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RESEARCH ON EMISSION TRADING SCHEME IN TERMS OF TURKISH SHIPPING AND FINANCIAL REPORTING STANDARDS

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ABSTRACT

Although the amount of greenhouse gases (GHGs) from maritime transport is very low amongst total anthropogenic emissions, reducing shipping related airborne emissions has become an important topic for policy-makers during last decades. Emission Trading Scheme (ETS), which is introduced by Kyoto Protocol, is a cap & trade system used to reduce GHGs by promoting the economic competitiveness. ETS policies should include maritime transport and should develop accounting approaches within the framework of financial reporting standards to increase the applicability of financial instruments notable for their complexity. The aim of this study is to examine the applicability of ETS policies to the Turkish maritime sector and the impact of ETS on financial reporting. A comprehensive review based on the literature has shown that it is necessary to implement emission trading considering international standards for international sectors and it is important to prepare national policies accordingly in order to avoid pressure factors in national economies and not to avoid international harmonization in financial reporting.

Keywords: *Global warming, environmental costs, emission trading, maritime transportation, financial reporting.*

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SALIM TİCARETİ SİSTEMİNİN TÜRK DENİZ TAŞIMACILIĞI VE FİNANSAL RAPORLAMA AÇISINDAN İNCELENMESİ

ÖZET

Deniz taşımacılığında elde edilen sera gazı (GHG) miktarı, toplam insan kaynaklı salımlar arasında çok düşük olmasına rağmen, nakliye ile ilgili hava kaynaklı salımların azaltılması, son yıllarda politika yapıcılar için önemli bir konu haline gelmiştir. Kyoto Protokolü'nün uygulamaya koyduğu Salım Ticareti Planı (ETS), ekonomik rekabet gücünü artırarak GHG'leri azaltmak için kullanılan bir salım üst sınırı ve ticareti sistemidir. ETS politikaları, deniz taşımacılığını içermeli ve karmaşıklığı için dikkate değer finansal araçların uygulanabilirliğini artırmak için finansal raporlama standartları çerçevesinde muhasebe yaklaşımları geliştirmelidir. Bu çalışmanın amacı, ETS politikalarının Türk denizcilik sektörüne uygulanabilirliğini ve ETS'nin finansal raporlama üzerindeki etkisini incelemektir. Literatüre dayalı kapsamlı bir gözden geçirme, uluslararası sektörler için uluslararası standartları göz önünde bulundurarak salım ticaretinin uygulanmasının gerekli olduğunu ve ulusal ekonomilerde baskı faktörlerini önlemek ve finansal raporlamada uluslararası uyumdan kaçınmamak için ulusal politikaları hazırlamak için önemli olduğunu göstermiştir.

***Anahtar Kelimeler:** Küresel ısınma, çevresel maliyetler, salım ticareti, deniz taşımacılığı, finansal raporlama.*

1. INTRODUCTION

Due to various scientific discussions, world's leading organizations call attention to climate change and global warming. These phenomena are both global facts and also are the most challenging issues for human society. Global warming refers to on-going increase in the mean temperature of the Earth (IPCC, 2013). Also it is an environmental phenomenon that deals with the potential for global climate changes due to the increased levels of greenhouse gases (GHGs) (Liang, et al., 2012). With respect to the Intergovernmental Panel on Climate Change (IPCC), most of the increase in global mean temperatures is most probably based on the raise of anthropogenic GHG concentrations (IPCC, 2008). From some point of view, extreme weather events are linked to climate change. Global warming is accepted as causes of the melt of glaciers and rise of sea level. (Melillo et al., 2014). On the other hand, some scientists, who defend opposite opinions on climate change, indicated that there are no significant and prolonged temperature changes since 1997, there are not

enough historical data available. These scientists also argued that Arctic ice increased 50% since 2012 and climate models are proven to be unreliable and early predictions about the effects of warming have been proven wrong (Conserve Energy Future, 2017). Whether global warming phenomenon is caused by GHGs or not, sustainable emission reduction methodologies should be investigated, to be on the safe side.

The Clean Development Mechanism (CDM) was developed in Kyoto Protocol to achieve cost-effective emission reduction. It reduces the GHG abatement cost by allowing developed countries to reduce emissions in developing countries; however, international efforts for climate change are facing considerable austerities on the allocation of responsibilities between developed and developing countries (Agusdinata, 2013). Also, many sources of GHG emissions are excluded from national emission inventories such as natural sources of GHGs, international air and maritime transport and GHGs separately controlled by the Montreal Protocol (Lovell and Ascui, 2012).

