Kyoto Flexibility Mechanisms in an enlarged EU: will they make a difference?

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Abstract

Many indicators and market evidence suggest that there are still sizable potentials for cost-effective investments into energy efficiency in the eight post-communist new EU member states. However, as long as the governments of these countries still struggle with economic revival and huge budget deficits, it is unlikely that a generous amount of state funds will be directed towards tapping these potentials. Market-based instruments, therefore, offer an attractive alternative to deliver energy efficiency as opposed to hard-to-obtain subsidies.

A study commissioned by the European Parliament and executed by Central European University has examined, among others, the role and potential role of new economic instruments in promoting sustainable energy pathways in the new member states. The present paper explores the effect flexible mechanisms under the Kyoto Protocol may have on energy efficiency, fuel switch and the development of renewable energy sources in this region. These eight countries are chief candidates for hosting Joint Implementation projects and for participating in International Emission Trading schemes, which may assist the implementation and financing of energy efficiency, renewable energy, and fuel switching projects. The article reviews the potentials and barriers to Joint Implementation, and the conditions under which International Emission Trading can influence the energy use of the selling country. The research has also examined the different strategies the host countries chose to adopt towards the application of these instruments, and the impact of the strategies on short- and medium term energy sustainability. The paper concludes that the flexibility mechanisms may play a positive but rather limited role in the sustainable energy development of the region, and that due to the barriers to JI the emphasis may shift towards emission trading. If emission trading transactions are carried out through innovative mechanisms tied to sustainable development goals, it may play an important role in mobilising the energy efficiency potentials of these countries.

Introduction

The communist era left behind the most energy intensive economies in the region of Central and Eastern Europe (CEE). While a decade and a half of economic, political and social restructuring and the transition to the market economy has removed many of the socialist legacies (Urge-Vorsatz et al. 2003a) contributing to the high energy intensities, and joining the European Union has aligned economic and energy policies with those of some of the most developed and efficient economies of the world, the energy intensity gap between East and West in Europe has not closed yet (Urge-Vorsatz et al. 2003b, forthcoming; Froggatt and Canzi 2004). While many of the very low hanging fruits have been harvested, many studies and flourishing energy efficiency businesses in some CEE countries demonstrate that there are still significant cost-effective energy-efficiency potentials in this region waiting to be captured. Due to the heavy social burden of energy bills resulting from the removed subsidies, soaring fuel poverty, compromised economic efficiency, combined with high energy dependence, energy efficiency improvement in CEE results perhaps in relatively even more important social and economic gains than in old EU member states[1]. Therefore, tapping into the remaining cost-effective energy efficiency potentials represent win-win opportunities, and should hence be high on political agendas.

It is also important, however, to recognise that the majority of these countries suffer from serious budget deficits[2], and generally lack the rich financial resources that would be ideal to support energy efficiency policy instruments. In addition, taxes are typically already among the highest in Europe, and energy prices have been raised to such an extent that modest tariff increases represent one of the most important promises in election campaigns. It is unlikely, therefore, than any of the New EU Member States or other countries in CEE would allocate generous amount of funds or introduce new earmarked fees on top of energy prices to and widely subsidise efficiency improvements or support policy instruments in the short-term.

As a result, innovative policy instruments and financing, and market-based solutions to capture the remaining of cost-effective efficiency potentials are fundamental in Central and Eastern European countries, even more so than in the old market economies. One of the opportunities for financing energy-efficiency (EE) and renewable energy projects in the region which has raised high hopes at the turn of the millennium is Joint Implementation (JI). The JI mechanism of the Kyoto Protocol (KP) was expected to bring external financing, expertise and know-how to EE investments, and, even more importantly, new motivations and initiatives to identify and projects with favourable financial returns and large carbon dioxide (CO_2) saving potentials, along with expertise and a mutually beneficial goal to overcome administrative and other barriers to implementation. The International Emission Trading (IET) instrument of the KP, as originally envisaged, was another opportunity which had the potential to leverage improvements in energy efficiency or foster renewable energy investments.

So, will the Kyoto flexible mechanisms deliver their promise? How much energy efficiency can they supply? Will they be able to capture a large share of the remaining cost-effective potentials housed in the New Member States and shake up the energy-efficiency market? Will they bring significant foreign investment into the industry of these countries? Does EU enlargement influence this promise? What role will IET play in this respect?

This paper examines these questions. The research on this subject was conducted under the framework of a project commissioned by the European Parliament titled "The impact of structural changes in the energy sector of CEE countries on the creation of a sustainable energy path. Special focus on investment in environmentally friendly energy and the impact of such a sustainable energy path on employment and access conditions for low income consumers". This paper aims to explore the effect flexible mechanisms under the KP may have on energy efficiency, fuel switch and development of renewable energy sources (RES) in the 8 post-communist New EU Member States[3] (NEU-8), and what impact EU enlargement has had on the scope of these instruments. All the 8 countries subject to this study are Annex I countries that ratified the KP. These countries are the chief candidates for hosting Joint Implementation (JI) projects and for participating in IET schemes, which can promote the implementation of energy efficiency, renewable energy, and fuel switching projects. This work reviews the potentials and barriers of JI, and the conditions under which IET can influence the energy use of the selling country. Since the European Emission Trading Scheme (ETS) and its implications have been widely studied, the present research covered the ETS only to the extent it influences the possibilities for JI projects. JI is still at a very early stage and the EU emissions trading scheme is entering into force in 2005, thus the evaluation of their future impact is difficult. Nonetheless, this study suggests that the flexibility mechanisms may play a positive but rather limited role in the sustainable energy development of the region, and while EU enlargement does narrow the scope for these instruments, there are other factors having a more determining impact on what role the flexible mechanisms will play.

