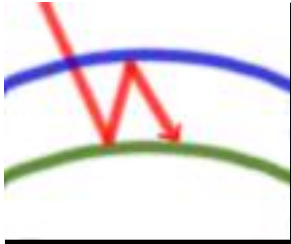


Kyoto Protocol Impact Assessment: Models, Framework & International Experience

Roger Raufer
United Nations DESA
New York
raufer@un.org

Tehran, I.R. of Iran
28 July 2004



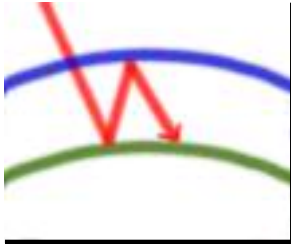
Numerous Modeling Analyses of KP Impacts



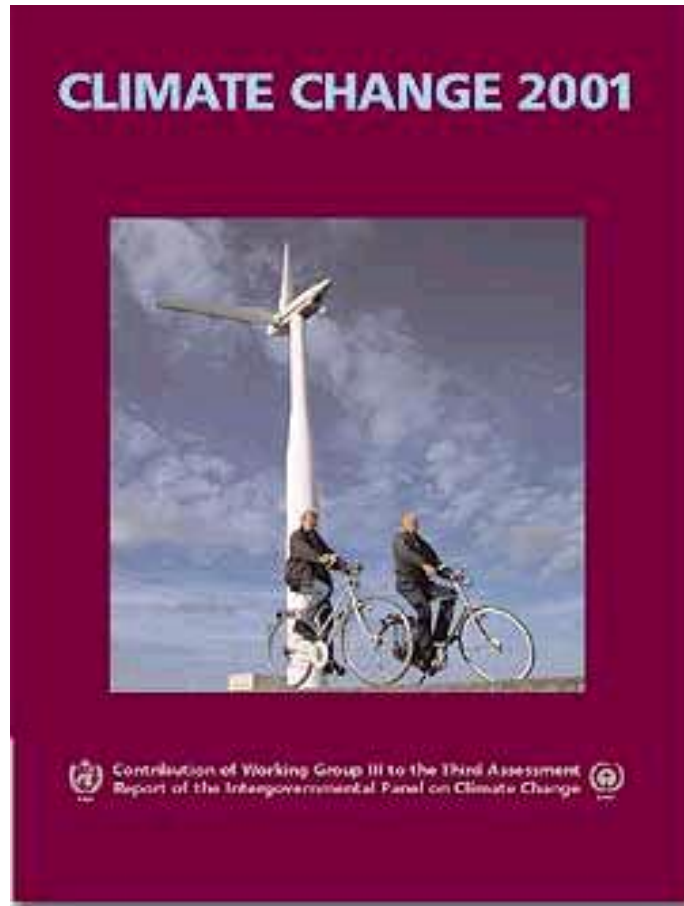
Springer, Sept., 2003; (25 models)



Haites, June, 2004; (21 models)

