German Economic Team Moldova

Policy Paper Series [PP/01/2012]

Emission Trading as a Catalyst for Energy Efficiency Improvements: Options and Potential for Moldova

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Berlin/Chişinău, February 2012

About the German Economic Team Moldova

The German Economic Team Moldova (GET Moldova) advises the Moldovan government and other Moldovan state authorities such as the National Bank on a wide range of economic policy issues. Our analytical work is presented and discussed during regular meetings with high-level decision makers. GET Moldova is financed by the German Federal Ministry of Economics and Technology under the TRANSFORM programme and its successor. Our publications are publicly available at our website (www.get-moldova.de).

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Emission Trading as a Catalyst for Energy Efficiency Improvements: Options and Potential for Moldova

Executive Summary

Emission trading systems, which cap the overall amount of emissions and allow companies to buy and sell emission allowances, are a cost-effective instrument to reduce environmental pollution. For Moldova additional benefits could result from wealth, knowledge and technology transfers. Furthermore, implementing best practice emission reporting standards and creating the effective administrative structures required for an emission trading system provides additional benefits.

Indeed, revenues and technical support obtained through Clean Development Mechanism (CDM) projects under the Kyoto protocol are a case in point of how Moldova has, and continues, to benefit from emission trading. However, with Kyoto expiring in 2012 the benefits achievable through CDM will disappear. To continue benefitting from emission trading, we argue that an EU ETS-like emission trading system with a link to the European system should be considered.

We estimate that up to *3.5 m tonnes of carbon dioxide emissions could potentially fall under an ETS* that follows the European standard. With the amount of CO2 emissions per dollar of goods and services produced (the so-called carbon intensity) more than 150% above the European average, the reduction potential is substantial.

Assuming emission reductions of 18%, as some commentators suggest could be expected from improvements in the heat and power sector, would provide trading benefits of *EUR 63 m over a ten year period*. As such, setting up a cap and trade system could offer the benefits of generating revenues to partly fund overdue efficiency improvements.

However, accessing these benefits has a price. It would require a substantial legislative and institutional effort and, as with any other international agreement, the government would have to sacrifice some of its sovereignty over how to regulate companies. Furthermore, allowances can only be sold if Moldovan companies manage to reduce overall emission levels. However, extending the EU ETS is a central vision of the European Union. Therefore, Moldovan policy makers may be able draw on a number of available support schemes. As such, emission trading could proof to be a catalyst for long overdue efficiency improvements.

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Acknowledgements: The authors would like to thank Ricardo Giucci for his kind assistance and for reviewing this study.

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1 Introduction

1.1 Why considering a cap and trade system?

Wealth, technology and knowledge transfers are the main benefits an international tradable permit system might entail for Moldova. Adopting an emission trading system and linking it to other international systems would allow Moldova to "export" emission reductions. Thus, planned and long overdue energy efficiency investments could generate co-benefits in the form of emission reduction certificates that can be sold internationally.

Furthermore, regulated companies could benefit from adopting best international practice in terms of emission monitoring, reporting and verification. This might help Moldovan companies to improve business processes and identify energy efficiency potential. Finally, setting up and linking a system based on the EU ETS is well in line with both the EU's vision of an international trading system and Moldova's European integration pathway.

Clearly, there are also costs connected to setting up and maintaining an emission trading system. First of all, allowances can only be traded if emissions can be reduced below the agreed limit. Furthermore, the administrative, legislative and institutional hurdles are high – especially for transition countries like Moldova and for a system that needs to meet European standards. Furthermore, an international link would imply giving away autonomy over which companies are included, how prices for emissions are set and how many allowances will be allocated. Finally, there is the issue of carbon leakage – the risk that high emitting companies move operations to less costly regimes.

In order to understand how these benefits could materialise, and the cost and barriers to achieving them, it makes sense to explain the basic mechanism of an emission trading system in more detail.

1.2 The basic mechanics of emission trading systems

A cap-and-trade system requires that each regulated company has to surrender one emission allowance for each unit of its emissions (e.g., one ton of CO2). The total number of allowances is limited. As emission allowances are scarce they get an economic value. A company that owns insufficient allowances can buy permits from other companies that need less. In the consequence, a market emerges that puts a value on emissions and thus provides an incentive for companies to reduce emissions (European Commission 2012).

The advantage of such a market-based approach is its cost-effectiveness. Emissions will be reduced in the sector, company or technical appliance that provides the lowest cost of emission reduction – so-called abatement cost. That is, a company that finds it easy to implement emission saving technology (e.g., by installing a new energy-efficient boiler) can sell its unused permits to other companies which consider the cost of reducing emissions to high.

