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Agenda item 3

**RESPONSE FROM PARTIES ON ISSUES
RELATED TO SINKS**

Comments from Parties

Note by the secretariat

1. At the first part of its eighth session, the Ad Hoc Group on the Berlin Mandate (AGBM) considered the issue of greenhouse gas sinks in the context of quantified emission limitation and reduction objectives (QELROs) (FCCC/AGBM/1997/8).
2. At the same part of the session, Parties were invited to submit views on this topic by 12 November 1997. The secretariat was requested to compile these submissions into a miscellaneous document.
3. Eight such submissions* have been received. In accordance with the procedure for miscellaneous documents, these submissions are attached and are reproduced in the language in which they were received and without formal editing.

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* In order to make these submissions available on electronic systems, including the World Wide Web, these contributions have been electronically scanned and/or retyped. The secretariat has made every effort to ensure the correct reproduction of the texts as submitted.

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PAPER NO. 1: DENMARK

Danish response to the sinks-questionnaire.

Denmark supports the submission by the UK on behalf of the EU and its members states, responding to the questionnaire on sinks.

The following is thus to be considered a supplementary explanation of the Danish views and the thoughts behind them.

1. Should anthropogenic sinks be included or excluded in a QELRO? Why or why not (in responding you may wish to consider a budget period or year)

Include or not? answer: yes, if properly designed.

a) It is not necessary to include sinks now.

The inclusion of sinks in QELRO's of the Kyoto protocol, in a so-called net approach, is being advocated by some parties, as necessary to achieve action in the field of sink protection and enhancement.

The Danish position is that this view is only justified if QELROs is considered the only mean to achieve results . All Parties are however already committed to protecting and enhancing sinks, and a large repertoire of policies exist, that may be used towards this end.

b) inclusion of sinks will not remove the necessity to achieve emission reductions

The enhancement of sinks, although an important contribution to overall GHG abatement, will not change the basic fact, that large reductions in emissions will be needed urgently, if stabilisation of the GHG-concentrations at safe levels shall be achieved. Considering the very big inertia in the political, sociological and technological processes that are typical for such emission reductions, and the very short time available to achieve such reductions, the inclusion of sinks in QELRO's should only be accepted contingent on safeguards to secure that it would not result in delays in the implementation of emission mitigation efforts.

A major concern in this connection is thus, that the inclusion of sinks in QELROs can only be accepted, when the likely impact on emission limitation efforts have been thoroughly analysed. Many of the proposed approaches to sink-inclusion in QELRO's have the risk of creating new quantities of hot air, that would lower overall emission reductions if such sink-hot air could be freely traded off against emission reductions.

We believe, that the lack of sufficient analysis so far, and the lack of consensus on definitions and technical details, would exclude any decision in Kyoto to accept a net approach already now.

We might however be prepared to include in the protocol, provisions and processes that might lead to a later agreement on sinks.

We believe the most important doubts are related to CO₂-sinks from the land-use change and forestry (LUCF), and will hence concentrate on these sinks in the following.

The following is an attempt to highlight the problems we see in relation to LUCF-sinks, and some thoughts on how to circumvent them.

c) Include only anthropogenic sinks, and avoid "hot air"

There seem to be general acceptance, that only anthropogenic sinks should be included in an eventual net approach. The IPCC inventory guidelines offers a first methodology for defining this concept. However, the precision, and the ability of the methodologies to capture dynamic effects are still rather rudimentary. We believe the only acceptable methodology would be a methodology based on detailed forestry statistics on areas, and age classes. We note that severe problems exist in certain areas, in relation to finding a robust discrimination between natural and anthropogenic sinks. Simultaneously, the IPCC is looking into the related questions. This is a strong argument to await this work, before inclusion of LUCF-sinks in QELRO's is even considered.

Present IPCC-methodologies tend to define the anthropogenic part of the CO₂-sink as more or less the total sink, in the case of managed forests. As more and more forests become managed, the total "anthropogenic" sinks of inventories could grow, as monitoring methods become more developed. Potentially this could lead to an anthropogenic sink in the inventories of about 6 bio ton of CO₂ (the size of the unidentified northern continental sink according to SAR). Today, annex1 countries have identified about 1/4 of this sink in their inventories. As the total sink is believed to result from factors largely beyond control, except by global policies, (such as CO₂-fertilisation, Nitrogen deposition, or warming-induced growth), gradual inclusion under a scheme where sinks could be credited against emission-reductions, poses the danger of a considerable amount of hot air, which would hardly be useful, especially, if emission-trading were to be allowed.

Hence any scheme would need to contain provisions for guarding against gradual inclusion in the inventories of this "hot air".

d) Avoid perverse incentives

Many sink-crediting schemes could lead to credit being giving for having stopped unsustainable behaviour, such as going from a situation with deforestation, to a more sustainable forestry policy. Giving credit for this, in a situation where not all Parties to the convention have QELROs, may create the incentive to continue such practices, in order to have a favourable starting position, when negotiating eventual future QELROs.

e) For Carbon, sinks should be defined as changes in Carbon stocks

Further we believe, it is absolutely essential that any definition of net LUCF-sinks should be restricted to represent anthropogenic changes in domestic carbon-stocks. This may be extended to include changes in domestic pools of wood products rather easily, if sufficient statistics are available.

Denmark would however not be in favour of accepting schemes, that necessitate detailed bookkeeping of carbon in products traded. The responsibility for securing that wood-products are sustainably grown and harvested, and hence CO₂-neutral, when used, should rest with the producers.

f) To define a scheme for the inclusion of sinks, definitions of sinks is not enough

The complete scheme will only be defined when it is settled both how compliance to the QELRO is defined, and how the QELRO itself is calculated. This will also involve the base year question (or maybe the baseline question).

As much confusion may arise from different interpretations of the same language, the discussion may benefit if the question of sinks is first approach in a pragmatic (and transparent) way, by simply trying to operationalize how QELROs should be set and compliance calculated. We restrict in the following the discussion to CO₂-emissions.

g) Definition of gross approach

As some doubts has been cast even on the definition of the gross approach, lets first make clear, that we assume, that a gross approach, to be used in the EU's proposed flat rate targets, would not involve any contributions (neither sources nor sinks) from LUCF, neither in 1990 nor in any future target years.

Hence in our view LUCF contributions should always be considered sinks (even when negative in 1990, and hence actually a net source!) and be excluded from a gross approach.

For CO₂ this means that 1990 emissions in the gross approach would be only emissions from fuel combustion + fugitive emissions (e.g. venting, solvents) + industrial emissions (e.g. cement, tiles).

Denoting these emissions with EG, the compliance to a 15% reduction target would be formulated:

$$EG_{20150} < \text{redfacgross} * EG_{1990} = \text{QELROGROSS}_{2010}$$

where $\text{redfacgross} = 0.85$ for a 15% reduction target.

Similar equations would apply to other target years or budget periods.

h) Definition of net approach

We then have a number of alternatives for extending this to a net approach. Defining the net sink from LUCF as $SN = \text{LUCFsinks} - \text{LUCFsources}$, we could define a net approach as

$$\text{alt A: } EG_{2010} - SN_{2010} < \text{redfacA} * (EG_{1990} - SN_{1990}) = \text{QELROA}_{2010} \quad (\text{"net-net" approach})$$

This alternative A is an approach where percentage reductions are directly prescribed for the net emissions (a "net/net" approach). As this would necessitate a recalculation of the

QELROs in going from a gross to a net approach, it is not so easy to implement later, on top of a Kyoto agreement (assuming that we will not in Kyoto go for a net approach right away). Alternatively one could therefore opt for a credit option, enabling any sink enhancement achieved after an eventual agreement on sinks, to be subtracted from emissions, in comparing with the QELRO:

alt B: $EG_{2010} - (SN_{2010} - SN_{1990}) < \text{redfacB} * EG_{1990} = \text{QELROB}_{2010}$ ("credit" approach)

Note that the redfac is related to a percentage reduction target (redfac= 1-relative emission reduction), to be distinguished from the question of "capping" (or reducing) credits, which should not be discussed before a clear understanding of the net approach as such has been achieved.

We note that QELROA is different from QELROGROSS (if redfacA = redfacgross), whereas QELROB may be equal to QELROGROSS (if redfacB = redfacgross).

We note as a site-effect, that by alternative A, the meaning of a percent reduction is influenced by the magnitude of SN. If $SN = 1/2 * EG$ a 10% reduction of EG-SN can be achieved with a 5% reduction in EG, keeping SN unchanged. This points to the necessity of considering differentiation of percentage reductions, dependent of the size of SN, if fair distribution of commitments are to be achieved. This is avoided by approach B.

One should also note for alternative A the rather peculiar situation that may arise for a country for which sinks are greater than emissions in the base year. Here alternative A prescribes that the country should continue to be a net sink, with a net sink size in the target year at least redfacA * the net sink size in the basis year. This would enable the country to expand emissions with $(1-\text{redfac}) * \text{base year sink}$, if the sink were held constant. In 1990, no annex 1 country among the 27 for which the secretariat was able to report sink data was in this situation. However in 1995 (or last reported year) Latvia reported a net CO2 sink of 141% of emissions. Hence this special situation need to be considered if a different base year is chosen (or in connection with future non annex 1 countries that may be in a similar situation).

Depending on how QELROs for individual countries were eventually set, both A) and B) may create winners and losers. Potential losers would be countries that already expect declining sinks over time, due to age distribution effects. A somewhat attractive option, that would make it easy to build upon a gross Kyoto result, would be to redefine the QELRO for each country (in each target year or budget period) so as to make the shift to a net approach neutral for all countries. This would involve estimating the future expected sink value in the target years in the case of no transition to a net approach. Such a procedure is described below as alternative D.

We could also use variants of A and B where SN_{1990} was replaced by, say SN_{1997} . This could be motivated by a desire not to make an advantage out of the fact, that a country might have had a numerically large, but negative net sink in 1990 (such as is the case of Australia) - we should not give future credit for having had an unsustainable behaviour in 1990!

It is to be noted, that all Annex 1 countries have $SN > 0$ in 1995, according to the compilation of the secretariat, with the possible exception of Canada and some other countries, for which no information is given, whereas negative SN's occur in 1990. This may motivate a base year for SN different from 1990.

The New Zealand approach, we believe is

alt C: $EG_{2010} - SN_{2010} < \text{redfacC} * EG_{1990} = \text{QELROC}_{2010}$ ("gross-net" approach)

with the result that most countries would find themselves in an easier situation after introduction of the net approach, unless the QELROs were adjusted downwards. The total reduction in QELROs for aggregate annex 1 would need to be around 1.3 bio t of CO₂ (or about 6% of 1990 emissions) to keep the ambition level unchanged (if the 1995 sink level were assumed to apply also for a future situation).

Finally, we could take the "Icelandic" approach, which we believe to be, that LUCF contributions should be restricted to effects attributable to anthropogenic actions to enhance sinks, taken after 1990. This would involve measuring against a baseline scenario (SN_{baseline}) for the magnitude of SN in the absence of such actions:

alt D: $EG_{2010} - (SN_{2010} - SN_{\text{baseline}_{2010}}) < \text{redfacD} * EG_{1990} = \text{QELROD}_{2010}$ ("base-line" approach)

or

alt E: $EG_{2010} - \Delta SN_{2010} < \text{redfacD} * EG_{1990} = \text{QELROD}_{2010}$ ("policy" approach)

where ΔSN_{2010} is the documented results of sink-enhancing actions after 1990 (such as Carbon accumulated in areas, that are afforested after 1990).

Here we have excluded SN from appearing on the right hand side of the inequality in alt D, as $SN_{1990} = SN_{\text{baseline}_{1990}}$ by definition. Also here, a later base year than 1990 could be used for SN and SN_{baseline}. It is not clear, whether $SN < SN_{\text{baseline}}$ should be allowed, or whether $SN_{\text{baseline}} < 0$ could be accepted.

An approach could be to demand that SN_{baseline} were to be chosen as the evolution to be expected in the absence of any net change in forest area, and with harvesting levels that approach long-term sustainability (i.e. SN_{baseline} approaching 0 in the long term). Such a baseline would include the effects of actions before the base year. This would give $SN_{\text{baseline}} = 0$ in all years when using the default IPCC approach, but certainly not when using a more realistic approach based on age distributions of the standing stock of trees.

With this definition of the baseline, afforestation and sustainable harvest policies would be an advantage, whereas deforestation or unsustainable harvesting would be punished. The definition would need further detailing, as evidently the dynamic approach to sustainable harvest levels, even with fixed forest area, is not uniquely defined.

The important thing would be to avoid baselines consisting of continuation of unsustainable practises, such as deforestation, or unsustainable harvest policies.

Alternative E would make the book-keeping much simpler. Guidelines would be set up on how to calculate the credits for each kind of action, much in analogy with the situation in the case of AIJ-projects. As methodologies are developed, more and more kinds of actions could be included.

There might be some "honourable free riders" in both approach D and E, namely countries, that would anyway, even without a net QELRO, undertake a policy of afforestation (as the Convention already ask for!). The effect on global emissions of such honourable free riders is equivalent to the existence of a new type of hot air, that would necessitate QELRO-redefinition to guaranty a benefit for global warming. Such QELRO redefinition should not necessarily hit the countries with ambitious programs even without the net approach, but may be distributed on all countries. The latter approach would in fact be preferable in order not to punish countries that already have taken action or giving a credit to countries that play a game of no action, with the intent to negotiate a larger benefit in a future negotiation on sinks (if such countries exist!).

