

出席聯合國氣候變化綱要公約第六次締約國大會

第二階段會議報告

出國人：行政院經濟建設委員會

副處長 吳家昌

出國地點：德國波昂

出國期間：90年7月13日至26日

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公務出國報告提要

報告名稱：出席聯合國氣候變化綱要公約第六次締約國大會第二階段會議報告

主辦機關：行政院經濟建設委員會

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出國類別：其他

出國地區：德國波昂

出國期間：民國90年7月14日—民國90年7月26日

報告日期：民國90年8月20日

分類號／目：G0／綜合（各類工程） G0／綜合（各類工程）

關鍵詞：聯合國氣候變化綱要公約，土地利用、森林

內容摘要：

本次會議通過之「波昂協議」，對於京都議定書中爭議多時的條文，明確地做出原則決定：

- (一) 成立一個「特別氣候變遷基金」，將用於因應氣候變遷的適應措施、技術轉移、能源、交通、廢棄物管理等工作。
- (二) 附件一國家應考量本國情況，優先執行本國境內的減量計畫，京都機制僅是為補充國內減量行動計畫的不足。
- (三) 明確指出附件一國家應避免使用核能為共同執行、清潔發展機制的計畫項目。
- (四) 對於各國藉由造林植樹吸收二氧化碳達成減量目標方面，訂出使用上限。

我國非為締約國亦無減量責任，但是，現階段我國應基於地球村成員責任與公約精神，優先進行「無悔策略」之工作，大力投入綠色科技發展及應用研究，包括製程方面之清潔生產或污染防治技術、綠色設計、綠色交通、綠建築等策略研究組合，並加強森林、農業土地和生態系統之研究。

頁數：21 含附件：否

摘 要

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出席聯合國氣候變化綱要公約第六次締約國大會 第二階段會議報告

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一、前言

聯合國氣候變化綱要公約第六次締約國大會第二階段會議(COP6 part II)，今(二〇〇一)年七月十六日至二十七日於德國波昂舉行，計有一百七十八國家，二百一十八個政府組織及非官方組織，約四千六百餘人參加。我國代表團循往例係以工研院名義，非政府組織身分參加，由環保署林副署長達雄擔任團長，計有外交部、經濟部能源會、工業局、國科會、環保署及本會等相關部會共十四人參加。

二、會議背景

- (一) 自工業革命以來，由於人類經濟快速成長伴隨大量使用化石能源，造成大氣中的溫室氣體濃度大幅提高，以致於氣溫升高及氣候型態改變。為防制此候變遷危及環境生態，聯合國於一九九二年「里約高峰會議」(Rio Summit)通過「聯合國氣候變化綱要公約(United Nations Framework Convention on Climate Change, UNFCCC)」(以下簡稱公約)，針對「人為溫室氣體」(anthropogenic greenhouse gases)排放降低進行全球性協議。為加速及落實溫室氣體排放管制，一九九七年於日本京都召開之公約第三次締約國會議時通過具法律效力的「京都議定書」(Kyoto Protocol)，規範三十八個已開發國家及歐洲聯盟(即所謂附件一國家)量化的溫室氣體減量目標，要求渠等在二〇〇〇年至二〇一二年應將其溫室氣體排放量回歸至該國一九九〇年水準，平均再減五·二%。
- (二) 由於京都議定書中多項條文之運作方式並未明確規範，因此，一九九八年在阿根廷召開的第四次締約國會議，特別通過「布宜諾斯艾利斯行動方案」(Buenos Aires Plan of Action)，要求各締約國在第六次締約國會議時應對遵約制度、京都機制等議題之運作方式完成定案，以促使京都議定書可早日生效。
- (三) 依照京都議定書的規定，需要有五十五個公約締約國簽署與批准，而且批准國家附件一國家的一九九〇年二氧化碳排放量應占所有附件一國家五十五%，滿足這兩項條件，議定書才能生效。至目前為止，已有八十四個國家簽署，三十四個國家批准，尚未達到生效條件。

- (四) 二〇〇〇年十一月於荷蘭海牙召開第六次締約國會議 (COP6)，由於美國與歐洲聯盟等主要集團國家，對於植樹吸收二氧化碳的計算 (或稱 sink, 「匯」) 和跨國減量的京都機制兩項議題認知差距甚大，無法形成共識，造成會議沒有結論。爰此，公約特別於德國波昂召開第二階段會議 (COP6 part II)。
- (五) 今 (二〇〇一) 年三月，美國布希政府對外宣稱，基於本身經濟情況考量將不批准京都議定書。布希總統並於今年七月中旬於義大利所舉行的八大工業國領袖高峰會 (G8)，重申不批准京都議定書立場不變。原本各國期盼京都議定書可於明 (二〇〇二) 年地球高峰會議十週年時生效之目標，增添一大變數。美國為全球溫室氣體排放量最大的國家，其在一九九〇年的二氧化碳排放量占附件一國家三六·一%，其他國家，如日本、澳洲 (其排放比分別為八·五%與二·一%)，自美國宣布不批准議定書後，其立場曾有偏向美國的情況，使得議定書生效的情況更不樂觀，也使第六次締約國大會第二階段會議談判顯得更加困難，惟大會主席 Pronk 發揮高度談判技巧及耐力，促使各主要集團 (如歐盟、G77 與中國) 妥協讓步，並使關鍵國家 (如：日本、加拿大、俄羅斯) 在優勢的減量條件下願意批准京都議定書，終使本次會議能有所突破，並促使京都議定書可望在里約高峰會議十週年生效。
- (六) 由於去年 11 月 COP 6 終止時，在附屬機構的工作及主席本身的職責之下，所有協商文件已經有相當的進展，但對政治性“關鍵”議題之考慮仍不夠充分，大會主席於 COP 6 會後，曾諮詢五十多個國家意見，並於今 (2001) 年 4 月 9 日發表一份新的建議，希望能針對主要政治性議題繼續協商，以做為談判條文後續修改的基礎。此建議主要加強說明土地使用變化及林業京都議定書之應用規則，其中森林管理可抵消排放量之額度上限增加五倍 (此爭議是去年談判失敗原因之一)，並對京都機制之應用不予明確數值的限制。很明顯的，主席對於美國拒絕批准京都議定書之立場，已做出初步的退讓。

三、氣候變化對全球環境之影響

- (一) 根據 IPCC 第一工作組『2001 氣候變化：科學基礎』

的報告，以及 IPCC 排放情景特別報告 (Special Report on Emission Scenarios, SRES) 中所發展的各種情景預測模型，發現氣候變化對地球與人類的生活環境已產生重大的影響，其重要結果如次：

1. 二十世紀全球平均地表溫度已經增加 0.6°C。
2. 從 1960 年以來，冰雪覆蓋和冰原範圍已經縮小 10%。
3. 二十世紀全球海平面上升 0.1 至 0.2 公尺之間。
4. 由於人類活動，大氣溫室氣體濃度和其輻射力已經持續的增加。從 1975 年至今，大氣 CO₂ 已增加 31%，CH₄ 已增加 151%，N₂O 已增加 17%，輻射力估計增加 2.43Wm⁻²。
5. 最近的區域性氣候變化，特別是溫度的增加，已經影響許多物理和生物系統。例如：冰河的縮小、永久凍土層融化、河流與湖泊冰層提早破裂和更晚凍結、中高緯度的植物生長季節增長等。
6. 人類社會和自然系統對氣候變化的脆弱性，包括受到乾旱、洪水、熱浪、山崩和暴風雨而發生危險、困苦或死亡。
7. 氣候變化對自然和人類產生各種不利的影響，包括水文和水資源；農業和糧食安全；陸地和淡水生態系統；沿岸地區和海洋生態系統；人類健康、生活與產業發展。
8. 推估全球平均地表溫度到 2100 年將比 1990 年增加 1.4 至 5.8°C，到了 2100 年全球海平面將上升 0.09 至 0.88 公尺。
9. 有新的和更有利的證據，證明過去五十年全球升溫是由於人類活動所引起。
10. 資源 (例如財富、技術、教育、資訊、基礎設施…等) 較少的國家，調適氣候變化之能力也較小，最易受到傷害。

(二) 限制或減少溫室氣體排放的方法

1. 沒有單一途徑可以達到低排放的未來，各國和各區域應選擇自己的途徑。
2. 社會學習與創新，以及制度結構改變將有助於氣候變

化減緩。

3. 某些溫室氣體排放源可以利用無成本或負成本（淨利益）之政策來限制，亦即無悔政策的利用。
4. 在溫室氣體減量努力下，經濟成本與效益在部門間很難取得平衡，但成本的考量可能是減量的適當政策。
5. 國家如果採取政策工具組合來限制或減少溫室氣體排放，氣候變化之因應將更有效。
6. 森林、農業土地、和其他地區生態系統提供重要的碳減量潛力。
7. 氣候變化決策基本上是在不確定性下的一連串過程，應組合各種方法，配合時間與地點之差異來持續推動。

四、各主要集團之立場

各國對「京都議定書」之細節一直有許多爭議，各主要國家的基本立場如下（括號內之數據為各附件一國家，占1990年總排放量之百分比）：

（一）美國（36.2%）

美國總統布希在八大工業國（G8）高峰會議之前，重申其反對「京都議定書」，也無意在波昂的會議中提出替代方案。美國代表說明美國政府無意在此會議阻擾其他國家之間的談判，但是將反對任何對美國不利的行動，或導致資助國際間氣候變化相關活動之承諾。美國表示其因應氣候變化策略將基於以下的原則：

