



PREMIER MINISTRE



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## La valeur tutélaire du carbone

Rapport de la commission  
présidée par Alain QUINET

Rapports et documents

# Le Rapport Quinet

## Outline:

1-Presentation of the report

2-Methodology

3-Results

4-Feasibility of the commission's recommendations

# *Presentation of the report*

○ The object of the Quinet report is to **propose a new carbon value trajectory** that fulfils the European Union's ambition of global warming limitation.

○ It was commanded by the prime minister at the beginning of 2008.

The executive commission was formed by the CAS (centre d'analyse strategique). It is composed of economists from ministries, universities, the CNRS, IEA, OECD and of representatives of environmental organizations.

○ Potential uses of the carbon value:

- A reference for evaluating the environmental cost of public projects.
- An instrument to assess efficiency of public policies.
- A reference for calibrating emissions regulation devices.
- A signal to orient firms' choices of R&D investments.

# *Presentation of the report*

## ○ **The European Union's objective:**

In 2007 the European Union committed to target a limitation of global warming to 2 °C since the pre-industrial situation.

According to the IPCC's projections, this objective corresponds to a limitation of GHG concentration to 450ppme, requiring a division by 2 of global emissions by 2050.

## ○ **Emission reductions should pursue the following timing:**

- A reduction of 20% of own Co2 emissions by 2020 under 1990 level.
- A reduction of 60 of own emissions by 2050; 80% considering developed and developing countries will have join Europe by then.

# Methodology

## ○ Two types of approaches to define a carbon value:

- The **cost/advantage** approach used by Stern:

the marginal abatement cost is equalized to the actualized sum of future damages caused by a ton of Co<sub>2</sub> today.

- In the **cost/efficiency** approach : the carbon value corresponds to the cost of reducing the last ton of Co<sub>2</sub> emission to reach a certain level of emission.

# Methodology

- They use a same reference scenario to run different models based on different hypothesis. They end up with a range of carbon values over time, computed to respect the timing in emission reductions. Relying on these results **they recommend a unique carbon value path** which is a combination of obtained results from simulations.
- The reference scenario is base on IEA (World Energy Outlook) for values of GDP, fossil fuels prices, economic growth projections etc.

# Methodology

## ○ Principles followed to insure **Social and Economic efficiency** :

- A unique tutelary value  $\Leftrightarrow$  cost minimizing solution.
- The path of the carbon value follows **the Hotelling rule**: it increases at the discount rate which is assimilated to a scarcity rent.
- The commission uses **the public discount rate set by the report Lebègue of 4%** as the growth rate of the carbon value. Back to the Boiteux report the public discount rate used was equal to 8%, while the growth of the carbon value was of 3%, thus the carbon value was squashed over time.  
→The commission reckons that the chosen growth rate is arguable rather we are pessimistic or optimistic.

# *Models:*

Brief presentation of the tree models used:

→ **POLES, GEMINI-E3 and IMAGIN-R.**

- **POLES:** It is a global model that simulates the energy system in partial equilibrium. Technology progress is endogenous.
- **GEMINI-E3:** Macroeconomic, general equilibrium model.
- **IMACLIM-R:** It is a hybrid model, combining a general equilibrium model and with precise description of energy sectors.



Tableau n° 20 : Récapitulation des valeurs carbone (2008) des différents modèles  
par date et par scénario (€/tCO<sub>2</sub>, \$/b)

	Scénario Europe Seule UE €/tCO <sub>2</sub>	Scénario coordonné - 550 ppme €/tCO <sub>2</sub>	Scénario mondial volontariste - 450 ppme €/tCO <sub>2</sub>	Prix pétrole \$/b
<b>En 2010</b>				
POLES	10			
GEMINI-E3	1			
IMACLIM-R	45			
Moyenne	19			
Valeur tutélaire Boiteux	32			
<b>En 2020</b>				
POLES	26	9	16	79
GEMINI-E3	25	4	13	57
IMACLIM-R	95	30	100	93
Moyenne	49	14	43	76
Valeur tutélaire Boiteux		43		41
<b>En 2030</b>				
POLES	97	23	57	96
GEMINI-E3	58	10	42	62
IMACLIM-R	150	55	160	94
Moyenne	102	29	86	84
Valeur tutélaire Boiteux		58		50
<b>En 2050</b>				
POLES	319	85	682	130
GEMINI-E3	446	62	339	60
IMACLIM-R	130	60	200	114
Moyenne	298	69	407	101
Valeur tutélaire Boiteux		104		74

Source : modèles POLE, IMACLIM, GEMINI-E3

# Results:

- Carbon value must be set at **100 euro** per ton of Co<sub>2</sub> by 2030.
  - After 2030 the carbon value will grow at the public discount rate (4%), which means in 2050 the ton of Co<sub>2</sub> will cost **200 euro**.
- **Two alternative scenarios are proposed for the 2010-2030 period:**
- Applying the Hotelling rule “backward”, which leads to a value of **45 euro** per ton in 2010 in order to reach 100 euro in 2030.
  - Start from the Boiteux value in 2010 of 32 euro, and deviating from the Hotelling rule to catch up with the value of 100 euro in 2030 (5,8%).
- ➡ Selected option.