In fact, there is no reason why any country's baseline (except for countries with very large forest cover in the start position) should not involve some afforestation policies, considering the commitments of the convention.

Hence a necessary condition for accepting a net approach might be the acceptance by each country of a certain baseline of sink enhancement, such that only efforts above this baseline may be substituted for emission reductions, whereas efforts below this baseline would necessitate increased emission abatement.

For all alternatives, we can define "the effective sink credit" to be the amount EG can be expanded, compared to the gross approach (which could be the one negotiated in Kyoto):

$$EG_{2010} < \text{redfac}_{\text{gross}} * EG_{1990} + \text{Credit}$$

For the various alternatives we find the following effective sink credits:

- A) $\text{Credit} = SN_{2010} - \text{redfacA} * SN_{1990} + (\text{redfacA} - \text{redfac}_{\text{gross}}) * EG_{1990}$
- B) $\text{Credit} = SN_{2010} - SN_{1990} + (\text{redfacB} - \text{redfac}_{\text{gross}}) * EG_{1990}$
- C) $\text{Credit} = SN_{2010} + (\text{redfacC} - \text{redfac}_{\text{gross}}) * EG_{1990}$
- D) $\text{Credit} = SN_{2010} - SN_{\text{baseline}2010} + (\text{redfacD} - \text{redfac}_{\text{gross}}) * EG_{1990}$
- E) $\text{Credit} = DSN_{2010} + (\text{redfacD} - \text{redfac}_{\text{gross}}) * EG_{1990}$

The notion of an effective sink credit is seen to be a little complicated, if redfacA,...redfacD is different from redfacgross above.

It is a most likely possibility, however, that one might want to adjust the reduction percentages (redfac) in going from a gross to a net approach, ia to secure a given ambition

level in terms of aggregate reductions of the total net emissions to the atmosphere. This would in particular be necessary under the New Zealand approach (alt C) as aggregate sinks over annex 1 (excluding Canada) were already about 1.3 bio t of CO₂ in 1995, equal to about 5-6 % of annex 1 gross emissions.

The degree to which it would be necessary to reduce the redfac's is determined by the size of the aggregate credit, summed over countries, and calculated in the situation where a gross approach is chosen, as any aggregate positive credit calculated for this situation constitutes "hot air" (net emission reductions that would occur anyway even without taking the net approach).

For all alternatives, it should be considered how the scheme would work if commitments were eventually extended to one or more non-annex 1 countries. Alternative A and B may give some problems for countries such as Brazil, for which $SN_{baseyear}$ might be negative and numerically large. Would it be fair to give a perpetual credit based on a large source in the base year? To stress what the implications of this is, you may imagine that a sufficiently large source might give future credits (depending on the size of redfac in future years/periods) that might enable the country to completely destroy its forests, and still be better off than under a gross approach. The total size of the credits accruing from baselevel emissions (SN_{1990}) in alt A and alt B, could be as high as the total source term estimated for the tropics (of about 8 bio t CO₂ annually), as this source term (mainly forest clearing) is evidently "anthropogenic". As forest clearings in the IPCC scenarios are assumed to stop (due to lack of remaining forests?) after clearing about 83 Gt C, a credit of 8 bio t from SN_{1990} in alt A would allow the forests to be cleared in about 40 years without penalty (or a similar emission expansion to be made in gross emissions) and would allow emissions to be expanded thereafter. The absence of the 1990 levels of SN from the net credits (as in alt C and D) is in this context a virtue, that should be considered.

If the transition from a gross approach to a net approach were to be taken in such a way as to leave any country neither worse nor better off (except by having a greater flexibility!) country specific reduction factors redfacA,, redfacD should be negotiated for each country so as to render zero the net sink credit defined above for the various alternatives. The difficulty of this, of course, is that it involves estimating the future value of SN, that would be achieved without taking a net approach (i.e. under a gross approach).

In any case, even if redA,,redD were chosen equal across countries (= flat rate net approach), such an exercise of adjusting reduction factors (or QELROs) would be needed based on a projection of the aggregate future SN of parties, to secure that the transition from a given gross + flat rate approach would not result in an overall lowering of the reductions of net emissions to the atmosphere.

i) Implications for inter country monetary payments

The choice of scheme for defining the net approach to QELROs will also, under the assumption of the introduction of a future emission trading system, have a major impact on the net monetary flows arising from trading between countries. Schemes that would result in major transfers to some or all major forestry countries even without explicit action taken by

these countries after 1990, would result in an unnecessary burden on the remaining countries, on top of expenses for domestic mitigation. This would represent a reinterpretation of the convention, from being a commitment to preserve reservoirs and enhance sinks domestically, to being a collective responsibility to finance such actions in other annex 1 countries as well. This would be especially doubtful, if such "preservation efforts" were actually just a reduced destruction rate (as could be the case in alternative A or B).

j) The question of substitutability of sink enhancement and emission reduction

Enhancement of LUCF-sinks, which increase the carbon-pools in forests, will not provide full certainty, that the carbon sequestered would not later be emitted to the atmosphere. Even if countries would be held strictly responsible for any future decreases in such Carbon pools, it is not certain, that unforeseen events (forest die-back, forest fires etc.) may not create carbon losses, that could not be compensated by other measures.

This may motivate that a certain discounting (such as allowing only a certain percentage of extra Carbon sequestered) to be offset against emissions.

Similar concerns would apply to other Carbon sequestration techniques, such as deposition in the oceans.

Other sinks (such as deposition in depleted gas wells, or reinjection for enhanced oil-recovery) may be more certain.

The different nature of various sinks may thus warrant an individual negotiation on setting of a discount factor for each sink type to be used in any net approach.

PAPER NO. 2: JAPAN

**Response of the Government of Japan to the Questions
for Parties regarding Sinks**

1. Should anthropogenic sinks be included or excluded in a QELRO ? Why or why not ?
(In responding you may wish to consider which budget period or target year)

In the long run, anthropogenic sinks should be included in a QELRO for the following reasons:

- (i) Effects on climate change is dependent on atmospheric concentrations of greenhouse gases (GHGs), which is affected by both GHG emissions and GHG sinks.
- (ii) In order to prevent dangerous anthropogenic interference with the climate system, the United Nations Framework Convention on Climate Change (UNFCCC) requests the Parties to take measures for mitigating climate change by addressing anthropogenic emissions by sources and removals by sinks.

On the other hand, we also recognize the very different nature of sinks, compared with emissions by sources. The following issues should be taken into account in a comprehensive manner when we consider the inclusion of sinks in the legally binding QELRO.

- (i) how to deal with significant uncertainties related to global carbon cycle;
- (ii) how to deal with significant technical uncertainties regarding methods for measurements/estimates and verification;
- (iii) how to define "anthropogenic" sinks, including the problem of forest fire;
- (iv) how to handle the reference year problems, as pointed out by New Zealand;
- (v) how to handle the issues related to forests and other woody biomass stocks, and harvested wood.

These are very unique problems in sinks, requiring comprehensive consideration for all these issues together. Otherwise, we may have significant other environmental problems. For instance, one of such problems could be to provide potential incentives to clear presently matured forests and plant single species of trees, neglecting importance of biodiversity. The Government of Japan (GOJ), therefore, believes that it is still premature now to include sinks in a legally binding QELRO. Some solutions should be provided on the above issues before we include sinks.

2. What would be the impact of including or excluding sinks on the QELRO levels, national plans or policies of your country ? (Please try to provide a qualitative answer.)

By including sinks in a legally binding QELRO on the basis of the present level of scientific knowledge, we may encounter significant problems in estimating and verifying "net" anthropogenic emissions. We are afraid that inclusion of sinks may cause a significant loophole in assessing compliance with a legally binding QELRO.

By excluding (not including) sinks, it may be argued that incentives for enhancement of sinks and protection of reservoirs be less. However, the UNFCCC requests the Parties to promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs (Article 4.1 (d)). The Government of Japan (GOJ) has been promoting these activities and will continue to do so, regardless sinks be included in a legally binding QELRO or not. GOJ is of the view that the exclusion of sinks should not be used as an excuse for inactions in this field.

3. What criteria governed your answer to question number 1 ?

The major criteria may include:

- (i) scientific level of uncertainty in understanding global carbon cycle;
 - (ii) state-of-art technologies to measure and estimate anthropogenic sinks;
 - (iii) present level of national systems of the Parties in estimating and verifying anthropogenic sinks;
 - (iv) clear, shared and common understanding on the definition of "anthropogenic sinks";
- and
- (v) resolution of other remaining issues, including the problem of reference year and appropriate methods to deal with the concern expressed by New Zealand.

4. How would you define "anthropogenic" sinks in the context of a QELRO ?

In the context of a legally binding QELRO, "anthropogenic" sinks should be clearly defined to provide no confusion nor conflict in their interpretations during the implementation stage of the protocol. From this viewpoint, the following issues should be taken into account when we define "anthropogenic" sinks:

- (i) anthropogenic sinks should be able to be measured/estimated and verified in a sufficiently accurate manner, based on the available scientific and technical knowledge.
- (ii) they should be defined as specific as possible, hopefully by source/sink categories or sectors (forests, grasslands/shrublands, mineral soils, organic soils etc.);
- (iii) they should not be defined to threaten the long-term objective of the UNFCCC;
- (iv) from administrative viewpoint, they should not be defined to cause significant annual fluctuations;
- (v) they should not create loopholes, for instance, by inadequate handling of changes from unmanaged forests to managed.

GOJ believes that it is difficult to appropriately define "anthropogenic" sinks within a short time before COP3, taking into account all the above mentioned issues.

5. Do you agree or disagree with the following proposition; if so, why or why not ?
"Any QELRO that would include sinks should be based on the 1996 IPCC guidelines. Any new IPCC methods would only apply to a second budget period or subsequent target."

We presume that the question means "If a QELRO will include sinks for the first budget period, the methods to be used for the first period should be decided at COP3. In this case, the methods should be based on the 1996 IPCC guidelines."

Based on this presumption, our answer is "Yes". GOJ agrees with the proposition mentioned above, because:

- (i) the legally binding QELRO that could be agreed on at Kyoto should be defined in a quantitative manner; and
- (ii) the only presently available authoritative methods are those included in the 1996 IPCC guidelines. We have no time by the Kyoto Conference to further develop/elaborate other methods in this field.

It should be, however, noted that we agree to use the 1996 IPCC guidelines as a whole, including its philosophy. In other words, the IPCC guidelines recommend to use country specific methods rather than defaults mentioned in the guidelines, if such country specific methods are considered more accurate and adequate. It should also be noted that in some source/sink categories such as land use change and forestry, particularly regarding agricultural soils, the 1996 IPCC guidelines have not been well developed to estimate GHG emissions/absorption by agricultural as well as forest soils. Further studies are ongoing to adopt adequate methods for such categories. In such cases, we should not use the methods presently described in the 1996 IPCC guidelines.

Regarding the second question in para 5, GOJ agrees that any new IPCC methods (adopted after COP3) should only apply to commitments that are adopted for a second budget period or subsequent periods. It should, however, be noted that this does not mean GOJ agrees with inclusion of sinks in a legally binding QELRO.

6. a) Which IPCC land use change and forestry (LUCF) categories should be included or excluded in a QELRO ? Why ? Examples: all LUCF/ changes in forest and other woody biomass stocks/other.

GOJ does not believe that we have sufficient scientific and technical knowledge on LUCF, and therefore, it is premature to decide which LUCF categories should be included in a legally binding QELRO (Please see paragraph 4 above).

b) If some categories are excluded, how should they be dealt with ?

We should work out appropriate and comprehensive methods to measure/ estimate anthropogenic LUCF emissions by sources and removal by sinks, taking into account the various aspects related to LUCF, together with IPCC, SBSTA and other relevant authorities. GOJ considers that the criteria in paragraph 4 above should be used in selecting LUCF categories to be included in a legally binding QELRO.

7. What reference year should be used as the basis for any QELRO that would include sinks ? 1990/2000/none/other

Since UNFCCC determined to use 1990 as the reference year for anthropogenic GHG emissions, we should use the same reference year for sinks. On the other hand, GOJ recognizes that the present methods have a problem, as addressed by New Zealand. Adequate methods should be developed to address this issue (with only one reference year).

8. a) How much uncertainty do you associate with the GHG inventories provided by your country for the specific IPCC reporting categories ?

Quantitative evaluation of uncertainties has been one of the most difficult tasks related to GHG inventory in Japan. Generally speaking, in some areas the numbers are relatively certain and in other areas not. Specifically, it is significantly uncertain to measure/estimate carbon sinks through soils, including both forest and agricultural soils.

b) What uncertainty levels would be appropriate for sinks in a QELRO, bearing in mind the uncertainties associated with sources ?

First of all, we should be careful on what methods should be used to discuss the uncertainties. If the methods used are different, the numbers on uncertainties differ. In this paragraph, we should use the methods prescribed in the IPCC guidelines (Volume I, Annex I (Managing Uncertainties)), to define uncertainties.