Cap & trade system is an economic policy instrument for controlling emissions from different sources. Emission reductions are assumed as a tradable commodity in these systems. These mechanisms can be used for not only GHG emissions but also for other environmentally important emissions such as nitrogen oxides (NO_x) or sulphur oxides (SO_x).

Cap & trade system can be designed as follows: Setting of the cap, defining the market, allocation of permits, banking rules and observing and enforcement (Fowlie, 2004). Standard contracts of derivatives such as futures and options are now traded actively on many exchanges worldwide. There are different types of derivatives which are added to bond issues: Forward contracts, swaps, options, and other derivatives (Hull, 2012). The Austrian Energy Exchange, the Chicago Climate and Futures Exchanges, the European Climate Exchange, the New York Stock Exchange, Nord Pool and Powernext are some examples of emissions exchanges. For the success of Emission Trading Scheme (ETS), it is crucial that initial emission permits are equitably allocated and the emission limit is set low enough, so the firms have the incentives to invest in energy efficient technologies (Vaillancourt and Waaub, 2004).

Zhu et al. (2018) developed a maritime emissions trading system on individual containership operators' fleet composition strategies and CO₂ emission levels. According to the results, implementing ETS on the fleet reduce CO₂ at least 1,54% and at most 3,38%. The authors also indi-

cated that CO₂ reductions are greater under scenarios in which bunker prices are higher. On the other hand, Hermeling et al., (2015) indicated that it is not possible to design a system that achieves emission reductions in a cost efficient manner and is compatible with international law. Des-sens et al., (2014) implemented ETS on aviation and maritime sectors to investigate the impacts of ETS on reducing GHG emissions. The authors concluded that ETS implemented on international maritime and aviation activities can reduce CO₂ and non-CO₂ emissions up to 65%. Besides, the radiative forcing is also reduced. Wang et al. (2015) discussed on the impacts of ETS between sectors and provided a framework for understanding and identifying ETS, in detail. Koesler et al. (2015) assessed the potential implications of ETS applied on maritime sector. The authors mainly focused on the organisation and operations of shipping companies and they concluded that cap and trade approach can be implemented on maritime sector, efficiently.

IMO, has also adopted a course of action to reduce shipping-related airborne emissions on 13 April 2018. According to the report, the initial strategy for emissions has three phases: (1) carbon intensity of the ship to decline through implementation of further phases of the energy efficiency design index (EEDI) for new ships; (2) carbon intensity of international shipping to decline (it is aimed to reduce CO₂ emissions 40% and 70% by 2030 and 2050, compared to 2008); (3) GHG emissions from international shipping to peak and decline (IMO, 2018).

European Union (EU) ETS, which entered into force in 2005, is the largest implementation of emission trading system to reduce GHGs. European Commission (EC) has intended to expand the scope of the scheme to energy intensive sectors such as power plants along with other sectors and the aviation is the first example for this purpose.

European Parliament (EP) forces International Maritime Organization (IMO) to develop stricter rules and take more active actions to reduce or, at least, keep the emissions at the same level. EP indicated that if no new regulations are developed until the end of 2021, EU ETS will be the only procedure, which include all shipping sector (European Parliament, 2017).

Almost 80% of world's trade is carried out by ships and short sea shipping transports 40% of European trade (Commission of the European Communities, 2009); however, ship owners are not willing to consider

investing on the innovative technologies onboard ships (Dedes et al., 2012).

This paper provides a comprehensive examination on GHG emissions trading at a level of global, regional, national and financial bases. It also evaluates the proposals which include auctioning a share of emission allowances and offers a suggestion about a new ETS implementation model for Turkish maritime sector. The aim of the study is to examine the applicability of ETS policies in the maritime sector in Turkey and its impact on financial reporting. For this purpose, information has been given on the effects of the scope, applicability and financial reporting implementation of emission trading policies which are closely related to the maritime industry. A comprehensive review based on the literature has shown that in order to avoid pressure factors in national economies and to do not avoid international harmonization in financial reporting, it is necessary to implement emission trading taking into account for international standards for international sectors, especially maritime trade and it is important to prepare national policies accordingly.

In this study, a meta-analysis was applied on emission trade and the technical, operational and market-based methods, which are used for reducing carbon emissions in maritime sector, are particularly referred. After identifying the place of Turkey amongst other countries for climate change issue, emission trade is discussed in terms of accounting and financial reporting perspective.

One of the most compelling constraints encountered during the study is the difficulty to find academic papers on emission trade. Besides, emission trade system has not been implemented any sector in Turkey. Moreover, there are no politics or legislations to restrict emissions using emission trade. Thus, the aims of this study is to raise an awareness on emission trade and to determine the basics of emission trade.