This argument also works on an international level. Countries that have yet cheap options of reducing emissions can use the permits generated here to sell them to other

countries that have higher abatement costs. Indeed, emission trading schemes can include the option of offsetting domestic emissions by buying emissions from off-set projects in developing or transition economies. Such projects are considered a good instrument for wealth and know-how transfer. For Moldova accessing these kind of benefits, on top of the projects that are already being pursued, could become the major advantages of emission trading.

Box 1

Types of emission trading systems

Emission trading systems can come in different forms. The main distinction is usually made between:

(1) Cap-and-trade systems

The unique feature of a cap-and-trade system is that it creates a number of tradable emission allowances by constraining the number of emissions of existing and potential polluters. The *European Union Emission Trading System (EU ETS)* is the most prominent example here. However, many other systems exist: For example the Japanese Voluntary Emission Trading Scheme set up in 2006 or the United States Regional Greenhouse Gas Initiative. Neither need the systems be restricted to greenhouse gas emissions; the *'Acid Rain Program',* enacted in the United States in 1990, established a permit trading system that covered sulphur dioxides and nitrogen dioxides (US EPA 2009). The scope can also differ in terms of regional coverage ranging from small regional systems to large multinational permit trade systems.

(2) Emission-Reduction-Credit Systems

Emission-reduction-credit systems award tradable credits to companies outside an emission trading system for implementing emission saving measures. Regulated companies are allowed to buy the credits that have become available to offset some of their own emissions. Clean Development Mechanisms (CDM) implemented in the Kyoto Protocol are the most relevant example for emission reduction credit systems and already successfully used in Moldova. Under the CDM, countries that have not adopted a national emission target can suggest suitable emission saving projects and earn credits for the reductions achieved through the project. These so-called certified emission reductions (CER) can then be sold to regulated entities that are part of a cap-and-trade system to offset their emissions.

Source: Jaffe, Ranson et al. (2009)

In conclusion, emission trading systems can come in different shapes in terms of regional coverage, scope of industries and types of emissions it covers. They are widely accepted as a cost-efficient instrument to reduce emissions. For countries with comparatively low abatement costs, like Moldova, they might be particularly attractive. Those countries can easily achieve emission reductions that can then be traded with regulated companies in

Europe and elsewhere. Indeed, the four projects accepted under the Kyoto Clean Development Mechanism show that cap-and-trade systems can add to the economic viability of emission saving projects. Furthermore, on top of those monetary benefits, access to technical advice and knowledge transfer are reasons for considering an emission trading system.

1.3 EU ETS vs. CDM: Options for emission trading in Moldova

Having outlined the basic idea of emission trading we now analyse the options for emission trading that are relevant in the Moldovan context.

For Moldova we have identified two basic options:

1. Further use of the Kyoto Clean Development Mechanism
2. Establishing an Emission Trading System and linking it with another international systems like the EU ETS

Regarding the first option, Moldova continues to participate in Clean Development Mechanisms under the Kyoto Protocol. However, with Kyoto expiring at the end of 2012 the value of emission reductions (i.e. Certified Emission Reductions CER) will fall substantially. Already today, the EU ETS accounted for two thirds of the demand for Certified Emission Reductions from Clean Development Projects. After Kyoto expires at the end of 2012 the European Union will account for the overwhelming amount of demand for certificates.

However, demand from the European Union will be reduced through a number of factors. Firstly, with the economic outlook subdued due to the debt crisis, economic activity and emissions will be lower depressing demand for allowances. Secondly, generous banking options – the mechanism that allows companies to use unused certificates from one period to the next – will depress demand for outside allowances. Finally, during the third phase of the ETS CERs will no longer be de-facto compliance assets and companies will have to swap them into EU Allowances to comply with their obligations which will add complexity to the process. In addition, only compliance entities will be allowed to swap CERs into EUAs reducing liquidity as it excludes financial institutions. Most importantly for the future of CDM in Moldova, the EU ETS Directive stipulates that unless a second commitment period is agreed – which is currently not on the agenda - only CERs generated by developing countries can be considered. Consequently, Moldova would not be able to sell CERs to the EU ETS – the largest international market for CERs. The World Bank Carbon Market Report argues:

"Unless additional non-EU demand emerges soon and the supply is boosted by meaningful CDM reforms, project developers will have very little, if any, real incentive to continue investing new CDM projects." (World Bank 2011)

As such, Moldova's best bet could lie in setting up an emission trading system and linking it to the European Emission Trading System. While this is likely to require a substantial administrative and legislative effort the advantage is in the higher value each tonne of

emission reduction can achieve on the European market. Also, this option would constitute a stable, long term approach as the European Emission Trading Scheme is planned to stay in place indefinitely (European Commission 2012).

