

Michaelowa, Axel; Betz, Regina

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## Implications of EU enlargement on the EU greenhouse gas "bubble" and internal burden sharing

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**IMPLICATIONS OF EU  
ENLARGEMENT ON THE  
EU GREENHOUSE GAS  
"BUBBLE" AND INTERNAL  
BURDEN SHARING**

**Axel Michaelowa  
Regina Betz**

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# **Implications of EU Enlargement on the EU Greenhouse Gas "Bubble" and Internal Burden Sharing**

**Axel Michaelowa  
Regina Betz**

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## **HWWA DISCUSSION PAPER**

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Hamburgisches Welt-Wirtschafts-Archiv (HWWA)  
Hamburg Institute of International Economics  
Öffentlichkeitsarbeit  
Neuer Jungfernstieg 21 - 20347 Hamburg  
Telefon: 040/428 34 355  
Telefax: 040/428 34 451  
e-mail: [hwwa@hwwa.de](mailto:hwwa@hwwa.de)  
Internet: <http://www.hwwa.de/>

Axel Michaelowa  
177 Bd. de la République, F-92219 St.-Cloud  
e-mail: [michaelo@easynet.fr](mailto:michaelo@easynet.fr)

Regina Betz  
Fraunhofer-Institute for Systems and Innovation Research, Karlsruhe, Germany  
e-mail: [betz@isi.fhg.de](mailto:betz@isi.fhg.de)

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## **Abstract**

Currently, the EU-15 forms the only bubble under the Kyoto Protocol and has negotiated an internal burden sharing. A strategic EU climate policy should include accession countries. Thus, even in the case of early ratification of the Kyoto Protocol by 2002, it would be sensible to form a bubble with all countries that are certain to be EU members during the commitment period 2008-2012. Of course due to Art. 4,4 of the Protocol the EU-15 has to stick to its own bubble. However, nothing prevents it from forming an implicit bubble including all first wave countries by inducing them to form a bubble on their own and transfer the surplus to the EU-15. Similarly, second wave countries should form a bubble of their own to co-ordinate JI and permit transfers to the EU. This would reduce the gap between business-as-usual and the target by about 50%. If ratification is delayed to a point where it is clear which second wave countries will be members by 2008, the bubble should be extended by those countries. When in 2005 target negotiations start for the second commitment period, the EU should negotiate a bubble consisting of all states being certain to be members by 2013.

## **Zusammenfassung**

Derzeit ist die EU der 15 die einzige Emissionsgemeinschaft nach den Regeln des Kyoto-Protokolls und hat eine interne Lastenteilung vereinbart. Eine strategische EU-Klimapolitik sollte die Beitrittsländer einschließen. Selbst im Fall einer frühzeitigen Ratifizierung des Kyoto-Protokolls wäre es sinnvoll, eine Emissionsgemeinschaft mit allen Ländern abzuschließen, die in der Zielperiode 2008-2012 EU-Mitgliedsländer sein werden. Aufgrund Art. 4,4 des Protokolls muss die EU der 15 ihre Emissionsgemeinschaft aufrechterhalten. Jedoch hindert sie nichts daran, eine implizite Emissionsgemeinschaft mit den Ländern der ersten Beitrittswelle zu bilden, indem diese eine eigene Gemeinschaft bilden und den Überschuß an die EU der 15 weitergeben. Gleichermaßen sollten auch die Länder der zweiten Beitrittswelle eine Gemeinschaft bilden, um ihre Transfers an die EU abzustimmen. Dies würde den Abstand zwischen "weiter so" und dem Kyoto-Ziel um ca. die Hälfte verringern. Wenn die Ratifizierung so lange verzögert wird, daß klar ist, welche Länder der zweiten Welle 2008 EU-Mitglied sein werden, sollte die Gemeinschaft entsprechend erweitert werden. Bei den 2005 beginnenden Verhandlungen über Ziele für die zweite Budgetperiode sollte die EU eine Zielgemeinschaft für alle Länder anstreben, die 2013 sicher EU-Mitglied sein werden.