2. GLOBAL WARMING AND STRATEGIES TO REDUCE GHG EMISSIONS

The 1st World Climate Conference assembled its first meeting in 1979 for international climate change negotiations and it was announced that carbondioxide (CO₂) gas would be dangerous. To protect the Earth's ozone layer, The Vienna Convention assembled in 1985 and entered into force in 1988. The aim of the convention was to reduce the ozone deplet-

ing substances. The Montreal Protocol was adopted in 1987 and entered into force in 1989 (UNEP, 2014). To provide source of information regarding climate change, The World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) established IPCC in 1988 as a scientific committee. IPCC calculates the emissions of the gases that occur from these resources and cause global warming. IPCC considers methane (CH₄), carbon monoxide (CO), CO₂, non-methane volatile organic compound (NMVOC), nitrous oxide (N₂O) and NO_x emissions as the causes of global warming.

In the United Nations Environment and Development Congress, which was held in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was opened for signature and entered into force in 1994 for the purpose of preventing GHG accumulations in the atmosphere. As of today, 192 countries consisting of 41 Appendix-I countries (40+EU) and 151 Countries out of Appendix-I have been approved to the Convention. Countries that are Parties to the UNFCCC must submit national direct GHGs such as: CO₂, CH₄, N₂O, perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF₆) as well as for the indirect GHGs such as sulphur dioxide (SO₂), NO_x, CO and NMVOC to the Climate Change secretariat. In the Convention, countries having historical responsibilities to emerge climate change and Organisation for Economic Co-operation and Development (OECD) member countries of that time were grouped in two lists according to their development levels. As per the Convention, by being different than Appendix-I, Appendix-II countries have the obligations to provide financial support to developing countries implementing emission reduction activity, to assist in their developments and to transfer technology. In the 3rd Parties Conference (COP3) held in Kyoto City of Japan on 11th of December 1997, Kyoto Protocol, relating to the UNFCCC which contains binding objectives to reduce GHGs worldwide, was signed. Mutual Understanding of Marrakech was signed in 2001 and Kyoto Protocol was enforced in 2005. With the purpose of drawing the road map of the negotiations for the climate change after 2012, Bali Action Plan was prepared in 2007 and Copenhagen Agreement. In the original text of UNFCCC, Turkey was in both Appendix-I (historical responsibility) and Appendix-II (pecuniary liability) lists. Turkey has made attempts to get out of UNFCCC appendices; however, because of not being a developed country it did not succeed in this attempt. In 7th Congress of the Parties held in Marrakech between the dates of 29 October-6 November 2001 (COP7), Turkey's request was accepted for being the party of UNFCCC in Appendix

I with special conditions. Also on 24 May 2004, Turkey has become the 189th Party participating in the Convention.

Since 2005, when Kyoto Protocol was enforced, meetings of the Parties of the Kyoto Protocol started to be organized in the scope of COP Meetings. In 2006, Turkey made its National GHG Inventory and National Notification in order to fulfill its obligations in UNFCCC Appendix-I List. After the efforts of determining the process, in order for Turkey to be included on the table and to have the right to comment, the “Law Draft on Suitability of Participating in Kyoto Protocol in the orientation of UNFCCC” was accepted on 5th of February 2009 in the General Meeting of the Grand National Assembly of Turkey. As per 25th Article of Kyoto Protocol, Turkey officially became the Party of the Protocol on 26 August 2009. Thus, Turkey’s position in the scope of climate change negotiations can be summarized as: (1) Turkey is an Appendix-I country; however, in the COP7 held in Marrakech in 2001, the decision in the direction of ‘to recognize the special conditions of Turkey, which has a different status from that of the other parties in the Appendix-I of the Convention, and to have its name remain in Appendix-I but be removed from Appendix-II’ was taken; (2) Turkey is the Party of the Kyoto Protocol; however, it takes place on the outside of Appendix-B (it does not have emission limitation or reduction commitment); (3) Turkey is an OECD Member Country; (4) Turkey is a G20 Member; (5) Turkey is a Candidate for EU Membership. When all of these features are also considered together, Turkey has the characteristics to be the only country in the world. In Figure 1, Turkey’s special status can be seen.

borders (Matisoff, 2010). In addition to EU ETS, other markets are running in some countries such as US, New Zealand, Japan and Australia (Howitt et al., 2010). Bottom-up linking of compatible emission trading systems results several potential benefits; reducing the emission abatement costs, increasing market liquidity, more stable carbon price and strengthening the global cooperation on climate change (EC, 2014a).