2 Cost and benefits of introducing an EU ETS in Moldova

As outlined above the potential benefits of participating can be substantial. Tapping them, however, could proof to be a lengthy and complicated process. Another issue is the reduced national government sovereignty that comes with participating in international agreements. Therefore, it is important to assess and compare the costs and benefits of joining an emission trading system. The two central questions in this context are:

(1) Can Moldova's economy achieve emission reductions at low cost and sell the generated allowances within the European trading system?

(2) What amount of emission would be falling under a European-style emission trading system?

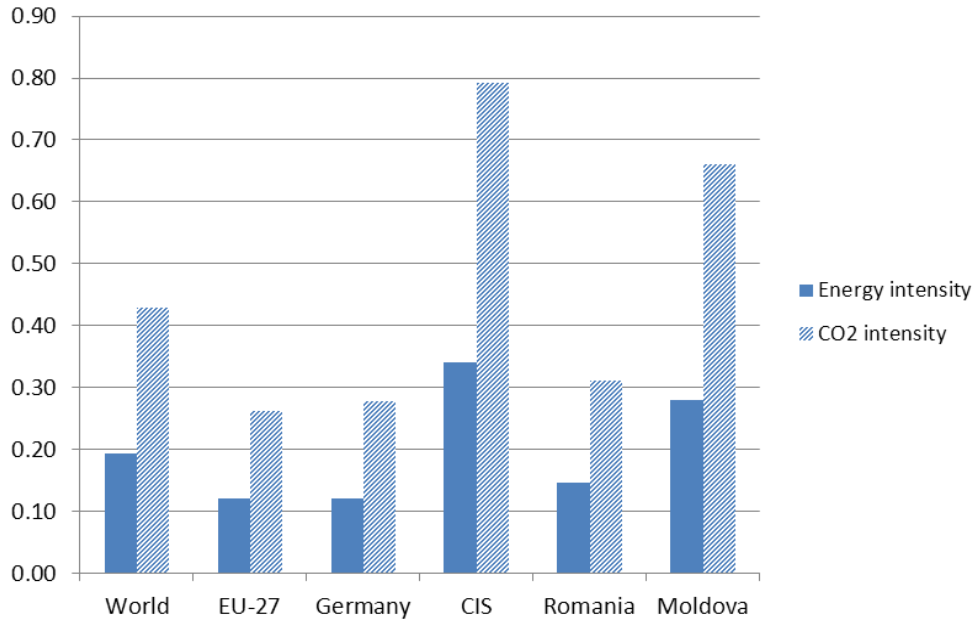
2.1 Are emission reductions possible?

A first indication of the order of magnitude of possible emission reductions is given by the overall energy intensity of the Moldovan economy. Energy intensity is measured in energy used to produce one unit of gross domestic product.

The data suggest that Moldovan energy intensity is relatively high (meaning in turn that energy efficiency is low) in international comparison. The Moldovan economy uses around 0.3 kilo of oil equivalent (koe) for each dollar of goods and services produced (purchasing power weighted) in 2009 (OECD/IEA 2012). In comparison, the economies in the European Union only needed 0.12 koe/USD on average in 2009 – the latest year for which data is available for all countries (Enerdata 2011).

Figure 1

International comparison of Moldova's energy and carbon intensity, 2009*



Source: Enerdata (2011), OECD/IEA (2012)

**Energy intensity expressed in kilo of oil-equivalent and carbon intensity in kg of CO2 both per unit of gross domestic product in USD 2005 PPP-weighted, USD 2000 PPP-weighted for Moldova*

Also in terms of greenhouse gases emitted per dollar of goods and services produced, (i.e. the carbon intensity) the Moldovan economy (0.66 kg CO2/USD PPP) performed significantly worse than the European average (0.26 kg CO2/USD PPP).

With energy and greenhouse gas intensity comparatively high, reductions are potentially achievable at low cost. Indeed, international experience shows that it is easier to achieve reduction when starting from high emission levels. Typically, many low cost, highly effective measures (for example building insulation) are still available in economies with high emission intensities.

