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Agenda item 3
Analysis of means to reach emission reduction targets and identification of ways to enhance their effectiveness and contribution to sustainable development

Views and information on the means to achieve mitigation objectives of Annex I Parties

Submissions from Parties

Addendum

1. In addition to the 13 submissions contained in document FCCC/KP/AWG/2008/MISC.1 and Add.1–4, four further submissions have been received.

2. In accordance with the procedure for miscellaneous documents, these submissions are attached and reproduced* in the language in which they were received and without formal editing.

* These submissions have been electronically imported in order to make them available on electronic systems, including the World Wide Web. The secretariat has made every effort to ensure the correct reproduction of the text as submitted.

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(Submissions received 21 August 2008)

AUSTRALIA

Estimation of Greenhouse Gases and Global Warming Potentials

Submission to the AWG-KP and AWG-LCA

This submission provides the initial views of the Australian Government on the following options being considered for the estimation of greenhouse gas emissions and global warming potential (GWP) values for the post-2012 outcome:

- Updating GWP values with the most recent information provided by the Intergovernmental Panel on Climate Change (IPCC);
- Using different time horizons (20, 100 and 500 years); and
- Applying global temperature potentials (GTPs) as an alternative metric.

These initial views are informed by the following overarching principles:

- Coverage of anthropogenic emissions and removals should aim to be rigorous, robust and comprehensive, while finding an appropriate balance between scientific precision, practicality and policy relevance;
- Approaches should facilitate activities that deliver real climate benefits within a timeframe appropriate to achieve the Convention's goal of preventing dangerous anthropogenic interference with the climate system;
- Methodologies should aim not to restrict the flexibility of policy responses, recognising the need for a comprehensive suite of mitigation measures to achieve required levels of abatement; and
- The AWG-LCA and the AWG-KP should apply the same methodologies and metrics to post-2012 mitigation actions.

Updating GWP values

Australia considers there is a strong case for adopting updated GWP values for the post-2012 outcome. These updated values should use the most recent IPCC assessment, as provided in the Third and Fourth Assessment Reports. These updated values reflect the improved scientific understanding of the international community of the impacts of covered gases. Updating the GWP values need not negatively impact time-series consistency, which can be appropriately managed.

Using different time horizons (20, 100 and 500 years)

Australia considers the 100-year time horizon should be maintained for calculation of GWP-based CO_2-equivalents in the second commitment period. Adoption of a 100-year time horizon for the first commitment period was primarily a policy choice, which sought to balance the need to account for both longer- and shorter-lived GHGs.

In the absence of compelling scientific or policy arguments for alternative time horizons, the 100-year time horizon remains an appropriate and practical approach. In addition, revision of the time horizon would unnecessarily introduce complexities relating to accounting and time series consistency without any appreciable general benefit.

Applying global temperature potentials (GTPs)

Australia considers that GWP remains the most appropriate metric for measuring the relative contribution of various greenhouse gases to climate change. The IPCC's Fourth Assessment Report recommends that GWP remains the metric to compare future climate impacts of emissions of greenhouse gases. Australia notes a number of the assumptions used in calculating GWP apply to other metrics, including GTP. Adoption of GTP would also unnecessarily introduce issues relating to accounting and time series consistency without any appreciable general benefit.

AUSTRALIA

Views on the coverage of greenhouse gases

Submission to the AWG-LCA and AWG-KP

This submission provides the initial views of Australia on proposals to broaden the coverage of greenhouse gases under the UNFCCC and the Kyoto Protocol in the second commitment period to include:

- Additional hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) with GWP values, as referred to in the Intergovernmental Panel on Climate Change's (IPCC's) Third and Fourth Assessment Reports (TAR and AR4);
- Nitrogen trifluoride (NF_3);
- Fluorinated ethers with GWP values, as referred to in the IPCC's AR4;
- Perfluoropolyethers with GWP values, as referred to in the IPCC's AR4; and
- Sulfuryl fluoride (SO_2F_2).