1. 穩定的，符合大氣中溫室氣體濃度之長程目標。
2. 可測量的，基於更多的科學知識。
3. 可彈性的，利用新資訊及新技術來調整。
4. 確保持續的經濟成長及繁榮。
5. 追求市場誘因及推動科技之創新。
6. 基於全球的參與，包括開發中國家。

（二）澳大利亞（2.1%）

支持美國的立場，無意自行批准議定書，並指出全球參與的重要性，開發中國家亦應參與。惟在大會主席團之努力協商下，澳洲最後已同意支持議定書。

（三）日本（8.5%）

日本環境省長官為此會議的日本代表，表示日本將儘

量努力在此會議達成整體的共識，以京都議定書於2002年生效為目標，重申美國參與的重要性，日本最後也在主席團之努力協商下，同意批准京都議定書。

(四) 歐盟 (24.2%)

歐盟已表明將於2002年批准京都議定書，不管美國是否參與。以包裹方式辦理，再由內部分別分配。

(五) 加拿大 (3.3%)

加拿大與歐盟在6月21日高峰會議之後，雙方決定將共同努力推動京都議定書。加拿大同意歐盟因應氣候變化的做法，雙方將在波昂會議努力合作。

(六) 東歐 (7.4%)

支持京都議定書，但是反對被要求提供協助開發中國家的調適及相關基金。

(七) G77/中國 (開發中國家集團)

表示已準備在此會議進行具體的協商，呼籲全球繼續給美國施壓，不讓其逃避全球環保的責任。此集團將重視財務機制、技術移轉、調適、能力建立、低度開發中國家之援助、及氣候變化與因應措施對開發中國家的不利影響。

(八) 俄羅斯

由於大會決議縮減京都機制排放交易的可賣出溫室配額的空間，並對運用森林吸收二氧化碳作為溫室氣體減量策略設定上限，俄羅斯二十五日一度在會中表示將不會批准京都議定書。後經主席協商，對於俄羅斯運用森林吸收二氧化碳的上限做出讓步，暫彌平此一波折。

(九) 島國聯盟

係由四十三個成員組成，因全球暖化，海平面上升，直接威脅其國家生存，呼籲已開發國家儘快批准京都議定書，並提供技術移轉、能力建立、及調適支援。

五、爭議議題分析

- (一) 京都機制 (Kyoto mechanism): 為協助已開發國家可以經濟有效方式達成其減量目標，京都議定書特別制訂三種可跨國合作進行溫室氣體減量的機制，分別為：清潔發展機制 (Clean Development Mechanism, CDM)，共同執行 (Joint Implementation, JI) 及排放交易 (Emissions Trading,

ET)。爭議內容略以：

1. 核能發電：多數締約國認為核能發電並不符合永續發展的目的，不可納入清潔發展機制中。
2. 公平性 (Equity)：開發中國家認為應將已開發國家與開發中國家兩者溫室氣體人均排放量的差距拉近，同時考量京都機制在進行時不可過度集中某一區域。
3. 補充性 (Supplementarity)：歐洲聯盟、G77 與中國認為各國應優先在本國境內進行減量，跨國合作計畫只能做為彌補本國減量之不足，必須設限。
4. G77 與中國認為應對「排放交易」做出限制，要求出售排放權的國家應限制其賣出額度，避免部分國家大量拋售「熱氣 (hot air)」，因此提案要求僅出售在議定書允許排放量的二%；然兩傘集團反對，認為不應過多限制，將使得交易市場不活絡，反造成此項機制失敗，因此提案建議放寬出售額度可達議定書允許排放量的四〇%。

(二) 遵約體制 (Compliance)

1. 歐洲聯盟認為應建構一個強而有效的遵約體制才能有效促進各締約國遵守議定書的規定。
2. 部分締約國提案應以「違約罰款並成立遵約基金」或「修護損壞環境進行付費」兩種方式，以促使締約國遵守京都議定書所規定的減量目標；惟日本、加拿大反對，建議應以誘因代替處罰。

(三) 土地利用變更及森林 (LULUCF)

京都議定書第 3.3 條訂定「造林 (afforestation)，重新造林 (reforestation) 及砍伐森林 (deforestation) (簡稱 ARD) 所產生之溫室氣體之淨變化可作為減量措施之一」，第 3.4 條訂定「土地利用變更及森林應是直接由人類引起之額外活動 (additional human-induced activities)」。由於這兩條文定義並不明確，且方法及結果具有高度之不確定性，各國均有不同見解。

1. 許多國家強調將第一承諾期匯所獲得的信用額度大小當作主要議題，LULUCF 是各國批准議定書的基礎。

2. G 7 7 / China 強調，議定書 3.4 條下之額外活動將使議定書無限擴大範圍要 LULUCF 活動的排放和匯的移除應作系統化的處理。
3. 吐瓦魯反對將議定 3.4 條活動包含在第一承諾期之內，認為它不啻是將京都議定書的目標重新談判，並且會侵蝕議定書的完整性。
4. 泰國認為不應將 3.4 條下活動包括在內，除非有更確定的科學依據。
5. 巴西支持中國、諾魯和印度，強調對議定書有關完整性的關注，不宜對 3.4 條下的活動作太自由的解釋。
6. 附件一國家質疑短期輪作森林的核算缺乏參考資料。EU 提議，限制經由 3.4 條活動和彈性機制的減量上限目標，不允許將 LULUCF 活動放入 CDM 使用。
7. 經濟轉型國家支持談判設限的妥協基礎，提出 3.4 條活動基準年排放比例。

(四) 能力建構 (capacity building): 討論議題包括能力建構、技術轉移、不利影響和全球環境機制之運作。

1. 開發中國家一再表示缺乏必要的技術與「know how」來因應氣候變遷，必須透過真正的環境技術轉移，才可以保證開發中國家之永續發展。本次會議多數國家均認為協助開發中國家建構適應氣候變遷能力極為重要。
2. 討論是否成立「適應基金」(Adaptation Fund)、「公約基金」(Convention Fund) 等基金，提供額外財務協助低度開發國家建立因應氣候變遷之技術轉移、能力建構等事項。惟對於基金的資金來源、繳款對象係為自願或義務規定、不繳款是否需接受處罰等，各國意見不一。

六、大會過程

- (一) 十六日會議開幕上午，大會主席 Pronk 決定將議題區分為四大諮商分組，分別為：討論各國如何遵守議定書規定與責任的「遵約體制分組 (compliance system)」、討論跨國合作進行溫室氣體減量的「京都機制分組 (Kyoto mechanism)」、討論協助開發中國家因應氣候變遷的「能

力建構分組 (capacity building)」、討論森林吸收二氧化碳統計計算的「土地利用變更和森林分組 (land use, land use change and forestry, LULUCF)」，要求各國進行為期三天的非正式協商。十九日至二十二日起召開各國部長會議，是本次會議的重點；二十三日至二十七日則係延續前述討論並包括附屬機構會議。

- (二) 二十一日晚間約十一點，主席 Pronk 以過去一週的討論結果及諮商文件，重新提出一份新的協議文件「執行布宜諾斯艾利斯行動計畫的核心要件 (Core Element for the Implementation of the Buenos Aires Plan of Action)」作為各國討論基礎。
- (三) 在歷經各國部長三十幾個小時的談判後，原本日本與加拿大所在意的「彈性機制運用的上限問題」與「遵約制度」兩項議題，在大會主席積極研商，以及日本、加拿大與歐洲聯盟紛紛表示希望本次會議能有所決議的情況下，歐洲聯盟遂妥協不再堅持對彈性機制之運用應設定上與取消未達減量目標應付費的處罰機制。本次會議終終在二十三日上午達成重大突破，各國部長接受大會主席所提出的協議文件。
- (四) 二十四日上午公約秘書處再依據該協議內容制訂成正式法律文件草案，提交各國代表於會中討論。二十五日上午，俄羅斯對於該文件中「排放交易」及「植樹造林」兩項限不滿，一度傳出將不批准京都議定書。後經主席整日協商，將文件中有關俄羅斯「植樹造林」的上限規定保留，將俟待科學方法計算後再修正，各國遂正式同意將該文件送交締約國大會決議，二十五日晚間大會正式通過「執行布宜諾斯艾利斯行動計畫的核心要件」。同時，大會決定繼續分成四個諮商小組討論「京都機制」、「遵約制度」、「能力建構」及「土地利用變更及森林」運作方式的細部文件。
- (五) 二十七日晚上十一時，氣候變化綱要公約第六次締約國大會第二階段會議正式宣布閉幕，會中決議將二十五所通過「執行布宜諾斯艾利斯行動計畫的核心要件」稱為「波昂協議 (Bonn Agreement)」。此外，大會主席對於四個諮商小組所擬定之細節文件，原預計採包裹 (package) 方式一併通過，但由於部分國家對於「遵約制度」、「京都機制」

