

Scientific and methodological aspects of the Brazilian proposal

Background paper

UNFCCC secretariat

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Introduction

The original Brazilian proposal (FCCC/AGBM/1997/MISC.1/Add.3) presented an approach for distributing the burden of emission reductions among Annex I Parties based on the effect of cumulative historical emissions from 1840 on the global-average surface temperature. It contained a proposed emission reduction target for Annex I Parties of 30 per cent by 2020 based on 1990 levels. The original proposal also contained a penalty mechanism called the 'clean development fund' which was to be sustained by requiring non-complying Annex I Parties to pay 10US\$ for every ton of carbon above the target. The money was to be used to fund projects in non-Annex I countries. The distribution of funds was originally proposed to be proportional to the impact of the non-Annex I Party on the global-average surface temperature. (See annex I)

The portion of the proposal referring to a clean development fund has been overtaken by decisions taken at COP 3 (1997), in particular, the provision for a clean development mechanism as defined in Article 12 of the Kyoto Protocol, that Protocol's Annex B and decision 1/CP.3 on the adoption of the Kyoto Protocol.

The SBSTA (1999) requested the secretariat to coordinate a review of the scientific and methodological aspects of the Brazilian proposal by experts selected from the roster of experts and from the IPCC, to be completed in time for its fourteenth session. It requested the secretariat to also make the information provided by the experts available on its web site. (See annex I and annex II)

July 1997	Brazil makes proposal during AGBM7
Dec 1997	COP3 refers scientific and methodological aspects to SBSTA, it notes that the aspect related to a fund was subsumed by the CDM
Nov 1998	Brazil provides revised version of their model
Nov 1998	Side event on the margins of COP4 organized by Brazil
May 1999	Expert meeting on the proposal held in, and organized by, Brazil
Nov 1999	SBSTA11 decides to review the proposal by SBSTA14 (June 2001)

Objectives for the expert meeting:

- Identify issues related to the scientific and methodological aspects of the Brazilian Proposal that need further consideration
- Identify relevant information from the IPCC and other sources and how such information could be used
- Identify, what activities could be undertaken by the SBSTA and how the activities could be organised, including the participation of international institutions
- Develop a report for consideration by the SBSTA

Scientific and methodological issues that may need consideration (see also annex III)

- What variable/parameter could be used as a measure of the effect of emissions on climate change? Current emissions? Cumulative historical emissions? Additional concentration levels induced by emissions? Radiative forcing induced by additional concentration levels? Global mean surface temperature increase? Rate of temperature change? Sea level rise?
- Could this parameter be used to attribute portions of climate change to specific greenhouse gases or countries?
- Does the “policy maker model” proposed by Brazil, which describes the impact of cumulative greenhouse gas emissions on the global mean surface temperature, accurately reflect this impact? Which degree of accuracy is needed for this purpose?
 - Which emission sources and gases should be included?
 - Which date should be considered as a starting point? E.g. 1840 or 1990?
 - What are appropriate data sources for historical emissions?
 - Should lifetimes of the gases in the atmosphere be considered time-dependant? (Terrestrial carbon cycle, CO₂ fertilisation, temperature feedback, dependence on OH concentration)
 - Is it reasonable to assume that the temperature increase at a point in time is a reflection of all emissions before that point in time, even though part of the effect of those emissions on the temperature will only occur *after* that point in time?
 - Should saturation of absorption bands be considered, thus differentiating between early and late emitters, or could the radiative forcing be considered proportional to the concentration?
 - Should the delayed reaction of the climate system to radiative forcing be considered? If so, how? Should a time-dependant climate sensitivity be assumed?
- What other models or approaches should be considered? What are they designed to do? What are their advantages and disadvantages?
- How can different models or approaches, including their outputs be evaluated? What criteria should be used to assess the models and approaches? What reference year and time periods should be used in an evaluation?
- What could be the scientific basis for the determination of an “overall effective emission reduction target”. For example: atmospheric concentrations, radiative forcing, global or regional temperatures? Could such a long term goal be broken into short term intervals?

Sources of some relevant information in the IPCC Third Assessment Report

- WG1 chapters 3 and 4 include new information on the carbon cycle and the lifetimes of GHGs.
- WG1 chapter 6 includes new information on radiative forcing and on climate sensitivity.

Output:

- Report of the expert meeting for consideration at the fourteenth session of the SBSTA.

Annex I

The original Brazilian proposal (FCCC/AGBM/1997/MISC.1/Add.3)

Part I: *Executive summary (3p)*

Part II: *Proposed text for a Protocol (2p)*

Introduce “effective emissions” as impact of emissions on global-average surface temperature. Establish reference (1990 levels) and ceiling (1990 level minus 30% in 2010) for all Annex I. Distribute the burden to reduce emissions and to reach the ceiling among Annex I Parties proportional to their impact on temperature.

