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# Emission Trading under the Kyoto Protocol

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Lithuania is on the integration way to the various world organisations and unions, *e.g.*, NATO and EU. In parallel, Lithuania should ratify the main international treaties, charters and protocols, the Kyoto Protocol *inter alia*. It is not enough just to ratify the Protocol, all the obligations should be taken into account as well. It is an essential question for Lithuania – how to reach the Kyoto targets? The purpose of the article is to overview the possibility of the implementation of the Kyoto Protocol's mechanisms, such as Emission Trading and Joint Implementation, in Lithuania.

**Key words:** Kyoto Protocol, Emission Trading and Joint Implementation

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## 1. INTRODUCTION AND KEY POINTS

The **Kyoto Protocol** is an agreement among the countries of the world, negotiated in 1997. The world has decided to reduce its emissions of greenhouse gases by 5% by 2012. The Protocol must be signed by at least 55 countries representing 55% of the World's emissions before its provisions can enter into force. The status is presently that the EU, Japan and most part of the world, but not the United States, are ready to ratify the protocol. Lithuania is planning to join the team, which will be subjected by the Kyoto Protocol and consequentially by the related mechanisms. Already from 1997, the EU and in parallel all accession countries started the integration of the Kyoto Protocol requirements in their legislation. In 2000, there was drafted the Green Paper on Greenhouse Gasses Emission Trading within the European Union [1]. The above-mentioned document was drafted with the intention to launch a discussion on greenhouse gas emission trading within the European Union and on the relationship between emission trading and other policies and measures to address climate change.

According to the Kyoto Protocol, there is given an 'assigned amount' for all the countries, which is really its limit to pollute. Lithuania's assigned amount is 92% of its 1990 level [2]. If one country wishes to sell Emission Reduction Units (ERUs) to another country, the assigned amount will be regulated accordingly. This means that Lithuania in principle can exploit the difference between its present level of emissions and the 92%.

In general, **Emission trading** (ET) is a market-based instrument related to the issue how to reduce

climate change. Kyoto Protocol has foreseen ET as a possibility to reduce the compliance cost of reducing CO<sub>2</sub> emissions. ET as an instrument is mainly suitable for the rich industrialised countries, the Clean Development Mechanism (CDM) is intended for the third world and Joint Implementation mainly for the Central and Eastern European (CEE) part of the industrialised world. However, there is only one active system in place in the EU, which is similar to the ET systems, namely the Danish system for CO<sub>2</sub> quotas in the power sector. Also, the power plants in the USA have a cap-and-trade system for reduction of SO<sub>2</sub> emissions. American companies in the power sector were given a limit on SO<sub>2</sub> emissions and were invited to trade pollution credits among them. The companies with the highest SO<sub>2</sub> reduction costs bought permissions for companies with low reduction costs. For these latter, it was more profitable to reduce emissions and sell the credits. The limited practical experiences with Joint Implementation have been made mainly by Sweden, the Netherlands [8] and the World Bank. Conclusions here point to a value of an ERU in the range of 5–9 EUR/t CO<sub>2</sub> equivalent. There are, however, reasons to believe that the value of the ERU is not the only important factor when an EU company decides whether to invest in a JI project or not. The project may be part of a larger expansion plan by this company.

The main players in the ET on the one side will be the companies that consider to buy so-called ERUs or credits, instead of carrying out reduction of emissions themselves. Sometimes it is even impossible to perform the reduction, *e.g.*, in nonflexible industries, such as construction, chemical, steel

and iron. On the other side, the energy sector will be the main seller of credits, because the sector generally can reduce its emissions at a rather low cost. Moreover, it should be mentioned that ET should go hand in hand with electricity trading.

As regards the **Joint Implementation (JI)**, it was introduced as a tool for reducing emissions (mainly CO<sub>2</sub>) by the technology transfer. JI is a market-based concept. Western EU countries generally have high CO<sub>2</sub> reduction costs, while Central and Eastern Europe (CEE) generally has low reduction costs. EU investors may invest in the CEE project, thereby reducing emissions there. The achieved reductions are credited on the CO<sub>2</sub> account of the host country and debited on the CO<sub>2</sub> account of the investor's home country. The resulting Emission Reduction Units (ERUs) are sold at a market price, and the investor keeps the profit. On the other hand, the host country benefits from increased investments in its technological base, and from positive effects of CO<sub>2</sub> reducing technologies locally: less damages to the general health and cleaner air.