STRUCTURE OF THE PAPER

The impact JI and IET will play in the CEE region is influenced by several factors, internal and external to the countries. To answer questions stated above, the paper is structured in four chapters. Firstly, to indicate the overall potentials for the flexibility mechanisms, it provides an overview of carbon emission trajectories and carbon and energy intensities in the region in an international comparison, and in relation to the Kyoto commitments of these countries. The second chapter examines the scope for cost-effective JI projects resulting from the number and extent of cost-effective[4] opportunities in energy-efficiency, renewable energy and fuel switch projects[5]. The paper examines the potentials in these three areas determined by researchers and the business community. The third section is devoted to the analysis of opportunities and barriers for JI projects implementation. The paper found out that the realisation of the JI potential described in these sections largely depends on institutional capacity, investment climate and business environment, international, EU and national policies influencing baselines and additionality. This examination is based on the review of AIJ experiences, present activities, reviews country rankings and policy analysis including the implication of EU accession, the introduction of the Linking Directive, and the influence of track-1 and 2[6] JI. After concluding that JI has a positive, but limited role to play in the

1. Old EU Member States refer to countries, which were members of the European Union in April 2004, before the last enlargement of the Union.
2. For a half of the New EU Member States the target of decreasing their public sector deficits below 3% of GDP seems to be remote. Only Estonia succeeded to have budget profit in 2004 of +1.2% of GDP; all other countries in focus experienced significant budget deficits (in % of GDP): Hungary (- 5.1), Poland (-5.7), Czech Republic 5.4%), Slovakia (-3.8%), Slovenia (-1.4%), Latvia (-1.7%) and Lithuania (-1.3%) (European Forecasting Network 2004).
3. This paper examines the 8 post-communist New Member States, which joined the EU May 1, 2004: Estonia, Latvia, Lithuania, Poland, Slovakia, Czech Republic, Slovakia, Hungary and Slovenia. These countries are sometimes abbreviated as NEU-8 (New EU Member States).
4. Cost-effective here includes the extra revenues resulting from carbon finance.
5. The study did not cover afforestation and other sequestration opportunities.

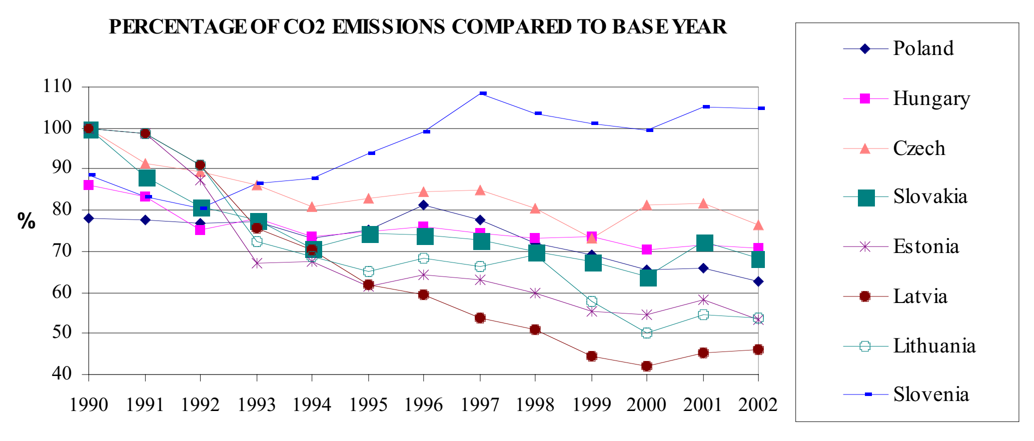

Figure 1. *CO_2 emissions of the eight accession countries between 1990 and 2002 compared to the base year. Base year 1990, except for Hungary (1985-1987), Poland (1988) and Slovenia (1986)*
Source of data: IEA 2002c, 2003c, 2004a.

region, we examine if IET can facilitate the capturing of energy efficiency or renewable energy potentials. We highlight Green Investment Schemes as a promising architecture to utilise "hot air" or other emission surpluses for sustainable (energy) development, and provide an example of the World Bank's activities in Bulgaria.

Overall potentials for flexible mechanisms in NEU-8

This section explores the overall potential for the Kyoto Mechanisms in the New EU Member States from both supply and demand sides and shows that most of these countries have considerable surpluses of CO_2 emissions to be captured. This conclusion is made on the basis of the comparison of the recent trends and projections constructed for CO_2 emissions and the Kyoto caps for this gas in countries in focus.

First of all, overall potentials for Emission Trading and Joint Implementation are signalled by the carbon indicators of the countries. Dynamics of the CO_2 emission growth for NEU-8 presented in Figure 1 shows a drop of CO_2 emissions in the early 1990s in all these countries mainly due the economic recession. The highest decline of more than 40% was observed in the Baltic Republics of the Former Soviet Union due to the structure switch of GDP: the service sector partially replaced declining industrial processes and agriculture. The Visegrad countries (Poland, Czeck Republic, Slovakia and Hungary) had almost stabilized their CO_2 emissions already from 1999 and by 2002 had decreased them by about 30% in comparison with their base years. The only exception from the common dynamics already from 1992 has been Slovenia's tendency for the CO_2 rise that has already led to the exceeding of the threshold of the Kyoto limits in 1996.

As a result of these emission plunges due to the recession, GHG emissions dropped well below Kyoto targets during the 1990s, and in several countries they may not grow back to exceed the target levels. Table 1 demonstrates that the fulfillment of the Kyoto Protocol will not cause major difficulties for six of the eight New EU Member States, however, it may create some difficulties for the rest namely Slovenia and Lithuania. According to the third National Communications of Poland (Polish UNFCCC Executive Bureau 2001), Estonia (Ministry of Environment of Estonia 2001) and Latvia (Ministry of Environmental Protection and Regional Development 2001), GHG emissions of these countries even in the case of emissions dynamics following high scenarios will not exceed the limit levels during 2008-2012. The forecast completed for Hungary (Systemexpert 2002), Slovakia (Ministry of Environment of the Republic of Slovakia 2002) and the Czech Republic (Econoler 2003) shows that overall emissions will not exceed the target value by 2010 if preventing measures are realised. Slovenia already exceeded its 1986 baseline emission levels in 1996 (Ministry of Environment, Spatial Planning and Energy of Slovenia 2002) and Lithuania, following the substitution of its Ignalina nuclear plant providing over 80% of total electricity by other sources, may also face challenges in meeting its commitment (Maly et al. 2002 and Point Carbon 2004b).