Part III: *Explanation of the proposal (48p)*

1. Introduction
 2. Differentiation of commitments
 3. Relationship between emissions and climate change
 4. An overall effective emission reduction target for the ensemble of Annex I Parties
 5. The relative responsibility of Annex I Parties
 6. Relative responsibility of the group of Annex I and non-Annex I Parties
 7. Sharing the burden of mitigation among Annex I Parties (example calculations)
 8. Compensation mechanism
 9. Distribution of the financial resources of the non-Annex I Clean Development Fund
- Appendix I: Policy maker model (describing relationship between emissions and temperature increase mathematically)
Appendix II: Historical data used
Appendix III: Simulation of different targets
Appendix IV: Estimation of relative responsibility of individual Annex I Parties

Updated proposal (Jan 2000, Brazilian web site)

The updated proposal “Note on the time dependant relationship between emissions of greenhouse gases and climate change” expands the Appendix I of the original proposal, adding new components to the formulas to more accurately reflect the climate system, but also retaining the simple version, the “policy maker model”, as “the Brazilian proposal”. In addition, it includes a discussion of the concept of global warming potentials (GWPs).

Annex II

DECISIONS BY THE COP AND CONCLUSIONS BY THE SBSTA RELATED TO THE SCIENTIFIC AND METHODOLOGICAL ASPECTS OF THE PROPOSAL BY BRAZIL

Report of COP3 (FCCC/CP/1997/7)

F. Other matters relating to implementation

(Agenda item 3 (f))

69. At its 5th plenary meeting, on 5 December, the Conference of the Parties, on the proposal of the President, decided that the proposal presented by Brazil in document FCCC/AGBM/1997/MISC.1/Add.3 should be referred to the SBSTA for its advice regarding the methodological and scientific aspects. It authorized the SBSTA to seek inputs, as appropriate, from its roster of experts and from the IPCC, and requested it to make its advice available to the Conference of the Parties at its fourth session. The representative of Brazil made a statement in connection with that decision.

Report of SBSTA 8 (FCCC/SBSTA/1998/6)

D. Scientific and methodological aspects of the proposal by Brazil

(Agenda item 6 (d))

1. Proceedings

49. The SBSTA considered this sub-item at its 7th and 11th meetings, on 5 and 11 June, respectively. It had before it document FCCC/AGBM/1997/MISC.1/Add.3.

50. Statements were made by representatives of six Parties, including one speaking on behalf of the European Community and its member States. A statement was also made by the representative of a non-governmental organization.

2. Conclusions

51. At its 11th meeting, having considered a proposal by the Chairman, the SBSTA adopted the following conclusions:

(a) The SBSTA recalled that the Conference of the Parties, at its third session, decided that the proposal presented by Brazil in document FCCC/AGBM/1997/MISC.1/Add.3 should be referred to the SBSTA for advice regarding its methodological and scientific aspects (see FCCC/CP/1997/7/Add.1, section III.3);

(b) The SBSTA noted that the portion of that proposal referring to a clean development fund had now been overtaken by decisions taken at COP 3, in particular, the provision for a clean development mechanism as defined in Article 12 of the Kyoto Protocol, that Protocol's Annex B and decision 1/CP.3 on the adoption of the Kyoto Protocol;

(c) The SBSTA recognized that there were a number of methodological and scientific issues raised by the remainder of the proposal and that these were still being investigated by scientists in several countries. The SBSTA welcomed the offer by the delegation of Brazil to host a workshop to further the understanding of the methodological and scientific aspects of the remainder of the proposal and invited that delegation to report back to the SBSTA, at its ninth session, on the workshop.

D. Scientific and methodological aspects of the proposal by Brazil

(Agenda item 4 (h) (ii) of the Conference of the Parties)

1. Proceedings

27. The SBSTA considered this matter at its 2nd and 8th meetings, on 3 and 9 November, respectively.
28. Statements were made by representatives of eight Parties, including one speaking on behalf of the European Community and its member States.

2. Conclusions

29. At its 8th meeting, on 9 November, the SBSTA adopted the following conclusions:

(a) The SBSTA noted the information provided by Brazil on recent scientific activities and on the workshop to be organized regarding the proposal presented by Brazil in document FCCC/AGBM/1997/MISC.1/Add.3. The SBSTA also noted the potential contribution of other relevant analyses to increase understanding of the methodological and scientific aspects of this proposal. The SBSTA invited the delegation of Brazil to inform the SBSTA at its tenth session of the results of its workshop and provide it with other relevant information;

(b) The SBSTA decided to further consider at its tenth session the scientific and methodological aspects of the proposal by Brazil.

II. ORGANIZATIONAL MATTERS

(Agenda item 2)

A. Adoption of the agenda

(Agenda item 2 (a))

[...]