The energy is the best sector for JI, because significant reductions can be achieved by relatively simple methods, and the result is relatively easy to monitor and verify. The Baltic area is likely to be the main area to benefit from JI. The EU countries around the Baltic Sea and some others face difficulties in reducing their emissions, and the candidate countries 'own' a significant amount of potential projects.

JI as a concept will most likely be competing with ET. The relation between Joint Implementation and Emissions Trading is that ET is essentially trading in ERUs, the same unit as JI projects result in. However, ERUs from JI projects should be produced, while ERUs for emissions trading can be immediately available. In accession countries, many ERUs are available. All the emission reductions that resulted from the industrial decline and reorganisation are in principle a resource for ERUs. However, if all CEE countries can sell these 'unused' emissions, the value of the ERU will be close to zero, especially if Russia is included. In that case, Joint Implementation projects will not be profitable for EU investors.

Moreover, it could be mentioned that a directive on emissions trading is under preparation by the European Commission. Its tentative date for the start of emissions trading in the EU is 2005 [6]. The international ET, as regulated by the Kyoto Protocol, will enter into force in 2008. However, the World Bank has estimated that about one billion tonnes of CO<sub>2</sub> need to be removed each year in the so-called commitment period 2008–2012. If half that reduction happens through trade-based mechanisms,

and the price of reductions is 5.5 EUR/t CO<sub>2</sub>, then the trade volume could reach EUR 10–20 billion per year.

## 2. THE PRINCIPLES OF THE RELEVANT MECHANISMS

### *Emissions trading (ET)*

ET was never used in real life. However, a number of experiments have been run. Nowadays, the European Commission is drafting the directive for ET [6]. Therefore, it could be strongly assumed that the main efforts will be centered around that particular document. On the other hand, the United States as a country having one of the biggest CO<sub>2</sub> emissions in the world has not introduced any similar trading arrangements.

The cheapest and easiest possibility to reduce CO<sub>2</sub> emissions is found in the energy sector. Therefore, the main sellers of CO<sub>2</sub> credits will typically be energy companies, even if there will be trade just among the companies. The highest reduction costs are found in the transport sector, and they are rapidly increasing. As one can see in the scheme, the main element of the electricity and CO<sub>2</sub> trading system is the electricity sector, which plays a significant role. The liberalised electricity market where the power companies can buy and sell electricity is already functioning in many EU Member States and takes the first steps in Accession Countries including Lithuania. On the top of the electricity market the elements of the CO<sub>2</sub> market could be placed. However, it should be politically established. CO<sub>2</sub> Emission Reduction Units (ERUs) are the main commodity in this market.

One of the most important conditions for having CO<sub>2</sub> market is that companies have a limit on the amounts of CO<sub>2</sub> emission. If the limit, or "cap", is not in place, there is no incentive to buy, and consequently not to sell either. This cap is based on the total emission cap of a country, distributed

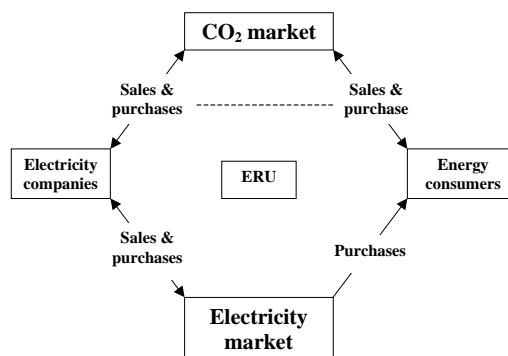


Fig. 1. CO<sub>2</sub> and electricity market functioning scheme

among the sectors allowed to participate in trading by a particular country or region. The cap has not been settled yet in the EU or any of the member countries. Only Denmark has already set a CO<sub>2</sub> emission cap for its power industry.

