complicated, however. From the economical point of view it is important to notice that in 1992 the European Commission failed to introduce Europe-wide carbon tax [Ellerman, Convery, Perthuis 2010, p. 17].

The market came into operation 1 January 2005 with the aim of helping EU Member States to achieve compliance as cheap as possible with their commitment under the Kyoto Protocol. The scheme is based on a budget which caps the pollution of a substance to a predefined volume per period (the budget is settled for the whole European Union)⁵. This budget is subdivided into a number of tradable certificates of which each carries the same allowance (European Union Allowance – EUA and – from 2013 – European Union Aviation Allowances – EUAAs) [Veith 2010, p. 7]. The CO₂ emissions reduction target of each member state has to be converted into National Allocation Plans (NAPs). Each government is in charge of deciding the amount of quotas available for trading, after negotiating with industrial companies and after validation of European Commission. The NAPs that are submitted may be rejected by the European Commission and sent back to Member States for revision before the final decision is granted. The sum of NAPs determines the number of quotas distributed to installations in the EU ETS [Chevallier 2008, p. 16]. Each Member State allocates freely (until the end of 2012) allowances among entities obliged to certify their emission. At the end of the period the regulated entities have to surrender the amount of certificates equal to the physical emission (deficiency of allowances results in relatively intense penalties). An entity can purchase necessary or sell supernumerous allowances at the given exchange (this is called cap-and-trade) [Veith 2010, p. 7].

The continuous scarcity of allowances is assumed in order to keep the price of allowances high and thereof create strong incentives for investment in carbon dioxide emission reduction. The scheme operates over discrete periods (presently – 2012 – II Phase goes on). For each period the cap is established and consequently the certain number of allowances is granted as well as types of installations obliged to legitimize their emission by appropriate number of allowances are defined. In 2013 the system will transit into full auctioning (allowances no longer will be granted freely). “Banking” and “borrowing” are allowed on the market, which means, that allowances bought or granted one year may be utilized next year (banking) or a year before (borrowing). Allowances may be traded privately, over-the-counter (with a broker participation, who matches buyers and sellers) or at one of the climate exchanges (Poland decided to trade allowances at the national platform – Polish Power Exchange – instead of centralized auctions in EU⁶).

⁵ The cap for the year 2013 has been determined at 2,039,152,882 allowances, i.e. just under 2.04 billion allowances. The cap will decrease every year by 1.74% of the average annual total quantity of allowances issued by the Member States in 2008-2012. http://ec.europa.eu/clima/policies/ets/cap/index_en.htm (23 November 2011).

⁶ In years 2010 and 2011 there were 6 – 9 sessions performed at Polish Power Exchange per year. No transactions were made. www.tge.pl, 9 January 2012.

This indicates that “dealer model” or “primary participants model” dominate in Poland. In this model a few or over a dozen financial intermediaries perform transactions being also responsible for the identification and registration of clients as well as for clients insolvency risk.

3. Uncertainty created by the EU ETS for business

3.1. EUAs price instability

The number of Polish installations obliged to certify their emission with EUAs or “substitutive” to EUAs CERs is large – 815⁷. These enterprises should consider EUAs as “[...] the same factor of production as machines or labor. Lack of emission allowances can result in incapability of an enterprise to operate” [Pera 2005, p. 415].

An enterprise may decide to invest in low-carbon technologies in order to reduce its emission and in this way lower the amount of EUAs it has to surrender. This enterprise would suffer losses due to such a decision if in long term it turned out that EUAs price multiplied by the number of needed allowances, assuming lack of investment in emission reduction, fell below the level whereupon the cost of investment is exceeded by savings realized owing to the investment.

The opposite decision is to resign from investment and certify maintained emission by relatively higher number of allowances. Such an enterprise would suffer losses when EUAs’ price rose and costs of needed allowances exceeded costs of investment in emission reduction.