We believe that there are different types of uncertainties to be discussed. In the context of sinks, the following issues need to be considered:

- (i) scientific uncertainties regarding global carbon cycle;
- (ii) technical uncertainties in data (both emission factors and activity data) relating to measurements, estimation and verification;
- (iii) uncertainties arising from ambiguous definitions and their interpretations;

When we generally discuss uncertainty issues, we bear in mind the uncertainties mentioned sub-para (ii) above. Even in this case, GOJ believes that uncertainties in activity data relating to sinks are significantly uncertain in some Annex I Parties. GOJ further believes that at present, uncertainties associated with sub-para (i) and (iii) above are much more significant, and therefore, cannot be ignored. GOJ proposes that adequate level should be determined by the Conference of the Parties, possibly through the SBSTA, from scientific, technical as well as political and administrative viewpoints.

c) How should uncertainties be dealt with ?

Uncertainty levels of various different source categories should be regularly reviewed and updated from scientific and technical viewpoints. When uncertain level of a source category reaches satisfactory level, such category should be included in the legally binding QELRO, unless we have other substantial problems.

9. Should there be a limit on the amount of sinks in a QELRO ? If so, how should it be determined ?

GOJ does not have sufficient information to answer the question.

10. Is the data provided in national communications adequate/inadequate for assessing compliance with a QELRO ? Why or why not ?

Yes, in some areas such as CO₂ emissions by fuel combustion, but no in other areas such as CO₂ sinks and N₂O emissions by agricultural soils because of significant lack of scientific and technical knowledge (Please see paragraph 8 (a) above).

11. Should any "national system" established under Article 4 give special consideration to sinks ?

Any national system should pay due attention to sinks, if a legally binding QELRO includes sinks.

12. In order to achieve compliance with a QELRO (with/without sinks), what activities should be credited or not credited and what base year should be used ?

Please see paragraphs 7, 8 (b) and 10 above.

13. What definition should be included; in which article of the protocol ?

Either now or later, when sinks be included in a legally binding QELRO, the definition of "net" anthropogenic emissions should be defined in Article 1 (definitions). Categories of LUCF to be included in a legally binding QELRO should also be well defined, either in the protocol (through its amendment) or by COP decision or other means related to methodologies.

14. Do you have any other approach to propose ?

The Conference of the Parties should request IPCC to further develop and elaborate methods for LUCF categories, with the policy guidance from SBSTA.

15. Do you have specific protocol language ?

No special proposal.

PAPER NO. 3: MARSHALL ISLANDS

**RESPONSE BY THE REPUBLIC OF THE MARSHALL ISLANDS TO SINKS
QUESTIONNAIRE**

Question 1. Should anthropogenic sinks be included or excluded in a QELRO? Why or/why not? (In responding you may wish to consider which budget period or target year.)

Anthropogenic sinks should not be included in a legally binding QELRO for the first budget period. Decisions on sinks for subsequent budget periods should be made when QELROs for such periods are being established. Such decisions should be based on further advice from the IPCC on sinks.

There are four major reasons which speak for the exclusion of sinks from the first budget period:

- (1) methodological weaknesses and scientific uncertainties;
- (2) gaps in data relating to sinks;
- (3) lack of comparability of sinks data; and
- (4) creation of possible perverse incentives.

Individually and collectively, these problems would render rigorous assessment of compliance with QELRO commitments, including the operation of related mechanisms such as trading and joint implementation, impossible. For these reasons, each reason is discussed in detail below under Question 3.

Question 2. What would be the impact of including or excluding sinks on the QELRO levels, national plans or policies of your country? (Please try to provide a qualitative answer.)

QELROs are being negotiated only for Annex I Parties. Their inclusion or exclusion is of critical concern to the Marshall Islands because the achievement of QELROs has direct and immediate implications for countries vulnerable to the adverse effects of climate change. Marshall Islands shares a strong interest in ensuring that the strongest possible QELROs are adopted in Kyoto but also that these are fully implemented.

Question 3. What criteria governed your answer to question 1?

The Marshall Islands seeks to ensure QELRO commitments for the first budget period stimulate early action to tackle the dominant causes of climate change: fossil fuel emissions. Furthermore, in our view, legally binding QELRO should be subject to the highest degree of certainty and they must be transparently achieved. Strict compliance with QELROs will be necessary to penalize free-riders, to ensure fairness among Parties and to promote confidence in the regime. QELRO implementation should promote early action in the critical sectors of economic activity and not lead to or exasperate other environmental problems. Including sinks in QELROs would not meet these criteria for the reasons described below in more detail.

(a) Methodological problems and scientific uncertainties

Volume 2 of the IPCC Second Assessment Report clearly sets out the methodological problems and scientific uncertainties surrounding the measurement of emission uptake by sinks. The 1996 Revised Guideline recognize that major uncertainties exist relating to the emissions factors and activity data for sinks. Table A1 from the revised 1996 Guidelines for National Greenhouse Gas Inventories listing the range of uncertainties, appended herewith, provides the range of uncertainties associated with CO₂, CH₄ and N₂O.

In his report to the seventh session of SBSTA (October 1997), Professor Bolin, on behalf of the IPCC, reiterated the problems relating to sinks. He specifically pointed out in relation to terrestrial ecosystems "the error margin for the determination of sources and sinks are quite large" and that "[b]ecause of our limited understanding and lack of observations simplified methods have been proposed by the IPCC and been adopted by the FCCC for the assessment of sources and sinks by countries". As these are "very approximate", Professor Bolin highlighted the importance of analyzing "their possible shortcomings" in the context of the IPCC's work.

Uncertainties also exist as regards CH₄ and N₂O. These uncertainties speak for excluding these sector categories (or dealing with them in a special way) and not for including sinks. Removals by sinks accounted for about 6 or 7% of total reported emissions by Annex 1 Parties. For Annex I Parties as a whole the removal effects of sinks are small but bigger than emissions of N₂O and trace gases. Furthermore, Parties' emissions projections and mitigation plans indicate that uncertainties from sinks are or are likely to be more significant in relative terms than uncertainties relating to CH₄ or N₂O. This is because the short and long term projections from Parties second national communications anticipate declining CH₄ emissions by 2000 and 2020. Secondly, although some Parties anticipate increases, in overall terms, N₂O emissions will probably fall for Annex I Parties. If continued, these trends will magnify the importance of sinks vis-à-vis the uncertainties associated with some CH₄ and NO_x source categories. Thus the treatment of sinks must be undertaken in a sound manner.

If accepted as part of the Kyoto Protocol, achievement of QELROs through the use of joint implementation sinks projects in developing countries or trading regimes involving non-Annex I Parties will also magnify the importance of sinks. Hence the cumulative effect of methodological problems and scientific uncertainties relating to sinks are likely be more significant over time.

(b) Data gap problems

Some Annex I Parties simply do not have adequate data for sinks or have failed to supply such data (however uncertain it might be) in their national communication despite the fact that the current reporting guidelines for Annex I Parties require the provision of such information.

The compilation and syntheses of national communications show the current quality of reporting of the land use change and forestry sector (LUCF) is highly inadequate. For example, in the initial compilation and synthesis of first national communications:

- out of all 33 reporting Parties, only 14 countries broke the LUCF sector down in emissions and removals for their base year as required by the reporting guidelines;
- USA failed to present emissions and removals separately as required by the reporting guidelines;
- Projections of the LUCF sector were equally deficient: only 16 out of the 33 reporting countries provided figures for 2000; and
- Among the economies in transition, only the Czech Republic and Latvia submitted emission projections for LUCF sector for 2000.

The level and quality of information has not improved markedly since the submission of first national communications. Between July 1996 and July 1997, a range of countries submitted updates on LUCF emissions and removals. The updates resulted in major changes in the value of sinks removals from the original value submitted. The percentage change of values is as follows:

Australia	7%
Bulgaria	65%
Czech Rep.	156%
Denmark	12%
Finland	21%
France	3%
Germany	50%
Japan	7%
Latvia	90%
New Zealand	16%
Norway	200%
Russia	33%
Slovakia	4%
UK	430%

On average, these fluctuations actually exceed the uncertainty of 60% for this type of data as given by the IPCC. The magnitude of these changes highlight Parties' present difficulties concerning reporting of the LUCF sector, and underscore the need for additional methodological and scientific work to remove these difficulties.

The compilation and synthesis of second national communications does not quell concerns about lack of data or the failure to provide this to Convention bodies. The LUCF data included in this compilation is significantly incomplete because not all Annex I Parties submitted their reports and those that have, have failed to do so in a comprehensive manner. The compilation document notes, for example, that:

- None of the 18 reporting Parties submitting second national communications provided the worksheets or equivalent information on LUCF requested by the FCCC guidelines.

Whether it is due to lack of technical capacity, unwillingness or the nature of the guidelines themselves, it is clear that the current FCCC reporting requirements have not significantly improved sinks data for Annex I Parties as a whole.

The difficulties presented by this lack of information will only be compounded if the Kyoto Protocol allows QELRO to be achieved through joint implementation sink projects with developing countries. The availability and accessibility of data from developing country Parties is much more acute.

Likewise, if the Kyoto Protocol allows achievement of QELROs through trading, data from all Parties must be accurate and made available in a timely manner. Thus it is not enough that some Parties have accurate data on sinks. Flexibility mechanisms such as joint implementation and trading require a high standard of reporting from all Annex I Parties (and those non-Annex I Parties that might play a role in QELRO achievement should the Kyoto instrument so permit).

(c) Comparability problems

Uncertain and incomplete information problems are compounded by the use of differing definitions and methodologies used by Parties with regards to sinks.

The compilation and synthesis of second national communications states:

"None of the problems with comparability of CO₂ emission estimates from this sector identified in the compilation and synthesis of first national communications appear to be resolved. The information provided did not shed additional light on various assumptions related to the definitions of anthropogenic activities and their treatment for emissions reporting purposes. In general, Parties did not specify whether their forests are totally managed or not."

And:

"Comparison and aggregation of emissions and removals from land use change and forestry was complicated by scientific uncertainties, difficulties in data collection and differing coverage. Further research and methodological work is needed to ensure that estimation and reporting is done in a consistent, transparent and comparable manner."(emphasis in original). FCCC/SBI/1997/19, Annex, para29.

Due in part to these problems, the confidence levels expressed by Parties in categories relating to sinks was at best "medium", and for the most part "low." This degree of confidence levels cannot be the basis of undertaking or discharging legally binding QELRO obligations. The present FCCC guidelines, including the 1996 Revised Reporting Guidelines do not provide agreed definitions for sinks. And these need to be resolved to improve comparability of data.

(d) Perverse incentives problem

Inclusion of sinks in QELROs may create perverse incentives and cause or exasperate other environmental problems.

All forests (temperate, tropical or boreal) serve multiple functions: they are important centers of biodiversity, a source of recreation and amenity globally and locally and are often home to indigenous peoples. They also serve invaluable ecological functions such as preventing soil erosion. Including sinks in QELROs will provide a powerful regulatory incentive to maximize one function above others: carbon sequestration. If unchecked, this might create an incentive for Parties to begin or accelerate felling of old growth forest (which are relatively stable carbon reservoirs) to ensure they can take credit for planting fast growing mono-culture forests to fix carbon. The inclusions of sinks in QELRO thus may run counter to the objectives and efforts of other international treaties and programs to promote conservation, sustainable development and sustainable forestry practices.

Including sinks in the QELRO would also run counter to the Polluter Pays Principle which requires the polluting industry or sector to internalize the cost of pollution. The largest source of total GHG emissions and of CO₂ emissions for Annex I Parties is fuel combustion. The inclusion of sinks in QELRO would tend to delay early action to tackle emissions at source. It would in effect shift the burden of pollution control to a sector which is not the major contributing sector. This has major social and equity implications which need to be fully considered.

Finally, to have the same environmental effect as avoiding fossil fuel emissions, carbon stored by sink conservation and enhancement would have to remain locked out of the atmosphere over geological time scales.

There does not appear to be any scientific basis on which the integrity of forests as carbon stores can be guaranteed for centuries, let alone millennia. The political and institutional mechanisms for ensuring this is the case are also lacking. At this stage, carbon storage is a high risk strategy, which could result in significant releases of additional carbon in the future (if as expected, climate change itself leads to increased forest fires). The significant scientific and methodological uncertainties concerning the long term safety of sequestered carbon speak against including these in the QELRO for the first budget period.

Question 4. How would you define anthropogenic sinks in the context of a QELRO?

The Convention's definition of sinks covers all removals of greenhouse gases from the atmosphere anthropogenic or otherwise. The purpose of defining "anthropogenic" is to ensure that Parties do not take credit for what nature is already doing on the carbon sequestration front.

Yet an application of a "but for human intervention" test is problematic as all sinks today are subject to direct or indirect anthropogenic interference, including "natural forests". The latter because humans decide not to cut these down. The 1996 IPCC Guidelines provide that "natural forests" should not be counted as these are in a state of equilibrium whether or not

these are managed. But this begs, rather than answers, the question of what is "managed" and "natural." To be useful, a definition of "anthropogenic sinks" should determine what counts as significant, human intervention. Criteria to establish which sinks actually meet these requirements also need to be elaborated. This should be done as soon as practicable by the first Meeting of the Parties to the Protocol, based on technical advice provided by SBSTA and the IPCC.

Question 5. Do you agree or disagree with the following proposition; if so why and why not? Any QELRO that would include sinks should be based on the 1996 guidelines. Any new method would apply only to the second budget period or subsequent target.