According to World Bank (2004) estimates, by 2012, the total demand for GHG emission reductions from Annex I countries will be about 1 billion tCO_2 eq per year, and there will be clearly a high interest in the flexible mechanisms also in the CEE region. CO_2 emissions surplus for at least six New Member States provides an opportunity to participate in IET as sellers. The potential for JI activities is measured by the ability to reduce GHG emissions due to related policies and measures. Their overall impact on the energy sectors depends on the number and the total emission reductions of the projects, which, as described above, are a function of the emission reduction potentials, options for low cost mitigations, and institutional capacities and investment climate. In the following sections, we provide a brief insight into most of these issues.

6. There are two possible procedures for carrying out a JI project: "track one" may be applied when the Annex I Party hosting the project fully meets all the eligibility requirements to participate in the mechanism. In this situation, the host Party may apply its own national rules and procedures to the selection of JI projects and the estimation of emission reductions from them. "Track two" must be applied if the host Party does not meet all eligibility requirements. In such cases, the project and the quantity of emission reduction units it generates must be verified under rules and procedures supervised by the Article 6 Supervisory Committee.

Table 1. CO_2 emissions* in 2002 and its projection for 2010 compared to the Kyoto target.**

Country	Change from base year** to 2002 (%)	2010 projections: Difference to target
Poland	-37.3%	-7% to –20%
Hungary	-29.4%	-2.5%
Czech Republic	-23.6%	-1% to – 6%
Slovakia	-31.7%	+0.4% to - 3%
Estonia	-46.8%	- 50%
Latvia	-53.9%	- 36%
Lithuania	-46.4%	+23% to -10%
Slovenia	+4.6%	+10% to – 14%

Sources of data: Change from the base year was calculated from data from IEA 2004. Projections adapted from Armenteros and Michaelowa (2002) and Ministry of Environment, Spatial Planning and Energy of the Republic Slovenia (2002).

** CO_2, CH_4, N_2O, in tCO_2 eq, excluding land use change and forestry.*

*** Base years other than 1990: Hungary (average of 1985-1987); Poland (1988); and Slovenia (1986).*

Opportunities for JI in NEU-8

POTENTIAL AND SCOPE

In this section, we discuss the opportunities to reduce CO_2 emissions resulting in the ability of the countries to participate in JI projects and theoretical barriers preventing this project realisation.

Although CO_2 emissions for most of the New EU Members heavily declined in the 1990s as shown above, indicators of CO_2 intensities for some of these countries are still high in comparison with those of the EU-15 countries. Figure 2 illustrates the wide distribution of CO_2 intensities of GDP and total primary energy supply (TPES) of the NEU-8. Measured in exchange rates, CO_2 intensities of GDP of these countries exceeded those of EU-15 by 2.7-10.6 times. Calculated at purchasing power parities (PPP) rates, CO_2 intensities of GDP still remain significantly higher in all countries but the Czech Republic and Hungary.

According to Bertoldi et al. (2004) CO_2 emission reductions can be captured mainly by actions directed at the end-use energy efficiency improvement and, in most cases, such reductions can be reached at negative or low costs. For example, estimates of the World Bank in 1998 (Michaelowa and Armenteros 2003) showed the triple digit USD/tCO_2 range of the marginal abatement costs in EU-15 countries in contrast with single or double digit range of these costs in NEU-8. High economic potential of such reductions, for example, in Poland, the Czech Republic and Slovakia is estimated about 20% (Urge-Vorsatz et al. 2003b). Thus this is one of the main rationales for investments into JI projects: for EU-15 and other high-income OECD countries GHG mitigation opportunities at affordable costs are much more abundant in transition economies than domestically.

Large GHG reduction potential is also provided by abundant and diverse renewable energy sources if they replace fossil generation. However, this potential has relatively high costs to capture and significant barriers for introduction and application. For example, one such barrier is the question of additionality[7]. NEU-8 have adopted very ambitious targets under the EU Renewable Electricity Directive, and thus a large number of renewable energy projects, measures, policies and initiatives should take place due to the effort to meet these targets even in the absence of JI. However, since it is difficult to show which project would or would not have taken place merely as a result of the RES Directive, this may remain a theoretical barrier rather than a real one.

OPTIONS FOR LOW COST CO_2 MITIGATION PROJECTS

Above we have demonstrated that the high energy and carbon intensities indicate high capacity for energy efficiency and fuel switch projects in the region. This section reviews the fields of projects having good JI prospects and their relative costs.

According to World Bank (WB) estimates (Maly et al. 2002), JI projects can be acceptable by the market if their unit GHG emission reduction costs are do not exceed \$20-26 /tCO_2 eq. Further, we will use this number to compare GHG mitigation costs of different projects. As it can be seen from the brief review of economically feasible emission reductions resulting from different measures in New EU Member States presented in Table 2 below, the best results belong to the fields of:

1. Energy efficiency measures in buildings and industry;

2. Renewable sources applications especially:

- Biomass for electricity and heat,
- *Landfill* gas recovery;

3. Fuel *switch*;

4. Realisation of Combined Heating and Power generation (CHP) / District Heating (DH) from the supply side.

7. For JI projects, emission reduction should be granted to those projects only that are additional. The determination of the baseline and the additionality of a project are highly complex tasks (Probase 2002). However, these are the most critical factors that determine the eligibility of a project and the strictness in applying their rules influences the magnitude of the impact of JI on the energy sector.