Thereof the significant term of making low-carbon technologies investment decisions is expectation about EUAs price. Technologies investment decisions are mostly long-term. Thus enterprise’s decisions in this field should be sensitive to long-term trends at the carbon markets, not short-term fluctuations [Brohe, Eyre, Howart 2009, p. 25]. However, in practice for investors dominating on the capital market (that is the actors that actually determine financing of this enterprise) immediate effects are reckoned [Kasiewicz]. As a result it may turn out that the factors that effectively determine enterprises actions are short-term fluctuations. Thereof, depending on enterprise’s governance, conditions for making decisions on investment in low-carbon technologies can be both: long-term as well as short-term expectations about EUAs price.

In the literature it is pointed that EU ETS long-term targets can be changed due to new findings about climate change, technological breakthroughs or new international agreements [Stade 2005, p. 8]. This would change long-term expectations about EUAs price and should be regarded as uncertainty that low-carbon technologies investment decisions come under. This kind of uncertainty cannot be removed from the system.

Short-term EUAs price fluctuations induce uncertainty for enterprises considering investment in low-carbon technologies too. Unfortunately carbon market experienced two major breakdowns: in 2006 the price of EUA fell from \$30 to \$10

⁷ Types of these installations are defined in *Rozporządzenie Ministra Środowiska z dnia 27 lipca 2009 r. w sprawie rodzajów instalacji objętych wspólnotowym systemem handlu uprawnieniami do emisji* (DzU z 2009 r. nr 136, poz. 1120).

when the first verified emissions reports were published which indicated that the allowances had been overly-generous (in 2007 their price fell down to zero) and in 2011 – when reflecting – again – oversupply, prices (since June 2011) were on the continuous decrease and on 6 January 2012 fell down to 6,27 euro/tonne (more than 10 euro less than in May). It should be stressed that in case of carbon market even specialists predictions can be significantly missed. The major analysts polled by Reuters revealed their expectations about EUAs prices in 2010 and following years. They estimated EUAs average price in 2011 at 20,78 euro⁸. In contrast to these expectations, the average price achieved by the EU member states in their auctions in 2011 was 13,06 euro⁹.

Described breakdowns prove market instability. Their causes are:

- difficulty in ensuring that there will be a shortfall between the demand for carbon emissions and the total allocation,
- market high dependency on speculators¹⁰.

It is extremely difficult to estimate demand for EUAs resulting from non-speculative needs of enterprises that fall under EU ETS. The emissions growth over the period dependson:

- demand for the energy (this demand depends, among others, on business cycle, weather patterns, policy initiatives¹¹),
- energy prices,
- oil and gas prices,
- the emissions cap,
- price of carbon.

As enumerated factors determining demand for carbon allowances are multiple and volatile, it is very probable that the number of allocations would be inappropriate. This risk cannot be excluded from the system, because it is ingrained in EU ETSnature.

Like all other commodities markets, a significant proportion of trade on the carbon market is carried out by speculators. It can be beneficial for large investors to allocate some part of sources on carbon market because this allows diversification of risk. Additionally investors are simply interested in buying anything what they can potentially rapidly appreciate. The volatility of EUAs prices induced by speculators behavior is possible to avoid by simple the exclusion of any entities not falling under EU ETS from the market. However, speculators presence on the market is also

⁸ www.rumoursandfacts.com/2011/04/05/eua-price-forecast-042011/, dostep: 17. 01. 2012.

⁹ <http://blog.vertis.com/?p=841>, (17 January 2012).

¹⁰ A well known broker and advisor acting at three of European exchanges where EUAs are traded at – Emissionshändler, claims that large surplus of allowances, which appeared on the market in December 2011, proves that a significant number of allowances had been bought in order to speculate,<http://www.handel-emisjami.pl/> (19 January 2012).