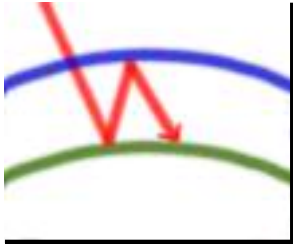


Modeling Analyses within IPCC

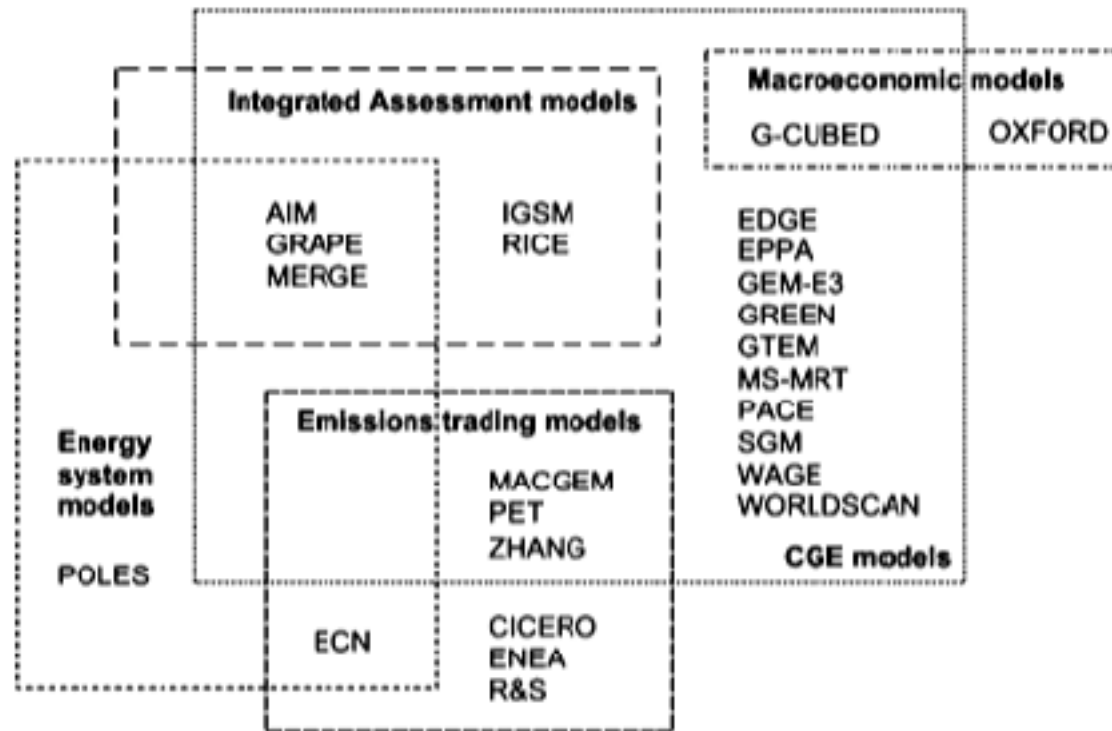


Oil price projections & impacts

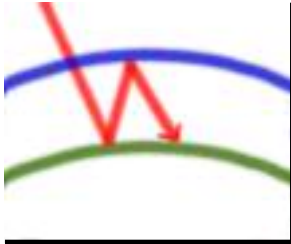
Model ^b	With "global trading"
G-Cubed	-7% oil revenue
GREEN	N/a ^d
GTEM	N/a
MS-MRT	0.36% welfare loss
OPEC Model	-8% OPEC revenue
CLIMOX	N/a



Kyoto Protocol Impact Models



Source: Springer, 2003



KP Framework: A New Type of Regulatory Approach

Engineering

Economics

Goals

EQ Standards

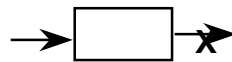
MC – MB

Regulatory Means

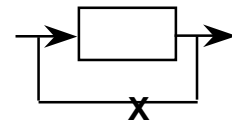
Technology-Based Standards

Economic Mechanisms

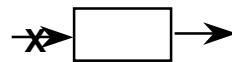
Emission Stds.



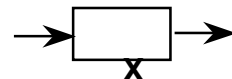
Performance Stds.



Input/Product Stds.

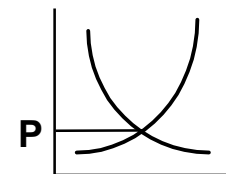


Design Stds.