Where additional gases have been proposed by Parties for inclusion in a post-2012 outcome, Australia's view is that these gases should be considered where they have been provided a GWP value by the IPCC.
Additional gases not provided a GWP value by the IPCC should not be considered for inclusion at this stage, however we would welcome further scientific research and analysis to achieve greater understanding and inform consideration for the third and subsequent commitment periods. Additional gases controlled under the Montreal Protocol should not be considered for inclusion in a post-2012 outcome.

Australia's initial views are informed by the following overarching principles:

- Coverage of anthropogenic emissions and removals should aim to be rigorous, robust and comprehensive, while finding an appropriate balance between scientific precision, practicality and policy relevance;
- Approaches should facilitate activities that deliver real climate benefits within a timeframe appropriate to achieve the Convention's goal of preventing dangerous anthropogenic interference with the climate system;
- Methodologies should aim not to restrict the flexibility of policy responses, recognising the need for a comprehensive suite of mitigation measures to achieve the required levels of abatement; and
- A coordinated approach should be taken across the two AWG processes, given their close interlinkages, to ensure the post-2012 outcome adopts a universal approach towards gases.

Australia considers that there is a strong case for including additional HFCs and PFCs, and also NF_3 (as listed in the IPCC's TAR and AR4). There is generally significant mitigation potential in relation to these gases. Further, a number of these gases have current or projected uses as

replacements for ozone depleting substances controlled under the Montreal Protocol and/or gases already covered under Annex A of the Kyoto Protocol. Australia considers that inclusion of the additional HFCs and PFCs is further supported by the principle of maximum coverage, and on the basis that coverage of these families of gases has already been agreed by Parties for the first commitment period.

Current scientific and practical understanding of fluorinated ether and perfluoropolyether use, contribution to climate change, and mitigation potential is relatively limited. Australia considers that achieving greater understanding of these gases is important and would welcome work by the IPCC to increase understanding of the mitigation potentials for these gases. Australia could support a decision to consider the inclusion of these gases in the third and subsequent commitment periods.

In contrast to the other proposed gases, sulfuryl fluoride has not been reviewed by the IPCC. No consensus exists on the data required to determine its contribution to climate change. In the absence of such information, there is not a good case to include sulfuryl fluoride in the second commitment period. Australia would welcome work by the IPCC to determine the nature and extent of sulfuryl fluoride's contribution to global warming.

Further information on current and projected use, relative contributions to climate change, and mitigation potential for these gases is outlined below, and has informed the above positions.

HFCs and PFCs

HFCs and PFCs are primarily used to replace ozone depleting substances controlled under the Montreal Protocol. HFCs are used for refrigeration, air conditioning, foam blowing, aerosols and fire extinguishing. PFCs result from aluminium smelting and sometimes refrigeration, fire extinguishing and electronics manufacture. The IPCC states that human-made PFCs and HFCs, "are very effective absorbers of infrared radiation so that even small amounts of these gases contribute significantly to the [radiative forcing] of the climate system".[1]

Use of **HFC-245fa and HFC-365mfc** is largely confined to countries that have phased out HCFC-141b in foam blowing applications. HFC use will likely increase as a result of the Montreal Protocol HCFC adjustment in 2007. There is significant potential for mitigation of these gases in the long term through the use of alternatives such as hydrocarbon, CO_2, and methyl formate.

HFCs 152, 161, 236cb, and 236ea do not appear to be components of common refrigerant blends, nor do they appear to be used as common fire suppression gases or foam blowing agents, though they could find future use in these applications.

PFC 9-1-18 has a limited number of medical applications stemming from its use in first-generation PFC-based blood substitutes. Recently, PFC 9-1-18 has been proposed as a carrier of glassified microspheres that contain vaccines as it reduces the need for refrigeration; if adopted, emission rates could rise to the order of 10^3 tonnes year (similar in scale to SF_6).[2]

It is important to recognise that HFCs and PFCs have already been included as families of gases covered in the first commitment period. More comprehensive coverage of these families

[1] AR4, WG1, p. 144.
[2] Shine K.P et al. 2005. Perfluorodecalin: global warming potential and first detection in the atmosphere, *Atmospheric Environment* 39 (2005) 1759–1763.

could be achieved by inclusion of the additional HFCs and PFCs (with GWP values in the TAR and AR4) for the second commitment.