The EU ETS is now in its 3rd phase, running from 2013 to 2020. The main changes in the 3rd phase are; a single, EU-wide cap on emissions and auctioning in place of default free allocation rather than national cap. More than 40% of allowances was auctioned in 2013 and gradually this share will rise each year (EC, 2014b). The shift from free allocations to auctioning of allowances will divert participants increasingly engage in hedging activities to decrease their risk; however, corruption reduces the effectiveness of the emission trading (Walter, 2013). In EU ETS, price determination of carbon is of great interest, because policy makers encourage the firms to move their production to fields which is less carbon intensive (Aatola et al., 2013). Environmental tax may have an adverse effect on energy intensive sectors and would harm those sectors by causing their prices to increase in their markets, leading those sectors cease their production or move towards production where is lower environmental taxes (Fitzgerald et al., 2009). This is often described as carbon leakage and may lead to increase in total emissions. Because of the competition with the industries in third countries, significant risk of carbon leakage will have a higher share of free allowances in the 3rd phase of EU ETS (EC, 2014b). One of the most important reasons of this situation can be said as unnecessary allowance distribution. EU should radically reduce the amount of emission credits to secure the effectiveness of the market (Lättilä et al., 2013). It is also possible that the EC will propose to include maritime transport into the EU ETS (Egenhofer, 2007).

3. THEORIES BEHIND THE ENVIRONMENTAL COSTS

Basically two distinct methods are most common to regulate carbon emissions: command & control strategy and emission trading or cap & trade system. Command & control may provide cost-effective environmental regulations, but it requires emissions standards for each emission sources and different standards in accordance with the emission abatement costs of firms (Hansjürgens, 2005).

Pigou (1912) was the first economist to analyse externalities systematically. He argued that since there is an inconsistency between both marginal private and social benefit as well as marginal private and social cost of externalities, optimisation of competition cannot be achieved (Pigou, 1912). Also, according to Coase Theorem, government does not have to intervene in market. In case of environmental damages, effects of externality can be removed by mutual agreement (Unsal, 2007). Effects of carbon tax and carbon cap on a firm that faces an increasing marginal emission abatement cost. Without command & control strategy, the firm would choose not to abate carbon emissions and make profit by avoiding the abatement costs. According to equimarginal principle, the optimal level of emission abatement is achieved where the marginal benefit and cost lines intersect. This point can be reached by imposing carbon tax or carbon cap.

In the case of emission trading between two firms, one has a higher marginal abatement costs, and other has lower marginal abatement costs. The economic efficiency is achieved at the intersections of the two marginal abatement cost curves. There are two ways to achieve this level of emission abatement: setting a tax where the marginal emission abatement costs are equal or a cap by issuing carbon allowances to the firms (Environmental Economics, 2014). In cap & trade system, emissions are reduced where the reduction costs are lowest and this would result at lowest cost for society (Hansjürgens, 2005). Cap & trade strategy works best when the marginal abatement costs differ among emission sources, emissions can be monitored accurately and consistently and there is a strong legal infrastructure for emission trading (OECD, 2003).

4. STRATEGIES TO REDUCE GHG EMISSIONS IN MARITIME SECTOR

Shipping is projected to increase the amount of GHGs due to growth of the industry, in spite of being the most efficient mode of freight transport (Gilbert and Bows, 2012). GHGs are controlled by the Montreal Protocol and emissions from international maritime and air transport are excluded. Also shipping emissions are currently excluded from the Kyoto protocol (IPCC, 1999). It is not clear allocation of the international shipping GHGs emissions to the individual countries (Eguino, 2011). The participation of shipping in an ETS would generate income for the maritime sector that provides funding for more environmental technologies (Nikopoulou et al., 2013). Transportation mode shares in EU were: Intra-

EU maritime transport with coastal transport 36,8%, inland waterways 3,3 % and the intra-EU air transport 0,1% in 2009 (Islam et al., 2013). All transport sectors could be integrated in the EU ETS (Schwaiger et al., 2012). Nevertheless, if the maritime transport is covered by GHG policies, marine fuel and freight costs could increase significantly (Curtis, 2009). Miola et al., (2011) provided a study in which an in-depth analysis of the policy instruments on reducing the sector's burden on the environment is investigated. The study also focused on economic theory, legal principles, technological options and the political framework of the international maritime transport sector.