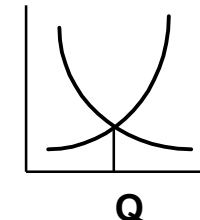
*Pollution Taxes
(Price-based)*

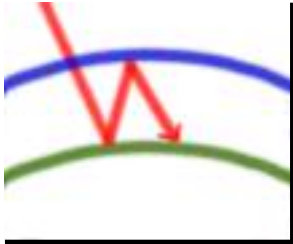
Pigouvian taxation



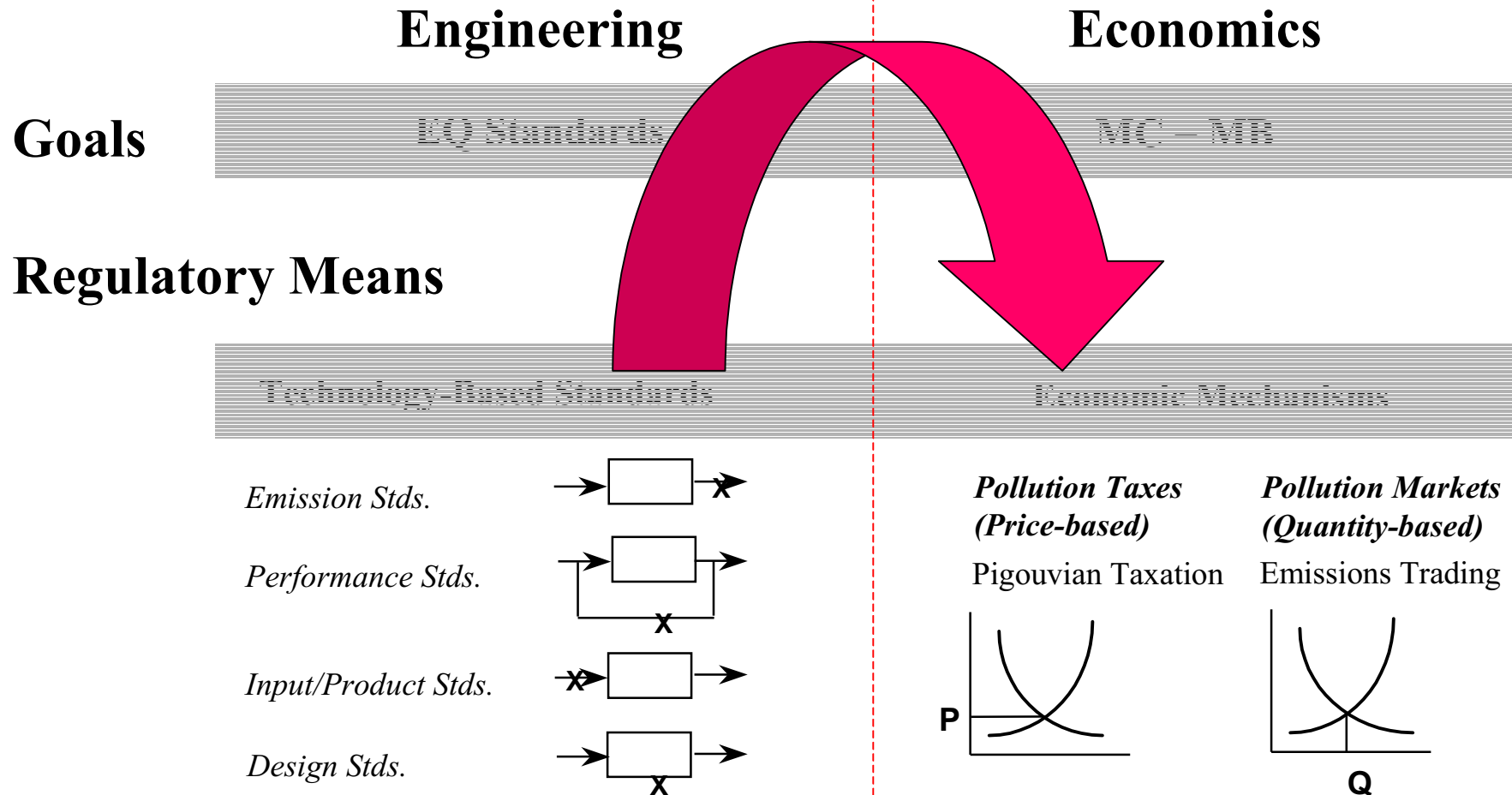
*Pollution Markets
(Quantity-based)*

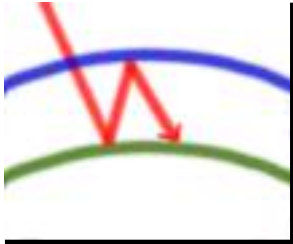
Emissions Trading





Shift #1: Engineering to Economics in Environmental Management





Shift #2: Price to Quantity within Economic Regulatory Means

Engineering

Economics

Goals

EQ Standards

Regulatory Means

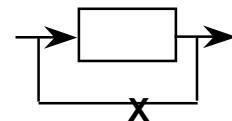
Technology-Based Standards

Economic Mechanisms

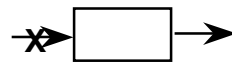
Emission Stds.



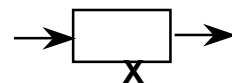
Performance Stds.



Input/Product Stds.

