

Trade through the Kyoto Protocol flexibility mechanisms : the impact of qualifying participants

Odile Blanchard

Université Pierre-Mendès France, LEPII-EPE,
Grenoble

Objective and outline of the presentation

- ◆ Objective : Show the impact of who qualifies to participate in the market on the permit price and traded amounts
- ◆ Outline :
 - Chronological steps in the building and implementation issues of the flexibility mechanisms of the Kyoto Protocol
 - Methodology
 - Characteristics of trading countries : targets, MACs
 - For each step, show the impact on price and quantities

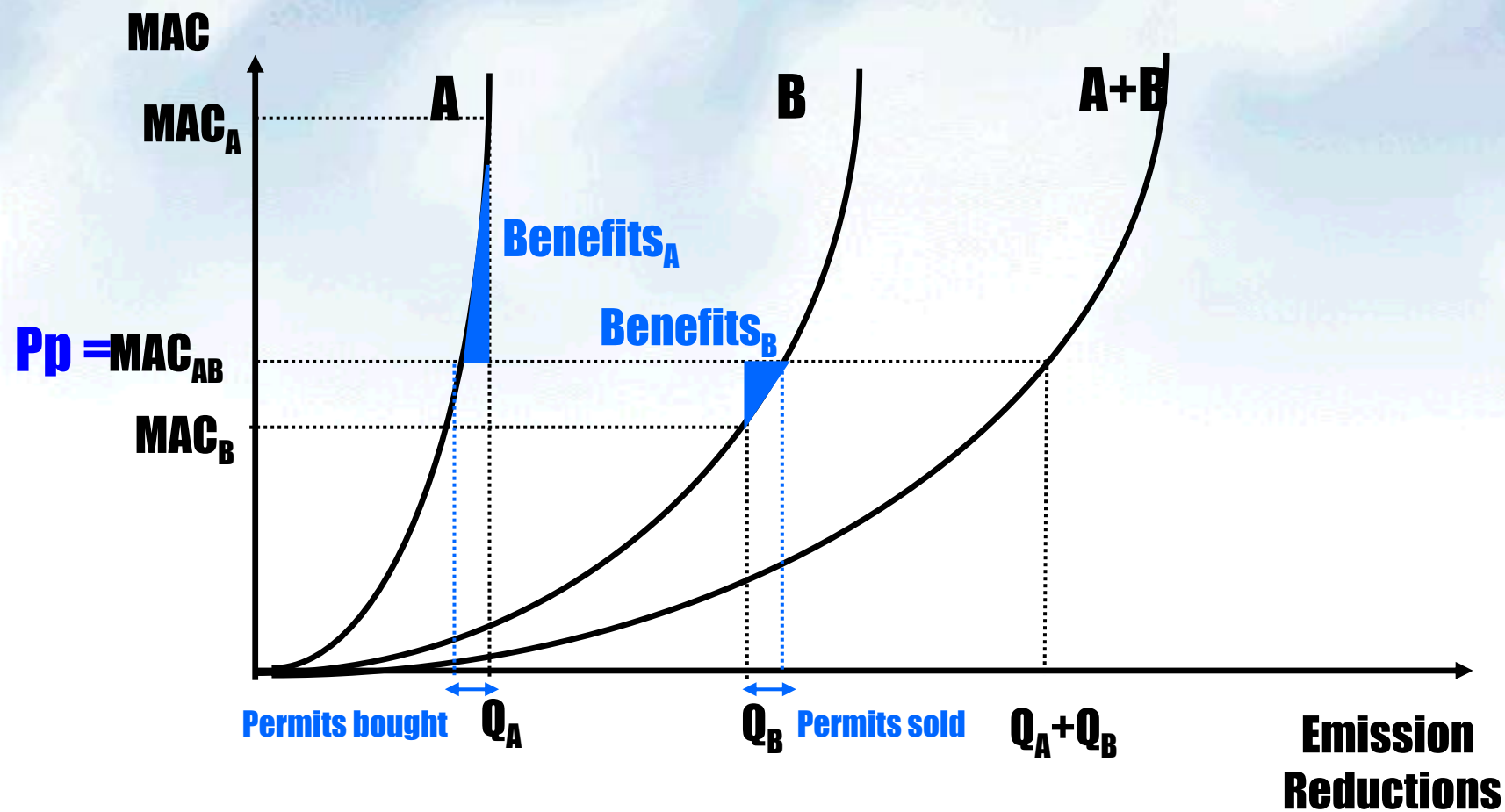
Building and implementing the flexibility mechanisms over time