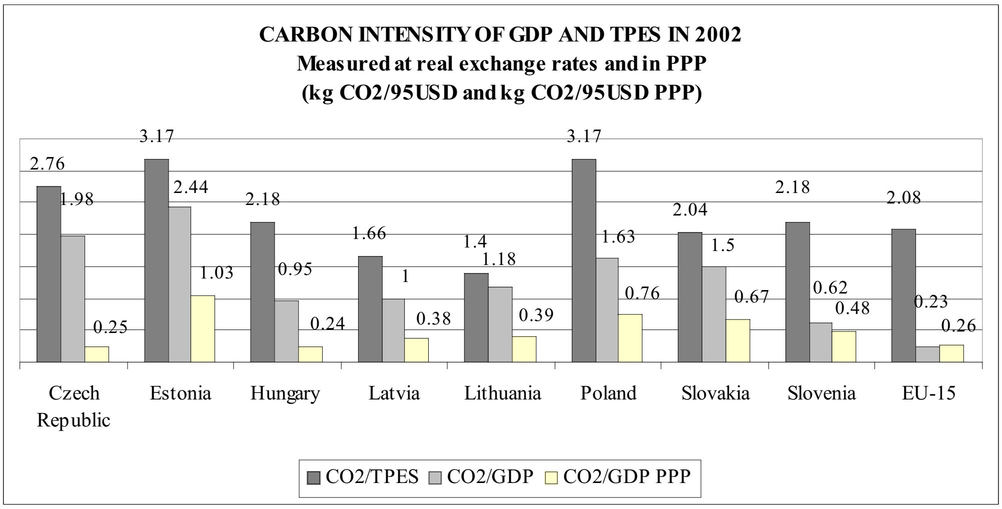

Figure 2. *Carbon Intensity of TPES and GDP in 2002, measured both at real exchange rates and in PPP (kg CO_2 /95$ and kg CO_2/95$). Source: IEA 2004a.*

Table 2. Economically feasible reduction emissions due to different measures in NEU-8.

Country	Economically feasible reduction emission
Poland	Poland has a strong potential for application of energy efficiency measures as well as renewable technologies and fuel switch. Introduction of AIJ projects showed that the reduction cost varied from 1 USD (use of biomass for power generation), to $4,6 – 64,2 (coal-to-gas conversion) to $26 and $130 (thermo-modernisation and energy conservation) per tCO_2 eq reduced (Maly et al.2002). Comparing these costs with WB threshold, one may find the projects of fuel switch as especially attractive.
Estonia	Estonia has probed AIJ projects directed to fuel switch from fossil fuels to the local bio-ones at heat producing plants; DH improvement through reduction of heat losses and end-use energy efficiency in buildings. The average cost of CO_2 emission reductions was positive (20 Euro / tCO_2 excluding transaction costs of 5.3 Euro/tCO_2) and almost reached the economically feasible threshold stated by WB (Maly et al. 2002a). Estonia has a large potential for low cost fuel switch as it rely heavily on high-carbon fuels: combustion of shale oil provides 98% of commercial electricity and 25% of heat (Point Carbon 2004a).
Slovakia	Estimates completed for Slovakia found the following projects at negative or very low abatement costs: biomass in district and space heating, biomass in industrial energy, solar heating, combined cycle in public combined heating and power (Maly et al. 2002).
Slovenia	Slovenia estimated an about 20% cost effective energy savings potential in industry and about 30% economic energy savings potential in the buildings sector. However, these projects require considerable investments. Having abundant biomass and hydro potential Slovenia is going to exploit the rest of non-utilised biomass (about 30% of the total technical potential) and hydro resources (about 60% of the technical potential) (Maly et al. 2002).
The Czech Republic	Czech experts estimated the large potential of CO_2 emission reduction with marginal abatement costs up to $30/$tCO_2$ in following sectors: production and distribution of power and heat, landfill gas recovery, utilization of renewable energy sources, energy savings in public and residential buildings, forestation and forest management, power and heat sector (Maly et al. 2002).
Hungary	The largest potential of GHG emission reductions belongs to the residential sector. The most economically feasible is the application of CHP and district heating in this sector having high potential and medium amendment costs (Maly et al. 2002).
Lithuania	There is a high energy conservation potential in modernisation of heat supply and use in buildings. The largest energy and GHG mitigation potential can be achieved by improvement of the thermal insulation of buildings (it can save about 45% of energy consumption in the housing sector). Another possibility for emission reductions is CHP infrastructure modernisation through fuel switch in Power Plant Facilities (Maly et al. 2002).
Latvia	Technical potential is feasible in the majority of DH systems constructed in 1960 - 1990. The measures can be directed to improvement of centralised district substations and heating schemes having the largest heat loses of 25-50% depending on the season. Large potential is also seen in building insulation (Maly et al. 2002).

ENERGY EFFICIENCY MEASURES

As can be seen from Table 2, demand-side energy efficiency (DSEE) measures should enjoy top attention in the climate policy of most countries. The highest energy efficiency potentials are concentrated in residential and commercial buildings and are the smallest in industrial processes. Since the largest energy consumption in dwellings is for space heating (71%), following hot water production (17%), and various kinds of appliances (12%) (data are given for the Czech Republic according to Econoler 2003), energy efficiency measures considered for JI, first of all, should be directed to the heating sector. This covers energy saving and energy efficiency measures related to local and central heating systems. It includes more efficient boilers and fuel switch, for example, from coal to natural gas, from natural gas to biomass, control systems in space and water-heating systems, the reduction of losses in heat distribution through thermal insulation of steam and hot water piping, and thermal insulation of buildings (Econoler 2003). Similarly to the residential and commercial sectors, typical measures can be

Table 3. Inventory of AIJ projects in CEE countries.