6. The Chairman noted that, following consultations with the Bureau of COP 4, the provisional agenda did not include items on: the impact of single projects on emissions in the commitment period; and the scientific and methodological aspects of the proposal by Brazil. Consideration of these two items would be deferred until SBSTA 11, and they had also been included in the list of elements for the COP 5 provisional agenda. The Chairman drew the attention of Parties to document FCCC/SBSTA/1999/MISC.3 and Add.1 and Corr.1 on the impact of single projects on emissions in the commitment period, noting that Parties might wish to use that document to prepare for their discussions at SBSTA 11. Statements regarding the provisional agenda were made by representatives of four Parties.

E. Scientific and methodological aspects of the proposal by Brazil

(Agenda item 9 (e))

1. Proceedings

61. The SBSTA considered this sub-item at its 6th and 10th meetings, on 27 October and 1 November, respectively.

62. Statements were made by representatives of 12 Parties, including one speaking on behalf of the European Community and its member States.

2. Conclusions

63. At its 10th meeting, on 1 November, having considered a proposal by the Chairman, the SBSTA adopted the following conclusions:

(a) The SBSTA took note of the information provided by the delegation of Brazil, including a revised version¹ of the methodology originally proposed in document FCCC/AGBM/1997/MISC.1/Add.3. The SBSTA commended Brazil for its work on this subject. The SBSTA also noted that the IPCC Third Assessment Report is likely to contain the best available information related to the values of the parameters and other material relevant to the assessment of the proposal. It also noted the need for further scientific analyses;

(b) The SBSTA requested the secretariat to coordinate a review of this proposal by experts selected from the roster of experts, to be completed in time for its fourteenth session. It requested the secretariat to also make the information provided by the experts available on its web site;

(c) The SBSTA invited the delegation of Brazil and other Parties to send to the secretariat information on the scientific and methodological aspects of, and related information on, the Brazilian proposal and requested the secretariat to make this information available on its web site for use by experts; and

(d) The SBSTA decided to consider any new information on the scientific and methodological aspects of the Brazilian proposal at subsequent sessions, as appropriate.

¹ The revised version of the proposal, entitled: "Note on the time-dependent relationship between emissions of greenhouse gases and climate change", will be available on the official Brazilian web site: <http://www.mct.gov.br/clima>. Hard copies may be obtained from: Ministério da Ciência e Tecnologia, Gabinete do Ministro, Esplanada dos Ministérios, Bloco E - 3 Andar - Sala 398, 70067-900 Brasília, Brazil.

Annex III

Evolution of discussions at past meetings and in publications on the Brazilian proposal (on mathematical relation between emissions and global-average surface temperature increase)

	Original Brazilian proposal (July 1997)	Updated Brazilian proposal (November 1998)	Possible improvement mentioned at meetings and in publications	Impact on relative contribution
Emissions to concentrations	Only CO ₂ from energy and cement production	Applicable to all gases and sources	Other data sources for historical emissions	- "Serious problem" (meeting report) - Decreasing with time (Den Elzen)
			Include forestry sector in analysis	Large (Den Elzen)
			Include CH ₄ , N ₂ O, and other GHGs in analysis	Large (Den Elzen)
			Include aerosols in analysis	Not quantified (Enting)
CO₂	Only oceanic sink, no terrestrial cycle, linear	Only oceanic sink, no terrestrial cycle, linear	Also terrestrial cycle, incl. CO ₂ fertilisation and temperature feedback, therefore non-linear	- CO ₂ fertilisation could be assumed linear (meeting report) - Very small (Den Elzen)
CH₄	Not included	Constant CH ₄ lifetime assumed	Time dependant (CH ₄ and OH concentrations relevant)	- Not quantified (meeting report) - Small (Den Elzen)
Concentrations to radiative forcing	Linear	Linear	Saturation in certain absorption bands, sometimes overlapping between gases	- Not quantified (Meeting report) - Medium (Den Elzen)
Radiative forcing to temperature increase	Time dependence of the climate system neglected. Temperature increase is assumed proportional to the integral over radiative forcing	Twofold impulse response function with constant climate sensitivity	-Parameters used differ largely from those used in other models, Brazilian parameters show slowest response. -Time dependant climate sensitivity possible (increasing or decreasing)	- Slow climate response, impact not quantified (meeting report) - Small / Medium (Den Elzen)
Temperature increase to sea level rise	Not included	Included	Can be approximated by temperature increase (meeting report)	- Not quantified (meeting report)
Radiative forcing to rate of temperature change	Not included	Not included	Possible, but further study needed (meeting report)	Large (fast increasing emissions have larger share) (Den Elzen)

Publications considered:

- Den Elzen et al, "The Brazilian proposal and other options for international burden sharing: an evaluation of methodological and policy aspects using the fair model", Report no. 410200029 (1999), includes two reports of meetings on the Brazilian proposal
- Den Elzen et al, "Evaluating major scientific uncertainties of the Brazilian proposal for emission burden sharing", Report No 728001012, July 2000
- Enting, "Attribution of greenhouse gas emissions, concentrations and radiative forcing", CSIRO Atmospheric Research Technical Paper no. 38