Any QELRO including sinks should not be based on the 1996 IPCC Guidelines. This is because the Guidelines do not provide conclusive answers to a number of issues that are relevant to providing legal certainty concerning what sinks should be counted in QELROs. The Guidelines, for example, do not define what is "anthropogenic," "natural" or "management." They are also not conclusive on other issues such as the determination of "anthropogenic fires" or how emissions from long life wood products should be treated. The issue of soil carbon is also not addressed.

These issues must be better understood by the IPCC and then agreed by Parties. They cannot be left solely for a scientific and technical assessment body such as the IPCC or for each Party to determine. Doing so would compromise transparency, consistency and comparability of sinks data.

Once agreed, the methodology and guidelines for determining what counts as sinks should not be changed during a budget period. Any such changes should not apply retrospectively unless there is agreement to the contrary by all Parties.

6.a) Which IPCC LUCF categories should be included or excluded in a QELRO? Why? Examples: all land use change and forestry/Changes in forest and other woody biomass stocks/other.

b) If some categories are excluded, how should they be dealt with?

All LUCF categories should be excluded from QELROs for the first budget period. If sinks are to be included in QELRO, no IPCC LUCF should be excluded per se. However, modalities for how different sinks could be included in QELROs should be discussed by Parties on the basis of advice from the IPCC on sinks (see also response to question 14 below).

Question 7. What reference year should be used as the basis for any QELRO that would include sinks? 1990/2000/none/other

1990 reference year should be used for QELROs. The inclusion/exclusion of sinks should not alter the base year. Base year choices, and other conditions for including sinks in the second budget period should be addressed when these QELROs are being negotiated.

Question 8. How much uncertainty do you associate with the GHG inventories provided by your country for the specific IPCC reporting categories?

The Marshall Islands has not completed the preparation of the national inventories. It is not clear at this stage whether uncertainties will exceed or be less than the IPCC default figures contained in Table A1-1 of the revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.

Question 8 (b) What uncertainty levels would be appropriate for sinks in a QELRO, bearing in mind the uncertainties associated with sources?

In general terms, for legally binding QELROs of modest proportion, only sources commanding "high" confidence levels should be included in the first budget period. In the compilation and synthesis of second national communications, "high" confidence levels were associated with an error range of less than 10 per cent and were reported only for CO₂ from fuel combustion and industrial processes. As these emissions are the primary cause of climate change, a QELRO focusing on them would send a powerful signal to the right sector.

Questions 8 (c) How should uncertainty be dealt with?

For the first budget period, Marshall Islands considers that Annex I Parties' achievement of QELROs should focus on the biggest and most certain cause of climate change: the emissions of CO₂ by fossil fuel combustion.

This first signal should not get lost in the noise of measures to tackle smaller and highly uncertain sectors. These sectors could, for example, be addressed through non-QELRO related commitments in the first budget period. And they should be considered for inclusion in QELRO commitments for subsequent budget periods based on advice from the IPCC.

Question 9. Should there be a limit on the amount of sinks in a QELRO; if so how should it be determined?

Removals by sinks account for about 6 or 7% of total reported emissions. The limit on the amount of sinks in a QELRO should not be greater than this amount. It should, in fact, be much smaller than this to take into account the methodological problems and scientific uncertainties associated with sinks.

Dividing this cap between Parties is likely to create problems because one cap might not fit all. Differentiated caps or limits for each Party would increase complex negotiations. Future options to deal with the issues might include the establishment of a discounting system (see question 14 below).

Question 10. Is the data provided in national communications adequate/inadequate for assessing compliance with a QELRO? Why or why not?

For detailed reasons see answer to question 3. The data currently provided to assess implementation of Article 4.2 (a) and (b) is inadequate. Unless improved by all Parties, such data would be wholly deficient for assessing compliance with legally binding QELROs.

Question 11. Should any "national system" established under Article 4 give special consideration to sinks?

All Parties should improve their sinks reporting. If sinks are included in QELROs, Parties should be obliged to improve their capacity to supply and monitor sinks data and the counting of any sinks related credits towards their QELRO should be contingent on the provision of such information.

Question 12. In order to achieve compliance with a QELRO (with/without sinks) what activities should be credited or not credited and what base year should be used?

It is not clear what is meant by the term "credit." Does it refer to some kind of points system operating in parallel or in conjunction with QELROs? Does it refer to joint implementation? Or is it an allusion to action taken under the Convention being "credited" to the QELRO commitment elaborated by the Protocol?

The latter would amount to shifting the base year forward from 1990. Such a move would have the perverse effect of rewarding Parties whose emissions have increased since 1990 and penalizing those whose emissions had declined or stabilized since then!

Question 13. What definitions should be included; in which article of the protocol?

No definitions relating to "net" or "sinks" should be included in the Protocol. The treatment of sinks should be handled through COP and/or MOP decisions as these are a more flexible tool capable of evolving in a dynamic fashion in response to new scientific knowledge and evolving methodologies. These decisions should be made on the basis of further work and advice from the IPCC.

Question 14. Do you have any other approach to propose?

All Parties to the Convention ultimately wish to see QELROs cover as comprehensive a range of actions as feasible. The question is when and how.

Our present knowledge of sinks, and how to account for them, is subject to very serious levels of uncertainty and methodological dispute. The first step to including sinks would be for the Parties to address these. To assist this process, the COP should request the IPCC to prepare a special report on the scientific and technical issues surrounding sinks for the attainment of a QELRO. The IPCC should address the issues that are unresolved from a scientific and technical perspective as well as those that cannot be resolved by the IPCC without further guidance from the FCCC. The report should suggest improved

methodological tools to deal with the uncertainties. The IPCC should examine various methodological tools and approaches for the treatment of sinks, including those being suggested by Parties in the AGBM with a view to providing an analysis of short and long term consequences that could be expected from each approach, in particular the impact on emissions during the first budget period. This report should provide a basis for Parties to the Protocol to agree when and how to include sinks in QELROs.

Without prejudice to the question of sink inclusion in QELRO in the first or subsequent budget periods, one approach that could be considered by the IPCC is that of "discounting" which would specify a discount for each sink category that would be applied to any credits generated by that category towards QELROs.

Under this scheme all IPCC source and sink categories would be listed in an annex (essentially draft Annex B) together with a default uncertainty values for each category. Parties would be allowed to count in to the QELRO all sources and sinks subject to discounting each sector according to the uncertainties, and other policy relevant factors, associated with it. Where Parties could demonstrate that they had a lower uncertainty than the default values, they might be permitted to use these instead. The removals credits generated by sinks could be subject to an appropriate discount to reflect their uncertain character. In the energy sector the IPCC default uncertainty on emission estimates is currently 10%. All Parties could thus claim 90% of their energy sector emission in the QELRO. Those that had lower uncertainties for the energy sector might be permitted to claim more. The IPCC default uncertainty for LUCF is 60%. So Parties could claim say, 60% of this sector, unless their data justified smaller discounts.

The discounting approach has several advantages over a blanket inclusion of all sinks because:

- it avoids the need to agree one uncertainty level applicable to QELROs;
- it could apply equally well to emissions from uncertain sources (some CH₄ and N₂O sources have uncertainty ranges comparable to some sinks);
- it rewards Parties with sound sinks data and at the same time provides a powerful incentive to others to generate such data and make it available to the Convention or protocol bodies.

The discount values, and modalities for gaining credits in excess of the default values would however have to be agreed by Parties. These could be established as part of the modalities for the accounting of emission budgets to be agreed by the first Meeting of the Parties, on the basis of expert advice from the SBSTA, responding in particular to the specific report from the IPCC on the sinks described above.

Question 15. Do you have specific protocol language.

This can be elaborated quickly should other Parties consider it useful.

Table A1-1 of the “Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reporting instructions”, page A 1.4

Table A1-1 UNCERTAINTIES DUE TO EMISSION FACTORS AND ACTIVITY DATA				
1	2	3	4	5
Gas	Source Category	Emission factor U_E	Activity data U_A	Overall uncertainty U_T
CO ₂	Energy	7%	7%	10%
CO ₂	Industrial Processes	7%	7%	10%
CO ₂	Land Use Change and Forestry	33%	50%	60%
CH ₄	Biomass Burning	50%	50%	100%
CH ₄	Oil and Nat. Gas Activities	55%	20%	60%
CH ₄	Coal Mining and Handling Activities	55%	20%	60%
CH ₄	Rice Cultivation	3/4	1/4	1
CH ₄	Waste	2/3	1/3	1
CH ₄	Animals	25%	10%	25%
CH ₄	Animal Waste	20%	10%	25%
N ₂ O	Industrial Processes	35%	35%	50%
N ₂ O	Agricultural Soils			2 orders of magnitude
N ₂ O	Biomass Burning			100%

Note: Individual uncertainties that appear to be greater than +/- 60% are not shown. Instead judgement as to the relative importance of emission factor and activity data uncertainties are shown as fractions which sum to one.

PAPER NO. 4: NAURU

PROPOSED QUESTIONS FOR PARTIES REGARDING SINKS

1. Should anthropogenic sinks be included or excluded in a QELRO? Why or why not? (In responding you may wish to consider which budget period or target year.)

Anthropogenic sinks should be excluded from a QELRO at the present time because: **1)** the term is not sufficiently well-defined; **2)** the uncertainties associated with sinks will make compliance with targets difficult or impossible to confirm; **3)** the lack of definition and the uncertainties in assessing sinks will facilitate mis-use of sinks in subverting the aims of reduction targets; **4)** removal by sinks of greenhouse gases is generally small (< 10%) in comparison with emissions by sources and hence inclusion of sinks will not make such a large difference.

It can be argued that such regulation of sinks is already required under the terms of Article 4 of the Convention, although specific regulatory policies, measures, targets and timetables are not presently specified.

On the other hand, sinks are important and creating specific incentives to manage them responsibly is a meritorious goal. Therefore, sinks should be included in QELROs when an adequate definition has been agreed and when uncertainties have been reduced significantly.

We favor establishing specific procedures to define anthropogenic sinks and reduce uncertainties in their assessment through the good offices of the IPCC. As soon as the definition is agreed and uncertainties reduced by appropriate methodologies and reporting procedures, sinks should be included in QELROs. This will provide incentive to prepare for the management of sinks while at the same time reducing problems that would be involved in including them.

2. What would be the impact of including or excluding sinks on the QELRO levels, national plans or policies of your country? (Please try to provide a qualitative answer.)

My country has not reported. It is a developing small island country and would not be bound by QELROs.

3. What criteria governed your answer to question number 1?

1) lack of definition; **2)** uncertainties; **3)** possibility of mis-use making compliance difficult or impossible to assess.

4. How would you define "anthropogenic" sinks in the context of a QELRO?

This is of course a major undertaking which should be tackled by an expert group of independent scientists and policy professionals, i. e., the IPCC. A tentative definition, based upon very limited thinking and consultation, is as follows:

Anthropogenic sinks are those that are created or significantly enhanced exclusively through significant human intervention and/or management efforts, and whose creation or enhancement yields net benefit within the contexts of climate, the larger environment, and the broader arena of socio-economic concerns.

The critical elements of this definition are as follows:

a) sinks... "that are created or significantly enhanced...through significant human intervention and/or management efforts;"

The term "created" is relatively straight-forward. If a forest is re-planted, or if specific management efforts and policies enable the reforestation of a previously deforested area, then a sink has been created under this definition.

On the other hand, the essential task of defining "significantly enhanced" and also "significant human intervention and/or management efforts" is challenging. What constitutes significant enhancement, and how can it be measured? This question intersects importantly with the issue of measurement uncertainty, discussed in detail below.

And what constitutes "significant human intervention and/or management efforts?" If one re-plants portions of a forest, has the entire forest been managed? Can a country fence off a forest, declare it a climate preserve, and claim credit for all greenhouse gases it absorbs? If one assesses the forest cover by satellite reconnaissance, is that "management?" If a coral reef is fertilized by runoff from agricultural lands, is this "management?" If the forest is studied by a scientific team for purposes of sink activity, is that "management?" If part of a forest is sprayed once a year does this qualify the whole forest for inclusion as a sink for QELRO purposes? How much effort must be invested before management can be said to be significant?

These questions embrace real policy and definition dilemmas that will have to be confronted directly if we are to draw the line between legitimate sink enhancement and bogus efforts to avoid significant actions to benefit the climate.

Determining what is a "significant" human intervention and/or management effort is also difficult. The significance will of course depend on how much effort is invested, but also on how successful that effort is. Definition of the term "significant" should therefore establish some kind of proportionality between managerial effort, the success of that effort, and credit obtained, in order to incentivize and properly reward managerial effort. This is obviously a complex undertaking, but I do not see how it can be avoided if benefit to the climate system is to be achieved and assured in workable operational compliance regimes. This issue demands calibrating the relationship between investment energy and QELROs credit, which is a matter both for science and also for policy and negotiation.

b) sinks whose enhancement creates net benefit within the context of climate;

If management efforts emit more greenhouse gases than are absorbed by the consequent removal of gases by sinks, then the management has had negative net benefit within the

context of climate. This obviously is to be avoided. It can be argued that the market would itself ensure this outcome. However, market distortion from the QELROs process may require more systematic attention and mitigation.

c) creation of net benefit within the broader context of environmental issues;

If management of a sink creates net benefit within the context of climate, this does not mean that it creates overall net benefit to the environment. For example, silviculture frequently entails monocropping and associated heavy application of fertilizer and pesticides. These practices are widely acknowledged to be highly destructive of natural biodiversity. Therefore, silviculture can be beneficial in the narrow context of climate, by enhancing removal of carbon dioxide from the atmosphere; but simultaneously disadvantageous to the environment at large, through the consequent loss of biodiversity. In such cases, net benefit to the environment may not result.

