

NATIONAL SCIENCE FOUNDATION
WASHINGTON D.C. 20550

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OFFICE OF THE
DEPUTY DIRECTOR

July 5, 1990

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Dear Bert:

My congratulations on the careful and thoughtful effort you have put into drafting both the IPCC executive summary and the overview and conclusions. I suspect that the meeting in Geneva was a useful preview for what to expect in Sundsvall! The draft documents that we recently received from the Secretariat incorporate many of the comments that the Drafting Committee raised in our meeting. We hope that careful consideration of the comments made in this additional iteration on the draft will save time and expedite consensus in the August plenary.

We have reviewed the draft documents as thoroughly as the tight deadline permits and offer both a reworked executive summary and detailed comments on the overview and conclusions. Some of the items in the enclosures reflect concerns about tone or policy implications and will require that substantive revisions be made, while others address typographical or stylistic problems which should improve readability and facilitate discussions in Sundsvall.

As you know, these documents will be used by ministers and heads of state to establish global policy on climate change and therefore they must be clear and convincing and flow logically for the lay reader. As I am sure you also realize, the documents still suffer from some redundancies and organizational problems, in large part a consequence of the Geneva additions and changes. In addition, the documents generally could use a thorough English-language editing to sharpen the meaning, improve readability, and avoid problems in translation. To try to assist in this editorial process, we have offered extensive suggested revisions in the enclosures.

The primary purpose of this letter, however, is to highlight our key concerns and suggestions which warrant your attention. It is essential that the plenary documents clearly distinguish between what is known and what is projected or hypothesized. This was

the task mandated to the IPCC. The three Working Groups have labored to strike a balance; that balance must be reflected in the plenary reports.

EXECUTIVE SUMMARY

The executive summary must contain a careful statement acknowledging the significant uncertainties inherent in the underlying science. Our reworked executive summary contains the following statement regarding uncertainties, taken from page 2 of the WG I Policymakers Summary:

There are many uncertainties in our predictions particularly with regard to the timing, magnitude and regional patterns of climate change, due to our incomplete understanding of the sources and sinks of greenhouse gases, clouds, oceans, and polar ice sheets.

The executive summary must strike a balance in its treatment of observed warming over the past 100 years and of the predicted warming. This can be accomplished by including the statement contained in the WG I Policymakers Summary (p. 30, last paragraph), as follows:

The size of the warming over the last century is broadly consistent with the predictions of climate models, but is also the same magnitude as natural climate variability. If the sole cause of the observed warming were the human-made greenhouse effect, then the implied climate sensitivity would be near the lower end of the range inferred from the models. The observed increase could be largely due to natural variability; alternatively this variability and other human-made factors could have offset a still larger human-made greenhouse warming.

There must be a more balanced presentation in the science summary of natural versus anthropogenic fluxes of greenhouse gases, notably CO₂. As I mentioned in Geneva, we should not be afraid to place the entire story before the reader, especially since it may become essential to consider what steps might be taken to modify the "natural" CO₂ cycle, should the situation turn out to be more serious even than we now expect. This can be done by including the following short paragraph:

While the annual anthropogenic emissions of carbon dioxide are only about 4 percent of the total annual exchange of carbon dioxide by natural processes, they have been large enough to modify significantly the natural balance since pre-industrial times. Stabilization of atmospheric carbon dioxide concentrations can be achieved by either a 60-80% reduction in anthropogenic emissions, or an increase in natural sinks by 2-3%.

OVERVIEW AND CONCLUSIONS

Scenarios

The Emission Scenarios A-D should be defined in a separate section at the beginning of the document. The explanation of how they were formulated should be taken from the WG III Policymakers Summary, Section 3.1. For example, for Scenario A:

Scenario A assumes that few or no steps are taken to limit greenhouse gas emissions. Energy use and clearing of tropical forest and the amount of biomass per hectare are low and fossil fuels, in particular coal, remain the world's primary energy source. The Montreal Protocol comes into effect but without strengthening and with less than 100 percent compliance. Under this scenario, the equivalent of a doubling of pre-industrial CO₂ levels occurs, according to WG I, by around 2025.

The Business-as-Usual Scenario should be called Scenario A. At a minimum the designation should be "Scenario A (Business as Usual)."