- ◆ Kyoto Protocol, 1997 :
 - Annex B (AB) : targets ; non Annex B (NAB) : no target commitment
 - Emissions trading (among AB ratifying countries), Joint Implementation (among AB), Clean Development Mechanism (AB <----> NAB)
- ◆ The Hague missed compromise , 2000 :
 - Add new categories of « carbon sinks » to the assigned amount of emissions
- ◆ US rejection of the KP, Bonn-Marrakech Accords, 2001:
 - The US is out of the trading game
 - Allocation of sinks credits for AB (except US)
- ◆ Up to 2004 : no ratification by Australia, nor by Russia
- ◆ 2005 : European Emissions Trading System

Methodology (1)

- ◆ Marginal Abatement Costs (MAC) for a given emission reduction target
- ◆ POLES world energy model
 - Simulation of world energy supply and demand balance to 2030, based on 38 countries/regions demand and supply equations
 - Projections of GHG emissions and MACs for these 38 regions. MACs built from incremental shadow taxes on energy
- ◆ ASPEN software :
 - Input = POLES MACs
 - Output = simulation of emission permit demand and supply for any specified market ; permit price

Methodology (2) : Mutual benefits from trade



Methodology (3): hypotheses

- ◆ CO₂ only ; 2010 analysis (proxy for 2008-12)
- ◆ Emission reduction objectives = KP targets
- ◆ Emission reductions achieved either domestically, or through any of the flexibility mechanisms (depending on MAC relative to permit price)
- ◆ The 3 flexibility mechanisms are totally «fungible » (not earmarked)
- ◆ Trading on the basis of pure and perfect competition between countries

Characteristics of (a few) trading countries (1)

Countries	Kyoto Protocol Target / Base year	MAC to reach target (1995\$/tC, POLES)	KP Ratification
United States	- 7%	212	No
Canada	- 6%	298	Yes
France	0%	171	Yes
Germany	- 21%	52	Yes
United Kingdom	- 12,5%	72	Yes
Australia	+ 8%	90	No
Japan	- 6%	160	Yes
Russia	0%	0	No
Poland	- 6%	0	Yes
Hungary	- 6%	0	Yes

Characteristics of countries (2) : Russia's and Eastern Economies in Transition's « Hot Air »

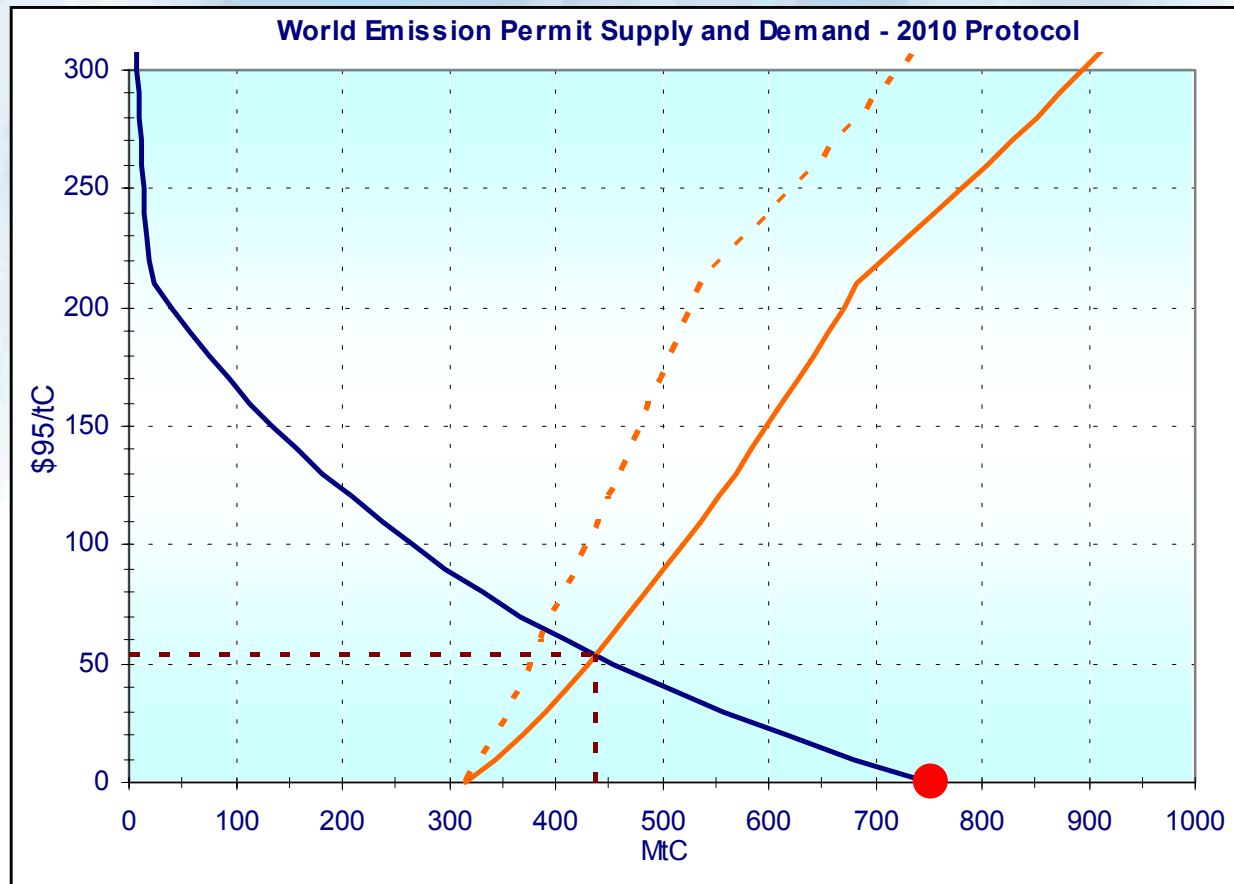
- ◆ Economic slowdown in the 1990s
- ◆ 2010 emission projections on a business-as-usual basis : more than 30 % below 1990 emissions
- ◆ 2010 Kyoto Protocol target /base year :
 - FSU, Ukraine : 0 % ; Bulgaria, Romania : -8 % ; etc...
- ◆ « Hot Air » low- hanging fruit = excess emissions allowances = emission reductions that will be achieved only through economic slowdown (MAC = 0), beyond the KP target : 315 MtC in 2010