## 1. INTRODUCTION

The Kyoto Protocol to the U.N. Framework Convention on Climate Change (UNFCCC) negotiated in 1997 sets legally binding greenhouse gas emission targets for industrialized countries. In Article 4, it allows all countries to conclude an agreement for a joint target equal to the sum of the targets of the participating countries. This rule is commonly known as the emissions „bubble“ and was introduced due to pressure from the EU that wanted to differentiate targets internally. Article 4 defines the following rules for bubbles:

- The bubble agreement has to be notified to the UNFCCC Secretariat together with ratification of the Kyoto Protocol (Art. 4, 2)
- The targets of the participating countries have to be quantified (Art. 4, 1)
- The agreement cannot be changed until the end of the commitment period (2012) (Art. 4, 3)
- If a „regional economic integration organisation“ (i.e. the EU) changes its composition, existing targets shall not be affected (Art. 4, 4)
- If the bubble does not reach its target, compliance of the individual bubble members shall be determined on the basis of the targets set out in the bubble agreement (Art. 4,5; 4, 6)

So far, analysis of the bubble rules has been neglected compared to the rules of the other flexible mechanisms under the Protocol. We discuss the possibilities the bubble rules open for the EU, particularly in the context of EU enlargement and delayed ratification of the Protocol.

## 2. THE EU BURDEN SHARING

Already from the outset of EU climate policy in 1990, it followed the idea of having an emission target for the EU as a whole and to differentiate commitments within the EU, i.e. let cohesion countries increase emissions while the richer North would have to reduce them. When the EU position for the U.N. climate negotiations was drafted in October 1990, it proposed to stabilize EU emissions at the 1990 level by 2000. There was no definition how this target would be allocated to member states as it was thought that the existing national targets would somehow sum up to the EU target. However, in 1991 the Commission tried to introduce an explicit burden sharing with three levels: 5% reduction for Denmark, Germany, and the Netherlands, 15% increase for cohesion

countries and stabilisation for the rest. This was not accepted by France, Italy and the UK and thus not pursued further.

Also after the stabilisation target had been accepted at the Rio Conference, an explicit burden sharing proved impossible. EU ratification of the Convention was delayed until December 1993 as the cohesion countries pressed for clear burden sharing rules while the UK publicly declared its opposition (Vellinga, Grubb, 1993, p. 2).

Only when the international negotiations for a protocol with legally binding targets had gathered momentum, the EU reopened the burden sharing debate (for a detailed account see Ringius 1999, p. 140ff.). Otherwise, it would not have been able to credibly press for stringent targets. In late 1996, the Commission made a new proposal to allocate a 10% reduction for 2005 which, however, was not endorsed by member states. Only the Dutch presidency of the first half on 1997 managed to dissolve the Gordic Knot with a clever negotiating strategy. It commissioned experts from Utrecht University to develop an approach deriving emission targets from sectoral characteristics of member states. They defined three sectors (and thus called their approach “triptique”): domestic (household, light industry and agriculture), energy-intensive, export-oriented industry and electricity production. To derive emission targets, it was assumed that per capita emissions of the first sector converge by 2030 for all member states. The second sector’s energy efficiency was assumed to grow by 1.2 to 1.5 % per year between 1995 and 2010 while the production growth rate would be 1.2% for all countries. In the third sector, electricity consumption was assumed to grow by 1.9% per year in the cohesion countries and 1% in the rest. Moreover, discretionary elements were included such as increasing renewables by 8%, reducing coal and oil by 70% and leaving nuclear where it is. Starting from the “triptique” proposal, early 1997 saw numerous negotiations rounds before the final position could be fixed in March (see second to fourth column in Table 1). Especially cohesion countries, but also some Northern countries fought for more lenient targets.

When the Kyoto conference had led to a successful outcome and acceptance of the bubble principle, the burden sharing had to be renegotiated due to the change from three to six gases and the lower (8%) target. There was a general tendency of Northern countries to have less stringent targets which was partly offset by cohesion country acceptance of stricter ones (see fifth and sixth columns in Table 1).