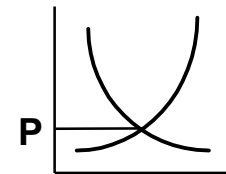


Design Stds.



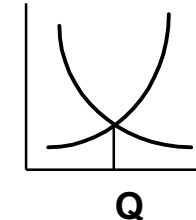
*Pollution Taxes
(Price-based)*

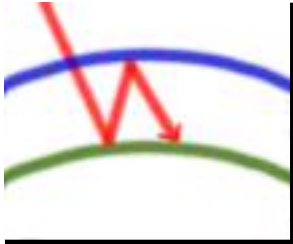
Pigouvian Taxation



*Pollution Markets
(Quantity-based)*

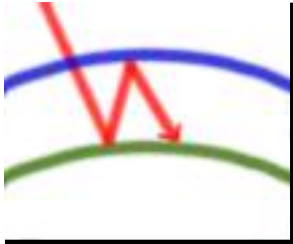
Emissions Trading





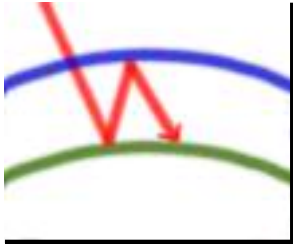
KP Uses a Quantity-Based Regulatory Approach

- **Overall reduction: 5.2% from 1990 baseline**
 - **8% reduction for EU, most Eastern Europe, & Switzerland**
 - **7% reduction for U.S.**
 - **6% reduction for Canada, Hungary, Poland & Japan**
 - **5% reduction for Croatia**
 - **0% (stabilization) for Russia, Ukraine & New Zealand**
 - **Increases for Norway, Iceland and Australia**



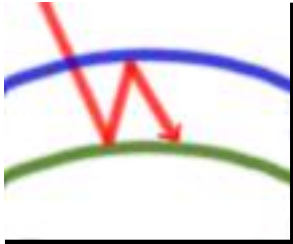
Three Market-Oriented Q-Based “Flexibility Mechanisms”

- **Article 6: Joint Implementation**
 - Transfer of “emission reduction units”
 - Project-based, effective 2008-2012
- **Article 12: Clean Development Mechanism**
 - Transfer of “certified emission reductions”
 - Banked after 2000, used during 2008-2012
- **Article 17: International emissions trading**
 - Transfer of “assigned amount” units
 - Annex I countries, 2008-2012
 - + Post-Marrakesh “removal units”