Similarly, fertilization of the oceans with elements that normally constitute limiting factors, such as iron, could enhance phytoplankton growth, but such blooms could interfere negatively with ocean ecosystems by, for example, loss of biodiversity through reducing light penetration to mid-waters and hence disrupting life cycles of species there.

Likewise, planting the African savannas with fast growing scrub bush could alter ecosystems irreparably and accelerate the loss of megafaunal biodiversity. Converting rangeland, grassland or wetland to agricultural land might have the same adverse effects on biodiversity. And so on.

Clearly, measures taken to benefit the climate must not do greater harm to the environment at large. To extend credit to environmentally harmful activities would provide incentives to do harm, which would be clearly counterproductive. Therefore, unless net environmental benefit results from sink creation or enhancement, credit must not be extended under QELROs.

Quantifying this provision of the definition of anthropogenic sinks will be difficult; how much is biodiversity worth in comparison with possible impacts on climate? How can we compare the rights of indigenous people with prospective climate change? Neither will it be simple to identify all harms associated with specific management activities. The effort is essential, however, if we are to avoid creation of inadvertent negative externalities.

d) creation of net benefit within the still broader context of policy (including socio-economic factors).

In the same way that climate-related activities can cause unintended negative impacts on other components of the environment, they can also have negative impacts on social or economic issues. For example, displacing island people by rising sea level may actually enhance sinks by enhancing coral reef growth. This does not mean that we should encourage sea level rise by extending credit under QELROs.

Less obvious, and therefore more difficult to handle, sink credits that cause displacement of indigenous peoples from grasslands in order to plant forests may well not serve the broader social good.

Equally difficult, climate related activities that adversely impact the economy may not be of value overall. Again, one could argue that the market will take care of itself; but again, extension of QELROs credit could provide exactly the market distortion that encourages counterproductive sink management activities. This must be guarded against in the definition of sink management.

5. Do you agree or disagree with the following proposition; if so, why or why not? "Any QELRO that would include sinks should be based on the 1996 IPCC guidelines. Any new IPCC methods would only apply to a second budget period or subsequent target."

The 1996 IPCC guidelines are certainly a good beginning. They indeed provide methodologies, and general guidance. They do not, however, address adequately the issue of uncertainty, nor do they attempt to define anthropogenic sinks. Until these difficult tasks are completed to the satisfaction of all Parties, credit should not be extended for sinks. If credit for sinks is applied prior to answering these difficult questions, the incentive to find answers will be lost. Sending the right market signals regarding sinks is possible without removing the incentives to do the job right.

6. a) Which IPCC LUCF categories should be included or excluded in a QELRO? Why? Examples: all land use change and forestry/Changes in forest and other woody biomass stocks/other.

The answer to this question is strongly related to 1 above. Categories of LUCF and other sinks should be included on the basis of: 1) adequate definition; 2) adequate measurement and assessment methodology; 3) adequate reporting data; and, above all, 4) sufficient certainty in assessment measures. As a general rule, uncertainties that are no greater than +10% might be considered acceptable.

b) If some categories are excluded, how should they be dealt with?

Their exclusion should signal the need to devote urgent attention to the four criteria listed in a) above in order to ensure their early inclusion.

7. What reference year should be used as the basis for any QELRO that would include sinks? 1990/2000/none/other

1990 seems adequate, but I would wish the issue of the baseline year to be evaluated by the IPCC in order to reveal possible complications or unintended implications from choosing different years.

8. a) How much uncertainty do you associate with the GHG inventories provided by your country for the specific IPCC reporting categories?

Not Applicable (Nauru does not currently report)

b) What uncertainty levels would be appropriate for sinks in a QELRO, bearing in mind the uncertainties associated with sources?

Uncertainties in sources is no excuse for permitting uncertainties in sinks. The proper response is to develop methodology to reduce both. The acceptable level of uncertainty is strongly dependent upon the magnitude of the QELROs targets. It is the **ratio** of uncertainties in the reduction targets (signal) to the uncertainty (noise) that matters (signal-to-noise ratio). Generally speaking, the signal to noise ratio must be sufficiently low to enable confident assessment of compliance and/or benefits of assessment measures. Unfortunately, this is possible at present mainly with carbon dioxide emissions from energy-related activities. This is why dealing with uncertainties should be a priority of the IPCC.

Error analysis and signal-to-noise ratios may appear at first sight to belong to the esoteric realm of statisticians. However, it is absolutely essential to deal with these issues if compliance under the Convention is to be assessed confidently. It would obviously be a curious policy decision to create a Convention or a Protocol for which compliance could not be confidently assessed.

In the meantime, a practical level of uncertainty is necessary for developing reasonable provisions. A value of + 5 - 10%, while entirely arbitrary, may be provisionally acceptable in that it strikes a balance between the ideal and the possible.

c) How should uncertainty be dealt with?

- 1) by requesting the IPCC to examine on an urgent basis the implications of uncertainties in assessing compliance and benefits of measures;
- 2) by requesting the IPCC to work consistently over the long term to reduce uncertainties in methodologies and reporting;
- 3) by creating appropriate incentives to eliminate or reduce uncertainties, for example, discounting or by inverse proportionality between credit and uncertainty.

9. Should there be a limit on the amount of sinks in a QELRO; if so, how should it be determined?

If uncertainty were not an issue, there would be no reason to limit sinks at all. On the contrary, the more they are included, the greater the protection will be in the long run, and hence the greater the benefit to the climate.

Given uncertainties in reporting and methodologies, however, there **should** be a limit on the amount of sinks in a QERLO and it should be determined on the basis of uncertainty

levels. For any particular target QERLO, the greater the uncertainty in measuring a sink, the less it should be credited in QERLOs. And the more ambitious the target, the greater uncertainty can be permitted to achieve the same level of confidence in compliance assessment. The exact proportionality between uncertainty, target levels and credit is a matter of scientific advice and negotiation.

10. Is the data provided in national communications adequate/inadequate for assessing compliance with a QELRO? Why or why not?

No. The data provided in national communications allow little more than an intelligent estimate of sources and sinks, although there is substantial variation across gases, sectors and sinks. In part this is because data are not available, and in part it is due to the issue of uncertainty. If, for example, the uncertainty level is 10% and the QERLOs target is 0% (stabilization), then compliance can be assessed only within a statistical probability range of perhaps 50%. This is far from the 5% confidence limits that are normally considered acceptable.

11. Should any "national system" established under Article 4 give special consideration to sinks?

Yes. It is important to prioritize sinks from the early stages of policy actions, in order to send the proper signals to governments, institutions and markets. On the other hand, it would be inappropriate to incorporate sinks quantitatively in contexts that could permit non-compliance or make compliance impossible to assess.

12. In order to achieve compliance with a QELRO (with/without sinks), what activities should be credited or not credited and what base year should be used?

The most rational approach is to credit activities in proportion to uncertainty levels (discounting). This would minimize the risk of non-compliance, minimize the risk of inability to measure compliance, and at the same time provide a powerful incentive to eliminate uncertainties by appropriate studies and development of methodologies. At the same time, a signal to include sinks could be sent by assigning a threshold uncertainty (e. g., $\pm 5 - 10\%$), below which the sink or activity could be credited.

In respect to base year, please see the answer to question # 7 above. This question appears redundant with that.

13. What definitions should be included; in which article of the protocol?

As usual, the need for definitions will follow directly from the terms that are agreed through negotiation. There is no need to specify terms in advance, and indeed, it is not possible nor appropriate to pre-judge the negotiations by such specification.

14. Do you have any other approach to propose?

The basic approach favored by Nauru is **discounting**. This includes: 1) inclusion of sinks from the beginning, in order to send the right signals to governments, institutions and markets; 2) assigning credit for sinks in direct proportion to the ambition of QERLOs targets, in order to maximize compliance assessment; 3) assigning credit for sinks in indirect proportion to measurement and reporting uncertainties.

The rationale for discounting is that it will: 1) enable sinks to be included from the outset, thereby maximizing the benefit to the climate; 2) limit credit for uncertain sinks in order to minimize the impact of uncertainties on compliance assessment; 3) create a powerful incentive to reduce measurement and reporting uncertainties in order to remove these, to the long-term benefit of the climate system.

15. Do you have specific protocol language?

Like definitions, protocol language is a matter for detailed negotiations following agreement on principle. Agreement on basic principles will lead quickly to acceptable negotiating text.

PAPER NO. 5: NEW ZEALAND

Questions for Parties Regarding Sinks: New Zealand Response

Q1 Should anthropogenic sinks be included in or excluded from a QELRO?

Yes, they should be included, based on a proportionate sharing of overall Annex I removals by anthropogenic sinks in 1990. (A Party's QELRO for a future budget period would be set on the basis of its emissions in 1990 less a proportionate share of total Annex I removals in 1990.)

Our reasons are as follows:

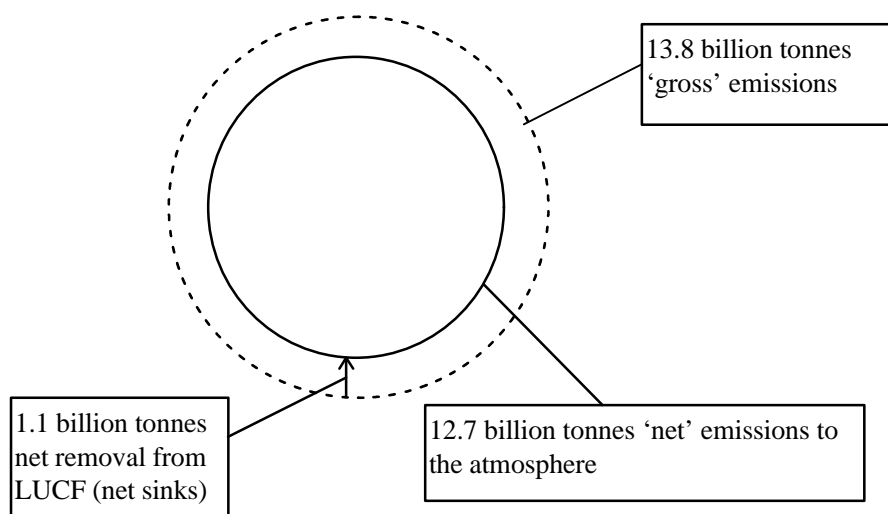
- (i) The FCCC and, in particular, the Berlin Mandate, are unequivocally clear that sinks must be taken into account;
- (ii) Not to do so would represent a substantial emissions 'loophole';
- (iii) To not include sinks would foreclose the opportunity for an important mitigation option that may provide additional least cost options;
- (iv) Sharing 1990 removals across Annex I Parties based on 1990 emissions would be equitable. Including sinks in this manner would ease the difficulty faced by some Parties and may assist in Parties converging to an agreeable outcome in Kyoto.

Further comment on points (i) and (ii)

It is important to ensure targets for Annex I as a whole are not set at such a level that net emissions could rise above 1990 levels. This could occur if 1990 removals are ignored. At AGBM8¹ we noted the following:

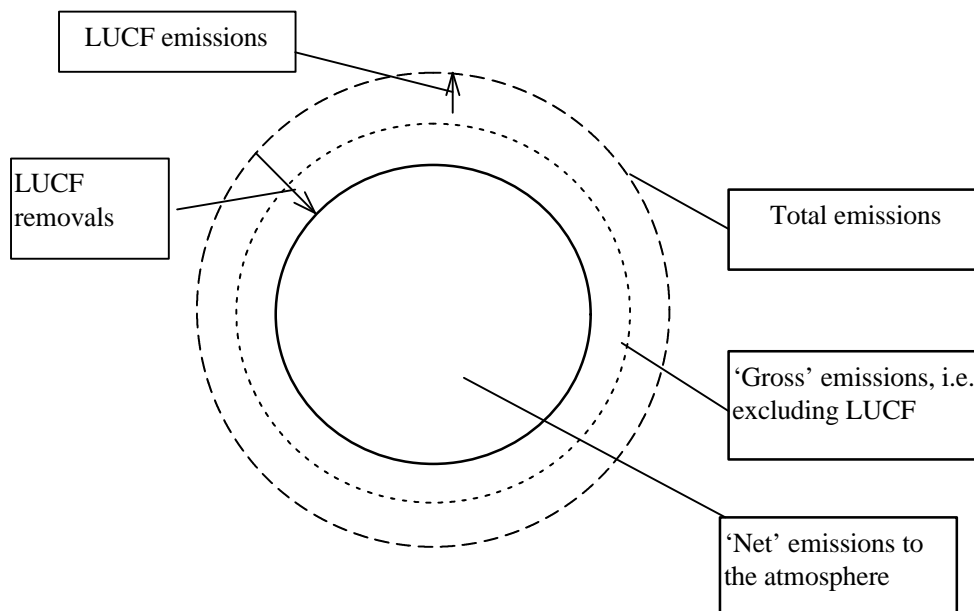
¹ In our 'Inspector Charbon response'

Figure 1: ANNEX I ANTHROPOGENIC CO₂ EMISSIONS AND REMOVALS IN 1990
(from FCCC/SBI/1997/INF.4)



This picture can be further elaborated as follows

Figure 2: ANNEX I ANTHROPOGENIC CO₂ EMISSIONS AND REMOVALS IN 1990



What this elaboration points out is that there are two elements to the 'net' removals noted in Figure 1 (earlier). These two elements can 'coexist' in a single activity, e.g. commercial forestry, which has harvesting emissions, and removals during forest growth. For a sustainably managed forest with an even distribution of age classes, these emissions and removals can net out to zero, i.e. the forest is in overall carbon equilibrium.