**Table 1: Different EU burden sharing proposals and agreements across time**

Country	NationalCO <sub>2</sub> targets for 2000	Original triptique 1997**	Dutch proposal 1997	1997 agreement	UK proposal 1998	1998 agreement
Austria	20 (2005)	1 to 25	25	25	20.5	13
Belgium	5	12 to 15	15	10	9	7,5
Denmark	5	12 to 25	25	25	22.5	21
Finland	0	4 to 7	10	0	0	0
France	+13	4 to 12	5	0	0	0
Germany	25 (2005)	17 to 30	30	25	22.5	21
Greece	+25	2 to +2	+5	+30	+23	+25
Ireland	+20	2 to 5	+15	+15	+11	+13
Italy	0	5 to 9	10	7	7	6.5
Luxembourg	0	17 to 20	40	30	30	28
Netherlands	3-5	6 to 9	10	10	8	6
Portugal	+40	+16 to +21	+25	+40	+24	+27
Spain	+25	+6 to +11	+14	+17	+15	+15
Sweden	0	+5 to +26	+5	+5	+5	+4
UK	0	17 to 20	20	10	12	12.5
<b>EU</b>	<b>0</b>	<b>9 to 17</b>	<b>15</b>	<b>9.2</b>	<b>8.5</b>	<b>8</b>

\* Three gas basket in 1997 burden sharing, six gas (Kyoto) basket in 1998 burden sharing

\*\* Range of four variants

Sources: EU Council (1997), European Commission (1994), Anonymous (1997, 1998), Ringius (1999).

Experiences in those member states that have a long-standing climate policy such as the Netherlands or Denmark show that it is more difficult to achieve greenhouse gas reduction than initially thought (see also Heller 1998). The cumulative effects of economic growth swamp efficiency gains. So far, only lucky circumstances (German reunification and the coal-to-gas conversion due to electricity market liberalisation in the UK) have led to an overall stabilisation of EU emissions. These one-off effects are likely to fizzle out in the next years. Thus, assuming that no further reduction policies

and measures are implemented the projected gap between the target and 2010 emissions (overall demand) of EU Member states would be around 325 Million t CO<sub>2</sub>-eq. (see Table 2).

**Table 2: Emissions from EU member states and change by 2010  
(million t CO<sub>2</sub> equ.)**

Country	Base year	With measure scenario 2010	Target 2010 (%)	Difference to target	Estimated change to base year in 2010 (%)		
					ISI	Projected (MARKAL)	Projected (UNFCCC)
Austria	77.8	70.4	13	2.7	10	-	-
Belgium	140.1	145.6	7.5	16.0	+4	+10	-
Denmark	80.7	63.4	21	-0.4	21	+6	-0.4
Finland	64.7	85.5	0	20.8	+32	+30	+3.5
France	500.8	510.4	0	9.6	+2	+2	0
Germany	1214.3	985.1	21	25.8	19	20	19
Greece	101.4	156.9	+25	30.1	+55	+44	-
Ireland	56.9	66.5	+13	2.2	+17	n.a.	+17
Italy	551.6	623.6	6.5	107.8	+13	+17	7
Luxembourg	14.0	12.5	28	2.4	11	n.a.	40
Netherlands	225.4	234.2	6	22.4	+4	+16	+6
Portugal	67.0	97.8	+2	12.7	+46	+24	+40
Spain	312.6	375.1	+15	15.6	+20	+18	+20
Sweden	66.5	76.4	+4	7.3	+15	+13	+10
UK	778.7	731.8	12.5	50.4	6	8	6
<b>EU</b>	<b>4252.5</b>	<b>4235.1</b>	<b>8</b>	<b>325.4</b>	<b>-0.41</b>	<b>-0.2</b>	<b>-</b>

Sources: Betz et al. 1999 p. 17ff., Gielen et al. 1998, UNFCCC (1998b).

Another danger to the EU target is the acceleration of nuclear phase-out. If Germany phased out its nuclear plants, overall EU emissions would rise by 7% even if

substitution were by gas-fired plants only! Thus it might become necessary to think about innovative approaches to achieve EU compliance with the Kyoto target.

### 3. TIMING ISSUES

Since 1998 the EU is negotiating accession with a big number of countries. Substantive negotiations on **accession** were set up with Cyprus, the Czech Republic, Estonia, Hungary, Poland and Slovenia, the so-called “**first wave**” countries, plus Malta. The so-called “**second wave**” countries (Bulgaria, Latvia, Lithuania, Malta, Romania, Slovakia) have not commenced substantive negotiations with the EU this time. Table 3 gives an overview of the likely timing of accession taking into account different views. For the first wave countries 2003-2006 would be an achievable date for acquisition. For the second wave countries 2005 until the end of the decade seems to be most likely. It has to be noted that the European Commission has not committed itself to any end-date for the enlargement process and the official line is that countries will not necessarily join in waves. Turkey was also added to the accession countries, but without any date for the opening of negotiations. In addition, the Balkans have been added to a list of countries for eventual future integration and a new framework of co-operation is to be developed with remaining EU-neighbouring areas, e.g. Russian Federation and Commonwealth of Independent States (CIS) (European Parliament, 1999 p. 1ff.).