Nitrogen trifluoride (NF_3)

NF_3 is used in the electronics industry (semiconductor and LCD manufacture) for plasma etching and chamber cleaning processes, and is increasingly a replacement for PFCs and SF_6. A recent paper estimates current global production at 4,000 metric tonnes per annum and provides reasonable evidence in support of a possible doubling of global production by 2010.[3] The rapid growth of NF_3 use in semiconductor manufacture is due both to growth in total semiconductor manufacture (with estimated production increases of 15 – 17% per annum[4]) as well as displacement of older PFC technology for new production lines that use NF_3.

Some emission reduction goals have already been established in the semiconductor and LCD industries. Mitigation efforts in the semiconductor industry focus on process improvements/source reduction, alternative chemicals, capture and beneficial reuse, and destruction technologies. Many of these mitigation activities are available to NF_3.

While use of NF_3 as a replacement for PFCs and SF_6 can deliver emission reductions, the relative contribution of NF_3 to climate change is likely to increase as the use of NF_3 grows, particularly if best practice emissions reduction is not employed.

Fluorinated ethers

Only hydrofluoroethers (HFEs) are provided GWP values in the AR4. Currently, the HFEs most widely used by industry are HFE-7200, HFE-7100 (both included in the AR4), HFE-7500 and HFE-7000 (both not included in the AR4), owing to their chemical similarity to HCFC-141b.[5]

The academic literature identifies a number of applications for which HFEs offer potential, in particular as refrigerants, solvents and as heat transfer fluids. The IPCC and the Montreal Protocol's Technology and Economic Assessment Panel suggests that as a result of the relatively low GWPs of some HFEs, their use as a replacement for other gases would "significantly reduce" greenhouse gas emissions.[6] However, as they are currently more expensive to produce than HFC alternatives, there is less commercial interest in their use except in high value sectors such as precision cleaning.

Information does not appear to be readily available on current and future uses for many of the HFEs listed in the AR4. This lack of information makes it difficult to assess the potential for HFEs to contribute to climate change, the scope for mitigation and its costs.

Perfluoropolyethers

Reported uses for perfluoropolyethers (PFPEs) include industrial heat transfer fluids, electronic reliability testing, metal and electronics cleaning, and lubricant applications. Only one PFPE is

[3] Prather, M. J., and J. Hsu. 2008. NF_3, the Greenhouse Gas Missing From Kyoto. *Geophys. Res. Lett.*, 35. L12810, doi:10.1029/2008GL034542, p. 1.

[4] Robson, J.I., et al., 2006: Revised IR spectrum, radiative efficiency and global warming potential of nitrogen trifluoride. *Geophys. Res. Lett.*, **33**, L10817, doi:10.1029/2006GL026210.

[5] Tsai W.T. 2005. . Environmental risk assessment of hydrofluoroethers (HFEs). Journal of Hazardous Materials A119 (2005) 69–78.

[6] IPCC/TEAP. 2005, Special Report on Safeguarding the Ozone and the Global Climate System. p. 391.

assigned a GWP value in the AR4. The use and relative contribution to climate change of this gas is not clear. More broadly, there appears to be a scarcity of readily available information on the global warming potentials and extent of PFPE use.

These uncertainties prevent an accurate assessment of the potential for PFPEs (including the PFPE listed in the AR4) to contribute to climate change, the scope for mitigation and its costs. However, achieving greater understanding of this family of gases is important.

Sulfuryl Fluoride

Sulfuryl Fluoride (SO_2F_2) is used primarily as a fumigant, particularly as a replacement to ozone-depleting methyl bromide, which is partially subject to phase out measures under the Montreal Protocol. SO_2F_2 may also have applications in the semi-conductor industry and as a cover gas for magnesium melt protection.