及「土地利用變更及森林」三項議題之諮商小組所規劃的細節文件仍有意見，將留待今年十月底在摩洛哥舉辦的第七次締約國大會定案。

七、會議決議

本次會議通過之「波昂協議」，對於京都議定書中爭議多時的條文，明確地做出原則決定：

- (一) 在氣候變化綱要公約下將成立一個「特別氣候變遷基金 (special climate change fund)」，將用於因應氣候變遷的適應措施、技術轉移、能源、交通、廢棄物管理等工作，同時針對低度開發中國家亦將成立「低度開發中國家基金」協助建立「國家適應計畫行動方案 (NAPAS)」；在京都議定書下，將利用清潔發展機制計畫或其他資源成立「適應基金」去進行實質的適應計畫。
- (二) 在技術轉移方面，將由二十位不同領域專家組成專家小組審議技術轉移工作；在京都機制方面，附件一國家應考量本國情況優先執行本國境內的減量計畫，而使用京都機制僅是為補充國內減量行動計畫的不足，參加京都機制者應先簽屬遵約協議且依據議定書遵約制度所定之方法陳報相關資料。
- (三) 明確指出附件一國家應避免使用核能為共同執行、清潔發展機制的計畫項目，對小型清潔發展機制計畫的方法與程序，如：再生能源最大輸出能量 15MW、能源效率改善每年達 15GWh、溫室氣體每年減量達 15 千公噸二氧化碳當量等。
- (四) 對於各國藉由造林植樹吸收二氧化碳達成減量目標方面，也做出使用上限，其可用額度最高的前三名分別為：俄羅斯 (17.63MtC/yr)、日本 (13.00MtC/yr) 及加拿大 (12.00MtC/yr)。在遵約體制方面，對於未能達成減量目標者，將處以扣減一承諾期的允許排放額度 (扣抵率為 1.3)、要求訂定遵約行動計畫、停止使用排放交易權利。

八、結論與建議

- (一) 目前公約或議定書並未對非附件一國家訂定規範，我國非為締約國亦無減量責任，但是，現階段我國應基於地球村成員責任與公約精神，優先進行「無悔策略」(no regret

policy) 的工作，例如：節約能源、提升能源效率、推廣清潔能源使用、完成我國國家通訊之編撰等表態承諾具體減量目標。

- (二) 有關國家通訊中需進行氣候變遷之衝擊評估與調適策略建立部分，涉及層面甚廣，如：水資源、海平面上升、森林、農地、氣候等，建議各主管部會進行評估。
- (三) 我國屬於海島國家，就環境利益而言，與島國聯盟相似。建議可蒐集該集團國家之相關資料並聯繫，以便在防止氣候變遷的工作推展上，增加一項國際交流管道。
- (四) 根據公約規定，各國因應氣候變化的政策各措施應講求成本有效性，以確保用最低的成本達到全球效益。因此，建議各主管機關應評估我國各項減量措施與技術之減量成本，分析比較各部門各措施與技術的減量成本之差異，以提供政府和業界溝通之依據。
- (五) 轉導產業自願性減量措施是國際間減少溫室氣體排放的重要措施，對參與自願性減量方案的產業及廠商應協助其有設立基線的能力，並提升我國基線資料評估能力與查核能力，建置各產業部門標準化基線方法。
- (六) 溫室氣體減量工作係需靠國內各排放部門（如：工業、能源、交通、住商）共同推動，方能彰顯效。建議主管機關應轉導業者進行節約能源、提升能源效率等溫室減量工作。
- (七) 國際間面對溫室減量規範時，均優先推動國內的減量工作，惟國內面臨減量成本過高時，跨國合作的排放交易、清潔發展機制等彈性機制則用於補充之最佳選擇。雖然我國目前無法正式參與此一國際減量合作，仍可嘗試依國際經驗規劃國內相關制度，推動國內彈性機制試驗計畫。藉由計畫的實施以學習管理經驗，以利未來與國際間彈性機制之接軌。
- (八) 我國應大力投入綠色科技發展及應用研究，包括製程方面之清潔生產或污染防治技術、綠色設計、綠色交通、綠建築等策略研究組合，並加強森林、農業土地和之生態系統之研究。
- (九) 氣候極端變化會對社會和自然系統產生危害之因素，如乾旱、洪水、土石流、暴風雨等亦須加強研究。

(十) 本次會議中對於植樹吸收二氧化碳的功能已經確定，建議應加強國內植樹造林及森林管理工作。對土地利用、土地利用變化與林業議題之討論亦應重視。

九、附錄

附錄一、土地使用、土地使用變化與森林之議題概要

關於土地使用、土地使用變化與森林議題，大會主席曾依各締約國代表意見及會前協商結果，彙總提出協商議題草案，其內容摘要如次：

- (一) 請附屬科學技術諮詢機構完成下列工作：
1. 審議並通過核算人類直接引起環境退化和植被破壞活動造成的溫室氣體人為排放量的方法，以期提請締約國會議通過納入第一個承諾期。
 2. 研究在第二個及以後的承諾期，按具體森林生物群落擬訂森林定義問題。
 3. 核算“京都議定書”第三條第四款規定之活動方式、規則和指南。
 4. 請政府間氣候變化專門委員會制定有關方法，用以估計、計量、監測和報告有關土地使用、土地使用變化和林業活動引起的碳儲存量變化和溫室氣體人為源排放量及匯清除量。
 5. 編寫一份報告，說明土地使用、土地使用變化和林業部門計畫、估計、評估不確定性及監測方法。
 6. 報告碳儲存量的淨變化和溫室氣體人為源排放量和匯清除量。
 7. 研擬人類直接引起的環境退化以及森林和其他類型植被破壞所產生的排放，有關清單編制和報告的提寫方法，以區分人類直接與間接引起的效應和自然效應。
 8. 研訂實際可行的方法。
- (二) 土地使用、土地使用變化和林業活動，在執行中應符合“聯合國氣候變化框架公約”及其“京都議定書”的目標和原則，以及根據該公約和議定書作出的任何決定，同時也作出下列多項決定：
1. 任何關於如何對待土地使用、土地使用變化和林活動的決定，都必須有合理的科學根據。
 2. 在估計和報告土地使用、土地使用變化和林業活動源排放量和匯清除量時，締約國應始終使用一致的方法，避免雙重核算任何特定活動的排放量和清除量。

- 3 · 土地使用、土地使用變化和林業活動的核算，不得改變“京都議定書”第三條第一款提出的目標，亦即總排放量須在1990年的水平至少減少5%。
- 4 · 核算的依據是碳儲存量的變化以及溫室氣體源排放量和匯清除量。因此，既有的碳儲存本身不在核算之列。
- 5 · 根據“京都議定書”發展土地使用、土地使用變化和林業活動，應有助於生物多樣性的保護和自然資源的可持續利用。
- 6 · 應用氣候變化專門委員會編制的“良好做法指導意見”，估計和報告土地使用、土地使用變化和林業活動的源排放量和匯清除量。
- 7 · 對於碳儲存量的淨變化以及溫室氣體人為源排放量和匯清除量，連同相關的不確定性，應在年度清單中加以報告。

附錄二、德國之環境政策

針對人為造成的溫室效應，德國聯邦環境部於去年（2000年）10月18日提出最新的氣候保護計畫，內容摘要如次：

（一）計畫目標

德國聯邦政府提出的環境政策，具有高度企圖心的目標，包括：

1. 縮減二氧化碳排放量於2005年達到1990排放水準的75%。
2. 於2008年~2012年之間縮減六種溫室氣體21%。
3. 至2010年的再生能源比例為目前水準的兩倍。
4. 以配額的方式擴大汽電共生系統，至2005年達到削減二氧化碳排放量1,000萬噸，至2010年達到2,300萬噸。
5. 於未來幾年大幅提升能源生產力。

（二）主要措施

1. 透過綠色租稅改革，以提高能源使用效率。
2. 訂定再生能源法，提升再生能源供應電力配比。
3. 再生能源的市場推廣計畫，提升太陽能使用者利益。
4. 推動屋頂太陽能計畫，支援太陽光電板（photovoltaic）系統投資。
5. 推動低硫及無硫燃料的生產，提升能源效率。

（三）配套措施

1. 擴展汽電共生計畫。
2. 採行節約能源導向政策。
3. 補貼既有建築二氧化碳減量計畫。
4. 推動德國產業對氣候保護宣導。
5. 增加六十億馬克於鐵路基礎建設的投資。
6. 利用汽車稅，提升汽車燃料效率。
7. 對機場實施排放差別著路費率。
8. 宣導正確駕駛習慣。
9. 整合運輸計畫及氣候變化政策。
10. 運輸效率能源政策的執行。

（四）減量成效

透過上述減量措施，預估至2005年約可以縮減18~20%（以1990為基準年）二氧化碳排放量，約為5千萬噸至7千萬噸，各部門減量成效如下：

1. 私部門家計及建築：1,800萬噸~2,500萬噸。
2. 能源與工業部門：2,000萬噸~2,500萬噸。
3. 交通部門：1,500萬噸~2,000萬噸
4. 各部門減量成效如下表：

德國各部門排放減量估計表

部門	基線（百萬噸）		減量成效（百萬噸）		
	1990年	1995年	2005年	2010年	2020年
工業	199	142	119	112	97
小型消費者	97	68	62	57	46
家計	158	149	113	98	72
交通	145	166	180	167	139
能源轉換	378	327	250	221	177
合計*	977	852	724	655	531