	Energy efficiency DH	Energy efficiency other	Forest preservation	Fuel switch	Renewable Boiler Conversion	Renewable other	Total number of AIJ
Hungary	0	2	0	2	0	0	4
Poland	0	2	0	1	0	0	3
Czech Republic	0	1	1	2	0	0	4
Slovakia	0	1	0	2	1	0	4
Latvia	5	6	0	1	12	1	25
Estonia	8	6	0	0	7	0	21
Lithuania	1	1	0	0	7	0	9
Slovenia	0	0	0	0	0	0	0
Total	14	19	1	8	27	1	70

Source: Evans 2001, UNFCCC 2002.

also identified in the industrial buildings: reduction of heat losses in industrial buildings through roof, wall, floor insulation and replacement of windows (Econoler 2003).

RENEWABLE ENERGY

The renewable potential in NEU-8 is very diverse. According to Black and Veatch (2003) in all these countries biomass is the most abundant and promising source. Wind and solar energy can be produced in the Czech Republic under attractive feed-in tariffs. The wind energy potential in the Baltic States and Poland is very good due to the geographical position of these countries on the coastal regions. Hydro energy appears one of the best opportunities for Slovakia and Slovenia. Geothermal sources can be used in Hungary and Slovakia, having less economic potential, however, than other sources such as wind and biomass. In the Czech Republic, for example, reduction cost related to biomass projects varied from \$2 to 8.6 / tCO_2 in comparison with hydro energy of \$9-11 / tCO_2, wind energy with \$21-34 / tCO_2 and solar and geothermal energy options with more than \$30 / tCO_2 costs (Econoler 2003). The abundant opportunities for renewables can be clearly seen from Table 2, mainly in biomass. Boiler conversion to biomass may be one of the most cost efficient options. This finding supported by the pilot phase of Activities Implemented Jointly (AIJ) is presented in Table 3: 27 out of the 70 registered projects were oriented to boiler conversion to biomass (Evans 2001, UNFCCC 2002).

FUEL SWITCH AND CHP/DH

The most effective measures of the energy efficiency improvement in district heat (DH) generation and distribution are the application of efficient boilers and fuel switch, reduction of losses in heat distribution, combined heat and power generation (CHP) and the introduction of highly efficient heaters (Econoler 2003). The fuel switch and application of more efficient boilers include replacement of existing coal fired boilers by more efficient ones. As already described above, the lowest costs can be found in switch from coal fired to biomass-fired boilers for space and water heating in residential and commercial sectors. This option is the best applicable in Poland, the Czech Republic and Slovakia, where coal is the main fuel for DH/CHP (Alakangas and Lensu 2004).

Natural gas is the main fuel for DH and CHP, in countries such as Hungary, Lithuania and Slovenia. Despite these countries have some biomass-fired plants and CHP installations at industrial plants, their capacities are far from their technical and economic potential (Alakangas and Lensu 2004). The development of DH/CHP and fuel switch in these technologies can be expanded; however, a number of barriers hinder this process. Beyond some general constrains discussed later in this paper, each country has also its country specific restrictive influence. In Hungary, for example, the process of renewable sources application and fuel switch is slowed by the tax on forest maintenance when burning woody biomass, and the lack of support for energy-forest plantations (Alakangas and Lensu 2004).

Assessment of JI: barriers and opportunities

EXPERIENCES FROM THE AIJ PHASE

Experience gained from the early actions on the pilot phase before 2008 when emission reductions from JI projects can be first accrued, revealed a number of challenges. Despite the relatively high success of AIJ projects in Eastern Europe playing an active role during the probation period and the great potential for DSEE, it is unlikely that many of such JI projects will be conceived (Evans 2001). According to analyses of 70 AIJ projects (Evans 2001, UNFCCC 2002) from the energy sector in countries in transition although DSEE projects are usually cost-effective by themselves, high transaction costs, the disconnection between end users energy savings and the emissions associated with energy production, along with the difficulties to tap benefits of energy savings by external investors hinder its implementation as a JI project. Below, we discuss each of these barriers in more details.

The largest barrier to the implementation of JI projects is the high transaction costs. This cost fragment in the total cost as per unit CO_2 reduced is decreasing with increasing scale of projects. Table 4 shows this effect on projects of different sizes. Taking into account the threshold for economically feasible projects mentioned above, Michelowa et al. (2004) conclude that projects below 2000 certified emission reduction units are not attractive without any additional incentives to invest (for example, subsidies). This factor hinders the implementation of small-scale projects, which are actually the most frequent. Evans (2001) proposed the way to overcome partially this challenge by the bundling of projects where possible. This would reduce the high trans-

Table 4. Project size, type and indicative specific transaction costs.

Size	Type	Certified Emission Reduction (tCO_2 /year)	Transaction costs in Euro/tCO_2
Very large	Large hydro, gas power plants, large combined heat-power (CHP) plants, geothermal, landfill/pipeline methane capture, cement plant efficiency, large-scale afforestation	>2000,000	0.1
Large	Wind power, solar thermal, energy efficiency in large industry	20,000-200,000	1
Small	Boiler conversion, demand side management, small hydro	2,000-20,000	10
Mini	Energy efficiency in housing and small and medium enterprises, mini hydro	200-2,000	100
Micro	Photovoltaics	<200	1000

Source: Michaelowa et.al 2004.

action cost per unit GHG mitigated and, therefore, make the bunch of projects more economically feasible.

The second problem, as mentioned above, is the disconnection between end-user energy savings and the emission reductions associated with energy production due to the implementation of the project. This problem did not influence much the projects implemented during the pilot phase, however, is expected to be very topical after the stage of JI begins.

There are two additional important challenges which investors have to take into account having intention to implement JI projects. Firstly, there is a shortage of the time for these projects to become operational . The project development has a time lag of 3-7 years for institutional procedures and construction, so for a project to contribute its CO_2 emission reductions in 2008-2012, the time to start procedures is no later than 2006. The second factor is connected with project financing. Being investment projects themselves, these projects require involvement of financial institutions, which however, usually have a minimum of $100-200 Million threshold before to start the consideration of project financing. This is too high for the small projects currently typical on the carbon market (Lecocq 2004). The bundling of JI projects may be seen a solution for this barrier as well.