ET as a mechanism should have a clear allocation of emission credits. There are several possible explanations of the principles of allocation of ERUs [1]:

- *Grandfathering.* Historical data are used to determine the amount of credits allocated to each company. The more they have polluted in the past, the more they will get;

- *Benchmarking.* Allocations are made as if plants were using the most efficient technology and processes available, giving incentives for participants to improve on existing standards;

- *Auction.* Pollution credits are auctioned to the market actors. Companies with high CO<sub>2</sub> reduction cost will be willing to pay more for allowances than companies with low reduction costs.

The European Commission has decided in its draft directive [6] that pollution allowances should be allocated for free in all Member States. This essentially excludes the *auctioning* principle, but could include the *grandfathering* principle, especially if combined with the *benchmarking* principle. It would give pollution reduction to sectors, based on a reasonable standard level of pollution per unit of output from that sector. This would mean that some power stations would receive pollution reduction, and some would not. The member states are however free to decide exactly which principles should be applied.

Why is the energy sector very attractive in view of ET and JI? The reason is that the technology is ready and available for increasing the efficiency and using non/low polluting fuels (*e.g.*, installation of gas turbines). One of the most attractive means when a sufficient heat load is available (such as district heating networks) would be installation of Combined Heat and Power Plants, which instantly increase the efficiency and reduce primary energy use by some 20–30%.

It is still unclear who will be the formal buyer of emissions. It may be the government itself, which buys the emission credits and then distributes them later. On the other hand, there may also be direct trade between companies, like in the liberalized electricity market.

#### Joint Implementation (JI)

According to the Kyoto Protocol, JI does not allow to sell 'unused' emissions directly, even if the total emission limit is far below the limit for 2010. The

emission credits can only be achieved by investing in technology that will further reduce emissions from a relevant CEE country. The Kyoto Protocol states that projects are eligible if they provide a reduction in emissions by sources, or an enhancement of removals by sinks, which is additional to any that would otherwise occur (article 6) [2]. The above statement stresses that the main target for JI projects could be the energy sector. JI projects can be carried out in other sectors too, but the energy sector has special characteristics that make it suitable for this type of project; *e.g.*, large-scale reductions can be achieved by fuel conversion in power plants, or heat boilers. Also, a high energy efficiency could be achieved by converting heat boilers to Combined Heat and Power units. That kind of projects could significantly benefit for CO<sub>2</sub> reduction. In other sectors the projects probably can be smaller and more different. Therefore, such cases will increase the transaction costs of doing the project. The situation will be the same with minor energy producers. Additionally, it should be stressed that nuclear power cannot qualify as a project under the Kyoto Protocol, even if it nowadays saves for EU around 300 mill. t of CO<sub>2</sub> emission per year [3]. It was decided under the United Nations Framework Convention on the Climate Change (UNFCCC) on the Conference of Parties (Sixth session, part two), which took place in Bonn on 16–27 July 2001. The Parties have agreed that nuclear power plants will not be used to generate carbon credits, and as a result there will be no JI or CDM nuclear projects [13].

### 3. GROUND FOR EMISSION TRADING

The Kyoto Protocol sets the overall demand for CO<sub>2</sub> credits. The Western countries decided to cut off 5% of CO<sub>2</sub> emission compared to 1990 levels and the EU to 8%. As Lithuania is planning to become a member of the EU, the 8% reduction of emission against the 1990 level is foreseen.

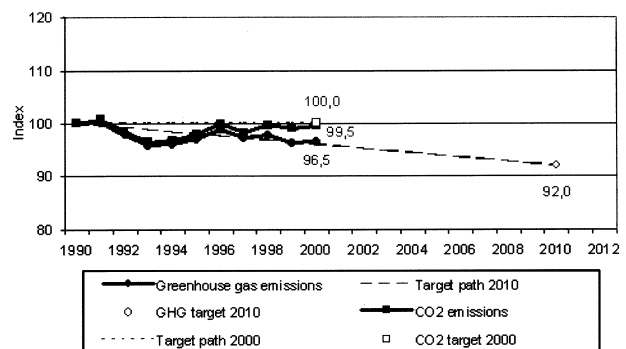


Fig. 2. Total EU greenhouse gas emissions in relation to the Kyoto target [10]