註：『*』並不包括製程及國際航空交通。

附錄三、美國芝加哥溫室氣體排放交易市場

- 一、排放交易制度 (emission trading system) 由於受到國際上的重視，已逐漸成為各國處理環境問題的重要政策工具，其實行的範圍相當廣泛，包括空氣品質改善、水資源管理、水資源保護、土地使用管理、漁業資源管理、以及 CO₂ 排放管理等，均是當前國際上已實行之議題。依據歐洲執行委員會 (2000) 的最新研究報告顯示，在 2005 年之前若能建制以全歐盟產業業為基礎的溫室氣體排放交易制度，推估至 2010 年時，整體溫室氣體的防制成本約需 60 億美元，相較於未建立排放交易制度之 90 億美元的總防制成本而言，約可減少 30 億美元 (33%)。
- 二、美國芝加哥溫室氣體排放交易市場於今 (2001 年) 5 月 30 日成立，是美國第一個溫室氣體交易的自願性試辦計畫，也是全球第一個溫室氣體排放交易市場。該計畫選擇美國中西部七州 (包括伊利諾、印地安納、愛荷華、密西根、明尼蘇達、俄亥俄、威斯康新) 為試辦區，該計畫將逐漸擴大試辦規模。中西部七州的經濟產值約佔美國經濟產值的 20%，且溫室氣體排放量亦約佔美國的 20%，目前有 25 家公司及非營利事業單位加入自願 (例如福特汽車、杜邦、國際紙業等)，其涵蓋的產業包括製造業、運輸業、能源 (電力) 業、農業、及森林部門等。該計畫目標於 2005 年的溫室氣體排放量能較 1999 年的排放水準再低 5%，對於加入的廠商可以獲得可交易排放許可權 (tradable emission allowance)，參與廠商同時必須承諾至 2005 年能夠減少排放，包括再生能源系統 (包括風力及太陽能)、農業及垃圾場的沼氣再利用、以及碳封存 (sequestration) 計畫 (例如造林與土地約管理等)。美國政府期望透過此試辦計畫掌握排放交易價格，以及發展排放監督系統標準架構。
- 三、參與者的利益
 1. 降低溫室氣體控制的長期成本。
 2. 從環境的永續作為 (如縮減能源成本)，獲得金融上的利益。
 3. 提升環境上領先的榮耀，溫室氣體交易市場『捷足先登』者優勢的利益。
 4. 建立溫室氣體交易與管理之技能，以及排放交易制度的運作法則。

四、試辦階段的內涵

1. 自願性排放減量及包括所有六種溫室氣體均納入交易體系。
2. 參與者承諾至2002年的排放量減少為1999年的98%，且以後每年減1%，至2005年減少排放量5%。
3. 監督、查證、追蹤、及申報的要求。
4. 獲得的減量信用將以國內減量目標，以及國外排放抵銷計畫（包括太陽能與風能計畫及匯等）為依據。

附錄四、美國 Texaco 公司之溫室氣體排放減量計畫

- 一、對於產業而言，目前國際間仍無一共同依循的清冊建立與基線估算準則。由於所涉及的產業類別廣泛，特性差異大，因此建立清冊與基線評估為一龐大的工程。2001年2月28日美國石油公司 Texaco 宣佈成立其溫室排放之獨立稽核驗證委員會，由 KPMG 公司及 URS 環境顧問公司組成，聯合查證 Texaco 公司於 1997 年開始為建立排放清冊 (Inventory) 所進行的提報綱領 (Protocol) 是否合理。
- 二、Texaco 事業部門涵蓋全球 150 個國家，除了清查事業部門排放並驗證外，Texaco 為因應此議題並訂立行動計畫之五項原則：
 1. 有效排放管理，經常性的清查排放量，並將結果納入公司發展規劃之考量。
 2. 應用清潔且更有效率之技術或設計，除推廣於主要事業部門以尋求排放減量外，並積極尋求此類科技推廣應用之領域及市場。
 3. 尋求及擴展使用彈性市場機制 (如排放交易) 之機會，確保能將清潔且具成本效益之技術推廣至全球。
 4. 積極參與國際對此議題之協商對話，提供有建設性的協助。
 5. 投入再生能源與碳固定新技術的發展研究，同時參與或贊助其他國際大型溫室氣體減量計畫。

附錄五、京都議定書有關土地使用、土地使用變化及林業活動之定義及計算規則

(一) 根據京都議定書第三條第三款和第四款進行之土地使用、土地使用變化和林業活動，應適用下列定義：

1. 森林 (FOREST): 是指樹冠覆蓋率 (或相等的樹木水平) 大於 10% 至 30%、樹木在原位成熟時應能達到的最低高度為 2 至 5 公尺、面積 0.05 至 1.0 公頃的土地。在正常情況下構成森林面積的一部分、由於伐木等人類行為或自然原因暫時失去樹木但預計會恢復為森林的地帶，亦可列入森林計算。
2. 植樹造林 (AFFORESTRY): 是指通過栽種、播種或目的在於增進自然種籽源，將至少有 50 年處於無林狀態的地帶轉變為森林地帶的人類的活動。
3. 重新造林 (REFORESTRY): 是指在曾經有林、但被改為無林的地帶通過栽種、播種和或目的在於增進自然種籽源，將這種無林地帶改變為森林地帶的人類活動。就第一介承諾期而言，重新造林活動將限於 1989 年 12 月 31 日處於無林狀態的地帶上的重新造林。
4. 毀林 (DEFORESTRY): 是指將森林地帶轉變為無林地帶的人類活動。
5. 重新植被 (REVEGETATION): 是指為增加碳儲存的目的，自 1990 年 1 月 1 日以來，人類在最小面積為 0.05 公頃、條件不符合此處所列植樹造林和重新造林定義的土地上，從事植被的活動。
6. 森林管理 (FORESTRY MANAGEMENT): 是指自 1990 年 1 月 1 日以後的森林管理和利用，這種管理和利用的方式和速率，要保持森林的生物多樣性、生產率、再生能力、生命力，以及當前和未來在地方、國家、區域和全球發揮有關生態、經濟和社會功能的潛力，而且不至於對於其它生態系統造成損害。
7. 耕地管理 (CROPLAND MANAGEMENT): 是指自 1990 年 1 月 1 日以後，人類在種植農作物的土地和在閒置或暫時未用於作物生產的土地上的一套做法。
8. 牧場管理 (GRAZING LAND MANAGEMENT): 是指自 1990

年1月1日以來，旨在調控所產飼料和牲畜數量和類型的一套做法。

- (二) 為了適用上文“森林”的定義，每個附件一所列締約國應在10%至30%之間選出一個單一的最低限度樹冠覆蓋率、在0.05至1公頃之間選出一個單一的最低限度土地面積，在2至5米之間選出一個單一的最低限度樹高。締約國作出的這種選擇，在第一承諾期內應保持不變，並作為締約國報告的一部分，以便確定其分配數量，包括樹冠覆蓋率、樹高和最低限度土地使用面積。締約國應在報告中說明這些數值與以往向聯合國糧食及農業組織或其他國際機構報告的數值一致，如有偏差，則應說明為何選定這些數值以及如何選定這些數值。
- (三) 符合資格標準的活動，是指於1990年1月1日以後，承諾期最後一年12月31日以前，開展的人為植樹造林、重新造林和或毀林活動。
- (四) 為了確定根據第三條第三款納入核算系統的毀林面積，每個締約國用以確定森林覆蓋率的空間量測單位應與確定植樹造林和重新造林所使用的相同。
- (五) 碳排放量與匯清除量之計算
1. 對於第一個承諾期，在第三條第三款規定之下形成淨排放源的附件一締約國，可以核算第三條第四款所述森林管理地帶的碳儲存量變化以及溫室氣體人為淨源排放量和匯清除量，核算量最多可等於淨排放量，但不得多於每年8.2兆噸碳，條件是：1990年以來在管理之下的森林。
 2. 對於第一個承諾期，核算第三條第四款所述森林管理地帶的碳儲存的淨增加量以及溫室氣體人為匯淨清除量，應乘以折扣系數85%。
 3. 達到下列標準的締約國每年最多13兆噸碳可不乘以折扣率。
 - (1) 能源消耗量低於每單位國內總產值合計初級能源供應量（即TPES/GDP）0.16。
 - (2) 締約國的土地持有量的一半以上為森林所覆蓋。
 - (3) 人口密度超過每平方公里300人。
 4. 對於第一個承諾期，除森林管理以外，第三條第四款之

- 下符合資格標準的活動，應予核算的碳儲存量變化和溫室氣體人為淨源排放量和匯清除量應等於；該締約國第一個承諾期的碳儲存量變化和溫室氣體人為淨排放量和匯清除量，減去基準年這些符合資格標準活動的碳儲存量變化和溫室氣體人為淨源排放量和匯清除量的5倍。
5. 如果計算的結果為溫室氣體的淨匯清除量，則應將這一數值加入締約國分配數量中。如果這一計算的結果為溫室氣體的淨排放量，則應從締約國分配數量中減去。
 6. 第三條第三款和第四款所述土地使用、土地使用變化和林業活動所致碳儲存量的淨變化和溫室氣體淨源排放量和匯清除量的核算，應從活動的開始時間或承諾期的開始時間起算，並以時間在後者為準。
 7. 一旦土地納入第三條第三款和第四款核算，該土地上的所有溫室氣體人為源排放量和匯清除量，在以後的各個承諾期都必須加以核算。
 8. 附件一締約國應在國家清單中，提供關於第三條第三款和第四款所述土地使用、土地使用變化和林業活動涉及的信息。
 9. 附件一締約國應核算其碳集合的變化，包括：地面生物量、地下生物量、廢棄物、枯木、土壤內的有機碳。



Forestry Issues outstanding from COP 6

Foreword by IETA Executive Director Andrei Marcu

IETA is pleased to present the first in a new series of papers submitted by IETA members designed to promote further debate around the issues arising from the COP process and the national trading schemes that are emerging in different jurisdictions.

Disclaimer: The views expressed in this publication are those of the author(s) and do not necessarily reflect the views of IETA or its members.



Forestry Issues outstanding from COP 6

Summary

In the notes and new proposals issued by Pronk following COP 6, the Chairman refers to "special concerns" and "issues" which arise from the implementation of afforestation and reforestation projects under the CDM. Specifically, these are: Non-permanence (also accounting modalities in the "Note by the President"); Social and environmental effects; Leakage; Additionality; Uncertainty; Scale (introduced in the "New Proposals"); Definitions for Article 3.3 (removed in the "New Proposals"). The Parties were asked to decide to establish a process under the SBSTA to develop rules and modalities to deal with these issues.