If the policies are not provided, IMO's technical and operational measures may not be implemented (Buhaug et al., 2009). Emission trading is the only option which would permit international shipping (COS, 2009). International aviation and maritime emissions could be regulated by domestic cap & trade systems established by the international organizations (Haite, 2009). The impacts of the emissions trading scheme deserve further research (Lee et al., 2013). Defining cap & trading rules for maritime is more complex compared with aviation and the EC has not resolved how they will tackle the problem (Musso and Rothengatter, 2013). Based on the fuel consumption statistics, Turkey emitted 285.73 Mt of CO₂ in 2011. In 2012, Turkey imported 45 bcm of 3.435 bcm of natural gas and 29 Mt of 7.831 Mt of coal produced entire world in 2012 (IEA, 2013). On the other hand, 30,6% of country-wide energy consumption (81.48 Mtoe) occurred in industry sector (24.97 Mtoe). Transport sector (14.86 Mtoe), which is of particular concern to this paper, built up 18% of total final consumption and rather dependent on oil products. Oil products to international bunkers were 1.31 Mtoe which is identified separately from transport sector. International Convention for the Prevention of Pollution from Ships (MARPOL) Annex-VI has brought significant rules in reducing the GHGs and pollution caused by vessels. Recently (4 February 2014), Turkey has ratified MARPOL Annex-VI. According to data from the Ministry of Transportation, Maritime and Communications, accounting of ships over 150 tonnes, in the last 23 years (1990-2013) gross tonnage (GRT) of Turkish flagged ship fleet increased from 3.356.000 to 7.049.491 tonnes. Shipping is the most energy efficient method of transportation therefore it is not feasible to impose taxes on marine fuels. In Turkey, special taxes on marine fuel are exempted and marine transportation is encouraged (Kilic and Girit, 2015). Therefore, establishing ETS might be seen as the most efficient way to reduce GHG emissions for Turkish merchant maritime sector.

Emission allowances has to be shared among participants in following manner: negotiations, reference figure (production, emission related in a certain year/period, benchmarks), abatement costs and potential, others (e.g. turnover, employees etc.) or any combination of them (Bode, 2006). Stability in carbon prices would increase investment in energy efficient technologies. Auctions could be applied to improve stability confidence for CO₂ prices (Grubb and Neuhoff, 2006). The use of ship movement data would be chosen to assess the actual miles of a country's fleet sailed in one year. Nevertheless, such data is not applicable for researchers for now (Heitmann and Khalilian, 2011).

Emission Efficiency Operational Indicator (EEOI) indicator is defined in IMO MEPC.1/Circ.684 as:

$$EEOI = \sum FC_j \cdot \frac{C_{Fj}}{m_{cargo}} \cdot D \quad (1)$$

where;

i is the cruising number, j is the fuel type, FC_{ij} is the fuel mass consumed, C_{Fj} is the conversion factor of fuel to CO₂, m_{cargo} is cargo carried or work done (number of twenty foot equivalent units (TEUs) or passengers) or GRT for passenger ships, and D is the distance in nautical miles.

The major problem in emission trade is the distribution of pollution permissions. It is also hard to find a fair method to apply free allocation with grandfathering method; however, it is expected that auction of the system will enable to provide supply and demand equilibrium and set real value of carbon price.

5. EMISSION TRADING SCHEMES UNDER FINANCIAL REPORTING STANDARDS

ETS offers convenience in implementing emission targets for countries that have an emission reduction obligation. If the emission reduction obligation is reduced excessively, this additional reduction should be sold to other countries (Cagle et al., 2009). ETS has been proposed to originate financial incentives for sleuthing low carbon investment. The increasing mobility as well increase in carbon market give signals that a greater number of players will be in the market in the near future. There are also regional and nationally developed ETSs. The EU ETS, which entered into force in 2005, has taken its place as the most developed and largest greenhouse gas emissions trading system in the

world. The SO₂ trading scheme in the US examined about the accounting implications before the EU ETS (Gibson, 1996).

After the Kyoto Protocol, some businesses excited about carbon market development. In this way, some issues have been controlled such as carbon measurement methods, restrictions, emission types. The International Financial Reporting Standards (IFRS) is rather important for companies' subject to the EU ETS. Companies laid down in EU ETS must prepare their financial statements in accordance with IFRS Regulation EC No 1606/2002. Both in EU and worldwide, accounting under IFRS has approved widely (IASB, 2015). International Financial Reporting Interpretations Committee (IFRIC3) covers the issue widely in terms of accounting in the Emission Trading System. IFRIC 3 was published in December 2004 to be applied as of the 1st of March 2005, but due to major deficiencies it was withdrawn after six months later (IASB, 2010; Ernst and Young, 2009). There is currently no regulation on carbon accounting published by the International Accounting Standards Board (IASB) or the Financial Accounting Standards Board (FASB) and it is believed the various political and business pressures are influential about this situation (Durgut, 2015: 28).