Similarly, the Reference Scenario should be explained with regard to its purpose, with clarification that it is a scenario and not a plan, and reference made to the data on which it is based. The language should be drawn from the WG III Policymakers Summary, section 3.2.

Greenhouse Gases

This draft continues to focus on CO₂ to the virtual exclusion of other greenhouse gases, notably methane, so that the reader is left with the impression that CO₂ reduction on the anthropogenic side, and reforestation on the natural side, are the only real options to consider. This does not reflect the conclusions of the AFOS report of WG III. To balance the presentation, lines 21 through 34 on page 17 need to be replaced with the following:

Because the sources of other greenhouse gases, most notably methane, but also including nitrous oxide and ozone, are diverse and the quantitative importance of each of their sources is not well known at present, emissions reductions may prove difficult to achieve and the effectiveness of different control strategies may be hard to evaluate.

Methane emissions arise primarily from agricultural, energy and waste management activities. Control strategies may include improved agricultural practices; use of low-emitting rice strains; and prevention, or recapture for energy recovery, of emissions from mine shafts, pipelines, and landfills.

Natural Sources and Sinks of Greenhouse Gases

As stated earlier, the document must more explicitly discuss the natural sources and sinks of carbon dioxide, and uncertainties associated with the anthropogenic fluxes. The section (page 4, lines 22 to 30) needs to be expanded. This can most easily be accomplished by using Figure 1 (carbon cycle) on page 8 from Section 1 of the IPCC WG I scientific assessment, and the following text:

The anthropogenic flux of carbon dioxide is about 6 Gt C per year from the combustion of fossil fuels, plus an additional 0.6 - 2.5 Gt C per year associated with tropical deforestation and changing land-use. These fluxes are much smaller than the natural exchange fluxes (about 200 Gt C per year) which occur between the atmosphere and the terrestrial biota and between the atmosphere and the oceans (Figure 1). However, while the anthropogenic fluxes are much smaller than the natural fluxes, they have been large enough to modify significantly the natural balance since pre-industrial times. [Footnote: Scientific evidence for the anthropogenic character of these changes is noted in the Policymakers Summary of Working Group I. (Cite proper page and paragraph.)] Stabilization of atmospheric carbon dioxide can be achieved by a 60-80% decrease in the anthropogenic emissions of carbon dioxide or by an increase of about 2-3% in the natural sinks of carbon dioxide.

Comprehensive Approach

There must be further mention of the comprehensive approach to any possible solutions to the greenhouse gas problem. All greenhouse gases whose atmospheric concentrations are increasing should be considered together. This can be done through the concept of greenhouse warming potentials (GWPs). A short section, such as the following, needs to be inserted on page 15 line 35:

All greenhouse gases whose atmospheric concentrations are increasing because of human activities contribute to the enhanced greenhouse effect. Therefore, in view of the interrelationship among all greenhouse gases, their sources and sinks, when considering approaches to limit anthropogenic increases in radiative forcing it is essential to take a comprehensive approach to reductions in greenhouse gas emissions, i.e., all gases should be treated collectively (carbon dioxide, methane, nitrous oxide, CFCs, HCFCs, HFC, and ozone and its precursors). To evaluate possible policy options, it is useful to know the relative radiative effect (and, hence potential climate effect) of equal emissions of each of the greenhouse gases. Working Group I developed the concept of relative global warming

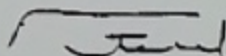
potentials (GWPs) which take into account the differing times that gases remain in the atmosphere. Table x lists the GWPs for several key greenhouse gases, together with their 1990 emissions. (Table at the bottom of page 18 of WG I Policymakers Summary should be added here.)

In addition, the following short paragraph needs to be added to the legal issues summary immediately after the last bullet on page 28:

While it is recognized that the Convention is to be all-encompassing, the negotiating parties will have to decide whether greenhouse gases, their sources and sinks, are to be dealt with individually, in groups, or comprehensively.

I must stress that a considered response to these matters is essential if we are to have any hope of reaching consensus in Sundsvall. Please call if there is anything further that I can do to help, and good luck.

Best regards,



Frederick M. Bernthal

cc: Dr. N. Sundararaman

enclosures:

- 1) reworked executive summary
- 2) specific comments on overview and conclusions (to follow on July 6, 1990)