Table 1. EU CO<sub>2</sub> reductions – objectives and status [10]

	Kyoto target in % of 1990	Actual emission 1998, % of 1990	Emission level in 1998, Mt. CO <sub>2</sub> equivalent <sup>1</sup>
Austria	-13	4.1	78.5
Belgium	-7.5	6.3	144.6
Denmark	-21	8.7	75.6
Finland	0	4.7	76
France	0	1.0	543.6
Germany	-21	-15.8	1011.6
Greece	+25	15	119.5
Ireland	+13	19.1	63.7
Italy	-6.5	4.6	538.1
Luxembourg	-28	-58.4	5.8
Netherlands	-6	8.2	225.9
Portugal	+27	17.8	73.7
Spain	+15	19.4	360.4
Sweden	+4	1.2	70.2
United Kingdom	-12.5	-9.5	657.7
<b>EU – 15</b>	<b>-8</b>	<b>-2.5</b>	<b>4045.6</b>

<sup>1</sup>CO<sub>2</sub> plus other gas types converted into CO<sub>2</sub> equivalents, e.g., CH<sub>4</sub> (methane).

The existing EU reduction has been divided among separate countries following the internal negotiations.

Most of the progress in EU made towards reaching the required reductions comes from the effect of the introduction of natural gas in the United Kingdom power sector and the de-industrialisation of Eastern Germany. Future reductions will be much harder to achieve, but the energy sector will still be in a good situation compared to other industrial sectors.

The possibility of buying ERUs in CEE and elsewhere is not the only issue. The rich industrialised countries should commit themselves to reducing emissions domestically. Such position has been agreed by the EU. Domestic reductions are part of the EU's Climate Change strategy [5]. ET is part of that obligation.

In 1990, the total CO<sub>2</sub> emission in Lithuania was 42,338 (Gg), in European Community 3,325,370 (Gg), USA 4,912,959 (Gg) and Japan 1,124,350 (Gg). Emissions in Lithuania are distributed as follows: energy sector 37,332 (Gg), industry 2,203 (Gg), and land use 2,803 (Gg) [11].

#### 4. LATEST STATUS OF IMPLEMENTATION OF THE KYOTO PROTOCOL IN EU

Table 2. Reduction commitment – ceilings on emission level (% – 1990 level)

Party	Quantified emission limitation	Party	Quantified emission limitation
Austria	92	Liechtenstein	92
Belgium	92	<b>Lithuania*</b>	<b>92</b>
Bulgaria*	92	Luxembourg	92
Croatia*	95	Monaco	92
Czech Republic*	92	Netherlands	92
Denmark	92	Norway	101
Estonia*	92	Poland*	94
European Community	92	Portugal	92
Finland	92	Romania*	92
France	92	Russian Federation*	100
Germany	92	Slovakia*	92
Greece	92	Slovenia*	92
Hungary*	94	Spain	92
Iceland	110	Sweden	92
Ireland	92	Switzerland	92
Italy	92	Ukraine*	100
Latvia*	92	United States of America	93
Japan	94	United Kingdom of Great Britain and Northern Ireland	92

Green Paper on Greenhouse Gas Emission Trading was published, and it was approved by most of the Member States, Accession Countries and others [1]. Also, in the context of the European Climate Change Programme [5], the European Commission invited the parties to comment on some aspects of the Kyoto Protocol. One of the outputs of this exercise was a draft *directive* on emissions trading [6], primarily intended for the present EU members. The draft directive is supposed to help the EU prepare for international emissions trading, which will proceed from 2008. The directive has been proposed now, therefore it creates a temporary market for the EU.

EU is on the way of implementation of the Kyoto Protocol. The latest step, dated 23 October 2001, was taken on the preparation by the European Commission of the “Proposal for a Council Decision concerning the approval, on behalf of the European Community, of

the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfillment of commitments thereunder” [7].