¹¹ Paradoxically EU and national authorities creating incentives for low energy consumption make EU ETS participants investment in low-carbon technologies less effective.

beneficial – it contributes to the market liquidity. There of reducing EUAs price risk in this way would have another adverse effect – poor liquidity.

The above deliberation allows to state that carbon market is volatile and making predictions about EUAs price is very difficult. Thereof low-carbon technologies investment decisions are taken in terms of significant EUAs price uncertainty.

3.2. Other fields of uncertainty

Except EUAs price instability there are many other types of uncertainty created for the business by EU ETS. These uncertainties can be divided into several groups.

Some “vagueness” in the system architecture. Regulation of EU ETS keeps on changing as well as existing rules are difficult to interpret. The list of installations that fall under the EU ETS has not been closed (recently air carriers have been obliged to possess allowances for their emission) – so it is possible that in the future new types of installations would be obliged to bear costs of emission allowances. Also recently it has turned out that full auctioning system would not be full because sectors threatened by so called “carbon leakage”¹² would be granted allowances freely even after 2012. The possibility and terms of use of CERs and ERUs instead of EUAs are still not clear¹³.

Reporting duties. National Center of Emissions Balancing and Management (KOBIZE) issued a document on Polish entities emitting gases to atmosphere reporting duties¹⁴. In this document there are 34 distinguished different duties that Polish enterprises come under (the most important for installations that fall under the EU ETS are I/23, I/25, I/33, I/34 and I/32 reports). So many duties may create confusion and generate a risk of mistake. More detailed instructions on preparing reports needed in order to grant allowances have been issued by KOBIZE so late that preparing the theme was almost impossible. It is pointed that the number and complexity of required information makes preparing reports very difficult even for specialized advisors¹⁵. Additionally some reports have to be verified by authorized verifiers, what in fact is expensive and creates a new barrier for small and medium enterprises. Reducing emission by investing in low-carbon technologies does not allow avoiding this type of uncertainty, what

¹² “Carbon leakage” is the possibility that bearing costs of emission allowances would induce transferring energy-intensive production outside UE, where it is not obligatory to have them.

¹³ *Ograniczenia jakościowe wykorzystania CER, banking jednostek CER i ERU i pozostałe zasady wykorzystania jednostek Kyoto od 2013 r.*, <http://www.ochronaklimatu.com/systemy-handlu-emisjami-instytucje-prawne/64-systemy-handlu-emisjami-instytucje-prawne/244-ograniczenia-jakosciowe-wykorzystania-cer-banking-jednostek-cer-i-eru-i-pozostae-zasady-wykorzystania-jednostek-kyoto-od-2013-r>.

¹⁴ *Wybrane obowiązki sprawozdawcze wynikające z przepisów prawa międzynarodowego, unijnego oraz krajowego w zakresie ochrony powietrza*, KOBIZE, http://www.kobize.pl/materialy/opracowania/grudzien2011/Obowiazki_sprawozdawcze_-_VI_2011.pdf, 927 (27 January 2012).

¹⁵ <http://www.bankier.pl/wiadomosc/Handel-emisjami-CO2-aspekty-podatkowe-1636808.html>.

is more – making such investment in some cases is covered with the duty of issuing special reports (for example I/26, I/27, I/28, I/29, I/31).

Risk of fraud. There have been a few serious larcenies of EUAs since it was launched. For example: in 2010 in Germany (21 000 EUAs)¹⁶, in 2011 in the Czech Republic (2 million EUAs), in November 2010 in Romania (1,6 million EUAs)¹⁷. Since late 2008, the total value of fraudulent activity is believed to be in excess of five billion euros¹⁸.