Indeed, the abatement cost observed in some of the Moldovan Clean Development Mechanism (CDM) projects show low costs for each reduced unit of CO2. Consider for example Project 0173 (Moldova Energy Conservation and Greenhouse Gases Emissions Reduction), an undertaking that aims at reducing energy use and switching to low emission fuel sources for public sector buildings. The net abatement cost for this project, after considering other benefits such as fuel expenditure savings, are estimated to be as low as EUR 6.2/tonne CO2 (CDM – Executive Board 2011)[1]. In comparison, emission

[1] Estimates made for grant applications should be treated with some cautions as abatement costs may have been overstated to meet the application requirements.

certificates currently trade at 8-9 EUR suggesting that trading emission reductions could add significantly to the economic viability of efficiency measures.

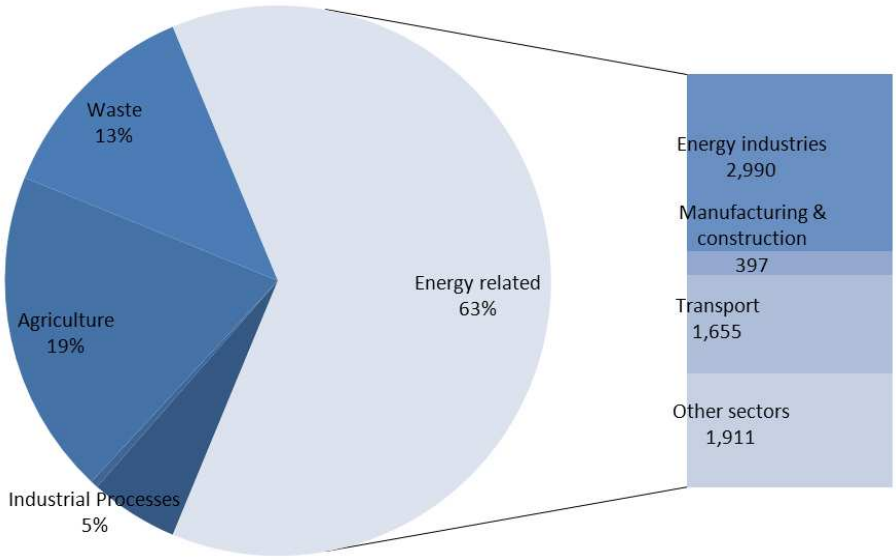
2.2 What amount of emissions would fall under an ETS?

To get a better idea about the potential for emission savings and thus the value of emission allowances that could be traded after introducing an EU ETS like system, one should consider the current level of greenhouse gas emissions in Moldova. According to the National Inventory Report 1990-2005 the Moldovan economy produced around 11.8 m tonnes of CO2 equivalents[2] in 2005[3].

The data show that the energy related activities contributed around 7.7 m tonnes - almost two-thirds of the overall amount (Ministry of Environment and Natural Resources / United Nations Environment Programme 2009).

Figure 2

Greenhouse gas emissions in 2005 by source, CO2 equivalents



Source: Ministry of Environment and Natural Resources / United Nations Environment Programme (2009)

Clearly, only a proportion of these emissions are potentially applicable for emission trading. Firstly, because the headline number above captures all emissions across the

[2] This number reduces to 10.5 m tonnes of CO2 equivalents after removal of greenhouse gases through changes in land use and similar activities are accounted for. Estimates include emission sources placed both banks of Dniester river.

[3] The latest year for which the National Inventory Report 1990-2005 provides data.

Moldovan economy, while the European Emission Trading System covers only some sectors and some types of greenhouse gases. Additionally, only large scale installations are captured in the European Emission Trading System.

Therefore, in order to provide an estimate of the emission trading potential of the Moldovan economy, an estimate of the share of the total emissions that would fall under the European Union Emission Trading System is needed.

The EU ETS covers only emission from fuel combustions from heat and electricity production and emissions from some industrial processes (e.g. metallurgic sectors, cement and glass production). We use the detailed sector data provided in the United Nations Environment Programme reports as a basis for our estimate. Although the most recent data is only from 2005 more recent aggregated data suggests that emission levels have remained stable.

We estimate that around *3.5 m tonnes of CO2 emissions could potentially fall under an Emission Trading System that would follow the European example*. The majority, around 3 m tonnes, of these emissions can be attributed to the energy sector with less than 0.5 m tonnes arising from other activities such as cement, glass and steel production (Ministry of Environment and Natural Resources / United Nations Environment Programme 2009). Table 1 shows the results of our analysis.