**Table 3: Timing of accession**

Country	EC view				EC view	Country view	Independent commentators
	Copenhagen criteria				Timing of accession		
	Political criteria	Economic criteria		Adoption of Acquis			
		Functioning market economy	Ability to cope with competitive pressure and market forces	Status / progress last year			
<b>“First wave”</b>							
<b>Cyprus</b>	condition satisfied	condition satisfied	condition satisfied	+/-	medium term	2003	political problem: partition of the country, 2004-2010
<b>Czech Republic</b>	condition satisfied	condition satisfied	in the medium term; loosing ground	+/-	medium term	2003-2005	slowdown in transposition, 2004-2006
<b>Estonia</b>	condition satisfied	condition satisfied	in the medium term	++/+	medium term	2003	very open to trade and FDI, 2004-2005
<b>Hungary</b>	condition satisfied	condition satisfied	in the medium term	+++/>++	medium term	2002	strong commitment towards reform, 2003-2004
<b>Poland</b>	condition satisfied	condition satisfied	in the medium term	+/-	medium term	2002	large agricultural sector, potential problems in CAP, 2003-2005
<b>Slovenia</b>	condition satisfied	condition satisfied	in the medium term	++/>+	medium term	2003	slowdown in transportation; 2004-2006
<b>Malta</b>	condition satisfied	condition satisfied	condition satisfied	+/-	medium term	2003	2004-2006

Country	EC view				EC view	Country view	Independent commentators
	Copenhagen criteria				Timing of accession		
	Political criteria	Economic criteria		Adoption of Acquis			
		Functioning market economy	Ability to cope with competitive pressure and market forces	Status / progress last year			
<b>“Second wave”</b>							
<b>Bulgaria</b>	condition satisfied	making progress; medium to long term	in the long term	--/++	long term	no official target	end of the decade
<b>Latvia</b>	condition satisfied	in the medium term	in the medium term	+ / ++	medium term	2005	2005-2006
<b>Lithuania</b>	condition satisfied	in the medium term	in the medium term	+/-	medium term	2005	slowdown in progress, 2005-2008
<b>Romania</b>	condition satisfied	worrying developments; long term	in the long term	---/-	long term	no official target	stabilisation not achieved; more than a decade away
<b>Slovakia</b>	condition satisfied	in the medium term	in the medium term	- / ++	medium term	2005	2005-2008

Source: European Parliament 1999, p. 4.

All accession countries are members of Annex B with the exception of Cyprus, Malta and Turkey (which even has not ratified the UNFCCC). It would be advisable for countries joining the EU to join Annex B upon EU accession. Since the negotiations on the next commitment targets shall start in 2005 (Art. 3.9 KP) a finalisation of the enlargement process (first wave and second wave) before this date would be desirable. Thus, these countries could be included in the negotiations on commitments for the second period.

Among the countries listed, only Cyprus has **ratified the Kyoto Protocol** so far. All other EU member states and accession countries still have to ratify it. As stated under Article 25 KP the protocol will only enter into force if a minimum of 55 Parties to the Convention which accounted in total for at least 55 % of total Annex I carbon emissions for 1990 have ratified. These requirements and the fact that only 22 non-Annex 1 countries (mostly AOSIS and CIS countries) have ratified the Kyoto Protocol until today make an early entry into force most unlikely. However, at COP 5 the call for Rio+10 which means an entry into force by 2002 was emphasised several times, particularly by the EU.