A case study of the Czech Republic (Econoler 2003) showed that a country may face also a number of country specific difficulties during the AIJ Pilot Stage. Among these were insufficiently transparent criteria and complicated procedures of planning and implementation of AIJ projects, leading to controversies, for example, in the additionality identification or sharing the emission reduction credits (Econoler 2003). Such controversies led to generally negative perception of JI and mistrust between the Czech Government and shareholders and finally resulted in high transaction costs.

Thus, the AIJ phase showed that there are large opportunities in low cost DSEE projects. However, due to the difficult administrative procedures with track-2 JI, the transaction costs are too high for small projects. The possibility that these costs may exceed the revenues from the investment, and the difficulty to satisfy conditions of additionality discourages potential investors from the JI market. Moreover, the AIJ phase pointed to the importance of having a single unit responsible for the solicitation and approval of projects that helps avoid controversy among ministries. Such confusion has already taken place in Eastern Europe and led to the increase of transaction costs for developers (Michaelowa et al. 2004).

In summary, one of the key concerns about JI arising from the AIJ phase is the issue of transaction costs for small projects. Typically, larger scale project opportunities with lower unit transaction costs have already been exploited. Most DSEE and renewable projects can be classified into the small scale category, therefore the key question to the success of Track-2 JI is whether project bundling can work. There are a few present initiatives where several projects are gathered under one[8]. On the other hand, some private sector participants are sceptical about project bundling at the corporate level (Langlois, pers. comm.), since administrative procedures for the individual projects may take so long that harmonization of them into one JI initiative is difficult.

THE IMPACT OF EU ENLARGEMENT ON JI POTENTIALS

On the one hand, with EU accession and the enforcement of the environmental standards of the Acquis, the scope for JI activities is inevitably reduced in accession countries and New Member States. Project baselines and eligibility are more stringent thus feasibility is decreased, as part of the abatement will be mandatory. However, the extent of this reduction will differ depending on transitional arrangements: a country's emission baseline decreases when environmental standards become obligatory (Probase 2002). Other factors influencing the scope of this reduction is the strictness of the best available technology determination (Armenteros and Michaelowa 2002b), early actions (Gaast 2001) and eligibility for Track-1 JI. For instance, Nondek and colleagues (2001) have calculated that the true JI potential of the Czech Republic in 2010 taking into account accession will be only about 4% of the “technical” potential that they estimated from emission reduction measures adopted between 1995-2000 in the Czech Republic.

8. For instance, in 2001-2004 Czech Republic implemented the JI project consisting of a portfolio of 9 biomass projects (replacement old combustion technologies and fuel switch) under the contract with SenterNovem (information from the official site of Senter International consulted in January 2005).

Table 5. Ranking country potentials for short and medium term JI.

Rank	Overall, beginning 2003	Overall, beginning 2004
1	Romania	Romania, the Czech Republic, Slovakia
2	Slovakia	Bulgaria
3	Czeck Republic	Poland
4	Poland	Hungary
5	Hungary	Russia
6	Bulgaria	Ukraine
7	Russia	Estonia
8	Estonia	Latvia
9	Ukraine	Lithuania
10	Latvia	Croatia
11	Lithuania	Slovenia
Source	Point Carbon and Vertis Environment Update, 2003, 2004	

On the other hand, the "Linking" Directive connecting JI and ET mechanisms has opened new opportunities for JI. Allowing approval of JI projects, leading to emission reductions covered by the EU ETS, the Linking Directive partially provides the indirect displacement of tradable emissions with JI emission reductions (Camilla Taylor of Vertis Finance Point Carbon 2004c). This is exemplified by the fact that JI country ranking have changed after the publication of the Linking Directive. Based on the cumulated experience of AIJ and JI, JI-related organizational apparatus and the stability and transparency of investment climate and CO_2 mitigation potentials, Point Carbon and Vertis constructed the country ranking of attractiviness for JI investments. The JI host country rankings that were published before the Directive took into account that the JI potential in the New Member States had become smaller, and thus the previously first league Visegrad countries were overtaken by Romania as the most promising supplier of ERUs (Point Carbon 2004c). After the Linking Directive, Romania and the Czech Republic have climbed up to the first place sharing it with Romania in the rankings (Table 5).

ON-GOING AND PLANNED JI ACTIVITIES

This chapter explores the current and planned JI activities and constrains preventing their expansion on the carbon market. At the moment, only few buyers are active in Central and Eastern Europe, mainly the Prototype Carbon Fund (PCF) of the World Bank and the Government of the Netherlands, and only a few JI projects have been fully approved. There is a lack of reliable and comprehensive information on on-going and accepted projects. Below, we summarize some of the available information on JI activities and provide the list of JI projects in Table 6.

The Netherlands is probably the most active on the JI market contracting projects through emission reduction procurement tenders (ERUPT). The ERUPT programme is carried out by SenterNovem and the investors from Central and Eastern Europe can benefit from this procurement programme under JI. Through ERUPT SenterNovem buys carbon credits from investments into renewable energy, energy efficiency, fuel switch, afforestation/reforestation and waste management. During the five ERUPT phases, the Government of the Netherlands has contracted more than eight million tons of CO_2 reductions from projects in CEE.

PCF is a Private-Public Partnership, whose stated aim is to pioneer the market for project-based GHG emission reductions within the framework of the Protocol and to contribute to sustainable development. This Fund pilots the production of emission reductions through the project-based mechanisms. It invests contributions by companies and governments in projects designed to produce emission reductions fully consistent with the Protocol. Contributors, or "Participants" in the PCF, will receive a share of the emission reductions, verified and certified in accordance with agreements reached with the respective countries "hosting" the projects.