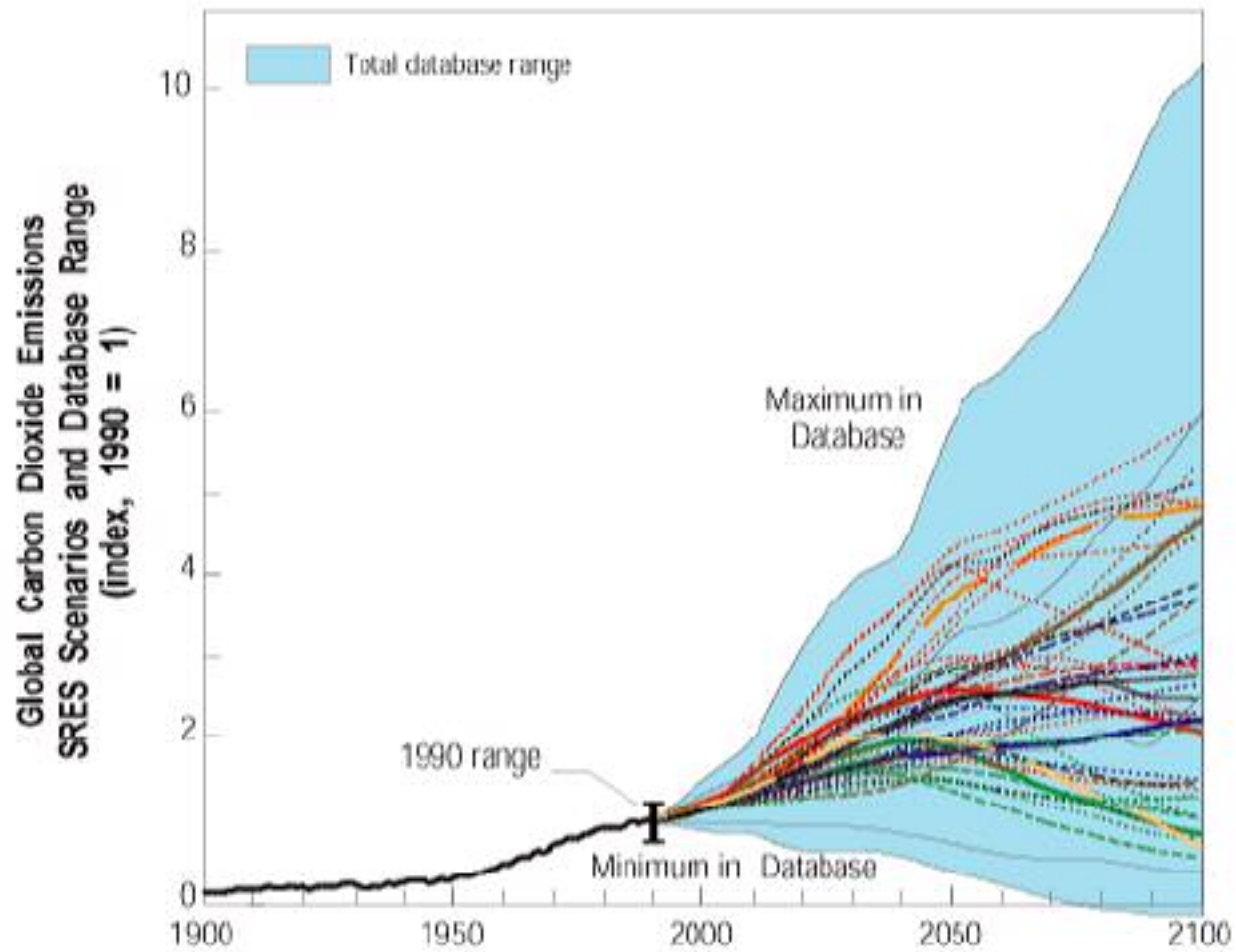


International Experience: Five Key Factors Affecting KP Impact Assessment

- 1. Economic/emissions growth**
- 2. Mitigation strategies employed in Annex I countries**
- 3. Sales of “Hot Air” from Russia & Ukraine**
- 4. CDM market development (especially in China)**
- 5. Post-2012 situation**

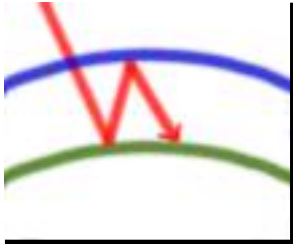


1. Economic/Emissions Growth



Source: IPCC, 2001 (40 emissions scenarios)