As regards Lithuania, the Framework Convention on Climate Change was signed in 1995 and the Kyoto Protocol on 21 September 1998. Lithuania has ratified it in 2002. Also, Lithuania submitted its National Communications on the implementation of the Kyoto Protocol to the United Nations Climate Change Secretariat in Bonn [12]. The first National Communication on Climate Change (Lithuania) was reviewed by UNFCCC experts in May 2000.

## 5. THE MARKET FOR EMISSION REDUCTION UNITS

If each country implements its target under the Burden Sharing Agreement of the EU individually, the total annual cost for the EU to reach the Kyoto targets would be 9 billion Euros. If only the energy sector will participate in the ET then it would cost 7.2 billion EUR. Moreover, if energy intensive industries, such as steel, non-ferrous metals, construction materials, chemicals and paper and pulp industries will participate in the ET, then the total cost would be 6.9 billion EUR [1]. It is foreseen that 42 mill. t of CO<sub>2</sub> would be traded inside the EU in 2010, around a cost of 33 EUR per tonne [9]. However, the estimations do not take into account the possibility that CEE countries may want to participate in the trading. It appears that this is still a highly political issue.

## 6. RECOMMENDATIONS

In order to facilitate the adaptation to the new conditions related to the Kyoto requirements, the following **essential recommendations** could be drawn up:

- **Governments and companies need long-term strategy** in order to optimise their strategic decisions;

- **Lithuania can in principle choose** whether to introduce Joint Implementation and Emissions Trading simultaneously or to implement just one of them;

- **Lithuania needs in any case to make its energy sector more ‘carbon-efficient’.** Even if Lithuania does not have a specific need for buying CO<sub>2</sub> credits in 2012, it still does have a need for developing its energy sector in a more efficient direction;

- **The energy sector needs diversification** in order to avoid future dependence on single technologies or countries (for fuels), and in order to survive

in the electricity market. Renovating smaller energy installations, notably district heating systems, would bring a significant added value for the country as a whole (lower energy prices, better quality for the citizens, a resource for making CHP when needed);

- **Firm political guidance can reduce costs for a potential investor.** Smaller energy installations, notably district heating schemes, are still suffering from the lack of funds. These funds could partly come from JI projects, but with no guidance from the political level; investors may get the feeling that investments are not a priority, and therefore choose to invest elsewhere.

- **EU funding programmes can incorporate Lithuanian priorities,** but they require that Lithuania has to define and express its priorities and wishes towards the EU institutions, so that they can be reflected in the calls for SAVE and ALTENER and within the 6th Framework Programme for RTD [4] (just to mention the most common). As the PHARE programme will fall away after the Accession (probably in 2004), it appears to be a good time to consider what should come instead;

- **Emissions Trading should stimulate investment** in greener energy investments rather than replace them;

- **Joint Implementation alone cannot solve Lithuania’s CO<sub>2</sub> problems;**

- The country should keep in mind that according to past experiments the **ERUs were brought mainly by investments, not trade.** Therefore, the investment-related policy should be developed.

The Emission Trading mechanism probably will be suitable for Lithuania, meaning that Lithuania will have something to sell in an emission trading exercise. The Joint Implementation tool is suitable for Lithuania too. Therefore the following specific **recommendations for action** could be drawn up:

- Lithuania should show the outside world that JI is being considered seriously, to make a new version of the National Communication to the UNFCCC (Estonia and Poland have already made version 3, Lithuania’s is from 1998).

- It is not enough just to establish general guidelines for good JI projects, but it would be better to have real data. This could be achieved by inviting Lithuanian parties to submit projects, especially amongst the district heating plants that wish to convert to CHP. Moreover, such projects are very likely to be appreciated by Scandinavian donors;

- A manual for the potential developers should be created, describing the main elements of JI and their responsibilities, produce standard cost and other information for the main categories of tech-

nologies (energy efficiency, boiler conversion, wind projects, district heating projects, etc.);

- There should be a balance between small and large projects. Large projects in the electricity sector are less likely to qualify as JI projects, and small projects may have too high transaction costs;