In other cases, the emissions and removals are more separate – for example, land clearance emissions, emissions from loss of soil carbon from land use change, and deforestation emissions, on the one hand; and land reversion removals, gain in soil carbon from land use change, and afforestation removals, on the other.

There are two key points to be made regarding these two Figures:

- The total anthropogenic removals by sinks are more than the net LUCF 1.1 billion tonnes.
- The total anthropogenic emissions by sources are more than the 13.8 billion tonnes of ‘gross’ emissions.

How does a potential ‘emissions loophole’ arise? In the long term, the level of removals by the 1990 sinks cannot be sustained. Eventually, all sinks must ‘grow up’ to become reservoirs, which no longer remove CO₂ from the atmosphere. As the removals diminish to zero, the atmosphere will see correspondingly greater net emissions.

If the Protocol were to establish a constraint (e.g. stabilisation) based on the large ‘anthropogenic emissions by sources’ pie in Figure 2, for example, the atmosphere would eventually see an *increase* in emissions equivalent to the amount of removals by sinks in 1990. Clearly, this would not be consistent with constraining the impact on the atmosphere².

How soon would this occur? If changes were left to nature, the length of time would depend on the age and growth rate of sinks in the regions of the world where the sinks exist. For New Zealand’s pine forests, for example, with relatively fast growth rates the length of time would be relatively short³.

However, if the Protocol were established with the larger ‘gross’ or total emission ‘pies’ of Figure 2 and then credit was allowed for some, or all, of the anthropogenic removals in future budget periods, the emission increase would be immediate. This is because the credits would allow ‘gross’ emission reductions to be deferred⁴.

Either way, the point is that, if sinks are excluded from QELROs, i.e. if QELROs are established on either a ‘gross’ basis or an ‘emissions by sources’ basis, without a ‘net contraction factor’, the atmosphere will see an *increase* in net emissions.

² While countries can ‘grow’ new sinks the capacity to do so is limited by physical and economic constraints. Also if, as they should, countries gain credit for the removals by these sinks which is used to offset emission reductions that would otherwise have to be made, these new sinks do not have a net effect on the atmosphere. Net reductions to the atmosphere will only occur through progressively more stringent net QELROS.

³ In the 30 year time frame from 1990 to 2020, for example, CO₂ removals by sinks in 1990 will have been fallen to zero.

⁴ This was the nature of the *gross-net* potential ‘emissions loophole’ identified by Inspector Charbon during AGBM8.

Comment on point (iii)

Point (iii) above is that to not include sinks would foreclose the opportunity for an important mitigation option that may provide additional least cost options.

This could only have the following effects:

- the overall costs of adjustment to a less fossil fuel intensive future would be higher than otherwise; and
- for a given level of acceptable cost, the Parties would negotiate less ambitious targets.

In other words, including sinks on an appropriate basis will mean that a more ambitious target emerges from Kyoto.

Comment on point (iv)

Point (iv) is that sharing 1990 removals across Annex I Parties in proportion to 1990 emissions would be equitable and, in our assessment, including sinks in this manner would ease the difficulty faced by some Parties. Rather than creating volatility, we believe our approach could have a smoothing effect.

Without doubt, including sinks at all will have a disparate effect on Parties' circumstances. Parties with relatively more forestry activity (active CO₂ removers), will fare comparatively better. This is directionally consistent with the intent of the Convention. Bearing in mind that the EU bubble itself has an internally smoothing effect on member States which is helpful when sinks are included, consider the circumstances of those Parties outside that bubble. In our view, including sinks in the way proposed here would change these circumstances in such a way as to improve the chances for negotiating an outcome, even a uniform target outcome.

Summary

In summary, inclusion of sinks is essential for conformity with the intent of the FCCC and the Berlin Mandate. By appropriately including sinks, it is possible to ensure that the collective Annex I target constrains future emissions in line with what the atmosphere 'saw' in 1990 – not some higher level. Including sinks provides a broader set of least cost mitigation options which serve to reduce Parties' costs to meet targets and allow more ambitious targets to be accepted.

Question 2: What would be the impact of including or excluding sinks on QELRO levels, national plans or policies of your country?

New Zealand has undertaken deliberate agricultural subsidy removal and forestry encouragement policies which today are having a substantial effect on New Zealand's net

emissions of greenhouse gases to the atmosphere. In 1990, CO₂ removals from New Zealand's plantation forests mitigated over 85% of all anthropogenic CO₂ emissions, including those from forest harvest and land use change.

Excluding sinks from the Protocol would have a clear adverse effect on New Zealand's ability to accept an ambitious target. Because of our already high usage of renewable energy, New Zealand faces one of the highest marginal abatement costs of OECD countries. In terms of emissions per capita and emissions per GDP, New Zealand is broadly comparable to Ireland, a country which, under the proposed EU burden sharing arrangement, would be allowed a substantial growth in emissions. Differentiation proposals, such as that developed by Iceland for example, have also indicated that New Zealand should have a comparatively easier target.

Including sinks will change New Zealand's circumstance only if inclusion is handled appropriately, i.e. in the way suggested in the response to Question 1 above. If, however, a Party's rate of removal in a future budget period were referenced against the Party's rate of removal in 1990, New Zealand would be penalised by the inclusion of sinks.

Using an 'individual Party net 1990' approach (one option in Protocol draft text) would not be a problem for New Zealand alone. It is true of all Parties who had substantial sinks in 1990. If targets were set for individual Parties on the basis of their 'net 1990' emissions, the greater the amount of removals a Party had in 1990, the smaller its budget would be. This would penalise those Parties with significant removals in 1990.

As explained above, New Zealand proposes that Annex I Parties proportionately share the total CO₂ removal by sinks occurring in 1990. This is achieved by setting a Party's QELRO on the basis of its anthropogenic emissions in 1990 less a proportionate share of total Annex I anthropogenic removals in 1990. This approach is exactly equivalent to basing emission budgets on a Party's emissions by sources in 1990, adjusted by a uniform contraction factor.

This contraction factor is the ratio of total Annex I removals by sinks in 1990 divided by total Annex I emissions by sources in 1990. Based on reported and estimated data this factor is around 12% to 15%. The contraction factor simply ensures that the sum of Annex I Parties' emission budgets is based on the net emissions to the atmosphere by Annex I Parties in 1990, ie the same total budget that would be derived from summing budgets based on the 'individual net in 1990'.

In the budget period, each Annex I Party's anthropogenic emissions to the atmosphere can then be measured on a net basis, i.e. emissions by sources less removals by sinks⁵.

If the Protocol includes sinks on this basis, even given the high marginal abatement cost faced by New Zealand's energy sector, New Zealand will be better placed to accept a more ambitious target.

⁵ This is therefore a 'net-net' approach, contrary to some claims

An important point to note is that New Zealand is a strong advocate of emissions trading. CO₂ removal credits derived from our sinks would be part of the international emissions trading regime. This means New Zealand's energy sector emitters would face the international market price of CO₂.

Question 3: What criteria governed your answer to question 1

Fully detailed in our answer to question 1.

Question 4: How would you define "anthropogenic" sinks in the context of a QELRO

New Zealand proposes that the text of the Protocol explicitly refer to anthropogenic emissions by sources and anthropogenic removals by sinks.

New Zealand is an active participant in the work of the IPCC inventory group for land use change and forestry and supports and will fully abide with the definition of anthropogenic that is recommended to SBSTA and agreed by the COP.

New Zealand's reported CO₂ removals are without question anthropogenic as they result from planted forests and afforestation.

Question 5: Do you agree or disagree that any QELRO that would include sinks should be based on the 1996 IPCC guidelines (for the first budget period)

New Zealand agrees but however notes that the 1996 IPCC guidelines need to be finalised with respect to the treatment of harvested wood products and biomass burning.

Any COP decision on inventory methodologies and any article in the protocol related to inventory methodologies should be mindful of this fact. In addition, a COP decision should urge the IPCC to place a high priority on the completion of the 1996 guidelines as they relate to land use change and forestry and additionally request the SBSTA to provide any assistance necessary to facilitate the work of the IPCC in this regard.

Question 6a: Which IPCC LUCF categories should be included or excluded in a QELRO?

New Zealand supports the principle that all anthropogenic emissions by sources and removals by sinks covered by the 1996 Guidelines should be included.

We also support the fact that the 1996 Guidelines endorse, and recommend to Parties, the use of the most accurate national inventory methods.

This said, we are mindful that some Parties have concerns about some inventory activities and that in accomodating such concerns Annex I Parties may choose, for the first budget period, to include a less than complete list of activities covered under the IPCC 1996 Guidelines.

It was to allow for this possible outcome that New Zealand earlier proposed a separate Annex for anthropogenic land use change and forestry activities. We believe this option may yet prove to be found agreeable to Parties.

Question 6b: If some categories are excluded, how should they be dealt with?

Methodological work should be completed as soon as possible and they should be included in the second budget period.

The protocol should include a provision for the review of changes in inventory methodologies including GWPs with a view to a process to revise QELROs in the second budget period if changes in methodologies have sufficiently substantive effects.

(Such a provision is also likely to accommodate changes in our understanding of climate change science. QELROs for the second period budget and any subsequent periods should therefore be established at this time on a provisional basis.)

Question 7: What reference year should be used as the basis for any QELRO that would include sinks? 1990/2000/none/other

As noted in our answers to questions 1 and 2 it will be necessary, under our proposal, to assess an individual Party's anthropogenic emissions by sources in 1990, and assess the aggregate of Annex I Parties' anthropogenic removals by sinks.

This latter assessment might be estimated at an aggregate level rather than building it up from the individual Party level which may prove difficult if some Parties do not have 1990 data.

During a future budget period net emissions or removals of CO₂ from land use change and forests can be assessed from the change in carbon stock during the period. For this measurement the reference stock would be that at the beginning of the budget period.

Should Parties not have 1990 or subsequent data for the level of carbon stock associated with the LUCF activities included in the Protocol, they should be urged to begin reporting this data in their annual inventories as soon as possible and, certainly, prior to the beginning of the first budget period.

Question 8: Uncertainty questions

The estimated uncertainty surrounding CO₂ net removals by plantation forest sinks is in the order of $\pm 25\%$.

The estimated uncertainty surrounding CO₂ emissions from on-site burning of biomass (scrub and indigenous forest) and on-site decay of scrub cleared for forestry is in the order of $\pm 35\%$.

(See NZ Second National Communication Pg 188-189 and Annex 5 for further detail)

On the general question of uncertainty we would note that the above uncertainty levels for LUCF emissions and removals are no greater than, and in some cases far less than, the uncertainties for some sources of methane and nitrous oxide.

In New Zealand's view, uncertainty for sinks should be treated in the Protocol in a manner consistent with that for other greenhouse gases. The focus should be continuing emphasis by IPCC/SBSTA on improving inventory methodologies and ensuring that methodologies do not contain systematic bias, i.e. there should be a generally equal likelihood that the true value lies on the + side of the central value as the - side. This, plus the fact that one is looking at differences over time of emissions and removals where uncertainties will tend to cancel themselves, means that uncertainty can be less of a concern than some perceive.

It is also important to realise that strengthening Parties' commitments will create incentives to improve national emission monitoring and inventory techniques. This should lead to a reduction in current levels of uncertainty.

We would also note that in addition to the uncertainty of measurement, some Parties may be concerned about how the inclusion of sinks affects their ability to predict their emissions in a future budget period. This concern may then translate to their acceptance of targets for this future period.

In our view this element of uncertainty needs to be put in the context of all emissions, including those from energy. While energy emissions may have relatively lower measurement uncertainties, future emissions depend on factors such as future economic growth which are relatively quite uncertain.

Again it is not appropriate to single out sinks as a particularly uncertain element with the view to exclude them from the Protocol.

Question 9: Should there be a limit on the amount of sinks in a QELRO?

With the New Zealand proposal, which is that Annex I Parties should proportionately share the aggregate 1990 level of removal by anthropogenic sinks, it is not necessary that a limit be placed on the amount of sinks in a QELRO.

In a budget period Annex I Parties should be assessed on a 'net to the atmosphere' basis. There is no rational reason to place limits on sinks in this calculation.

Placing a limit on sinks can, at the margin, remove all incentive to take additional actions to increase CO₂ removals. This runs counter to the objectives of the Protocol and the Convention itself. It also has the potential to unnecessarily increase the overall cost of attaining a target.

Question 10: Is national communication data adequate/inadequate for assessing compliance with a QELRO?

By the time the first budget period begins there is no reason to believe this should be a significant problem. Parties not following the 1996 guidelines by then should have their data duly adjusted (penalised). This is provided for in the current proposed Protocol text (in Article 5.2)

Question 11: Should any "national system" established under Article 4 give special consideration to sinks?

National inventory systems need to be established under the general principle that the most accurate possible methods should be established to estimate all anthropogenic emissions by sources and removals by sinks. Removals by sinks are no more or less important than emissions by sources.

Question 12: In order to achieve compliance with a QELRO what activities should be credited and what base year should be used?