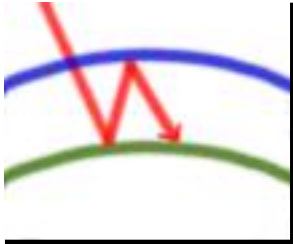
R. Rauber, UN DESA



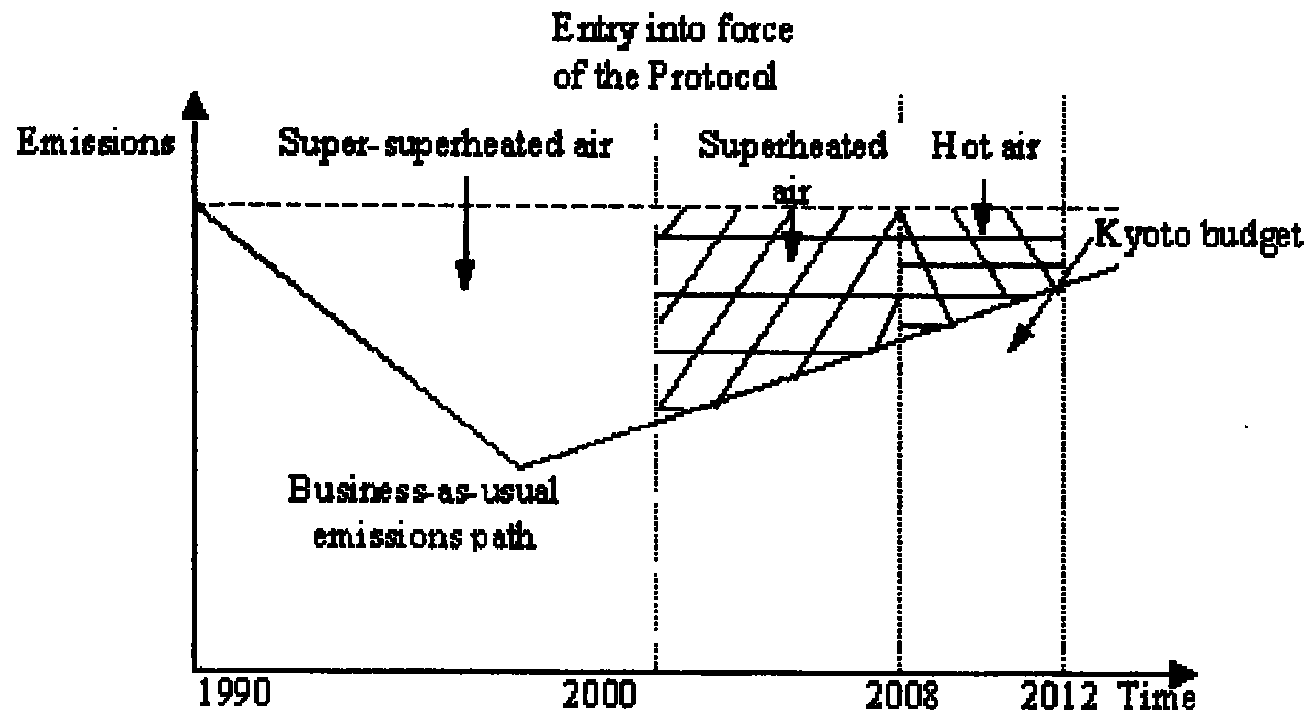
2. Role of Domestic Abatement

KP Mechanism	Market Share (%)
Domestic abatement	29
CDM	32
JI	5
EIT (assumed “hot air” AAUs)	34
Total	100

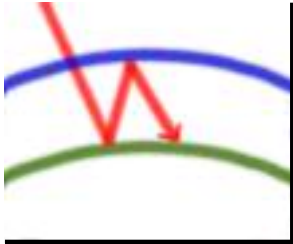
Source: Jotzo & Michaelowa, 2002



3. The “Hot Air” Debate



Source: www.hotair.org

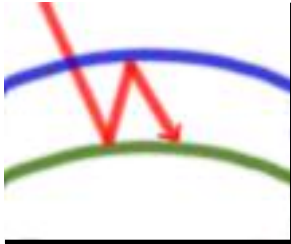


Potential KP Market Prices in 2010 (without U.S.)

- ***Unrestricted “hot air” scenario:***
 - Carbon credit price: \$2.35
 - Range: \$0 to \$13.50

- ***With restricted “hot air”:***
 - Price: \$11.40
 - Range: \$1.00 to \$33.00
 - “Hot air” contribution: 41%
with a range of 10 – 75%