Transaction taxation. The important issue about transaction taxation is EUAs qualification: it is problematic if selling EUAs should be treated as a financial instrument of sale or providing services (acknowledgment of selling EUAs as a service of financial intermediation would result in lack of right to deduction of input tax)¹⁹. Another ambiguous interpretations concern understanding of EUAs granted freely tax consequences. The head of Lower Silesia Tax Office acknowledged granted EUAs as incomes that should augment corporate income tax basis. On the other hand EUA granted freely confirms enterprises right to the natural environment exploitation and income would appear only if such EUA was sold²⁰. Reducing emission by investing in low-carbon technologies does not allow avoiding this type of uncertainty, yet the lower the number of needed allowances, the lower transactions value and consequently – the lower possible penalties.

Listed types of uncertainty make decisions on investing in low-carbon technologies difficult, because consequences of such decisions cannot be precisely predicted.

4. Conclusion

Emissions trading promises to meet the environmental goal in the most cost-effective way by ensuring that the market price of carbon is equal to the lowest marginal abatement cost amongst all controlled sources. Yet significant uncertainty generated by the implementation and architecture of EU ETS, that impedes business long-term planning, undermines EU ETS. This uncertainty concerns EUAs long-term as well as short-term price trends, system vagueness, entities reporting duties, fraud and ta-

¹⁶ <http://www.accordgetc.com/english/newdetail.aspx?id=12166>, (8 January 2012).

¹⁷ http://en.emissionshandelsregister.at/service/recent_info/items/news127.html, (08 January 2012).

¹⁸ <http://newworldorderreport.com/News/tabid/266/ID/505/European-fraudsters-steal-7B-in-carbon-credit-scam-And-this-is-the-same-cap-and-trade-system-that-the-climate-changers-want-to-impose-on-America-No-wonder-Wall-Street-is-salivating.aspx>, (08 January 2012).

Additionally past scams have included the sale of carbon credits more than once <http://www.newscientist.com/article/dn20012-black-market-steals-half-a-million-pollution-permits.html>, (9 January 2012).

¹⁹ <http://www.bankier.pl/wiadomosc/Handel-emisjami-CO2-aspekty-podatkowe-1636808.html> (9 January 2012).

²⁰ Ibidem.

xation. The uncertainty augments the cost of transactions and impairs the realization of the Coase theorem. Some of described types of uncertainty can be removed due to system perfecting. On the other hand EUAs price instability is ingrained in the system nature. Thereof asking if imposing carbon taxes would be more efficient in achieving environmental goals in the most cost effective way is still reasonable. Answering it, however, requires a continuous and profound examination of outcomes of both systems (based on emission trading and on taxation) in changing external environment.

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DECYZJE O INWESTYCJACH W TECHNOLOGIE OBNIŻAJĄCE EMISJĘ CO₂ W WARUNKACH NIEPEWNOŚCI STWARZANEJ PRZEZ EUROPEJSKI SYSTEM HANDLU EMISJAMI

Streszczenie: Handel emisjami ma pozwalać na realizację celów środowiskowych w jak najbardziej efektywny sposób przez zapewnienie, że rynkowa cena emisji CO₂ będzie równa najniższemu marginalnemu kosztowi obniżenia emisji pośród wszystkich kontrolowanych jej źródeł. *European Union Emission Trading Scheme* funkcjonuje od 2005 r. Kolejne lata dowiodły, iż architektura systemu oraz proces jego wdrażania generują znaczną niepewność, która utrudnia długoterminowe planowanie w firmach. Niepewność ta wynika zarówno z długo-, jak i krótkoterminowej zmienności cen pozwoleń na emisję, swoistej niedbałości w konstrukcji systemu, obowiązków sprawozdawczych, możliwości nadużyć oraz opodatkowania. Podwyższa ona koszty transakcyjne i zagraża realizacji teorematu Coase'a, przez co podważa zasadność implementacji systemu. Dlatego też wciąż zasadne pozostaje pytanie o to, czy wprowadzenie podatku węglowego nie byłoby bardziej efektywnym sposobem redukcji emisji CO₂.

Słowa kluczowe: rynek praw do emisji, certyfikaty emisyjne, decyzje inwestycyjne, niepewność.