Two other countries active on the JI market in CEE are Denmark and Austria. As of May 2004, the Danish Environmental Protection Agency (DEPA) has signed memoranda of understanding with Bulgaria, Estonia, Latvia, Moldova, Romania, Slovakia and Ukraine and it is in the process with the Czech Republic, Hungary, Kazakhstan, Russia, and Poland. During the first call, twenty-one Expressions of Interest for JI projects from nine Host Countries were submitted by Austrian investors, among them two with the Czech Republic, one with Estonia, three with Hungary, one with Poland, one with Slovakia (Austrian JI/CDM Programme 2004).

Thus, the number of participating buyers in NEU-8 is limited to the representatives from four countries. Most of JI projects are on the stage of negotiations, planning, or validation. On the other hand, as concluded above, JI activities are limited because of a number of barriers, such as the particularly complicated administrative procedures and consequently high transaction costs, and the track-1 JI project requirements are hard and expensive to comply. From the other side, track-2 JI is likely to be substituted by either project-based emission trading, which is discussed in details in the next section, or other, more flexible approaches allowed by Emission Trading. Thus, Michaelowa et al. (2004) envisage that the share of the world annual demand for emission reductions captured by JI activities in 2008-2012 will be only 3%. The compliance gap of 64% of the world annual demand for emission reductions or about 700 Million tCO_2 annually in 2008-2012 period will need to be covered by IET (Streck 2004). The WB (2004) projection for the highest activities on the carbon market connected with IET in the nearest future is likely to hold for the CEE region as well.

This effect is strengthened by the fact that some countries in CEE, such as Slovakia, actually give priority to IET over JI (Point Carbon and Vertis Finance Ltd. 2003). Unless

Table 6. On-going and planned JI activities in CEE region.

	The Netherlands, SenterNovem	World Bank, PCF	Denmark, DEPA
Bulgaria	Two fuel switch and one cogeneration projects/ contracted (SenterNovem 2005).	Two projects on biomass and district heating rehabilitation/ on-going projects (Prototype Carbon Fund/ 2004[1)]	
Poland	A project on landfill gas utilization / on the validation stage (SGS 2004[2)].		A project on utilisation of wood-chips for heating/ on-going (The official site of Polish Ministry of Environment).
The Czech Republic	A biomass portfolio/ contracted (SenterNovem 2005). A biomass project /on validation stage (SGS 2004).	A project on energy efficiency and renewables development/ on-going projects (Prototype Carbon Fund 2004)	
Estonia	A wind project (SenterNovem 2005). A project on fuel switch from coal to biomass/ on the validation (SGS 2004).		One project on wind farm construction (Bendtsen 2004).
Hungary	One project on biomass for heat and power, one on landfill gas utilisation and one on fuel switch from coal to biomass (SGS 2004).	A fuel switch from coal to biomass project/ on-going projects (Prototype Carbon Fund 2004)	One project on fuel switch from coal to biomass at power plant (SGS 2004).
Slovakia	A landfill gas recovery project (SenterNovem 2004).		A geothermal project/ on the validation stage (SGS 2004).
Romania	Two hydropower projects and one in the cement industry (SenterNovem 2004).	A afforestation project/ on-going projects (Prototype Carbon Fund 2004).	Five projects on biomass firing in boilers and one geothermal project (Bendtsen 2004).
Latvia		A waste management and methane capture project/ on-going projects (Prototype Carbon Fund 2004)	

[1] Here and further with this reference: as of January 2005.
[2] Here and further with this reference: as of September 2004.

the transfer of AAUs[9] under Article 17 is tied to some criteria corresponding to the goals of the Kyoto, policies prioritizing IET over JI weaken the environmental integrity of the Protocol and, more importantly for the topic of this paper, fail to deliver energy efficiency or other carbon mitigation in CEE, which is a significant lost opportunity to bring investments into this area.

Potentials for sustainable energy promotions through emissions trading

This section examines whether the other Kyoto flexible mechanism[10], international emission trading, can promote sustainable energy developments in CEE. In theory, the trading of AAUs should facilitate more cost-effective global compliance with the planet's GHG reduction target. When marginal abatement costs are high in a particular country, it has an opportunity to purchase AAUs from another country where the saving of these AAUs are associated with lower marginal costs. Thus, when emission trading works as originally aimed, the host country receives carbon financing for GHG mitigation efforts, making more sustainable energy projects financially viable.

In theory, CEE countries should be prime candidates for selling AAUs resulting from GHG abatement activities due to the low marginal project costs, described above. However, as already shown, after the economic recession and decline in CO_2 emissions, many of the countries are likely to have surplus emission "allowances"[11]. Therefore, when AAUs are sold by a CEE country, they will most probably not be the result of additional emission reduction efforts, but rather the selling of these surplus AAUs[12]. Therefore, it is unlikely that international emission trading will directly foster sustainable energy developments in CEE, unless revenues from IET[13] are earmarked for such a purpose.

Streck (2004) estimated that about 650 Million tons of emission credits worth of surplus AAUs of economies in transition (excluding Russia) will be needed to close the compliance gap taking into account available JI and CDM credits. Thus, it is probable that emission trading for the surplus AAUs will pick up speed in CEE as the end of the first commitment period approaches. However, the population of many AAU buying countries may not find it acceptable to

9. Under emissions trading, an Annex I Party may transfer some of the emissions under its assigned amount, known as assigned amount units (AAUs), to another Annex I Party that finds it relatively more difficult to meet its emissions target.
10. None of the NEU-8 countries are eligible as hosts to receive Clean Development Mechanism (CDM) projects.
11. It is wrong to consider the national Kyoto targets as emission rights, therefore the usage of the concept "allowances" is also flawed.
12. Often referred to as "hot air".
13. By international emission trading (IET) we refer to the transfer of AAUs (or ERUs, RMUs or CRUs) under Article 17 of the KP.

meet the country's Kyoto targets through the purchase of "hot air", i.e. no real emission reduction, and therefore undermining the integrity of the KP. There are a few options to address these concerns, of which we describe two in this paper.