Table 1

Estimated CO2 emission in Moldova that would potentially fall under an EU ETS-like system, based on 2005 data

	Emissions (m tonnes of CO2 equivalent) per year		
Sector[4]	Total	Right Bank	Left Bank
Energy industries	2.99	1.39	1.60
Cement production	0.37	0.23	0.14
Glass production	0.02	0.02	0.01
Bricks production	0.02	0.01	0.00
Steel production	0.11	0.00	0.11
	3.51	**1.65**	**1.86**

Source: Own calculation based on: Ministry of Environment and Natural Resources / United Nations Environment Programme (2009),United Nations Environment Programme (2009)

The number of 3.5 m tonnes CO2 equivalents covers installation on both banks of the Dnister river. A closer examination of the data suggests that emissions are fairly evenly

[4] A serious drawback of this analysis is the lack of information of individual firm level data. As such we are not able to assess if emitters would exceed the size limits set in the EU ETS regulation. Consequently, our estimate for industrial processes can be considered to be rather generous.

spread between the two regions. However, the annual data shows large fluctuations of emissions especially on the Left Bank.

Estimating how many of these emissions could be reduced is difficult as the reduction potential differs between installations. Using carbon intensity as an indicator, which is 150% higher than the European Union average, suggest that there is ample potential for emission reductions even if a potential future decline of the emission limit is taken into account[5]. The United Nation Environment Programme's estimates of mitigation potential could serve as an indicator for the extent of potential emission reductions in Moldova. According to the organisation, efficiency measures in the Power Sector alone could reduce CO2 emissions per kWh by around 18% (United Nations Environment Programme 2009).

Assuming, for illustrative purposes, such an 18% reduction of emissions across the entire economy, Moldova could trade allowances for 0.63 m tonnes CO2 equivalents each year after the measures are fully implemented. *Thus, over a ten year period regulated companies could sell allowances worth EUR 63 m.*

Table 2

Illustrative example of potential gains through emission trading over a ten year period

	Baseline emissions	**Annual average emission reductions**	**Emission reductions over 10 year period**	**Potential trading value***
	tonnes CO2 equivalent	tonnes CO2 equivalent	tonnes CO2 equivalent	EUR m
Moldova	3.5	0.6	6.3	63.1
Right Bank	1.6	0.3	3.0	29.7
Left Bank	1.9	0.3	3.3	33.4

*Source: Own calculation, based on Ministry of Environment and Natural Resources / United Nations Environment Programme (2009) data. *Assumes a carbon certificate price of EUR10/tonne CO2.*

Clearly such estimates are only indicative and need to be treated with caution. Firstly it is envisaged that emission caps fall by 1.74% each year within the EU ETS. Secondly, much depends on the overall level of allowances available in an emission trading system. Indeed, reductions in emission intensity could be partly or fully off-set by increased economic activity which would lead to rising absolute emissions. Furthermore, allowances can only be sold after successful implementation and reduction of the efficiency measures. Finally, the benefits would reduce accordingly if only activity based on the Right Bank of Dnister River would be covered under such a system.

[5] The EU ETS cap will decrease each year by 1.74% of the average annual total quantity of allowances issued by the Member States in 2008-2012.

To sum up, our indicative analysis of carbon dioxide emissions in Moldova suggest that there is potential for emission reductions and consequently trade with allowances. Specifically, we estimate:

1. Emissions of 3.5 m t per year would be covered under an EU ETS
2. Assuming emission reductions of 18%, allowances worth EUR 63 m could be traded over a 10 year period once the measures are fully effective.

To illustrate this concept we use the example of Termocom SA, a Moldovan District Heating Operator, to show how revenues generated through emission trading could be used to co-finance investments in energy efficiency.

2.3 Case study Termocom: Cost and benefits of emission trading

Termocom SA owns and operates the district heating system in Chisinau. District heating is the dominant type of residential space heating in the city with around 500,000 people, roughly 17% of the population of Moldova, relying on district heating for their well-being (World Bank 2009).

With heating tariffs below cost recovery level and the public sector ill-equipped to support Termocom, the company has been insolvent for the best of the last decade. Payment arrears and a huge investment back-log are the consequence. Although some improvements have been made over the last years, technical conditions remain inadequate. This is evident in poor reliability of heat supply and high heat losses. In Termocom 24% of the generated heat is being lost in the system, compared to below 10% in modern facilities. To address these issues the World Bank has developed an investment plan aiming at increasing system reliability and efficiency.

A positive side-effect of such investment would be reductions in carbon-dioxide emissions which could be traded under an emission trading system. The authors of the World Bank study estimate a cumulative emission saving potential of around 2.9 m tonnes CO2 over a fifteen year period (World Bank 2009). As such the measure could create – among other benefits – allowances worth EUR 29 m[6] over a 15 year period thus substantially contributing to the expected benefits of the investment (see Table 3).

[6] We assume a trading value of EUR 10 for each allowance of one tonne CO2 equivalent emission.