#### **4. EMISSIONS IMPLICATIONS OF EU ENLARGEMENT**

Within the first wave group, especially Poland and the Baltic states are unlikely to come near their Kyoto budget under business-as-usual. The volume of available permits of these countries under business-as-usual probably amounts to 130 million tons of CO<sub>2</sub>, i.e. about 40% of the shortfall of the EU (see Table 4). In the case of **Poland** the GHG emissions decreased due to the recession. But in spite of an positive growth of GNP from 1992 further emission reduction could be observed because of lower energy consumption due to the structural change of the economy (e.g. substitution of coal by gas or fuel oil). (Republic of Poland, 1998). In **Estonia** the economic depression (collapse of energy intensive industry e.g. chemical and paper) resulted in an decrease in electricity generation. Moreover, increasing electricity prices have been the main reason for the considerable decline in GHG emissions (Schön et al. 1998, p. 14). **Hungary, Slovenia** and the **Czech Republic** are less likely to produce sizeable surplus. They have been suffering from economic recession and the collapse of trade relations with the Former Soviet Union which mainly resulted in reduced GHG emissions. However, the recovery of energy-intensive industry and increases in the transport sector have changed the declining trend of the early years of transformation. Thus, it is estimated that the emission level in 2010 will be close to that of the base year (e.g. UNFCCC 1999, p. 5f.). According to a World Bank Study, Hungary, Slovenia and the



Czech Republic could offer 10 million tons CO<sub>2</sub> eq. per year if domestic policy instruments are implemented (World Bank 1998a, p. xii).

Within the group of second wave countries, national circumstances differ considerably. **Slovakia** (World Bank 1998b, p. 30f.) and **Romania** (Romania 1998, p. 52ff.) are in a situation comparable to the Czech Republic and thus can offer surplus only if domestic instruments are implemented. **Bulgaria's** projected emissions exceed the Kyoto target significantly due to reasons such as: the reduced share of nuclear energy or the increasing transit of natural gas flows with associated methane losses through the Bulgarian territory (Republic of Bulgaria, 1998, p. V-21). **Turkey** has a strong emissions growth and is arguing for deletion from Annex I of the UNFCCC (that is the reason why it has not ratified so far).

EEA (1999) calculates business-as-usual reduction for the 10 Eastern European accession countries at 11%.

Under the „*acquis communautaire*“, accession countries shall implement all EU legislation. Obviously, in the negotiations, they want to delay entry into force of stringent rules. Currently, many countries try to get delays of five to ten years approved (DNR/Grüne Liga 1999). Despite such delays, it is probable that many legal instruments such as IPPC or energy efficiency standards will be implemented that reduce emissions compared to business-as-usual. Moreover, the enlargement seems to influence the Community Agricultural Policy (CAP) which might have effects on the emission level of both, accession and former member States (UNFCCC 1997, p. 18). In any case, long-term considerations warrant quick inclusion of accession countries in EU climate policy.

It should also be tried to direct the use of cohesion funds towards low-emission technologies. The mistakes made in the use of the current cohesion fund, where the lion's share goes into road-building should not be repeated.

While marginal abatement costs in the EU15 are often estimated to be in the triple digit \$/t CO<sub>2</sub> range, marginal costs in accession countries will be often negative or in the low single or double digit-range (see e.g. World Bank 1998b, p. 67 for options in Slovakia, World Bank 1998a, p. 42ff for marginal costs in the Czech Republic). According to a study from the Polish Academy of Science (IPPT PAN) in 1993 for instance, the “no regret” potential for Poland was estimated to be around 398 Gg CO<sub>2</sub> by 2010.

(Karaczun 1996, p. 41) The Swedish AIJ programme in the Baltic states has shown low to negative costs for its boiler conversion projects (Michaelowa 1999).

**Table 4: Greenhouse gas emission characteristics of EU accession countries (in million t CO<sub>2</sub> equivalent)**

Country	1990 *	1997 *	Kyoto target	2010 projections	Difference to target
<b>First wave</b>					
Cyprus**	4.6	6.2	-	n.a.	n.a.
Czech Republic	192.1	157.8	176.7	164.9 to 174.9	-1.8 to -11.8
Estonia	40.7	23.1	37.4	17.0	-20.4
Hungary	101.6 <sup>3</sup>	77.2 <sup>1</sup>	95.5	93.0	-2.5
Poland	564.3 <sup>3</sup>	426.2	541.7	429.0 to 502.0	-39.7 to -112.7
Slovenia***	19.2	20.1	17.7	n.a.	n.a.
Malta**	2.5	2.9	-	n.a.	n.a.
<b>Wave I</b>	<b>925.0</b>	<b>713.5</b>	<b>869.0</b>	<b>703.9 to 786.9</b>	<b>-74.4 to -147.4</b>
<b>Second wave</b>					
Bulgaria	136.1	84.50	125.2	115.7-138.6	+13.4 to -9.5
Latvia	35.7	15.60	32.8	20.1	-12.7
Lithuania	51.5	n.a.	47.4	42.2-59.1	+11.7 to -5.2
Romania	264.9	164.02	243.7	242.4 to 277.8	+34.1 to -1.3
Slovakia	72.5	55.11	66.7	64.6 to 67.0	+0.3 to -2.1
<b>Wave II</b>	<b>560.7</b>	<b>319.23</b>	<b>515.8</b>	<b>485.0 to 562.6</b>	<b>+46.8 to -30.8</b>
<b>Rest</b>					
Turkey	209.5	269.7	-	517.7	n.a.
<b>First and Second wave</b>					
<b>Wave I + II</b>	<b>1486</b>	<b>1033</b>	<b>1385</b>	<b>1189 to 1350</b>	<b>-27.6 to -178.2</b>

\* CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, million t CO<sub>2</sub> equivalent, excluding land use and forestry

\*\* CO<sub>2</sub> from fuel combustion only

\*\*\* 1997 data for Slovenia: personal communication Hydrometeorological Institute, Ljubljana.

<sup>1</sup> 1996 value

<sup>2</sup> 1994 value

<sup>3</sup> Base year emissions

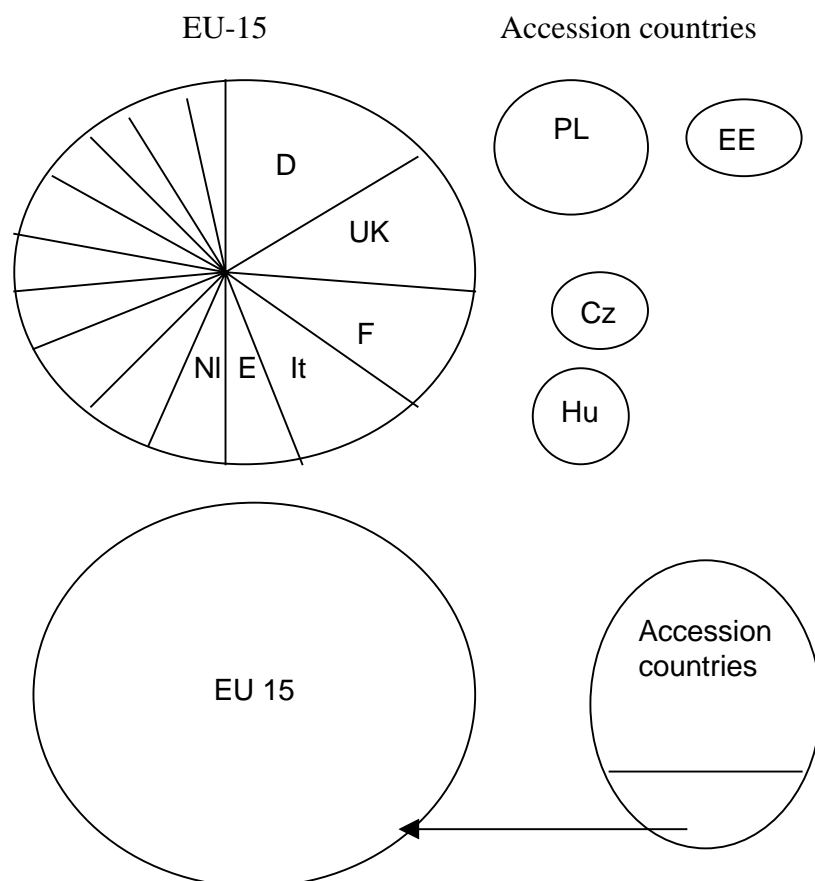
Sources: Data from UNFCCC (1999), UNFCCC (1998a), IEA (1999), Turkey (1998), Betz et al. (1999), Kallaste et al. (1999)

## 5. DIFFERENT BUBBLE OPTIONS

There are different options for bubbles, where timing plays a major role. Two main distinctions can be made:

First, enlargement process with some accession countries (e.g. Hungary and Poland) would be finalised **before** Kyoto Protocol ratification. The EU would then enlarge the EU15 bubble by the new member states.. However, it would have to take into account the rule of Art. 4,4 which would mean that the target of the EU (-8 %) would still refer to the 15 members as of 1997. Thus, the EU-15 bubble target would remain the same but be adjusted by emissions transfers according to the new burden sharing for the enlarged bubble. Thus we have a two-tiered system (see Figure 1). Cyprus and Malta would have to accede Annex I.