The initial deal of the Kyoto Protocol

◆ Main assumptions :

- All Annex B countries participate in emissions trading (incl US and Russia)
- Non Annex B participate through the CDM
- A 10 % CDM-accessibility factor
- A 50 % JI-accessibility factor in Russia ; 100 % in other AB countries
- No sinks credits are considered

Equilibrium on the emissions permit market



- Annex B demand
- ⋯ Annex B supply
- Annex B supply + CDM

Source : ASPEN from POLES MACs

The Kyoto Protocol initial deal : price and trade volume

- Complementarity of US and Russia on the market

Permit Price (\$/tC)	54	Traded Volume (MtC)	437
----------------------	-----------	---------------------	------------

Countries	<i>Purchasers (MtC)</i>				<i>Sellers (MtC)</i>			
	Required emissions reductions =	Dom. Red. to reach target	+ Imports	+ Sinks	Exports			
					CDM	Dom. Red. for IET / JI	Traded Hot Air	Sinks in EEE and FSU
USA	513	204	309	-	-	-	-	
Europe	136	67	70	-	0	-	-	
CANZ	66	27	39	-	-	-	-	
Japan	35	15	20	-	-	-	-	
FSU	-	-	-	-	-	41	277	
EEE	-	-	-	-	-	23	38	
<i>Non-Annex B countries</i>					57			

The Hague missed compromise

◆ Main assumptions :

- Same as for the « KP initial deal » : all AB participate; 10 % CDM accessibility ; 50 % JI accessibility on Russia ; 100 % JI accessibility in other EEEs
- Except for sinks : credits up to 3 % of base year emissions
- Costlessness of sinks

The Hague missed compromise : permit price and trade volume

- Similar trade volume
- Price decrease (domestic sinks at nil cost) ; lower domestic reductions

Permit Price (\$/tC)	31	Traded Volume (MtC)	432
----------------------	-----------	---------------------	------------

Countries	<i>Purchasers (MtC)</i>				<i>Sellers (MtC)</i>			
	Required emissions reductions =	Dom. Red. to reach target	+ Imports	+ Sinks	Exports			
					CDM	Dom. Red. for IET / JI	Traded Hot Air	Sinks in EEE and FSU
USA	513	130	329	55	-	-	-	-
Europe	136	41	74	20	-	-	-	-
CANZ	66	16	20	30	-	-	-	-
Japan	35	10	9	16	-	-	-	-
FSU	-	-	-	-	-	28	277	34,7
EEE	-	-	-	-	-	14	38	3,8
<i>Non-Annex B countries</i>					36			

US withdrawal, Bonn-Marrakech Accords

◆ Main assumptions :

- Similar to the Missed Compromise : 10 % CDM accessibility ; 50 % JI accessibility on Russia ; 100 % JI accessibility in other EEEs ; sinks credits as in Marrakech Accords ; costlessness of sinks
- **Participants : all Annex B countries but the US**

US withdrawal, Bonn-Marrakech accords : no trade, nil price

- Hot Air and sinks bring more credits on the market than needed for importers
- No equilibrium price
- No abatement effort needed for Annex B (excl US) countries
- Negative impact of US withdrawal on Russia

Countries	2010 Reduction targets (MtC)	Sinks (MtC)	Remaining emission reductions = 2010 targets - sinks	Surplus (MtC) = Hot Air + Sinks
United States	-	-	-	
Europe	136	20	116	
CANZ	66	30	36	
Japan	35	16	19	
FSU	0	35	0	312
EEE	0	4	0	42
Total	237	105	170	354