Non-governmental advisory body to EC, The European Financial Reporting Advisory Group (EFRAG), noted that IFRIC 3 did not reflect the business reality and economic essence in EU ETS. Accordingly, a negative recommendation to the EC was published by EFRAG and in 2005 the IASB had decided to pull back IFRIC 3. After this, the IFRIC 3 is out of necessity, by only it is used for a possible approach about accounting under the EU ETS (IASB, 2005; EFRAG, 2005). However, we must note that IFRIC 3 was probably the most convenient proposal within the existing IFRS. But in this proposal, emission allowances have various utilizations, that they were conceptualized in different ways. It should need to bear in mind that IFRIC cannot issue comments that contrast the International Accounting Standards (IAS) (Giner, 2014, 47; Deac, 2013, 43).

However, when looking at historical development, it seems that there are many initiatives related to the issue. IASB and FASB have started joint operation in 2007 about carbon accounting and reporting. It was expected that this study will be successful in 2011. But no clear improvement has been achieved. Due to the absence of regulations issued by authorized bodies, many businesses have developed their own accounting practices in carbon reporting (Fornaro et al., 2009; Öker and

Adıgüzel, 2013: 25). According to IFRS have not succeeded to provide authoritative guidance, thus EU ETS has emboldened the discussion on how participators would appropriately implement the scheme in their financial statements (Haupt, and Ismer, 2011).

IFRIC 3 envisaged the adoption of IAS 38 (Intangible Assests), IAS 37 (Provisions, Contingent Liabilities and Contingent Assests) and IAS 20 (Accounting for Government Grants and Disclosure of Government Assistance) in the transfer of emission rights to the financial statements. Since the interpretation of IFRIC 3 was withdrawn in 2005, the IAS 8 (Accounting Policies, Changes in accounting Estimates and Errors) standard became effective in reporting carbon information since no further standardization work was carried out (Altınbay and Golagan, 2016: 2111). According to IAS 8, business management should make sure that the results of the decisions related to the development and implementation of accounting policy are appropriate and reliable for the economic decision making needs of the users of the financial statements. In this context, if businesses do not have a specific standard or interpretation for any issue, they should take into account the provisions of other standards and interpretations related to similar or related issues and the definitions, recording criteria and measurement approaches described in the conceptual framework for assets, liabilities, income and expenses (Durgut, 2015: 28).

According to the IASB's note, IFRIC 3 was existed inadequate measurement methods and disharmony in reporting. Because of this, The IASB has tried to minimize the difficulties by making rapid changes at IAS 38. Even so, the IASB change its approach and determine to composing details about accounting of the emission rights schemes (Giner, 2014). Standard setters were faced three challenges about emission rights and these were problems for accounting (Cook, 2009): (1) a costly activity was formed, (2) the costs were decreased by governments, (3) by means of marketable allowances.

In the absence of authoritative accounting guidance, identified three possible approaches to accounting for emissions allowances. They are (Warwick and Ng, 2012: 57-58; Altınbay and Golagan, 2016: 2112; Durgut, 2015:29-30; Öker and Adıgüzel, 2013: 26-27): (1) the IFRIC 3 approach, (2) the net liability approach, and (3) the government grants approach.

Under the IFRIC approach, which takes into account the IFRIC3 interpretation, is registered in the form of an intangible asset within the IAS 38, which is purchased or sold by the government. These are then valued at cost or revaluation method. The IFRIC 3 approach envisages to initially recognize the permissions at fair value. In this context, if the amount paid for the permissions is less than the fair value, it will not affect the recognition from the fair value. The difference between the fair value and the value paid will be government assistance according to IAS 20. The IFRIC 3 approach is considered as a guideline by the majority of accountants, and the practice of this approach is more compatible with the International Accounting Standards for the transfer of carbon information to the financial statements.

Under the net liability approach, granted emissions are recognised at nil value if granted for free (this accounting policy choice is permitted under the IAS 20) and the entity only recognises a liability once actual emissions (measured in terms of a number of emissions allowances) exceed the granted emissions allowances on hand. The shortfall is measured at the market price. The net liability approach is specifically prohibited under IFRIC 3.

Under the government grants approach derives from the application of IAS 20. The emission liability under this approach is recognised as incurred. However, unlike IFRIC 3, the liability is measured by reference to the carrying amount of those granted emissions allowances held that are used to settle the obligation. Only the shortfall will be measured at the market value.