Considerable progress in addressing these issues has already been made, and the authors believe that this progress has a significant bearing on the debate surrounding the inclusion of afforestation and reforestation projects in the CDM. In **Part I**, this paper summarises the reasons why the "issues" have arisen and explains some of the solutions that could be used to address the issues. **Part II** provides details of project related experiences gained through the validation and verification of a wide range of sinks based projects.

Permanence is addressed through accounting regimes. The main decision required by COP is whether to relate credits to stock changes, as in Annex 1 inventories and JI projects or to the real, long-term, measurable benefits that arise from carbon storage.

Social and environmental effects can be addressed through guidelines that require projects to identify and mitigate negative impacts.

Activity-based **leakage** can be identified and managed. Market-based leakage is harder to quantify but can be approximated. Conservation / deforestation projects are generally prone to very high levels of market-based leakage and this is one reason why COP 6 was right to rule conservation projects out of the CDM.

Additionality must be assessed for individual projects but there is little difference between the problems faced in afforestation and reforestation projects and other types of CDM projects.

Uncertainty can be managed through normal statistical procedures in the same way as variation around a mean would be handled in any other type of CDM project.

Scale is a non-issue. *Once an accounting framework has been defined, the issue of scale will be resolved because the number of credits and the time over which they are delivered may be defined. The low cost of some CERs derived from afforestation / reforestation projects is irrelevant. Many other types of CDM projects are profitable without CER revenues. The expected volume of credits arising from sinks projects in the first commitment period is not representative of expected volumes in the second and subsequent commitment periods.*



Introduction

The purpose of this paper is to address the issues related to the inclusion of LULUCF under the CDM as identified by Jan Pronk in the Note By The President of COP 6 issued 3rd November 2000 and re-emphasised in "New Proposals by the President of COP 6" issued 9th April 2001.

In the notes, Pronk refers to "special concerns" and "issues" which arise from the implementation of afforestation and reforestation projects under the CDM. Specifically, these are:

- Non-permanence (also accounting modalities in the "Note by the President")
- Social and environmental effects
- Leakage
- Additionality
- Uncertainty
- Scale (introduced in the "New Proposals")
- Definitions for Article 3.3 (removed in the "New Proposals").

The Parties were asked to decide to establish a process under the SBSTA to develop rules and modalities to deal with these issues.

Since 1997, SGS has gained considerable experience in the validation and certification of potential CDM projects in the LULUCF sector and on the basis of this experience, strongly supports the inclusion of afforestation and reforestation projects in the CDM. In Part I of this paper we present an analysis of the special concerns and in Part II, we present some of our experiences in validation and certification of LULUCF projects that are relevant to the special concerns.

PART I : Special concerns with LULUCF Projects

Non-permanence and accounting modalities

The two issues of non-permanence and accounting modalities are closely linked therefore they are considered together.

Annex I countries use their National Inventories to report stock changes in the LULUCF over a defined accounting period and therefore increases or decreases in carbon stocks resulting from land use activities can be recorded. Thus, if a LULUCF domestic or JI project activity in an Annex I country incurs an increase in carbon stocks, credits or Emission Reduction Units can be awarded. If the activity causes a reduction in stocks as a result of harvesting, or a fire, the loss can be recorded and the company or project responsible for the emissions may be required to take steps to compensate for the reduction. Because of the link between the National Inventory and compliance with Assigned Amounts, the issue of permanence in LULUCF projects in Annex I countries does not arise.

Non-Annex I countries have no Assigned Amounts with which to comply and therefore there is no mechanism to compensate for reductions in carbon stocks. Once issued, Certified Emission Reduction units (CERs) can never be recalled and therefore carbon stocks in LULUCF CDM are considered to be non-permanent.

At least three accounting modalities have been proposed to address this issue and these include:

- 1) Carbon tonne year
- 2) Temporary CERs
- 3) Average carbon storage capacity

Implementing each of these methodologies has its own advantages and disadvantages.

1) Carbon tonne year accounting recognises the length of time over which carbon is stored, giving credit to a project that stores 100 t of CO₂ for 1 year and to a project that stores 1 tonne of CO₂ for 100 years. The methodology requires the definition of an equivalence factor used to calculate how many carbon tonne years are equal to one tonne of emitted CO₂.

The carbon tonne year methodology could be implemented by an annual *ex-post* verification to confirm the amount of additional CO₂ sequestered over the year. Using the conversion factor, the Operational Entity would issue CERs that have already had a real, long-term measurable benefit.

The main advantages of this approach are that it:

- a) addresses the issue of liability by only crediting benefits that the environment has already received (so there is no liability issue) and
- b) makes sequestration CERs fully fungible with other sequestration CERs, emission reduction CERs and both emission reduction and sequestration ERUs.

The disadvantages of this approach include:

- a) the need to agree on an equivalence factor and
- b) since LULUCF projects rely on the accumulation of carbon through biological means, very few CERs will be generated at the start of the project and most CERs will be issued when carbon storage in the ecosystem is maximised.

2) Temporary CERs assign a lifetime to a CER equal to the project life. When the project is completed, the TCERs expire and must be replaced by another TCER, an ERU or an assigned amount unit. Rules could be established requiring the project investor to purchase insurance to replace the TCER, thus ensuring that commitments are not simply transferred to future commitment periods. Alternatively, project developers can make their CERs more appealing by extending the project lifetime.

Under the TCER accounting methodology, annual stock changes would be confirmed through *ex-post* verification and TCERs issued that are valid until either the end of the project life or the time when the carbon was to be released again, whichever is the shortest.

Advantages of this approach include:

- a) it is analogous to the JI accounting approach where stock increases are credited over commitment periods and the project is liable for the emission of the credits when the trees are felled. Under TCER however, the *buyer of the credits* is liable for their replacement when they expire.
- b) The TCER approach rewards projects in line with stock change.

Disadvantages of the TCER approach include:

- a) that it greatly complicates the transaction process, requiring multiple transactions to offset one year's emissions
- b) it clouds the issue of fungibility – TCERs will have different lifetimes and different liability issues attached and will not be directly fungible with any other form of CER or ERU and
- c) eligibility as a CDM project must include an assessment of the project's intended lifetime.

3) Average carbon storage capacity is calculated by averaging the annual carbon stock in the project over a defined period of time. This recognises both increases and decreases in carbon stocks associated with forestry projects but requires the definition of a common time denominator. CERs are awarded following *ex-post* verification of stock changes, but only up to the level of environmental additionality, which is defined as the difference between the average carbon storage capacities of the baseline and with-project scenarios. Liability may rest with either the project developer or the investor.



The advantages of this approach are:

- a) that the definition of a time horizon acts as a common denominator for all projects, making sequestration CERs fungible with each other and with ERUs from JI sequestration projects and
- b) like JI accounting, it rewards projects in line with stock changes.

The disadvantages are that:

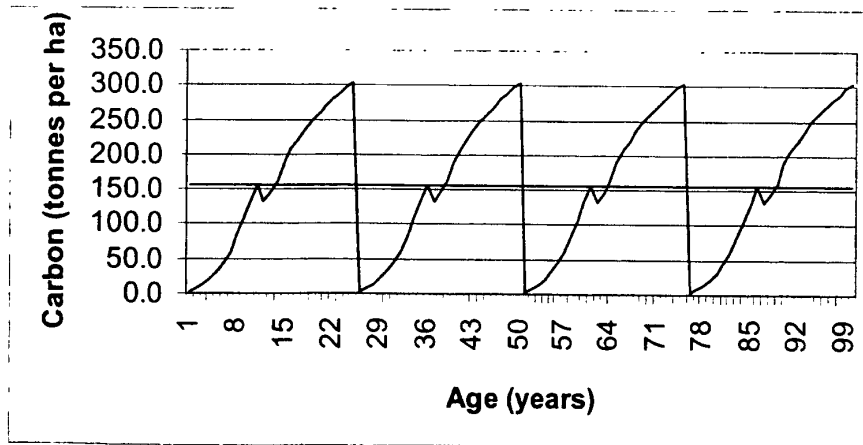
- a) a common time horizon must be agreed by the Parties
- b) eligibility as a CDM project must include an assessment of the project's intended lifetime.

From a project developer's point of view the average carbon storage capacity is clearly the most rewarding whilst the carbon tonne year method is least rewarding.

EXAMPLE

The following example shows how the different accounting methodologies could be used to create credits for a 1 hectare block of *Pinus patula* plantation. For simplicity, the baseline is assumed to be zero, although in fact this is not usually the case. It is assumed that the plantation is grown on a 25-year rotation and that the project intends to manage 4 rotations over its 100-year lifetime.

Figure 1: Carbon dynamics in a *Pinus patula* plantation managed on consecutive 25-year rotations



The graph shows carbon stock varying from zero to approx. 300 tonnes of carbon per ha, and the average carbon storage capacity, approx. 156 tonnes carbon per ha. (Note, one tonne carbon = 3.667 tonnes CO₂.)



In the table below, the credits awarded to the project each year under the different accounting regimes are shown. The carbon tonne year equivalence factor used is 46.4 (Moura Costa and Wilson pers. comm.). TCERs are issued each year with different lifetimes. Average carbon storage capacity is calculated over a 100-year time horizon. JI credits are based on stock change alone. There are some years when TCERs and JI credits are negative. These reflect thinning and harvesting operations. Under the TCER accounting method, no credits would be issued in these years. In the JI stock change method, the project would have to offset these emissions.