Table 3

Key data of the World Bank Termocom investment plan over 15 year investment period (2009-2014)

Assumed 15 year investment horizon	Value	
Estimated investment costs	239.3	EUR m
Emission reductions	2.9	m t CO2
Assumed ETS trading value per tonne CO2	10.0	EUR/tonne CO2
Revenue from sold emission allowances	28.9	EUR m
Net costs after accounting for trading gains	210.4	EUR m

Source: World Bank (2009), own calculations

2.4 Barriers and challenges

A general issue with the introduction of a national/regional cap-and-trade system is that there is a risk that carbon intensive sectors move to countries were carbon is not priced. In particular, weak economies cannot easily afford to lose industry to competitors with less strict rules. For Moldova, carbon leakage would however be less of an issue. The majority of the emissions is situated in sectors that cannot move across borders, such as local electricity and heat supply. It is also not conceivable, that emission trading would change the regional market share of Moldovan power plants, as they are already more expensive than the Ukrainian or Romanian ones.

And electricity and heat consumer, that might have ultimately to pay the emission cost, might not see final electricity and heat prices rise. Efficiency measures to reduce emissions also lower the fuel bill of electricity and heat producers and thus should over-compensate cost arising from having to buy emission allowances. Thus, electricity and heat prices should not be largely affected. In addition, consumer would benefit from higher government income that could be redistributed in the form of tax cuts or increased government spending.

Introducing an emission trading system in Moldova would be faced with the question of how the left bank of the Dniester is included in such scheme. A large share of Moldovan emissions, an estimated 1.9m tonnes of the total 3.5m tonnes in 2005, are concentrated in this region and excluding it from a potential emission trading system is difficult and inefficient. As we argue the scheme is a positive-sum-game. Thus, political solutions for reaping the joint benefits should exist.

3 Implementation of an ETS System

Following the assessment of Moldova's emission trading potential this section explores how such a system could be implemented. In this context we will also consider practical issues in the Moldovan context as far as the scope of this policy paper allows. A particular focus will be on how a link to the European system could be achieved as this is a pre-requisite for harvesting the benefits of an ETS in Moldova.

The main steps towards implementing a cap-and-trade system are:

- Defining the scope of the system and setting a corresponding cap on allowances based on historic emission patterns
- Allocating emissions to polluters
- Setting up institutions to monitor emissions and reduction commitments
- Linking to another ETS

The steps will be explained in some more detail in the remainder of this chapter.

3.1 Setting a cap and allocating allowances

For emissions to have a value their supply needs to be capped, that is, limited to a certain level. The total number of allowances, i.e. the "cap", determines the maximum amount of emissions possible under an ETS. Usually each allowance represents the right to emit one tonne of CO2 – or the amount of another greenhouse gas with the same contribution to global warming as one tonne of CO2 (European Commission 2012).

The total number of allowances depends on which sectors and emissions are covered under the system. If the Moldovan system would follow the EU ETS in scope, we estimate that allowances of around 3.5 m tonnes of CO2 equivalents would have to be issued initially per year.

As opposed to our analysis (and the estimates made in the National Inventory Report) the total number of emission is usually determined *bottom-up*. That is, potential polluters are required to report their emitting activities. The amount of emissions over a historical period is then used a benchmark to determine how many allowances a company needs. The sum of individual emission constitutes the national cap.

Allocating allowances to companies that need them can happen in two ways. (1) Allowances can be given away for free – so-called grandfathering or (2) emission certificates can be sold for example through auctions. A mixed approach – as planned for the third allocation period of the EU ETS – is also possible. Clearly, both approaches differ in the financial implications for emitters and governments.

3.2 Institutional arrangement and legislative framework

The cornerstone of a working emission trading system is a mechanism that monitors, verifies and reports emissions (MVR system) of the regulated industries on a regular basis.

The annual process of monitoring, reporting and verification is known in the EU ETS as 'Annual Compliance Cycle'. Regulated companies need to monitor and report their emissions during the year. The data needs to be verified by an accredited auditor in order to reduce the chance and incentive for wrongly reporting of emissions (European Commission 2012).