In the transfer of carbon information to the financial statements, three different elements such as emission permits, government assistances and usage emissions allowance may arise. There is no consensus about which accounts to use for the element in question in accounting literature in Turkey. In line with the IFRIC 3 approach, which is the focal point of our study, in the studies in the literature, the Rights Account for the emission permits, the Deferred Revenues Account for government assistances and the provisions for Emissions Permits Provision account are proposed (Durgut, 2015; Öker and Adıgüzel, 2013; Altınbay and Golagan, 2016; Uyar ve Cengiz, 2011; Karakoç, 2012; Çankaya and Şeker, 2013).

ETS includes several accounting properties like balance sheet accounts, their acknowledgment and subsequent measurement. EU ETS debates about emissions allowances, liabilities arising from the emissions

and financial instruments hedging risks. Cost of allowances have to be considered when purchasing and the cost directly refers their purchase price neither the allowances obtained on the market nor through the auctioning mechanism. On the other hand, the accounting of allowances is rather controversial.

In spite of its economic value, a firm having allowances with no acquisition cost, will probably return some of the allowances which are not required in order to meet EU ETS regulations. Also, net liability approach works out the problem about heterogeneous handling of allowances because allocated allowance is not identified in balance sheet but purchased allowances are featured in balance sheet. Therefore, homogenous assets are treated like under the government grants approach (Ernst and Young, 2009; Lovell et al., 2010). Regardless of whether entering allowances to the accounts or not, these two models are used to classify emissions allowances as intangible assets in all accounting approaches (IAS38, 2004).

Entities which is subject to EU ETS have to meet allowances for their CO₂ emissions along the adaptation period and report in financial statements. Two different options are sited for timing of the recognition for free allocations of allowances in general: (1) to enter a liability in the account by happening for a free allocation of allowances for the entities under EU ETS, (2) to not to have an obligation to remit allowances emerges. Therefore, emissions are defined as obligating event in IFRIC 3. IFRIC 3 suggested fair value approach against for an entity is not liable for repaying its own allowances and also the fair value discloses the real expenditure to balance concerning emissions. According to this approach, the provisions must be measured individually from allowances (Ertimur et al., 2010).

Another accounting questions arise from handling of hedging contracts because under IFRS, regular contracts different accounting as financial instruments. CO₂ allowances are reported compulsory at fair value according to IAS39. Volatility in the statement of income is important depending on the market price of CO₂. But, as to harmony of EU ETS, this accounting rule is disadvantageous for an entity which takes physical delivery of allowances. The IFRS contains two provisions to purchase CO₂ allowances: (1) own use exemption and (2) hedge accounting. This accounting approach permits entities to avoid distorting effects in the EU ETS (Ernst and Young, 2009; IAS39, 2005). Table 2 indicates

the qualitative criteria of the IFRS and requirements for accounting in the EU ETS.

Table 2: Requirements for Accounting in the EU ETS

Different Accounting Policies	Interpretations
Understandability	The information must be comprehensible for users and should include an extensive assessment about risks and opportunities of the entity-specific.
Materiality	The information would be valid if only it influences the economic decisions of financial statements' users. Accounting requirements of EU ETS are listed as: (1) To emphasize how a company carry on with producing or operating in carbon-constrained world; (2) To evaluate the profitability of carbon-intensive production because of increasing costs of emitting CO ₂ ; (3) To foresee future risks and to evolve a plan about different performance indicators.
Reliability	All assets and liabilities of company, especially allocated allowances, should be in the financial statements.
Comparability	The performance of an entity should be assessable, comparable and needs the requirements listed as: (1) Comparability of inter-period annual reports. The amount of free allocations according to EU ETS is gradually reduced and/or replaced by auctioning; (2) Comparability of financial statements belonging to different entities. ETS of different entities should be ensured due to be an option for transitional free allocations.
Incentives and disincentives	Investments in emission allowances are influenced by different accounting approaches. The following issues should be investigated: (1) By the reason of accounting transactions of emissions allowances and carbon derivatives, whether hedging strategies are followed by entities covered by the EU ETS; (2) Whether decisions about investment in emissions allowances might be encouraged.

Source: Haupt and Ismer, 2011.

Requirements for accounting and present accounting transactions under the EU ETS show insufficient in two point (Lovell et al., 2010): (1) emission allowances do not fit with available IFRS, (2) corporate strategy with national and international low-carbon objectives is not placed in present financial accounting approaches and because of this, consistency of corporate strategies are not assessed by financial information users.

Currently, there are two types of carbon markets: Mandatory markets and voluntary markets. Compliance markets (cap and trade system) are created by the Kyoto Regions and are EU based markets. In the mar-

ket on which the Kyoto Protocol is based, states are classified as developed and developing countries. Developing countries do not have responsibilities for emission reduction. Developed countries are also obliged to help developing countries with financial support and clean technology transfer. Voluntary market is a market where states, institution and even individuals can operate regardless of the Kyoto regimes mandatory commitments and classifications.