The credits awarded under different accounting methodologies are shown in Table 1 below:

Table 1: Credits awarded under different accounting methodologies

Age / year	Total carbon tons/ha	Carbon tonne year CERs (Ef = 46.4)	TCERs	Lifetime of TCER	ASC CERs	JI ERUs
1	2.8	0.1	2.8	24	2.8	2.8
2	8.0	0.2	5.2	23	5.2	5.2
3	14.0	0.3	6.0	22	6.0	6.0
4	22.0	0.5	8.0	21	8.0	8.0
5	32.0	0.7	10.0	20	10.0	10.0
6	44.0	0.9	12.0	19	12.0	12.0
7	60.7	1.3	16.7	18	16.7	16.7
8	83.6	1.8	22.9	17	22.9	22.9
9	107.4	2.3	23.8	16	23.8	23.8
10	131.3	2.8	23.9	15	23.9	23.9
11	154.6	3.3	23.3	14	23.3	23.3
12	132.7	2.9	-21.8	13	0.0	-21.8
13	144.0	3.1	11.3	12	0.0	11.3
14	159.6	3.4	15.6	11	0.0	15.6
15	189.4	4.1	29.8	10	0.0	29.8
16	206.6	4.5	17.2	9	0.0	17.2
17	221.3	4.8	14.8	8	0.0	14.8
18	235.1	5.1	13.7	7	0.0	13.7
19	247.9	5.3	12.8	6	0.0	12.8
20	259.6	5.6	11.7	5	0.0	11.7
21	270.3	5.8	10.7	4	0.0	10.7
22	280.1	6.0	9.8	3	0.0	9.8
23	289.0	6.2	8.9	2	0.0	8.9
24	297.1	6.4	8.1	1	0.0	8.1
25	304.5	6.6	7.4	0	0.0	7.4
26	2.8	0.1	2.8	24	0.0	-301.6
27	8.0	0.2	5.2	23	0.0	5.2
28	14.0	0.3	6.0	22	0.0	6.0
29	22.0	0.5	8.0	21	0.0	8.0
30	32.0	0.7	10.0	20	0.0	10.0
31	44.0	0.9	12.0	19	0.0	12.0
32	60.7	1.3	16.7	18	0.0	16.7
33	83.6	1.8	22.9	17	0.0	22.9
34	107.4	2.3	23.8	16	0.0	23.8
35	131.3	2.8	23.9	15	0.0	23.9
36	154.6	3.3	23.3	14	0.0	23.3
37	132.7	2.9	-21.8	13	0.0	-21.8
38	144.0	3.1	11.3	12	0.0	11.3
39	159.6	3.4	15.6	11	0.0	15.6
40	189.4	4.1	29.8	10	0.0	29.8
41	206.6	4.5	17.2	9	0.0	17.2
42	221.3	4.8	14.8	8	0.0	14.8
43	235.1	5.1	13.7	7	0.0	13.7
44	247.9	5.3	12.8	6	0.0	12.8
45	259.6	5.6	11.7	5	0.0	11.7
46	270.3	5.8	10.7	4	0.0	10.7
47	280.1	6.0	9.8	3	0.0	9.8
48	289.0	6.2	8.9	2	0.0	8.9
49	297.1	6.4	8.1	1	0.0	8.1
50	304.5	6.6	7.4	0	0.0	7.4
51	2.8	0.1	2.8	24	0.0	-301.6
52	8.0	0.2	5.2	23	0.0	5.2
53	14.0	0.3	6.0	22	0.0	6.0
54	22.0	0.5	8.0	21	0.0	8.0
55	32.0	0.7	10.0	20	0.0	10.0
56	44.0	0.9	12.0	19	0.0	12.0
57	60.7	1.3	16.7	18	0.0	16.7
58	83.6	1.8	22.9	17	0.0	22.9
59	107.4	2.3	23.8	16	0.0	23.8

Age / year	Total carbon tons/ha	Carbon tonne year CERs (Ef = 46.4)	TCERs	Lifetime of TCER	ASC CERs	JI ERUs
60	131.3	2.8	23.9	15	0.0	23.9
61	154.6	3.3	23.3	14	0.0	23.3
62	132.7	2.9	-21.8	13	0.0	-21.8
63	144.0	3.1	11.3	12	0.0	11.3
64	159.6	3.4	15.6	11	0.0	15.6
65	189.4	4.1	29.8	10	0.0	29.8
66	206.6	4.5	17.2	9	0.0	17.2
67	221.3	4.8	14.8	8	0.0	14.8
68	235.1	5.1	13.7	7	0.0	13.7
69	247.9	5.3	12.8	6	0.0	12.8
70	259.6	5.6	11.7	5	0.0	11.7
71	270.3	5.8	10.7	4	0.0	10.7
72	280.1	6.0	9.8	3	0.0	9.8
73	289.0	6.2	8.9	2	0.0	8.9
74	297.1	6.4	8.1	1	0.0	8.1
75	304.5	6.6	7.4	0	0.0	7.4
76	2.8	0.1	2.8	24	0.0	-301.6
77	8.0	0.2	5.2	23	0.0	5.2
78	14.0	0.3	6.0	22	0.0	6.0
79	22.0	0.5	8.0	21	0.0	8.0
80	32.0	0.7	10.0	20	0.0	10.0
81	44.0	0.9	12.0	19	0.0	12.0
82	60.7	1.3	16.7	18	0.0	16.7
83	83.6	1.8	22.9	17	0.0	22.9
84	107.4	2.3	23.8	16	0.0	23.8
85	131.3	2.8	23.9	15	0.0	23.9
86	154.6	3.3	23.3	14	0.0	23.3
87	132.7	2.9	-21.8	13	0.0	-21.8
88	144.0	3.1	11.3	12	0.0	11.3
89	159.6	3.4	15.6	11	0.0	15.6
90	189.4	4.1	29.8	10	0.0	29.8
91	206.6	4.5	17.2	9	0.0	17.2
92	221.3	4.8	14.8	8	0.0	14.8
93	235.1	5.1	13.7	7	0.0	13.7
94	247.9	5.3	12.8	6	0.0	12.8
95	259.6	5.6	11.7	5	0.0	11.7
96	270.3	5.8	10.7	4	0.0	10.7
97	280.1	6.0	9.8	3	0.0	9.8
98	289.0	6.2	8.9	2	0.0	8.9
99	297.1	6.4	8.1	1	0.0	8.1
100	304.5	6.6	7.4	0	0.0	7.4



The carbon tonne year method rewards the project with very small amounts of carbon, increasing as the trees mature and then falling to almost zero again when they are cut.

The TCER method rewards credits in line with stock changes, but each year the TCERs have a shorter lifetime until those issued at age 25 are valid for less than 1 year. The number of TCERs issued is exactly the same as JI ERUs. The JI ERUs are emitted when the trees are felled and are shown as a negative. The Average carbon storage capacity method awards credits during part of the first rotation only.

EXAMPLE ENDS

Social and environmental effects

Social and environmental effects are relevant to CDM projects because the Framework Convention on Climate Change was established to stabilise atmospheric levels of GHGs in order to promote sustainable development. Consequently, CDM projects are expected to contribute towards sustainable development objectives of the host country. Annex 1 countries are required specifically address sustainable forest management through the implementation of policies and measures, rather than on a project by project basis (Article 1 (a) (ii) of the Kyoto Protocol)¹.

LULUCF projects have a great potential to impact upon social and environmental conditions because they often affect large areas of land and the people who live in and around those lands. Consequently, such projects should recognise and address any negative impacts that they cause.

There is a widely held perception that large-scale forestry projects generally have a poor record of recognising and addressing negative impacts. Whilst this perception is justified in some cases, the forestry industry has come a long way since the large-scale industrial plantations of the 1960s, 70s and 80s. Much of the recent progress is due to forest management initiatives spearheaded by the Forest Stewardship Council and more recently recognised in the Pan-European Forest Certification Scheme. These initiatives have successfully linked greater market access with improved resource management. Whilst the objectives of forest management certification are quite different from those of CDM projects, there is no doubt that some of the techniques employed in certified forest management can be transferred to LULUCF CDM projects so as to ensure that negative environmental and social impacts can be addressed.

However, this does not mean that Forest Management Certification should become a condition of CDM project registration. The establishment and management of forests that do not meet the requirements of third party Forest Management Certification programmes can nevertheless contribute to a Party's sustainable development.

CDM projects that fail to recognise and address negative impacts should not be considered as eligible CDM projects. Developers may choose to use existing Forest Management Certification programmes to demonstrate their contribution to sustainable development, or they can demonstrate that they meet the host country's own criteria. If they choose an existing programme, the host country must acknowledge that this programme meets its sustainable development criteria.

To ensure a high level of environmental and social integrity, projects implemented under the Adaptation Fund could be required to achieve Forest Management Certification under a defined scheme that requires independent third party certification.

¹ Annex 1 Parties are at liberty to establish and implement national forest management certification schemes and to require that JI host countries comply with such schemes. Similarly, Annex 1 Parties are at liberty to determine which forest management certification schemes contribute to *Sustainable* Forest Management. These are sovereign issues that have no direct bearing on accounting frameworks defined under Articles 3.3 and 3.4 and Joint Implementation under Article 6.

EXAMPLE

Addressing negative environmental impacts

Large-scale plantation projects often rely on fast growing exotic species to produce higher quality raw materials at a greater rate than indigenous species. Whether intentionally or unintentionally, concentration on one or several species inevitably results in a reduction in genetic, species and ecosystem diversity. This has negative impacts upon the biodiversity, firstly by removing existing flora to make way for planting and secondly by reducing the range of habitats for remaining flora and fauna. New habitats are created in the process but these are frequently of less value from a biodiversity point of view.