As noted in our answer to question 2, during a budget period each Annex I Party should be assessed on the basis of their net effect on the atmosphere. All activities leading to anthropogenic emissions by sources and removals by sinks for which IPCC inventory guidelines exist and have been accepted by the COP should be included in this assessment.

As noted in our answer to question 7, LUCF emissions and removals can be assessed from the change in carbon stock over the period, The 'base year' for this assessment would be the beginning of the budget period.

Question 13: What definitions should be included?

Net = emissions by sources less removals by sinks

(We will provide others at a later time following a fuller review of the draft articles)

Question 14: Do you have any other approach to propose?

The approach generally proposed in answers to previous questions and articulated in text in response to question 15 is the approach New Zealand is putting forward for consideration at this time in an effort to have Parties converge on a solution to the sinks issue. It should be noted that this approach is a little different to that articulated in the 27 October position New Zealand circulated at AGBM8.

In the 27 October proposal, the distinction was drawn for CO₂ emissions between energy and industrial processes (often termed 'gross' emissions) on the one hand and land use change and forestry (LUCF) on the other. LUCF includes both emissions and removals.

This, for example, is a distinction also drawn by the Secretariat in how it synthesizes inventory data. There are a number of arguments that Parties including New Zealand have made about why such a separation is logical, both deriving from the Convention and from the nature of the emissions themselves (eg fossil fuel based compared with recycled atmospheric carbon).

However such a separation is not universally accepted and may lead to it being difficult to reach convergence on the sinks issue.

A more practical problem arises when one attempts to construct protocol text with such a separation. For example, sinks other than for CO₂ from LUCF exist which may be construed as anthropogenic, even if inventory methodologies have yet to be developed for Parties to report them. Also emissions from LUCF are not restricted to just CO₂.

In our view, on reflection, to create understandable and agreeable text to cater to these practical complexities appears unlikely at this late hour. It now seems to us that the appropriate distinction to draw is simply anthropogenic emissions by sources and anthropogenic removals by sinks.

This is the basis of the text proposed in our answer to question 15.

Question 15: Do you have specific Protocol language?

Yes:

New Zealand textual proposal - Article 3

1. Each Party [Parties] included in Annex I shall [individually or jointly] ensure that [its/their] net aggregate anthropogenic carbon dioxide equivalent emissions of [the] greenhouse gases [listed in Annex A] [not controlled by the Montreal Protocol] do not exceed [its/their] commitment[s], expressed in terms of [an] emission[s] budget[s], calculated in accordance with this article.

***Comment:** Paragraph 1 combines through the use of [] the elements of the current Alternatives 1 and 2 in FCCC/CP/1997/2. We suggest that the intent behind Alternative 3 is catered to in our proposed paragraphs 6 bis and 6 ter which establish defined aggregate Annex I Party targets on a net basis for the first and second budget periods.*

Paragraph 1 essentially says that Annex I Parties' net emissions to the atmosphere during a budget period shall not exceed the emissions budget for that period established under the various paragraphs in Article 3 by which the emissions budgets are finally calculated. Paragraph 1 caters to the inclusion or exclusion of an Annex A and the inclusion or exclusion of Parties acting jointly (i.e. the EU Bubble).

6 bis. For the first budget period, the total of all Annex I Parties' net emissions of [the] greenhouse gases [listed in Annex A] [not controlled by the Montreal Protocol] shall be [] per cent of the total of all Annex I Parties' net emissions of greenhouse gases [listed in Annex A] [not controlled by the Montreal Protocol] in 1990.

6 ter. For the second budget period, the total of all Annex I Parties' net emissions of [the] greenhouse gases [listed in Annex A] [not controlled by the Montreal Protocol] shall be [] per cent of the total of all Annex I Parties' net emissions of greenhouse gases [listed in Annex A] [not controlled by the Montreal Protocol] in 1990.

***Comment:** As noted above, paragraphs 6 bis and 6 ter establish the aggregate Annex I targets on a net basis relative to 1990 for the first and second budget periods. (The combination of these paragraphs and emissions trading under the provisions of Article 6 essentially establish an 'Annex I Bubble').*

7. For the first budget period, from 200[x] to 200[x+5], the starting budget for each Annex I Party shall be [] per cent / the percentage inscribed for that Party in Attachment 1] of that Party's aggregate anthropogenic carbon dioxide equivalent emissions⁶ of [the] greenhouse gases [listed in Annex A] [not controlled by the Montreal Protocol] in 1990 or in the base year or period determined in accordance with paragraph 3 above, multiplied by 5.

***Comment:** Paragraph 7 provides that the starting budgets of Annex I Parties are individually established on the basis of their anthropogenic CO₂ equivalent emissions by sources. The text contemplates various [] options. First, these could be all anthropogenic emissions by sources or only those from gases/sources listed in Annex A. Second, the targets could be uniform for Parties or as differentiated and inscribed in Attachment 1. Paragraph 8 duplicates paragraph 7 for the second budget period.*

8. For the second budget period, from 200[x] to 20[x+5], the starting budget for each Annex I Party shall be [] per cent / the percentage inscribed for that Party in Attachment 1] of that Party's aggregate anthropogenic carbon dioxide equivalent

⁶ Note: this is total emissions, **not** 'net'.

emissions of [the] greenhouse gases [listed in Annex A] [not controlled by the Montreal Protocol] in 1990 or in the base year or period determined in accordance with paragraph 3 above, multiplied by 5.

8 bis. To ensure that the total amount of all Annex I Parties' net emissions to the atmosphere of [the] greenhouse gases [listed in Annex A] [not controlled by the Montreal Protocol] established under paragraph 6 bis and 6 ter is not exceeded, the budget for each Annex I Party established in paragraphs 7 and 8 shall be reduced by the ratio of total Annex I anthropogenic removals by sinks in 1990 divided by total Annex I anthropogenic emissions in 1990.

Comment: Paragraph 8 bis is the means by which the individual starting budgets for Annex I Parties established under paragraphs 7 and 8 are contracted (or shrunk) to proportionately share the aggregate removals by sinks of Annex I Parties in 1990. This ensures that the total of Annex I Parties' emissions budgets are in accord with the limits established in paragraphs 6 bis and 6 ter.

It should be noted that because this contraction of Parties' individual budgets occurs after any equity decisions that may be taken which lead to differentiating the emissions baseline (ie in paragraphs 7 and 8 if this happens), these would be taken into account in the uniform sharing of removals.

(Note that text relating to Article 10 Parties needs to be similarly reviewed for modification in accord with the above!)

PAPER NO. 6: NORWAY

The Norwegian response to questions for parties regarding sinks

Question 1

Norway wants a protocol with incentives to direct policies and measures both towards sinks and sources. This necessitates an inclusion of sinks in the QELROs in the protocol or other instrument to be agreed in Kyoto. Otherwise we are afraid the protocol will hamper the Parties in stimulating the most effective balance of policies and measures in order to fulfil the goal of the Climate Convention. An inclusion is consistent with the Convention and the Berlin Mandate. Both a traditional «net» approach and a so-called «stock change approach» (here the term «stock change approach» is used for an approach in line with what New Zealand has advocated in recent AGBMs) could provide incentives to increase the sinks. We can see technical and scientific advantages with a «stock change approach». Practically all Norwegian forests are managed and thus subject to various policies and measures which will constantly affect the uptake of carbon. We realise technical difficulties in an approach that would try to single out and count effects of specific climate related policies and measures only.

Question 2

Inclusion of removals by sinks seems to make it possible for many Parties to accept more ambitious QELROs. The alternatives a) exclusion of sinks, b) inclusion on a «net» basis or c) inclusion on a «stock change» basis will imply three different levels for the QELROs in order to express equivalent levels of ambitions regarding emissions of GHGs. In countries where the sinks are large compared to the emissions, these levels can be significantly different. (This is illustrated in the secretariat's paper FCCC/SBSTA/1996/9/Add.1 table 3, based on the first communications under the Convention.) For Norway, inclusion of sinks in a QELRO may make it possible to accept a more ambitious QELRO than without.

Regarding national plans or policies in Norway, inclusion of sinks in the QELROs will definitely put more emphasis on efforts in the forestry sector, which would most likely lead to a higher net uptake of GHG (CO₂).

Question 3

The main reasons for our answer to question 1 are the commitments of the UNFCCC and the Berlin Mandate, addressing all sectors, sources and sinks of GHGs. From an environmental point of view, it is important to give the right incentives for actions, including sources as well as sinks, in the protocol or other instrument to be agreed in Kyoto. Inclusion of removals by sinks will also make it possible for many Parties to accept more ambitious QELROs.

Question 4

For Norway it seems reasonable to include anthropogenic emissions and sinks from land use change and forestry (LUCF) in accordance with the IPCC guidelines. For Norway reporting on such sources has been extensively undertaken in our second national communication.

In principle all areas within the jurisdiction of a party which have been affected by management, and all categories, should be included in the basic calculations in accordance

with the IPCC guidelines. Inclusion of sinks in a QELRO should be based on the assumption that the calculated sink is real in terms of removing CO₂ from the atmosphere, and thus comparable to reductions of emissions by sources.

Question 5

The reporting scheme should be compatible with the reporting of emissions included in QELROs. The other important principle is to be able to utilise the best information at a certain point in time. When we define QELROs in Kyoto, these will most probably be related to present data based on IPCC 1996 guidelines and presented in the national communications.

If Parties make improvements in their methodology within the guidance of the IPCC guidelines the same changes should apply to all relevant years, both base years and target years. The changes should be reported in a transparent way. The questions arising from future revisions of the guidelines that may lead to changes in the figures have many similarities with other types of questions related to future methodological issues connected to the implementation of the protocol. The approach to such changes should therefore reflect the more general approach in the protocol to such methodological issues. The same problem of uncertainty and possible revision applies for any gas or sector included in the QELROs, and not only to sinks. The uncertainty and possibility for revisions in this sector is not considered greater than for emissions of methane and nitrous oxide.

Question 6

In principle all IPCC LUCF categories should be included.

Question 7

1990 should preferably be used as base year, but differentiated QELROs or lack of reliable data may make it possible to use other years.

Question 8

a)

The level of uncertainty varies between different chemical compounds and different reporting categories. We find most of the data of CO₂ emission from fossil fuels rather accurate. The uncertainty in the emission data for biotic CO₂ sinks are in general at the same order of magnitude as the data for some of the methane and nitrous oxide categories, e.g. CH₄ from landfills and N₂O from agriculture.

The trend from one year to another is less uncertain than the level of the emission in one year. Further the uncertainty is generally higher for single categories than for the aggregated figure for a chemical compound.

b)

We will have to live with uncertainties related to many sources and sinks in the QELROs. Compared to other uncertainties, we find the uncertainties in the LUCF sector in Norway acceptable, and it is thus appropriate to have sinks included in our QELROs. We believe the situation is similar in many Annex I countries. In principle the level of uncertainty for sinks in the QELROs should not be significantly higher than for other single reporting categories. Inclusion of sinks (LUCF) in a QELRO will not necessarily increase the uncertainty and

inclusion is not more problematic than inclusion of i.a. methane from landfills and N₂O from agriculture.

c)

Transparent reporting according to agreed guidelines.

Question 9

No limitation.

Question 10

Yes it is adequate - if the communications are in line with the guidelines.

Question 11

The national system for estimation of emissions and removals referred to in article 5 in the FCCC/CP/1997/2 should take into consideration anthropogenic emissions by sources and removals by sinks of all GHGs as proposed in the document.

Question 12

Base year: Preferably 1990. The development in all anthropogenic emissions by sources and removals by sinks should be credited against properly differentiated QELROs.

Question 13, 14 and 15

At the moment we have no further comments to these questions beyond the information given above.

PAPER NO. 7: PERU

ANSWERS TO THE PROPOSED QUESTIONS FOR PARTIES REGARDING SINKS

1. Yes. Because it is a reduction that can be accomplished within those that offer economic advantages. However, there is a need for a special global effort from the scientific community to achieve a reliable methodology on land use change and forestry.
2. The impact of including sinks on QELRO levels should mean higher levels of commitments that if they are not accounted. Peru is aware of the need to initiate a short term progressive reduction of emissions for the next century. This is a cornerstone of the Protocol.
3. The answer to question 1 is governed by scientific, economic, environmental and political criteria.
Scientific: sink function of woods and soil is evident
Economic: higher resource valuation, cost efficiency and efficacy in mitigation options
Environmental: additional environmental benefits as land use capacity restoration, water balance, microclimate and biological diversity
Political: Higher forest valuation leads to better national policies on sustainable development. Specially ifs developing countries, this will help to initiate or reinforce the long term process to reduce deforestation due to poverty.
4. "Anthropogenic" sinks should be defined as a product of a process in which clear action and decision making processes were involved and that can not be attributed to chance or circumstances. In fact, anthropogenic sinks are produced by activities of afforestation, reforestation and forest management.
5. Disagree. 1996 IPCC guidelines recommends the use of available national methodologies or default values in tile land use change and forestry categories. This has meant the use by developed countries of their own expertise and the use of default values from developing countries. New IPCC methods should be developed to reduce uncertainty and achieve comparable methodologies according to Art. 4.1 a). These new methodologies should be based on field work research, systematic observation and development of data archives.
6. A. The category that shall be **included** is changes in forest and other woody biomass stocks. The reason is that human action is more evident and quantifiable methodologies are easier to achieve in a short term period.