**Figure 1: Bubbling of EU and accession countries**



Second, the enlargement of the EU will take place **after** ratification of the Kyoto Protocol but before the first commitment period (2008-2012). Two options are to be

taken under consideration. Since Art. 4 allows “bubbling” for every Party (they do not have to be formal members of an economic integration organisation) the EU could form implicit strategic bubbles with accession countries anyway by inducing them to form a bubble when ratifying which co-ordinates JI projects and/or sale of emission permits to the EU-15. From a political point of view, a bubble encompassing all first and second wave countries would make sense. These will be EU members by the commitment period in any case. Implications for the target are the same as in the first option. In any case, it would be profitable for accession countries to form bubbles of their own (see first lines of Table 5) and co-operate closely with the EU. Moreover, the EU could co-ordinate cohesion funds with the bubble. This close co-operation would it then make easier to bring these bubbles together for the next commitment period. The different bubbles would have the following characteristics (see Table 5).

All bubbles would considerably reduce the gap between business-as-usual and the Kyoto target. Whereas for the EU15 bubble the difference amounts to 8.3 percentage points, the first wave bubble reduces it to a range of 3.7 to 5.3 percentage points whereas in the case of inclusion of both waves it would amount to 2.8 to 5.6 percentage points, i.e. a reduction by more than 50%.

If the EU wants to maximise its leeway, the bubble would contain Poland and the Baltic states. It seems to be most likely, that they are going to meet their Kyoto target easily and will even have some potential for emissions sales. Since a full membership in the EU before ratification is not certain the option of an strategic bubble with these countries should be envisaged and forced.

**Table 5: Different bubbles (average per year of the commitment period in million t CO<sub>2</sub> equivalent, excluding land use and forestry)**

Country	Base year	With measures scenario 2010	Target 2010	Difference	Difference as % of target
<b>Wave I</b>	922.6	703.9 to 786*	869.0 (5.3 %)*	-74.4 to -147.4*	-8.6 to -17.0
<b>Wave II</b>	563.2	485.0 to 562.6*	515.8 (8 %)*	+46.8 to -30.8*	+9.1 to -6.0
<b>Baltic states</b>	127.9	79.3 to 96.2	117.6 (8 %)	-21.4 to -38.3	-18.2 to -32.6
<b>Wave I and II</b>	1,485.8	1,188.9 to 1,348.6**	1,384.8 (6.4 %)*	-27.6 to -178.2*	-2.0 to -12.9
<b>EU15 + Wave I</b>	5,175.1	4,939.0 to 5,021.1*	4,778.7 (7.6 %)*	+178.0 to +251.0*	+3.7 to +5.3
<b>EU15 + Wave I &amp; II</b>	5,731.2	5,424.0 to 5,584.6*	5,294.5 (7.6 %)*	+147.2 to +297.8*	+2.8 to +5.6
<b>EU 15 + Poland + Hungary</b>	5,095.3	3,702.7 to 3,775.7	4,546.9 (7.6 %)	+210.2 to +283.2	+4.6 to +6.2
<b>EU 15 +Poland + Baltic</b>	4,380.4	4,314.4 to 4,331.3	4,027.3 (7.6 %)	+287.1 to +304.0	+7.1 to +7.5

\* without Malta and Cyprus

Source: Own calculations based on Table 2 and 4.

## 6. CONCLUSIONS

A strategic EU climate policy should include accession countries. Thus, even in the case of early ratification of the Kyoto Protocol by 2002, it would be sensible to form a bubble with all countries that are certain to be EU members during the commitment period 2008-2012. Of course due to Art. 4,4 the EU-15 has to stick to its own bubble. However, nothing prevents it from forming an implicit bubble including all first wave countries by inducing them to form a bubble on their own and transfer the surplus to the EU-15. Similarly, second wave countries should form a bubble of their own to coordinate JI and permit transfers to the EU. This would reduce the gap between business-as-usual and the target by about 50%. If ratification is delayed to a point where it is clear which second wave countries will be members by 2008, the bubble should be extended by those countries. When in 2005 target negotiations start for the second commitment period, the EU should negotiate a bubble consisting of all states being certain to be members by that time.

Any creative bubbling by the EU might lead to replication of these efforts by other Annex B countries and considerably change the use of the project-related flexible instruments.

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