In theory, reducing diversity is designed to yield a homogenous crop, which is easier to manage, harvest and market. In practice it increases the risks of fire damage, insect and fungal attack and increases susceptibility to extreme weather conditions. It tends to ignore natural variation in the landscape leading to the planting of the same species in dry and wet areas, on deep and shallow soils, on flat land and sloping land.

Good forest management recognises the importance of maximising biodiversity and encourages the use of different species and provenances, age class diversity, retention of existing vegetation, rehabilitation of degraded vegetation, and avoiding planting commercial species on marginal sites. For example, limiting the size of the forest compartment or management unit is a simple means of ensuring that diversity is introduced into even the most aggressive plantation programme. Long-term carbon storage potential will also benefit from most of these activities.

EXAMPLE ENDS

Leakage

Leakage arises when the project results in unforeseen emissions outside the project boundaries. Leakage is a complex issue that can reduce project benefits significantly.

Leakage has been categorised into various types, the most useful of which are:

activity-shifting and market-based leakage. Life-cycle effects constitute another form of leakage where products influence upstream or downstream emissions. Life-cycle effects may be generally positive in the LULUCF sector and are not discussed further in this paper.

Activity shifting tends to arise around the boundaries of the project and is related to the socio-economic conditions of the surrounding population. For example, local people may be using land for agricultural and grazing purposes. If this land is then reforested or afforested, the local people may be forced to move to other areas where they will clear forest resulting in emissions that would not have arisen if the project were not implemented.

As long as it is undertaken at the project design phase, identifying and managing this kind of leakage is relatively straightforward.

Market-based leakage, on the other hand, is much more complex. Consider a plantation project that expects to derive revenues from carbon credits. The additional revenue stream makes this an attractive project and it proceeds. As a result, predicted supply of wood in the region increases, predicted prices decrease and as a result, investment in a second plantation is now considered marginal. Without the CDM supported project, the second plantation might have gone ahead. It could also be argued that by increasing the supply of raw material and decreasing the price, the value of natural forest is decreased, leading to an increase in the conversion of forest to other land uses.

Compared to activity-shifting, market-based leakage is a much more complex issue and can have much greater consequences for the project.

National inventories in Annex I countries also suffer from market-based leakage across international boundaries. Other types of JI and CDM projects, not just LULUCF projects, also impact upon markets and influence supply and demand.

Methods of addressing market-based leakage / negativity include:



- Development of econometric supply and demand models that would enable the impact of the project to be estimated
- Assigning a leakage deduction to all projects
- Ignoring market-based leakage and accepting that a component of the additional benefits are not real.

The issue of market-based leakage is one reason why at least some *forest conservation* projects should not be considered as eligible CDM projects. Deforestation is often closely linked to the demand for wood products, on local, regional or international markets. In these circumstances, halting deforestation will lead to an unfulfilled demand for raw materials that will encourage further deforestation in other areas. If all the other areas of natural forest have already been allocated for harvesting, then the issue becomes one of timing, in which case credits might be delayed until the other resources have been exploited. If new areas of land become economically viable or are released from protected status, then there is no benefit from the project. For the same reasons, capping an oil well would not be rewarded with credits equal to amount of oil that the well would have produced. The market-based leakage would only disappear when these resources were the last harvestable resources left on the planet.

The only means of addressing the unfulfilled need for the raw material is to invest further down the supply chain: in “sustainable” forest management projects in the natural forest or in new plantations; in projects that lead to the substitution of non-renewable resources with renewables; in energy efficiency projects. These are the projects that could generate additional carbon credits that are less affected by market-based leakage.

Additionality

Additionality is categorised as environmental, programme and financial additionality. **Investment additionality** is not considered in this discussion because it is not possible to assess investment additionality in a consistent manner and therefore it is not an appropriate criterion on which to judge eligibility. Investment additionality could be used to support a claim of programme additionality.

Environmental additionality is simply the difference between the baseline and with-project scenarios. In any of the accounting regimes described above, the difference can be easily calculated once the baseline has been defined. Defining the baseline can be difficult in some situations and where solid evidence is not available. All assumptions must be stated clearly and fully justified.

Programme additionality requires that there is some reason why the project would not take place without the Kyoto Protocol. Many projects are financially viable but are not implemented for any number of reasons – capital may not be available; risks may be too high; infrastructure may be inadequate; legal or technological barriers may exist etc. These issues may be identified in the baseline as reasons why the project is not going ahead. By overcoming these barriers, the project is demonstrating programme additionality. Inadequate financial returns in view of risks could be viewed as a barrier to project implementation and the injection of carbon revenues into the project could overcome this barrier – in other words, investment additionality.

Financial additionality is simply the use of additional funds, additional to existing Official Development Assistance funds.

LULUCF projects are just as capable of demonstrating all three kinds of additionality as any other kind of project. The main difference between a LULUCF project and, for example, an energy project, is that the data used to estimate the baseline and with-project scenarios have different characteristics pertaining to quality, availability and quantity of data. The issues of risk and uncertainty are addressed in the next section.

Uncertainty and risk

Risk was not highlighted in the issues identified by the Chairman. Risk is an important issue and it should be clearly distinguished from uncertainty.

Uncertainty relates to statistical uncertainty around parameters that are used to estimate carbon flows within sinks projects. For example, inventories of commercial volume in forests and plantations are often carried out to specified levels of confidence. Statistically designed sampling programmes minimise uncertainty and give the highest level of confidence for a specified cost. Confidence limits around estimates of carbon content can be used to verify and certify carbon at different levels of certainty. By specifying a required level of confidence, the Parties could ensure that forestry projects deliver carbon benefits that are at least as certain as those from other types of projects. (Projects in all the other sectors will also use statistical principles to estimate key parameters and they will have associated levels of uncertainty attached – so this problem is not unique to forests). Where statistically valid estimates are not available, projects can be penalised by the use of deliberately conservative parameters and default values. This in turn creates an incentive for projects to improve the quality of information that they use to determine carbon benefits.

Risk can be divided into qualitative and quantitative risk.

Qualitative risk relates to issues such as political instability, infrastructural support etc. Qualitative risk can be addressed, to some degree, by specifying conditions that the projects must fulfil. Nevertheless, some events may be beyond the control of the project developers. Whilst such risks are not unique to forestry projects, the problem is that awarding credits based on the expected life of the project (as proposed under both the TCER and ACSC accounting modalities) exposes the environment to the risk of the project failing due to events that are beyond the control of the developers. Emission reduction projects do not face these risks because credits are awarded only on the basis of verified emission avoidance in the previous year.

Quantitative risks include threats such as fire, drought, insect and pest attack. These may be addressed by a conventional risk assessment approach and may be mitigated partially or completely by the development and implementation of risk management procedures and systems (e.g. a fire readiness programme) and conventional insurance.

Scale

Scale refers to the ability of LULUCF projects to create (i) large amounts of (ii) very cheap CERs which have the potential to discourage other forms of emission reduction and sequestration activities. With the exclusion of conservation projects, as proposed by the President of COP 6, the issue of scale is greatly diminished.

Conservation projects can create "carbon offsets" very cheaply. By purchasing the rights to harvest a forest concession and then not harvesting it, millions of tonnes of CO₂ emissions could be avoided for a small cost, delivering "carbon offsets" at a fraction of a dollar each. Such projects are no longer being proposed under the CDM. Generating CERs from afforestation or reforestation projects is a different matter.

i) The issue of volume of credits is dealt with through the accounting framework:

- Each of the accounting modalities described above takes into account the release of the carbon if and when harvesting occurs. This immediately reduces the number of credits that a project can generate to a proportion of the maximum amount of carbon sequestered during the project life. For example, if above and below ground biomass is the only pool that is counted, the credits are limited to approximately half to two thirds of the maximum carbon stock. If other pools (such as soil carbon) are included, this value will increase.
- The timing of the award of credits is such that they will have the little impact on individual commitment periods. Afforestation and reforestation CDM projects will yield credits over all or part of the project life, depending on the accounting modality adopted. Under the Average Carbon Storage Capacity approach (which is the most favourable to projects), credits for a single planting



activity are awarded over time frames in the region of 10 to 40 years, with the result that the total amount of credits (already limited under the point above) are distributed over several commitment periods.

- Once land has been committed to a CDM project, that land will no longer be able to be used for another project. This is in contrast to a biomass project, for example, where the same piece of land can be used to substitute for fossil fuel consumption again and again. Whilst credit from an afforestation or reforestation project is limited to a proportion of cumulative increment, a biomass project substituting for fossil fuel can generate credits equal to the full cumulative increment over many years.

The expected volume of credits arising from sinks projects in the first commitment period has been over-inflated for three reasons.

- early crediting under the CDM allows credits to be banked from 2000 onwards, which means that changes in carbon stocks over 12 years are concentrated into the first commitment period
- estimates of credits have not taken into account the initial slow growth rates of trees in afforestation and reforestation projects. Growth rates are often quoted in terms of mean annual increments (MAI - total increment divided by age); credits are awarded on the basis of current annual increment (CAI). CAI is less than MAI during the early part of a plantation's life.
- Conservation / deforestation projects yield very large number of credits at the start of the project, decreasing over the life of the project. By excluding these kind of projects from the CDM, the number of available CERs is greatly reduced and the average cost, substantially increased.

These points explain why the issue of volume of credits arising from forestry based CDM projects is not significant.

ii) The price of CERs from afforestation and reforestation projects is not an issue. Many CDM projects are financially beneficial as marginal cost abatement curves show. The appropriate test is one of additionality. If a project is additional then it must be allowed to generate CERs.

If scale of credits arising from afforestation and reforestation projects is an issue for the first and subsequent commitment periods then it should be dealt with through boundary conditions and other political decisions, as proposed by the President of COP 6.