- To prepare for reducing transaction costs for project developers, by appointing persons in the ministry and elsewhere responsible for specific elements of the JI cycle;

- To reduce the transaction costs for project developers by being specific about standardisation of the administrative processes (the competition for projects can be hard with countries like, for instance, Romania and Bulgaria). Also, the help desk for project developers should be provided;

- Lithuania should take an active part in the discussions about JI on the international level. A useful start would probably be to inform BASREC (The Baltic Sea Region Energy Co-operation) about Lithuania's intentions concerning Joint Implementation, and which types of capacities and projects are needed here;

- It should be clearly stated that not only technological projects like installation of CHP will be eligible in Lithuania, but also the projects such as laying a natural gas pipeline towards the areas where there was no gas before are suitable too. This statement is needed because, e.g., if the pipeline is not profitable itself, it could be financed as a Joint Implementation project, if it provides cleaner energy than the existing solution (which would typically be mazout for district heating systems). Natural gas could give added values such as cleaner air, possibility for operating efficient CHP, etc. These combined benefits might be worth much for the Lithuanian society, even though the separate project of laying the natural gas pipeline in itself is not profitable and therefore can be funded as a JI project;

- It could be expected that participants of ET and JI will increase investment mostly in natural gas fired power plants and double their investment in renewable energy projects.

#### Relevant links

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12. UNFCCC Greenhouse gas inventory database // <http://62.225.2.23/default1.htf?time=04%3A11%3A23+PM>.

13. The first National Communication of the Republic of Lithuania on the Climate Change / Lithuania. 1998 // <http://www.unfccc.de/resource/docs/natc/litnc1.pdf>.

14. UNFCCC conference of Parties (Sixth session, part two) // <http://unfccc.int/resource/docs/cop6secpart/107.pdf>.

#### Useful links

1. Prototype Carbon Fund // <http://prototypecarbonfund.org/router.cfm?Page=Home>.
2. Euroheat & Power/International Energy Agency (Implementing agreement for district heating, cooling and CHP) // <http://www.euroheat.org/etposition.html>.
3. Eurelectric – the Union of the Electricity Industry / <http://www.eurelectric.org/Public/Files/efe.pdf>.

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#### PREKYBA EMISIJOMIS PAGAL KIOTO PROTOKOLĄ

#### S a n t r a u k a

Lietuva rengiasi integruotis į įvairias pasaulio organizacijas, tokias kaip NATO ir Europos Sąjunga. Lygiagrečiai šiam procesui Lietuva privalo ratifikuoti pagrindines tarptautines sutartis, chartijas ir protokolus, įskaitant Kioto protokolą. Būtina ne tik ratifikuoti Kioto protokolą, bet ir atsižvelgti į visus išpareigojimus, susijusius su protokolu. Esminis klausimas yra tai, kaip Lietuva gali pasiekti Kioto protokole nurodytus tikslus ir prisiimtus išpareigo-

jimus. Šiame straipsnyje mėginama apžvelgti Kioto protokole numatytą mechanizmą įgyvendinimo galimybes Lietuvoje.

**Raktažodžiai:** Kioto protokolas, prekyba emisijomis, bendrasis projektų įgyvendinimas

**Арвидас Галинис, Скирмантас Пилецкас**

## **ТОРГОВЛЯ ЭМИССИЯМИ ПО КИОТОВСКОМУ ПРОТОКОЛУ**

**Р е з ю м е**

Литва готовится к интеграции в разные всемирные организации, такие как НАТО и Евросоюз. Одно-

временно Литва должна ратифицировать основные международные договоры, хартии и протоколы, включая и Киотовский протокол. Необходимо не только ратифицировать Киотовский протокол, но и обратить внимание на все обязательства, связанные с протоколом. Основным вопросом является то, как Литва сможет достичь цели и принятые обязательства по требованиям, изложенным в Киотовском протоколе. В настоящей статье делаются выводы об имеющихся возможностях внедрения в Литве механизмов, намеченных в Киотовском протоколе.

**Ключевые слова:** Киотовский протокол, торговля эмиссиями, внедрение общих проектов