First, ET can support sustainable energy development through the targeted investment of the revenues from ET into the development of renewables and energy efficiency (Evans 2001). However, this road may bring its risks under conditions of budget shortages and compromised public fiscal discipline in CEE countries. Additionally, despite the advantage of the institutional requirements for use of AAUs as the targeted investment, they may bind some emission trading potential (WB 2004). Along the same lines, if emission trading is tied to concrete projects, the surplus AAUs will generate real emission reductions. This project-based emission trading, in essence, is not markedly different from Track-1 JI. The flexibilities offered by this alternative may make this option more alternative for investors and hosts than JI tied with high transaction costs due to institutional barriers and the small scale.

Second, Green Investment Schemes (GIS) can serve as a solution to providing ear-marking funds generated from the sale of emission allowances and provide more flexible mechanism for institutional requirements (monitoring, reporting, and others). GIS is a long-term financing facility providing the transfer of AAUs supported by emission reduction activities (Blyth and Baron 2003). Thus such schemes are similar to JI, but, they are more flexible. For example, it can support activities with time frames wider than the 2008-2012 period and accept projects with CO_2 emission reduction more difficult to verify than that of JI projects requiring compliance with additionality (WB 2004). Being a result of policies and investments directed to emission reductions ("greening"), AAU sales based on GIS contribute to the sustainable energy development and are more palatable with public opinion. The realization of GIS will tap additional financial sources, leverage private financing and their funds can be used to support the seller's co-financing obligations in official borrowing (WB 2004). Despite this, such "greening" can be "neutral" resulting in emission reductions difficult to measure or demonstrate (such as educational campaigns or R&D spendings) (WB 2004)[14]. The feasibility of GIS is currently being explored in CEE. Among others, the WB is continuing discussions with the Government Bulgaria.

In sum, on the one hand, plain IET of surplus AAUs in CEE can not only undermine the environmental integrity of the KP and may not contribute to the development of energy-efficiency, fuel switch or renewables directly in the region. On the other hand, there are several mechanisms through which IET can be turned into a useful and flexible instrument, which can bring substantial benefits to the CEE region in the field of sustainable energy. Since IET is expected to be the main player on the global carbon market in the longer run and we have shown that it will probably play an important role also in several NEU-8 countries, the role IET will play in the CEE region for promoting sustainable energy developments will depend on the actual mechanism through which IET is applied. These mechanisms can open new opportunities to tap additional financing sources for "green" (emission reduction) activities, and are more flexible and efficient in comparison with JI, thus they may replace JI in the longer term even in the absence of surplus AAUs.

Conclusion

The paper has first demonstrated why innovative policy tools and new economic instruments are especially important in the region of Central and Eastern Europe to unlock the sizable no-regret energy-efficiency potential, and to foster the development of renewable energy technologies. With limited public funds that can be mobilized for this purpose, the flexibility mechanisms of the KP were viewed with high hopes to deliver energy efficiency and renewable energy in the capital- and cash-short new EU Member States.

The paper has shown, that while the technical and economic potential in EE and RES is large in NEU-8, and the investment climate is positive, the Kyoto flexible mechanisms are expected to play a positive, but limited role to mobilize this potential. The experiences from the Activities Implemented Jointly phase showed that the procedures with Joint Implementation are complicated, and due to this reason track-2 JI may give place to project-based emission-trading instead, which can be considered similar to track-1 JI. The AIJ phase has also indicated that there is a significant cost-effective potential in demand-side energy efficiency, but due to the large transaction costs small projects are not viable under JI. Therefore, the success of project bundling will be key to determining the future of JI, helping to overcome the financing thresholds and high marginal transaction costs. However, while there are some new JI projects contracted or in the pipeline attempting innovative approaches to project bundling, some industry sources are skeptical about the feasibility of bundling on the private level. Experiences so far show that despite the fact that DSEE projects may promise lowest unit mitigation costs, most JI projects are targeted to fuel switch, especially boiler conversion to biomass, and other small-scale renewable investments, mainly biomass. Therefore, JI is unlikely to contribute to the mobilization of the no-regret potential on the demand-side to a significant extent, although a limited amount of activity will probably take place in this area. While EU accession has withered the scope for JI through mandating some measures otherwise eligible to JI, national policies and concrete implementation approaches to EU Directives on the country level have turned out to be more important to determine baselines and thus the overall potential for flexibility mechanisms.

Since most countries in NEU-8 may have emission surpluses in 2008-2012 for sale, IET transactions in the first approximation are unlikely to deliver any energy efficiency or renewable energy. As a first-order remedy, IET revenues

14. The term "neutral" greening means that applied policies and measures result in difficult to measure CO_2 emission reductions. But still a based on these measures project can be accepted for project-based emission trading under GIS but cannot be implemented under JI due to the difficulty to prove additionality of such reductions (WB 2004).

can be earmarked for sustainable energy projects. Another innovative approach for "greening" surplus AAUs and for a more flexible alternative to track-2 JI are Green Investment Schemes. Among others, the World Bank has started some initiatives in the area in Bulgaria. In addition, as track-2 JI proves to be laden with many difficulties, project-based ET under Article 17 of the Protocol may offer more flexibility to implement carbon mitigation activities, and may prove to be more promising in unlocking also the demand-side EE potential. As a result, emission trading under Article 17 may also unlock some of the sustainable energy potentials in CEE through these new innovative mechanisms in the pipeline. However, these instruments are still only on the design, so their feasibility in real life remains to be seen.

To sum up, the Kyoto flexibility mechanisms are expected to play a positive, but limited role in mobilizing the economic potential in energy efficiency and renewable energy in Central and Eastern Europe. Their success now depends on the viability and acceptance of some new mechanisms under article 17, such as green investment schemes and project-based emission trading. As far as JI is concerned, its potential can be maximized by more countries becoming eligible for track-1 JI and by successful approaches to project bundling. Due to the undisputed benefits of additional cash for EE projects from carbon finance, it is certainly advisable for the countries in CEE to explore the options to utilize the new and old approaches offered by the flexible mechanisms to help capture DSEE and RES potentials.

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