Cap and trade system (Compliance markets) is the only application addressed by IFRIC. Cap and trade system is based on the IFRIC 3 interpretation. IASs were taken into consideration in terms of accounts and accounting criteria. The recognition regarding voluntary market are important for applications in Turkey (Öker and Adıgüzel, 2013: 25). Unlike the Cap and trade system used in the Emissions Trading System, carbon credits in voluntary carbon markets are accounted for as an asset reduction in a certain period. When the carbon credits obtained due to emission reduction are sold, it is appropriate to register them as deferred revenue until they are sold (Öker and Adıgüzel, 2013: 32).

6. CONCLUSION

Since cap & trade is more cost effective for business and community, it should be preferred rather than command & control approach. Also business may develop more efficient emission reduction technologies and businesses having higher emission reduction costs can buy permits on the market; however, further studies should be conducted to establish emission trading models for specific sectors such as maritime and to develop principals for these models. In developing countries such as Turkey and fast-growing sectors such as Turkish trade fleet, it is not possible to foresee 5% reduction compared with 1990. Even if the maritime sector's contribution to global warming can be negligible and Turkey's contribution in total CO₂ emissions is very low, maritime sector can be chosen as a pilot project for emission trading. Therefore, it would be possible to have necessary know-how and experience for other bigger industries nationwide.

Since present situation under IFRS might decline to provide an unbiased view of the assets, in terms of transparency of financial statements, the stakeholders such as investors, analysts, policymakers might be displeased. Considering the complexity of the policy instrument, accounting approaches under emission trading scheme must respond the needs for financial accounting under IFRS. Seeing that prices for emission allow-

ances are expected to increase in the future, providing fair knowledge about the entities under the EU ETS has great importance. Also, accounting under IFRS must prevent the occurrence of competitive distortions.

The application of emissions trading schemes are discussed by some global actors. In this case, some reliable accounting recommendations about the implications of emissions trading schemes should be needed. As to these global actors, lower compliance costs for entities are important. Allowances should be accounted as fair value even that allocated for free. Also, establishing ETS might be seen as the most efficient way to reduce GHG emissions for Turkish merchant maritime sector. A comprehensive review based on the literature has shown that in order to avoid pressure factors in national economies and to do not avoid international harmonization in financial reporting, it is necessary to implement emission trading taking into account for international standards for international sectors, especially maritime trade and it is important to prepare national policies accordingly.

In order to improve the energy efficiency for reducing carbon emissions, it is a must to restrict the amounts of emissions. It is clearly understood that the most efficient and economic way to reduce is to develop an ETS. For this reason, an emission trade politics and necessary legislations should be developed particularly for maritime sector in Turkey.

This paper is the first part of a more comprehensive project on maritime ETS. In further studies, in which the total financial and environmental impacts would be investigated in detail, the values of age and GRT of Turkish fleet will be obtained. Then, after analyzing the general characteristics of the fleet, the costs and environmental impacts of two cases will be investigated in order to determine which will be better in terms of finance and environment: (1) reducing total CO₂ and (2) scrapping older ships. For this purpose, an escalation analysis will be implemented for ships' life cycle. Thus, a final decision will be determined between two options.

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APPENDIX: NOMENCLATURE

CDM	Clean Development Mechanism
CH ₄	Methane
CO	Carbon monoxide
CO ₂	Carbondioxide
COP3	3 rd Congress of Parties
COP7	7 th Congress of Parties
EC	European Commission
EEOI	Emission Efficiency Operational Indicator
EFRAG	European Financial Reporting Advisory Group
ETS	Emission Trading Scheme
EU	European Union
FASB	Financial Accounting Standards Board
G20	Group of Twenty
GHGs	Greenhouse gases
GRT	Gross tonnage
HFCs	Hydrofluorocarbons
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IET	International Emissions Trading
IFRIC	International Financial Reporting Interpretations Committee
IFRS	International Financial Reporting Standards
IPCC	Intergovernmental Panel on Climate Change
IMO	International Maritime Organizations
JI	Joint Implementation
MARPOL	International Convention for the Prevention of Pollution from Ships
N ₂ O	Nitrous oxide
NMVOG	Non-methane volatile organic compounds
NO _x	Nitrogen oxides
OECD	Organisation for Economic Co-operation and Development
PFCs	Perfluorocarbons
SF ₆	Sulphur hexafluoride
SO ₂	Sulphur dioxide
SO _x	Sulphur oxides
TEU	Twenty-foot equivalent unit
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework Convention on Climate Change

US United States
WMO World Meteorological Organization