SO_2F_2 is the only gas currently proposed for inclusion in the post-2012 outcome that has not been reviewed by the IPCC. Available information indicates no consensus on SO_2F_2's GWP and atmospheric lifetime. GWP estimates over a 100 year time horizon range from between 278 and 477[7] to between 500 and 2000[8] and as high as 8000[9]. Atmospheric lifetimes range from less than 4.5 years,[10] to approximately 30 years[11]. Available data suggests, however, that SO_2F_2's current contribution is likely to be small. SO_2F_2 use is expected to rise in the future as pressure increases to reduce the use of other fumigants on efficacy, occupational health and safety and environmental grounds.

Recapture technology for SO_2F_2 is in its infancy and likely to be relatively costly. The scope for mitigation of SO_2F_2 emissions is therefore largely limited to the adoption of alternatives; the technical and economic feasibility of which varies depending on country-specific regulatory, environmental and physical circumstances.

These uncertainties prevent an accurate assessment of SO_2F_2's relative contribution to climate change, the scope for mitigation, and associated costs. Further work to clarify these issues would appear warranted.

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[7] KEMI, Kemikalieinspektionen, Sulfuryl Fluoride (PT8), Competent Authority Report, Document III-A7, Exotoxicological profile including environmental fate and behaviour, Swedish Chemicals Inspectorate, Sweden, 2005

[8] Dr Paul Fraser, Chief Research Scientist Centre for Australian Weather and Climate Research CSIRO Marine and Atmospheric Research

[9] Dillon, T., A. Horowitz & J. Crowley, The atmospheric chemistry of sulfuryl fluoride, SO_2F_2, *Atmos. Chem. Phys*., 8, 1547-1557, 2008

[10] Ibid. 7

[11] Ibid. 8 and Dillon, T., A. Horowitz & J. Crowley, The atmospheric chemistry of sulfuryl fluoride, SO_2F_2, *Atmos. Chem. Phys*., 8, 1547-1557, 2008

AUSTRALIA

Emissions Trading and the Project-based Mechanisms

Submission to the AWG-KP and the AWG-LCA

This submission provides further Australian views on international emissions trading and the project-based mechanisms as a means to achieve the mitigation objectives of Annex-I Parties, together with initial views on the use of the mechanisms to date.

The flexibility mechanisms have made an important contribution to achieving mitigation at least cost. Australia welcomes consideration by the AWG-KP of possible post-2012 improvements to the flexibility mechanisms, including in the context of the more ambitious mitigation efforts that will be required in the second commitment period. Australia agrees that possible pre-2012 improvements should be addressed by the second review of the Kyoto Protocol.

The flexibility mechanisms are also likely to play a useful role in a post-2012 framework. It is important that they also be considered by the AWG-LCA as not all countries are party to the Kyoto Protocol. The two AWGs will need to ensure that all approaches towards flexibility mechanisms in the post-2012 outcome are harmonious and that these mechanisms are supportive of differentiated commitments. In determining the flexibility mechanisms adopted in the post-2012 outcome, the AWGs should draw on the experiences of the first commitment period of the Kyoto Protocol.

Emissions Trading

Australia supports the continued provision for emissions trading under Article 17 of the Kyoto Protocol. In addressing the global challenge of climate change, an emissions trading system is a leading means by which Parties can achieve cost-effective abatement.

Article 17 has underpinned the development of a number of domestic emissions trading schemes, including Australia's planned Carbon Pollution Reduction Scheme. The design of the Australian scheme will be finalised by the end of 2008, ahead of scheme commencement in 2010. The proposed Australian scheme is designed to support and be a part of an effective global response.

The Australian scheme will be one of the most comprehensive in the world. It will have maximal coverage of greenhouse gases and sectors to the extent that this is practicable. As currently proposed, the Australian scheme will cover stationary energy, transport, fugitive emissions, industrial processes, waste and forestry, and all six Kyoto Protocol greenhouse gases. Forestry will be included on an opt-in basis, and it is proposed that agriculture be included from 2015, subject to a final decision in 2013.