# Results:

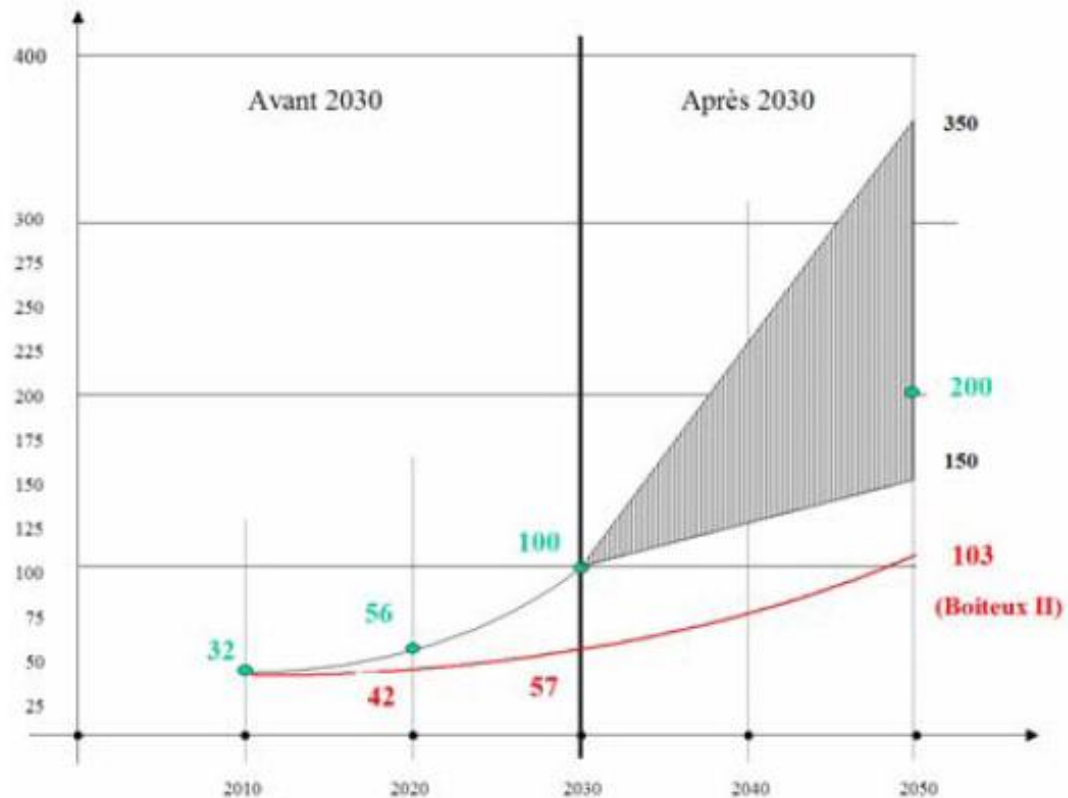
Tableau n° 1 : Valeur tutélaire d'une tonne de CO<sub>2</sub>  
(en euros 2008)<sup>1</sup>

	2010	2020	2030	2050
Valeur recommandée	32	56	100	200 (150-350)
Valeur actuelle (Valeur « Boiteux »)	32 <sup>(1)</sup>	43	58	104

Source : Centre d'analyse stratégique

# Results:

Graphique n° 16 : La valeur du CO<sub>2</sub> recommandée par la commission



Source : Centre d'analyse stratégique

# Results:

## ○ Relation between the price of carbon and of fossil fuels:

In the Cost/efficiency approach there is a principle of substitutability between the value of carbon and of the aggregated price of fossil fuels (gas, oil and coal). However the commission recommends not to link the value of carbon to the value of fossil fuels as:

- An aggregate price would not permit to control for substitution in the use of fuels. An increase in aggregate price can be due to oil price while coal is cheap. Thus lowering carbon price would conduct to a higher use of coal which is more polluting than oil.
- In time of growth, fossil fuels price will increase with global demand increase, thus carbon value should increase to maintain low emissions.
- A transitory decline in fossil fuels price would modify the carbon value trajectory.

**The commission considers that carbon values proposed are acceptable for a petrol price between 50 and 100 euro per barrel and for a coal price between 60 and 120 euro per ton.**

# *Feasibility of the commission's recommendations*

- According to IPCC avoiding a 2°C increase in global temperature would require a 25-40% reduction of industrialized countries' emissions by 2020.
- The 189 States that have signed the United Nations convention on climatic change haven't managed to agree on a long-term quantitative objective of GHG atmospheric concentration yet.
- **Unsolved diplomatic issues:** From the **Kyoto protocol** attempt, we know that obtaining the commitment of all developed and developing or at least the more polluting ones are key issues.  
→ Uncertainty on partner's positions, heterogeneity of preference, or asymmetry of cost and benefits of global warming leads to free rider behaviours.

# *Feasibility of the commission's recommendations*

## **Other issues:**

- A unique world price doesn't seem feasible:
  - Countries have different reduction objectives
  - Sectors have different abatement costs
  - The more appropriate tool is not always the same

**Tableau n° 6 : Les prix annuels moyens de la tonne de CO<sub>2</sub>  
sur le marché européen**

	2005	2006	2007
<b>Quota au comptant (<i>spot</i>) - pour la phase I (2005-2007)</b>	22,79 €	17,64 €	0,66 €
<b>Contrats à terme (<i>futures</i>) – phase II (2008-2012)</b>			
- livraison fin 2008	21,78 €	20,49 €	19,57 €
- livraison fin 2012	22,26 €	22,60 €	21,65 €

*Source : Mission Climat de la Caisse des dépôts*

**Tableau n° 7 : Prévisions du prix du CO<sub>2</sub> sur le marché *ETS*  
(en euros par tonne)**

	2012	2020
<b>Commission européenne</b>		39,00
<b>Fortis</b>	37,50	
<b>Société générale</b>	35,00	
<b>Deutsche Bank</b>	35,00	
<b>UBS</b>	32,50	
<b>ICF</b>	32,50	45,00

*Source : Caisse des dépôts, Mission Climat*