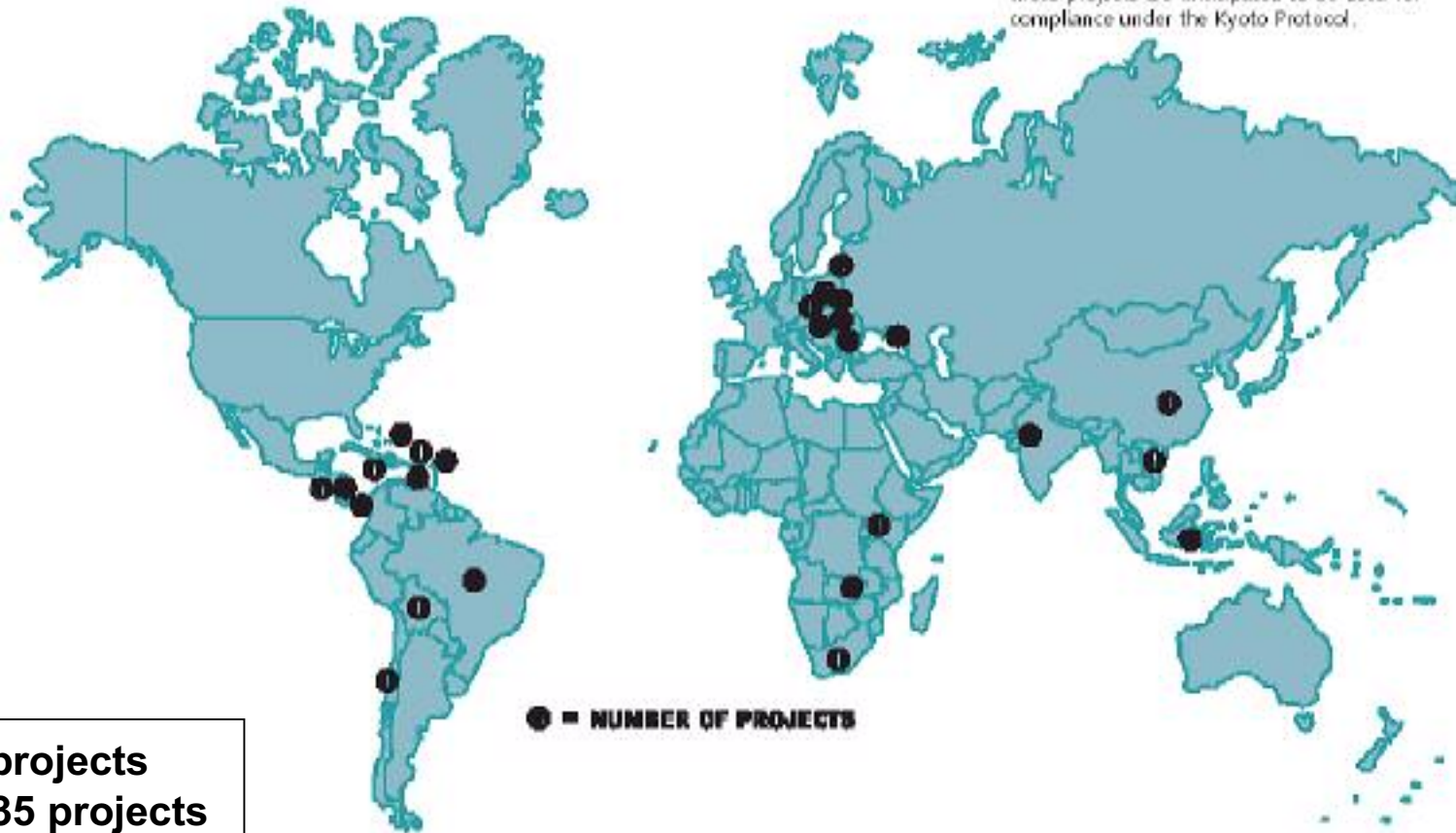
Source: Survey of 21 analyses for WB,
IEA, & IETA by Haites (June, 2004)



4. The development of the CDM Market

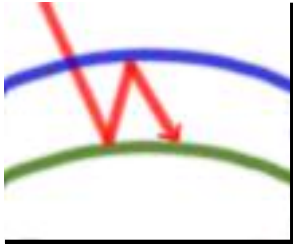
Planned and ongoing JI / CDM Projects

For the projects listed here an emission reduction transfer has been agreed between the host and investing country or multilateral fund. The emission abatement credits achieved through these projects are anticipated to be used for compliance under the Kyoto Protocol.