B. The categories that shall be excluded are expected to be addressed with specific policies and measures to enhance their role as greenhouse gases sinks
7. The base year should be 2000 to which clear methods should be developed.

8.
 - a. For sinks high uncertainty is assumed.
 - b. A maximum of what is allowed to me highest source considered
 - c. Uncertainty should be addressed through enhancing the knowledge of biogeochemical cycles particularly in tropical countries. Additional funds should be provided for that reason
9. Yes. It should be determined according to the overall capacity, of greenhouse gases removal by sinks in comparison with the global emissions level.
10. Inadequate. Maximums and minimums according to uncertainties are expected to be provided as well as evidence that the enhancement is due to anthropogenic sinks.
11. Not clear which article 4.
12. Afforestation, reforestation and forest management.
13. The categories of anthropogenic enhancement of sinks should be included
14. No.
15. No.

PAPER NO. 8: UNITED STATES OF AMERICA

RESPONSES OF THE UNITED STATES TO AGBM8 QUESTIONS ON SINKS

- 1. Should the anthropogenic sinks be included or excluded in a QELRO? Why or why not? (In responding you may wish to consider which budget period or target year.)**
- 3. What criteria governed your answer to question number 1?**

(The US has combined its answers to questions 1 and 3.)

Sinks should be included in QELROs for the first and all subsequent budget periods. The following criteria and conclusions regarding each are important in determining that position (roughly in order of importance):

a. The provisions of the FCCC

The FCCC clearly calls upon Parties to include sinks in their greenhouse gas reduction obligation; it would be consistent with the approach taken by the Convention to include sinks in the protocol. The objective of the FCCC (Article 2) and the principles (Article 3) call on Parties to stabilize greenhouse gas concentrations in the atmosphere, which is only possible by acting on both sources and sinks. In addition, Decision 1/CP.1, the “Berlin Mandate,” includes coverage of all greenhouse gas emissions by sources and removals by sinks, all relevant sectors, and explicitly, QELROs for emissions by sources and removals by sinks.

Further, it would be illogical not to include both sources and sinks, in net, in the QELROs of Parties. If sinks were not included, emissions from all sources would be included, but the uptake by the same categories or sectors would not be included. Some categories can be both sources and sinks. For example, land use can result in either emissions or removals, and emissions from fossil fuel use by power plants can be removed by extraction of CO₂ from the stack gases and injected permanently, for example, into oil and gas wells. Including only the emissions but not the removals by any category or Party would be illogical and inconsistent with the approach taken by the FCCC and subsequent Decisions.

b. The impact on protecting the climate system

Sequestration from Land Use Change and Forestry (LUCF) is a critical component of the global carbon cycle and a significant offset to Annex I emissions, roughly 7-10% in 1990. For this reason, LUCF sinks must be included in QELROs to provide the necessary incentive for Parties to maintain and enhance carbon sinks. Inclusion of sinks will also provide incentives for Parties to further improve measurement, monitoring and verification of emissions and sequestration in this sector.

Further, inclusion of LUCF emissions but not removals would “grandfather” those emissions -- benefiting those countries that were deforesting or otherwise emitting carbon from land in the base year. Since those practices are unsustainable over time as well, excluding sinks would allow those Parties to take advantage of those declining carbon losses and not make the same degree of greenhouse gas reductions

from the energy and other sectors as those Parties that sequestered carbon in 1990.

c. Flexibility and cost-effectiveness in meeting QELROs

Because of differing national circumstances, the proportions of emissions and removals by different sources and sinks varies across Parties. For instance, in 1990 US net removals in LUCF offset 17% of emissions from all other sectors, using the current IPCC accounting system. In contrast, inclusions of LUCF emissions for 1990 would increase Australia's total emissions by 23%. In order to achieve a QELRO, Parties must have flexibility to reduce emissions in ways that are appropriate to national circumstances. Inclusion of all sources and sinks in the QELRO will provide Parties with maximum flexibility to achieve QELROs in the most practical, appropriate and cost-effective manner. Lower costs makes it possible for many Parties to agree to tighter greenhouse gas obligations.

2. What would be the impact of including or excluding sinks on the QELRO levels, national plans or policies of your country? (Please try to provide a quantitative answer.)

Due to declining rates of sequestration in to forestry sector, inclusion of LUCF using the current IPCC accounting system increases the amount of reductions required for the US to meet a 2010 target by 40 MMTC. Exclusion of these emissions would effectively reduce the US target by 40 MMTC.

With respect to the US national plan, exclusion of sinks would eliminate significant opportunities for low cost emission sequestration. Further, sink enhancement measures also have significant local environmental benefits for air (by reducing local temperatures leading to ozone formation, and by the filtering effect of trees), water quality (by reducing erosion and run-off of pollutants in watersheds), and biodiversity. Inclusion of sinks in a QELROs is consistent with other national environmental objectives.

4. How would you define "anthropogenic" sinks in the context of a QELRO?

Due to vast differences in national circumstances, and the arbitrary nature of defining 'anthropogenic', the US believes that all changes in the LUCF sector should be included in a Party's accounting of its activities that are important to resolution of the climate change problem. At a minimum, all LUCF fluxes should be included in a Party's GHG accounting, although a Party could be allowed to demonstrate that some portion of those fluxes are truly outside of its responsibilities. This accounting would then be subject to review, just as any other inventory category. This is how the IPCC forest experts have defined what should be measured in Parties' GHG inventories, and the U.S. supports this approach. The U.S. believes that it is impractical to determine or negotiate what portion of the changes in carbon sinks and reservoirs are due to actions taken before or after any other point in time, or which are due to non-anthropogenic causes. The definitions would be subject to great variations in interpretation, and the estimates would be difficult to verify.

5. Do you agree or disagree with the following proposition; if so, why or why not? “Any QELRO that would include sinks should be based on the 1996 IPCC guidelines. Any new IPCC methods would only apply to a second budget period or subsequent target.”

The U.S. believes that it is important to set definitely the general framework for accounting for sinks prior to determination of the QELRO, since any change in this framework would change the nature and stringency of the obligation. Such a framework must include a determination of which sources and sinks of GHGs are included in the QELRO, and how sinks are to be accounted. However, the US also believes that it is desirable to continually improve methodologies for accurately measuring and reporting gas emissions and removals. We believe that improvement to these methodologies could be adopted after agreement on the QELRO, provided that the improvements apply both to the base year and to the QELRO, and provided that they apply for the duration of applicable budget periods.

The U.S. recognizes, however, that not all countries have used the IPCC guidelines to estimate their 1990 GHG inventories. The IPCC guidelines themselves allow countries to use methods which are demonstrably better than those specified. The U.S. proposes incentives for countries to move to the best, most comparable methods over time, through provision for adjustments to inventories if a Party does not use the best agreed method.

6. a) Which IPCC LUCF categories should be included or excluded in a QELRO? Why? b) If some categories are excluded, how should they be dealt with?

All forest and land use categories should be included, including: above-ground forest carbon, soil carbon, wood products, and carbon stored in landfills. We recognize that currently not all Annex I Parties have estimated emissions and sequestration from these categories sufficiently to gauge attainment of future QELROs. However, we believe that inclusion of all LUCF categories in a QELRO will provide the appropriate incentive for Parties, individually and collectively, to improve the accuracy and reliability of measurement and reporting. We also note that there are both technical and policy issues with the harvested wood carbon category that will need to be resolved before it can be included in a QELRO.

7. What reference year should be used as the basis for any QELRO that would include sinks? 1990/2000/none/other?

The U.S. believes that for consistency the base year for emissions should be the base year for sinks. However, we note that because both emissions and removals from LUCF are unsustainable over the long term -- unlike emissions from other categories, it may be desirable to treat LUCF differently from other categories.

**8. a) How much uncertainty do you associate with the GHG inventories provided by your country for the specific IPCC reporting categories?
b) What uncertainty levels would be appropriate for sinks in a QELRO, bearing in mind the uncertainties associated with sources?
c) How should uncertainty be dealt with?**

The U.S. estimates of uncertainty of its GHG inventory are provided in the attached table. However, we note that in verifying attainment of budget targets, it will be more important to know with confidence the change in emissions or removals from the beginning to the end of the reference period, than the absolute level of emissions or removals. Because the table

provides estimates of uncertainty of emissions or removals at a particular point in time, it over-estimates the uncertainty of measuring changes in emissions or removal trends. For example, a Party's estimate can be "wrong" in both the base year and budget periods; but as long as the Party uses consistent methodologies for both, the estimates should be biased in the same direction. More importantly, the estimate should provide a reasonably accurate estimation in the net change in emissions or removals (the trend) over the period.

The U.S. believes that the benefits of including all categories in the QELRO outweigh the risks of existing levels of uncertainties. Further, the U.S. believes that the uncertainties associated with sinks are not arguably different from those associated with sources, and so no distinction between sources and sinks can be made on grounds of uncertainties.

Uncertainty should be dealt with by requiring use of the preferred, accepted IPCC GHG inventory guidelines. An incentive to use these can be provided, as the U.S. proposed, by adjusting a Party's inventory for sectors or sources where best methods have not been used. In all cases, the method used to estimate the base year inventory for a Party must be the same used to measure that Party's attainment of the budget target.

9. Should there be a limit on the amount of sinks in a QELRO; if so how should it be determined?

Due to the vast differences in Parties' national circumstances, the US believes that it would be inappropriate and arbitrary to limit the inclusion of sinks in a QELRO.

10. Are the data provided in national communications adequate/inadequate for assessing compliance with a QELRO? Why or why not?

The concerns expressed by many Parties over the accuracy and comprehensiveness of sink data do not result from inadequacy of current reporting guidelines, but rather from Parties' failure to comply with reporting guidelines. We believe that Parties' full compliance with IPCC inventory and reporting guidelines, in conjunction with the processes for in-depth review of individual Parties, and the additional provisions the U.S. anticipates in the agreement now under negotiation, *taken together*, are sufficient for assessing compliance of a Party with its QELRO. Additionally, comparison with other sources of data, input from experts and non-governmental organizations, and comments from other Parties will assist the multi-faceted process of determining compliance.

11. Should any "national system" established under Article 4 give special consideration to sinks?

The U.S. is open to special consideration of sinks in the national systems proposed under Article 4. The U.S. also notes that the levels of accuracy associated with any category or activity will vary tremendously from the project, to regional, to national, to international levels. The necessary degree of accuracy, and the achievable level of accuracy, will differ among applications. For example, the level of accuracy associated with a specific land use project may be much higher than the national estimate of land use fluxes, or international "average" accuracies.

12. In order to achieve compliance with a QELRO (with/without sinks), what activities should be credited or not credited and what based year should be used?

Consistent with our response to questions 4, 6 and 7 above, the US believes that all changes in emissions or removals from LUCF should be accounted in achieving compliance with a QELRO.

13. What definitions should be included; in which article of the protocol?

Article 3 governing QELROs should include text that clearly describes how sinks and net anthropogenic emissions are to be calculated for the purposes of specific GHG obligations. We do not currently have a textual proposal.

14. Do you have any other approach to propose?

No.

15. Do you have specific protocol language?

Not at this time.

Table: Reliability of Emissions and Reductions Estimates by Source
H (High; ± 10 percent), M = (Medium), L = (Low)

Class	Source	Quality of National Emission Estimate		Quality of Project-Level Reduction	US Emissions Share (percent)	US Emissions Trend
		IPCC Current	Post-Kyoto			
Carbon Dioxide					85	
1	Energy Consumption	H	H	H		up
1	Flare Gas	H	H	H		--
1*	Natural Gas CO ₂	L	H	H		--
1*	Non-Fuel Use (sequestr.)	M	H	H		up
1*	Bunker Fuel	M	H	H		--
1	Cement	H	H	H		up
1	Other process	H	H	H		--
2*	Forestry - Above Ground ⁺	L	M	M		--
2	Forestry - Below Ground	L	L	L		--
2	Other Land Use	L	L	L		--
Methane					11	
2	Coal Mines-abandoned	L	L	H		--
2	Coal Mine-Surface	M	M	M		--
1	Coal Mine-Underground	H	H	H		down
2*	Gas Pipelines	M	M	M		--
2	Oil&Gas Production	M	M	M		--
1*	- Associated Gas Venting	M	H	H		--
2	Landfills	M	M	H		down
2*	Waste water	L	M	H		up
2	Livestock (enteric ferm)	M	M	M		up
2	Livestock Manure	M	M	H		
2	Rice Cultivation	L	L	L		--
2	Crop Burning	L	L	L		--
2*	IndustrialMethane	L	M	M		up
2	Mobile Combustion	L	L	L		down
2	StatonaryCombustion	L	L	M		down
Nitrous Oxide					2	
1*	Industrlal nitrous oxide	M	H	H		--
2	Fertilizer N ₂ O	L	L	L		up
2	Mobile Combustion	L	L	L		--
2	Stationary Combustion	L	L	L		--
High GWP Gases					2	
1*	SF ₆ - all sources	M	H	M		--
1*	HFCs - all sources	M	H	H		--
1*	PFC aluminum	M	H	H		--
2*	PFC semiconductor	M	M	M		--
1*	HFC-23 from HCFC 22	IH	H	H		down

Source: Adapted from assessment of EPA Working Group, with input from the DOE Policy Office and DOE's Energy Information Administration

Notes: * = Accuracy

⁺ = Currently, the best available methodology for estimating above ground carbon sequestration in forests has an uncertainty of ±10%.