No ratification by Russia and Australia

◆ Main assumptions:

- Same as in the Bonn-Marrakech Accords
- No participation of Russia and Australia

No ratification by Russia and Australia : permit price and trade volume

- Decreasing volume of trade (US out, Russia out)
- Similar price as in the Hague missed compromise

Permit Price at equilibrium (\$/tC)	34	Traded Volume (MtC)	96
-------------------------------------	-----------	---------------------	-----------

Countries	<i>Purchasers (MtC)</i>				<i>Sellers (MtC)</i>			
	Required emissions reductions =	Dom. Red. to reach target	+ Imports	+ Sinks	Exports			
					CDM	Dom. Red. for IET / JI	Traded Hot Air	Sinks in EEE and FSU
USA	-	-	-	-	-	-	-	-
Europe	136	45	71	20	-	0	-	-
CANZ	43	8	17	18	-	-	-	-
Japan	35	10	8	16	-	-	-	-
FSU	0	-	-	-	-	-	-	-
EEE	-	-	-	-	-	16	38	3,8
<i>Non-Annex B countries</i>					39			

Trading restricted to European Union (25 countries)

◆ Main assumptions :

- Same as for Bonn-Marrakech case
- Only EU member countries (25) can trade

Trading restricted to European Union : permit price and trade volume

- Lower price and traded volume
- Western Europe import reductions bought from Eastern Europe

Permit Price (\$/tC)	24	Traded Volume (MtC)	83
----------------------	-----------	---------------------	-----------

Countries	<i>Purchasers (MtC)</i>				<i>Sellers (MtC)</i>			
	Required emissions reductions =	Dom. Red. to reach target	+ Imports	+ Sinks	Exports			
					CDM	Dom. Red. for IET / JI	Traded Hot Air	Sinks in EEE and FSU
USA	-	-	-	-	-	-	-	-
Europe	136	33	83	20	-	-	-	-
CANZ	0	-	-	-	-	-	-	-
Japan	0	-	-	-	-	-	-	-
FSU	0	-	-	-	-	-	-	-
EEE	-	-	-	-	-	12	38	3,8
<i>Non-Annex B countries</i>					29			

Comparative total abatement costs (TAC)

- TAC depends on volume of domestic emission reductions, MAC curve shape, volume of trade, permit price
- FSU : main beneficiary of revenues when US is in the game
- Initial Deal/ The Hague MC : impact of sinks on buyers and sellers

Scenario	Initial Deal		The Hague Missed Compromise		No Russian and Australian Ratifications		European Union (25)	
Permit Price (\$/tC)	54		31		34		24	
Countries	Dom. Red. (MtC)	TAC (M95\$)	Dom. Red. (MtC)	TAC (M95\$)	Dom. Red. (MtC)	TAC (M95\$)	Dom. Red. (MtC)	TAC (M95\$)
USA	204	21615	130	12051	-	0	-	0
Europe	67	5413	41	2920	45	3135	33	2410
CANZ	27	2771	16	850	8	718	-	0
Japan	15	1439	10	424	10	449	-	0
FSU	-	-16109	-	-10074	-	0	-	0
EEE	-	-2695	-	-1515	-	-1888	-	-1298

Conclusion (1)

- ◆ Impact of geographical distribution of emissions permits on price and volume of trade
- ◆ Impact of hot air on price and volume traded
- ◆ Consequently, low participation of developing countries through the CDM
- ◆ Complimentarity of US and Russia may explain Russia's current hesitation to ratify KP

Conclusion (2)

- ◆ Further analyses : potential market power of Russia (80 % of Hot Air) if partial “banking” (carry over) of this Hot Air to second commitment period
- ◆ Results are only for CO₂ ; quantitatively dependent on the model (type, Business As Usual assumptions, ...)
- ◆ Simplification of complex flexibility mechanisms for this presentation
- ◆ Case study : theory is far from reality

Want to go further on the issue ?

Further analysis in :

Blanchard O., Criqui P., Kitous A. (2002). *After The Hague, Bonn and Marrakech : the future international market for emissions permits and the issue of hot air.*- Grenoble : IEPE, janvier, 27 p. Cahier de Recherche n° 27bis.

Online at :

<http://www.upmf-grenoble.fr/iepe/textes/Cahier27Angl.pdf>

Appendix on Hot Air (as calculated by POLES)

MtC		1990 level	2010 level (BaU emissions)	Natural Hot Air	Target (2010 objective / 1990 emissions)	<i>Resulting tradable Hot Air</i>	<i>HA not tradable</i>
FSU	Russia/ Ukraine/ Baltic States	816	540	277	100%	277	-
EEE	Poland/ Czech Rep./ Hungary/ Slovakia	174	165	9	106.8%	21	-
	Bulgaria/ Slovenia/ Romania	67	48	19	97%	17	2
Total				305		315	2