JI: 17 projects
CDM: 35 projects

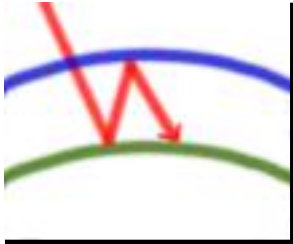
Source: *JI Quarterly*, March '04



Current CDM Market

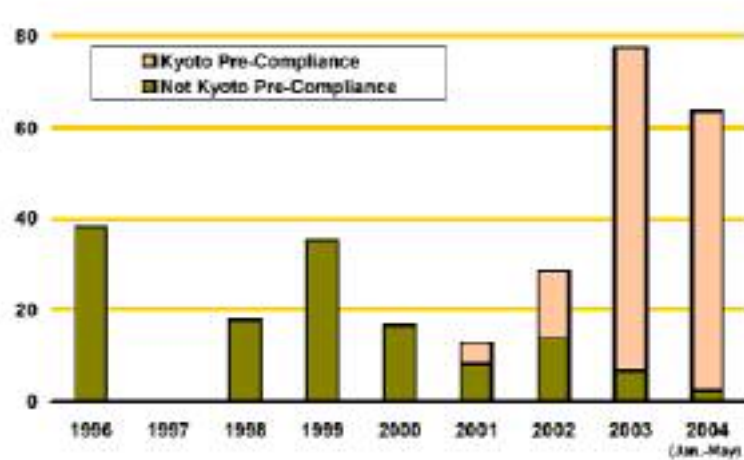
- **160+ CDM activities in 48 countries
(none in Middle East)**
- **450 – 500 CDM project “ideas”**
- **\$800 m now available in carbon funds or
CDM/JI programmes**
- **20 companies applied for DOE status
(18 from Annex I countries)**
- **57 countries have established DNAs**

Sources: OECD, 2004; Haites, 2004; PointCarbon 2003

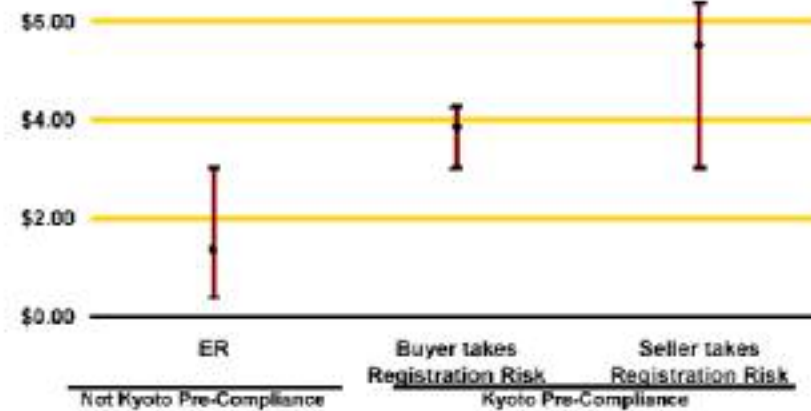


Recent Shifts in the Carbon Market

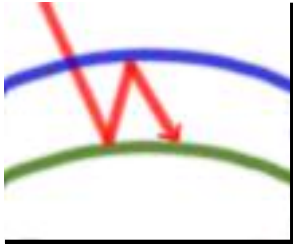
Volume has shifted towards KP
pre-compliance.....



..... and prices have risen accordingly



Source: World Bank; June, 2004



Current Supply & Demand in the KP Carbon Market (2003 - 2004)

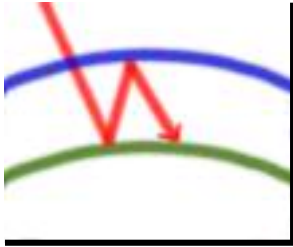
Supply

- **Asia (51%)**
- **Latin America (27%)**
- **Transition economies (8%)**
- **Three countries (India, Brazil and Chile)
sold more than half of the credits**

Demand

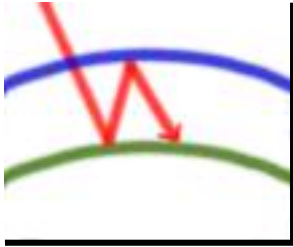
- **Japan (41%; mostly private sector)**
- **World Bank (24%; PCF & CDCF)**
- **Netherlands (23%; mostly government)**

Source: World Bank; June, 2004



5. Post-2012 Situation?

- **CDM only applicable for 1st commitment period (2008-2012)**
- **CERs after 2012 being created, but currently have limited market value**
- **Multi-year lead time necessary for major projects... so new projects must begin now!**
- **Will CDM Executive Board be able to handle a forthcoming “approval crunch”?**
- **What happens in next commitment period?**



The Future

- **123 nations have ratified (meets 55 nation criteria)**
- **44.2% of 1990 emissions have ratified (needs 55%)**
- **Needs Russia (~17%)**
 - **EU WTO concessions**
 - **Ratification at COP 10 in December?**
- **Future KP market development?**
- **A U.S./China parallel KP?**
- **KP structure in future commitment periods?**
- **KP market development for OPEC and I.R. Iran?**