Recognising the importance of working towards a global system, Australia's scheme will be designed to link with others internationally. Australia's preference is for open linking within the context of an effective global emissions constraint.

While the linking of domestic markets is an important step in developing a global response to climate change, decisions as to whether to link domestic schemes should remain the national prerogative of Parties with such schemes.

Flexibility mechanisms

Australia appreciates the efforts of the CDM Executive Board (CDM EB) and the JI Supervisory Committee (JISC) to build stable and credible structures under which projects can operate, particularly given the limited resources to which they have access.

Australia agrees with other Parties that there is scope to improve the efficiency of the approvals process for projects in order to enhance access and effectiveness. Automatic in-principle approval for technical aspects of certain well-recognised technologies may be one approach that could assist in this regard. Australia does not support a full waiver of the additionality test.

Australia welcomes consideration of ways to further improve the operation of the CDM EB and Designated Operational Entities, and the JISC and Accredited Independent Entities. It is important that projects under these mechanisms are subject to independent scrutiny in order to ensure their additionality and environmental integrity. Australia does not favour proposals that could weaken their ability to deliver on these aims.

Differentiation and graduation

The enhanced mitigation actions of the post-2012 outcome should reflect a range of differentiated responses from Parties according to their national circumstances and respective capabilities. The flexibility mechanisms will need to take account of these likely differentiated responsibilities.

For example, it is likely that some current non-Annex I Parties could be expected to take comparable mitigation efforts to current Annex I Parties. If these countries host CDM projects that are effective beyond 1 January 2013, the status of these projects will need to be determined.

Some non-Annex I Parties may decide to take mitigation commitments that include economy-wide policies and approaches. They might also be expected to make distinct national contributions towards the establishment of mitigation projects. It will be important to ensure that the post-2012 flexibility mechanisms can support these new commitment structures. The AWG-KP and AWG-LCA should consider possible models for allowing host Parties to make national contributions towards flexibility mechanism projects.

Geographical uptake

Australia notes that 80 per cent of CERs already issued are from four countries (China, India, Brazil and South Korea). When all projects currently in the CDM pipeline are taken into account, 80 per cent of CERs are expected to come from these same four countries by the end of 2012. Similarly, while only four JI projects have been registered so far, current indications from the JI pipeline are that two-thirds of all ERUs by 2012 could go to one country (Russian Federation).

It is to be expected that CDM and JI projects will be concentrated where there is high potential for cost-effective mitigation. The five countries above have demonstrated a strong ability to host projects.

While the priority of the CDM and JI should continue to be lowest cost abatement, some concerns have been raised about the geographical distribution of projects.

Analysis of the countries hosting CDM projects to date indicates that countries within the same region have had different experiences in their success in hosting CDM projects. For example, the economies of Honduras and Paraguay are similar in size. Honduras has 21 CDM projects in the pipeline while Paraguay has only three projects. In Africa, Kenya has seven projects in the pipeline, compared with Nigeria with only two projects but with an economy some five times larger than Kenya's.

In considering the future operation of financial mechanisms, the AWG-KP should consider any lessons that successful hosts have learned that could be adopted by other potential hosts. Streamlining some aspects of the approval and verification process should be considered as long as the principles of environmental integrity and additionality continue to be applied with the same rigour.

Sectoral approaches

There is scope for supplementing the purely project-based approach of the CDM with sectoral approaches using options such as benchmarking and no-lose targets. Such additional approaches could deliver broader technology and capacity benefits, as well as larger cuts and deviations from business as usual trajectories. In developing new approaches, care will need to be taken to ensure that principles of environmental integrity and additionality are upheld.

Scope

Technological and methodological improvements since the adoption of the Kyoto Protocol provide new abatement opportunities not currently addressed by the flexibility mechanisms. In particular, there is now scope for measurable, reportable and verifiable abatement through carbon capture and storage and reduced emissions from deforestation and degradation (REDD). Australia supports the inclusion of such projects in the CDM, and welcomes consideration of other abatement opportunities.