A consistent, accurate and simple monitoring, verification and reporting system requires suitable institutional and legislative arrangements. Specifically, the government needs to set up a public body responsible for carbon market monitoring and regulation. This includes:

- **National Registry:** The registry ensures the accurate accounting of all allowances. They keep track of the ownership of allowances quite similar to a commercial bank. To partake in emission trading a company or person has to open an account at the National Registry.
- **Inventory of Greenhouse Gas Emissions:** Inventories collect and monitor the level of emission inside and outside the emission trading system. As such they are vital to establish sources and trends in emission levels and form the basis for any regulatory adjustments. They can partly rely on the data collected from regulated companies.
- **National Monitoring System:** A public body that monitors companies that fall under the ETS, administers the annual reporting, establishes if an emitter provides enough certificates for all its emissions and sanctions those that do not.
- **Trading Platform for market transactions:** Finally, for emission trading to work a suitable marketplace that allows companies and financial intermediates to trade allowance with each other needs to be established. As with any other financial market regulation it needs to ensure that market participants do not abuse their market power. Here, Moldova could draw largely on existing European structures.

Legislative arrangements are required to set up these public bodies and to create the legal basis to ensure regulated companies comply. Specifically this involves:

- **Fining and sanctions:** Companies will only have an incentive to participate in the market if not having sufficient allowances for polluting activity is fined accordingly – for that the fine of not having enough certificates needs to be higher than the prevailing market price of an allowances.
- **Reporting requirements:** Legislation also needs to govern the rules of reporting emissions, quite similar to corporate accounting standards, so companies provide truthful, accurate and timely accounts of the emission activities.
- **National allocation plan (NAP):** The NAP regulates how allowances are distributed among regulated companies. It determines if companies need buy allowance or being allocated them for free. It also regulates if companies can

make use of cost containment options such as offsetting, banking, borrowing or safety valves (Jaffe, Ranson et al. 2009).[7]

3.3 Linking to EU ETS

The main benefit for Moldova in setting up an emission trading system would lie in participating in international trade of carbon allowances. Specifically, Moldovan would be able to sell excess allowances generated through efficiency measures on the international market. For these trading benefits to materialise a link to another emission trading system is required. For international counterparts a link is also the favourable option. Indeed, the major benefit of an ETS is the fact that emission can be reduced where it is cheapest. Enlarging an emission system would thus open up more opportunities to reduce carbon emissions for all trading partners.

Being the largest and most advanced emission trading system in the world, the European Union ETS is the most obvious partner for such a link. Indeed, the European Union sees enhancing and linkages of its system as an important stepping stone towards reaching its vision of a comprehensive, international cap and trade system. Additionally, the European Union values the benefits of introducing best practice in terms of emission registering and implementing efficient administrative structures that are required to set up a working emission trading system that meets European standards. As such, a link to the EU ETS in Moldova is likely to be seen as an important aspect of further European integration pathway(European Commission 2012).

On top of potential trading benefits the advantage of linking and enlarging an ETS are as follows (Jaffe, Ranson et al. 2009):

- Increased compliance options for both trading partners
- Reduced transactions costs and increased liquidity
- Less volatility

However, linking a national system is not without costs. Particular disadvantage that may arise are:

- Reduced ability to protect national industries from regulation as national standards need to meet European guidelines
- Extent and scope of the system will be determined by EU authorities
- Reduces ability to control prices as demand and supply in the entire system impacts the cost of allowances
- Costs of legislative and administrative efforts to meet EU ETS standards

[7] Offsetting means companies can buy allowances (for example from CDM projects) to meet their own targets. Banking and borrowing allows organizations to transfer unused allowances from one period to the next. Safety valves put a cap on the total compliance costs per organization.

- Trading benefits rely on the assumption that overall emission reductions will be achieved

There are already a number of examples for linkages to the EU ETS system. First of all, the system itself can be seen as a linkage between the single member states. However, more relevant in the Moldovan context, are Norway, Liechtenstein and Iceland which joined the EU ETS having previously run their own national systems. Switzerland, which also has its own national ETS, also currently negotiates the terms of joining the EU ETS with a linkage planned from 2013.

The situation for Moldova would be different in the sense that countries like Norway and Switzerland already have had a working national ETS in place before joining the EU ETS. As such the major step required for the Moldovan government would be to set up its own system. However, the advantage is that European institutions could be invited to consult the process. That way Moldova would set up a system in accordance with the European guidelines from the beginning - just like the original European member states that make up the EU ETS. Unlike Switzerland, Norway, Iceland and Lichtenstein, Moldova would avoid the cost of having to change its national system to bring it in line with the EU ETS guidelines.

4 Conclusions and recommendations

Our report shows that an emission trading system with a link to the European Union system could be a viable route for Moldova to capitalise on future energy efficiency improvements. It would offer an alternative after the Kyoto Clean Development Mechanism will come to an (de-facto) end after 2012. Specifically, the main advantages of introducing an ETS would result from monetising Moldova's low abatement costs through trading with other European economies that have exhausted low cost energy efficiency options.