Australia considers that there are further opportunities in the LULUCF sector that have not yet been harnessed by the flexibility mechanisms. Australia encourages efforts to ensure that the treatment of removals from LULUCF activities under the flexibility mechanisms is consistent with the treatment of removals from LULUCF in Annex I Parties' national accounts.

The AWG-KP should review the restrictions on access to and use of certain Kyoto unit types, in particular those related to the LULUCF sector. The use of a Tier 3 methodology for the LULUCF sector would deliver greater confidence in the measurability and verifiability of any credits generated under such a scheme, thereby allowing for greater convertibility among Kyoto unit types. There should be no cap for eligible LULUCF activities under the CDM.

HFC-23 projects

The relative merit of HFC-23 incineration projects under the CDM is a particular issue given their potential impact on the achievement of Montreal Protocol objectives. If implemented properly, HFC-23 incineration projects deliver emissions abatement. However if these projects prolong the operation of existing HCFC-22 plants, or lead to the construction of new plants, they could result in adverse climate and ozone impacts in the long-term. The AWG-KP should address the specific matter of HFC-23 incineration activities and make an assessment of the relative merit of these projects. This is a significant issue considering that HFC-23 projects account for one-fifth of all CERs currently in the CDM pipeline.

Sustainable development and co-benefits

Although the flexibility mechanisms should continue to tightly focus on the reduction of emissions, projects should also allow scope to contribute towards sustainable development and other co-benefits. Given that host Parties are best-placed to indicate what constitutes sustainable development, the provision of additional co-benefits should not be made a mandatory criterion in assessing projects.

PAPER NO. 1D: AUSTRALIA

Cooperative sectoral approaches

AUSTRALIA

Cooperative Sectoral Approaches

Submission to the AWG-LCA and the AWG-KP

Australia supports consideration of cooperative sectoral approaches to reducing emissions under both the Ad hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) and the Ad hoc Working Group on Long-term Cooperative Action (AWG-LCA).

Australia welcomes the conclusion of the AWG-KP at the resumed fifth session "that approaches targeting sectoral emissions could be used by Annex I Parties as a means to reach, but not replace, their emissions reduction targets". This outcome accords with Australia's initial submission on sectoral approaches (KP/AWG/2008/MISC.1/Add.2).

Parties which adopt fixed national emission reduction targets set a binding economy-wide constraint in the form of an assigned amount of emissions. Given the relative stringency of national targets over other forms of mitigation policies, there is no compelling rationale for those Parties that take such targets to adopt subsidiary binding international commitments, including targets, for individual sectors already included within their economy wide commitment. Sectoral targets are subordinate, and not additional, to economy-wide national targets adopted under the UNFCCC or Kyoto Protocol.

Where Parties do not adopt a binding national target as part of the post-2012 outcome, there may be scope for these Parties to commit to binding actions based on cooperative sectoral approaches.

Sectoral approaches offer several advantages:

1. Existing initiatives, such as the Asia-Pacific Partnership for Clean Development and Climate, suggests that such approaches can expedite the research, development and diffusion of low-carbon technologies and sector-specific expertise between countries and regions;

2. Collaborative activities may lower transaction and risk-associated costs and provide attractive incentives for private sector investors;

3. Sectoral collaboration can help build capacity between Parties facing similar challenges; and

4. Given that technological advancement and expertise in many sectors will vary from country to country – often irrespective of Annex I and non-Annex I status – collaborative sectoral approaches can facilitate joint R&D and enable world's best practice to be applied across a given sector.

International Maritime and Aviation Emissions

Australia considers that sectoral approaches are important for dealing with emissions that cannot be attributed to any particular economy, and that multilateral collaborative action is the most appropriate means to address emissions from the international aviation and maritime sectors. The International Maritime Organisation (IMO) and the International Civil Aviation Organisation (ICAO) should continue to develop effective sectoral approaches towards international maritime and aviation emissions respectively as a matter of priority.

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