A pre-requisite for these trading gains to materialise would be Moldova's ability to achieve overall emission reductions. The available data on energy consumption and emissions suggest that there is indeed potential for such reductions. The country currently produces 150% more greenhouse gases for each unit of output than its European Union counterparts. Additionally, high returns and low amortisation times of some of the approved CDM projects indicate that Moldova could achieve emission reduction at comparatively low costs.

Overall, we find that around *3.5 m tonnes of CO2 equivalents* would be covered under an EU ETS system. Assuming a reduction of this amount by 18% would offer allowances worth about *EUR 63 m over a ten year period* [8]. As such, overdue efficiency improvements could partly be funded through the sale of excess allowances.

[8] While this is only an assumption for illustrative purposes, the United Nations Environment Programme report for Moldova suggests that an 18% reduction could be achieved in the Power Sector through implementation of standard mitigation measures.

However, accessing these benefits is likely to be a lengthy and complicated process that requires considerable legislative and financial efforts. Other costs may come in the shape of submitting national sovereignty in terms of how and which companies are regulated. Thus, Moldova would have to provide a substantial upfront effort to be able to take part in the EU-ETS. The same is true for individual companies as allowances can only be sold after energy efficiency investments have led to emission reductions.

The implications for policy makers are manifold and need to be well understood by companies and politicians alike. The government need to apprehend what the financial implications for regulated companies as well as public bodies are and if instruments exist that can help them to overcome the initial gap between costs and benefits from trading allowances. If emission allowances are to be distributed via auctions – as is planned during the third phase of the EU-ETS – the government should consider how to redistribute the incomes of auctioning to regulated companies.

Additionally, the cap of the ETS needs to reflect Moldovan circumstances, namely the country's comparatively low gross domestic product per head. As such, future economic development could well lead to overall increases in carbon dioxide emissions.

In practical steps we would recommend a comprehensive feasibility study of the costs and benefits of introducing emission trading. The feasibility study could be accompanied by a roundtable with stakeholders to explore acceptance and political will to implement such an instrument. If both feasibility and roundtable are positive, actual steps towards an implementation could follow possibly including a pilot project on a voluntary basis.

The Moldovan government should seek the support of international donors and European partners throughout the entire process. As enlarging the EU-ETS is in the very interest of the European Union, there should be impetus to support Moldova. Indeed, with the EU ETS in place since 2005 and several countries having joint the original members since its inception, there is ample international experience for Moldova to draw upon.

Appendix – Background Emission Trading

Reducing environmental pollution has been on the top of the international political agenda for some time. Indeed, the cost of polluting the environment in the shape of health costs reduced or damaged harvests and polluted water – to name only some examples – can be substantial. Additionally, a majority in the scientific community believes that some emissions, so-called greenhouse gases, pose a real threat of global warming with potentially enormous cost due to climate change.

If the costs to pollution are known why do households and companies seem to have little incentive to reduce this kind of damaging activity? Economists argue that consumers and business alike are not considering the full costs of environmental damage because of missing property rights for the environment. Indeed, the environment is a textbook example of a public good as no-one can "own" and, in turn, one cannot be excluded from using it.

Consider the example of energy production. While producers factor in the cost of producing energy – such as the costs of fuel, depreciation and capital cost of the power station – they do not consider the cost pollution incurs on the wider society. On the other hand, with no-one having a property right on the environment, there is no group that could claim compensation for the damages from pollution. As a result polluters and consumers do not account for the cost of environmental damage. With costs, and consequently prices, lower than they should be if environmental damage would be considered, more polluting activity is occurring than would be in the interest of society.

Market based vs. command and control instruments

With the cost of environmental pollution nevertheless very visible there are several policy options to reduce polluting activity to a sustainable level. Firstly, policy makers can prevent polluting activity by passing laws and regulations which directly control the extent of polluting activity – for example by requiring that facilities fulfil certain technical standards, passing regulations which restrict the amount of pollution and so on.

However, by reducing environmental pollution excessively the cost – for example low supply of energy and high prices – of doing so may outweigh the benefits of reduced environmental damage. Additionally, reducing pollution in one sector or company may be more expensive than in others. For governments and regulators it may be difficult to assess which are the cost effective ways to reduce pollution. A "one size fits it all" approach in the shape of emission standards may thus have comparatively high cost.

Therefore, a more market-based policy response maybe the desired option for policy makers. As the term suggests, instruments would try to interact in the market decision of consumers or companies in order to provide the incentives for reducing harmful polluting activity. One approach would be to create a market for emissions and thus overcoming the problem of missing property rights.

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