PART II: Experience relevant to the special concerns

SGS has addressed most of the special concerns in the validation and verification / certification of projects that it has undertaken to date.

Accounting methodology

SGS has adopted the average storage capacity accounting methodology. Whilst applying it to nine LULUCF projects, solutions to some of the technical problems have been developed as follows.

A time horizon of 100 years was selected for the calculation of average storage capacity for two reasons. Firstly, Decision 2/CP.3 reaffirms the use of a 100-year time frame for the calculation of the Global Warming Potentials. Whilst this is not necessarily a scientifically derived horizon, the Parties have reached consensus on it. Secondly, a time horizon of 100 years reflects a commitment by project developers to sustainable development. In most tropical countries and most Non-Annex I countries, 100 years will require projects to manage multiple rotations and this will require consideration of sustainable land use practices. Social benefits such as employment and infrastructure developments are more likely to be long term under this requirement. It is feasible that shorter projects can be



accepted. The consequence is that they will receive fewer credits because the average storage capacity will be calculated on the basis of carbon stocks over the project life of, say 60 years, divided by the defined time horizon of 100 years.

Setting a timeframe of 100 years could be seen as tying land resources up for the foreseeable future. As described above, it is not necessary to make such a long term commitment, although the carbon credits will be reduced if a shorter time horizon is selected. Indeed, such commitments are already common in afforestation and reforestation projects. Project developers are unlikely to invest in physical infrastructural development such as roads, nurseries and sawmills for the benefit of one rotation only. Many countries where forestry industries have become established are already entering second and subsequent rotations as their industries become economically sustainable. Forest management certification initiatives require secure long term tenure and are encouraging broader based "sustainability" which encompasses environmental and social performance criteria.

The main risk is that once credits have been awarded over, say the first 40 years of the project, and these have been sold, the project developer pulls out and does not replant the second or subsequent rotations. Such an event could arise for many reasons including: poorer than expected growth of trees, changing climatic conditions, fire damage which destroys the investment without sufficient salvage value to cover the costs of replanting and profiteering by the investors. Some of these eventualities can be covered by insurance mechanisms, risk buffers, legal instruments such as bonds or trust funds etc. However, in some circumstances the global community will have to accept that issued CERs did not, in fact, provide real long term benefits. There is little difference between this risk and risks associated with the crediting of emission reduction projects based on predicted baselines, measurements, sampling programmes and associated assumptions. Here too, there is a likelihood that some emission reductions will be awarded that did not arise.

Social and environmental effects are addressed through the application of appropriate forest management criteria. The emphasis is on the identification and mitigation of negative environmental and social impacts. Award of a positive Validation statement and an SGS Certificate of Project Design does not constitute Forest Management Certification, but there is considerable overlap between the two processes. For example, stakeholder consultation is a key tool in the identification of negative impacts, although the process used to date is not as formalised as the FSC stakeholder consultation process.

SGS uses its own Eligibility Criteria to ensure that projects have acceptable social and environmental performance. Audit protocols, in the form of checklists, are reviewed for application in different countries to take into account the host country's sustainable development criteria. The host country's sustainable development criteria include environmental and social policies and programmes, regulations (such as the need for environmental impact assessment) and local forest management standards if available.

Several projects are also seeking FSC certification to provide additional credibility to their activities. Under the current situation where FSC Forest Management Certification does not address carbon crediting, the decision to seek both types of approval has significant cost implications for the project². For afforestation and reforestation projects, there is usually no marketable product for at least 15 to 20 years and therefore the added cost of Forest Management Certification is unlikely to be recovered through market access. A typical forest management certificate is valid for 5 years, subject to regular surveillance visits. The forest management assessment team may have visited the site as many as 10 to 15 times and re-assessed the project 2 or 3 times before a single piece of certified wood enters a chain of custody. Forest Management Certification may improve investors' confidence in the project and provide investors with re-assurance that they are not buying into projects that the international

² The assessments must be lead by different team leaders although local specialists can be shared between the two teams. Two separate reports are required and each must follow its own peer review and approval process. Costs associated with the development and implementation of management systems and accreditation are duplicated as the two assessment processes are run from separate offices.



community will reject, however, this is a high price to pay to demonstrate that a CDM project contributes to a host country's sustainable development.

In summary, a project's contribution to a host country's sustainable development can be assessed by using Eligibility Criteria that require assessors to review social and environmental impacts. Projects that create negative impacts must mitigate these impacts if they wish to be registered as eligible CDM projects.

Leakage must be identified and addressed by the project and where this has been done, credits are reduced accordingly. Projects that fail to address leakage will receive Major Corrective Action requests and will not receive a positive validation statement until the issues have been addressed. Where market based leakage is an issue and no data is available to estimate the impacts, SGS deducts a proportion of the credits.

Conservation projects in particular are considered to suffer from very high levels of market-based leakage – perhaps to such an extent that all of the additionality is undermined. These projects may not be considered to be Kyoto compliant and are unlikely to deliver credits that will be traded under the CDM. However, they may still have value to companies and projects that wish to “offset” emissions from specific activities. In these cases, the very obvious link between emissions in one location being offset by halted emissions in another location may be exploited for public relation benefits.

Additionality tests are limited to environmental, programme and financial additionality. Investment additionality is not considered explicitly, but it can be used as a means of demonstrating programme additionality.

Experience has shown that environmental additionality is relatively easy to demonstrate. Projects typically construct spreadsheet models that predict the fate of existing carbon pools in the baseline scenario and new carbon pools in the with-project scenario. Such models greatly facilitate the analysis of risk and uncertainty.

Programme additionality is commonly demonstrated by the lack of any similar activities in vicinity of the project. For example, no other company or project is undertaking large-scale planting in Mufindi, Tanzania. Conversely, business as usual projects have failed their assessments because they are surrounded by other companies undertaking exactly the same activities. A conventional plantation company might be able to claim programme additionality for sustainable forest management activities such as replanting / re-establishment of native vegetation where these practices are not currently implemented. However, Forest Management Certification is becoming more and more common and will soon be a part of the baseline in some countries.

Financial additionality is simply proven by demonstrating that the project is not receiving Official Development Assistance for its carbon sequestering activities.

Risk and uncertainty are assessed for each project. Qualitative risks are addressed by raising corrective action requests. Quantitative risks and uncertainty result in the definition of a buffer of credits that are with-held from certification. If risk events arise, credits are released from the buffer to compensate for the losses. If the events do not materialise, credits may be periodically released from the buffer. The buffer is like a self-insurance policy that is regulated by an independent party, adding credibility to the GHG Credits (CERs) that the project delivers and at the same time, reducing the certifier's liability.

Experience has shown that the extent of the buffer varies between as much as 60% in case of the Tanzanian project (where there was a high risk of fire and insect attack) and 12% in The Netherlands where risk events are much less likely and the main issue surrounds uncertainty in estimated growth rates of native species.

Scale: SGS has assessed five LULUCF CDM projects of which four have involved afforestation or reforestation activities. Two projects (Kilombero Forests Ltd. and Face Ecuador) have been certified



as complying with SGS Eligibility Criteria and two are in the late stages of the assessment process (Face Kibale and Face Mt Elgon). An important part of the certification service that SGS offers is the preparation of a Schedule of Projected Emission Reduction Units (SPERU). This schedule (which is not a certificate nor a guarantee) indicates how many credits the assessors think the project will deliver once risk and uncertainties have been taken into account. Part of the schedules for the four afforestation / reforestation projects certified / soon to be certified are reproduced below. The total column shows that whilst the numbers may be significant to individual project developers, they are unlikely to have impacts upon the global commitments during the forthcoming and subsequent commitment periods:

Table 2: Projects Emission Reduction Units arising from activities implemented by "certified" projects ('000 tonnes CO₂).

Year	Kilombero Forests Ltd.	Face Ecuador	Face Kibale *	Face Mt Elgon*	Total
1995		1.8	0.0	1.1	2.9
1996		7.5	1.5	4.8	13.9
1997		20.8	3.7	10.9	34.6
1998		41.2	5.6	20.5	49.7
1999	0.6	65.4	7.9	30.5	122.7
2000	15.1	94.9	10.9	42.0	162.9
2001	17.1	122.3	14.8	50.9	205.1
2002	18.2	136.0	19.5	58.9	232.6
2003	45.9	143.7	23.9	66.2	279.7
2004	48.3	147.8	28.5	72.8	297.4
2005	45.7	103.5	33.9	78.2	261.3
2006	47.9	83.6	36.7	81.8	250.1
2007	48.4	71.9	37.8	83.5	241.7
2008	45.6		38.4	82.9	166.8
2009	0		38.0	81.0	94.9
2010	0		36.3	77.9	108.6
2011	11.7		34.8	75.1	151.2
2012			33.5	72.5	106.0
2013			32.4	70.1	102.5
2014			31.3	67.9	99.1
2015			30.2	65.7	95.9
2016			29.2	63.7	92.9

Year	Kilombero Forests Ltd.	Face Ecuador	Face Kibale *	Face Mt Elgon*	Total
2017			28.3	61.7	90.0
2018			27.4	59.9	87.3
2019			26.5	58.1	84.6
2020			25.7	56.4	82.1
2021			24.9	54.8	79.7
2022			24.2	53.2	77.4
2023			23.4	51.7	75.2
2024			22.8	50.3	73.0
2025			22.1	48.9	71.0
2026			21.5	47.6	69.0
2027			20.8	46.3	67.1
2028			20.2	45.1	65.3
2029			19.7	43.9	63.6
2030			19.1	42.7	61.9
2031			18.6	41.6	60.2
2032			18.1	40.6	58.7
2033			17.6	39.5	57.1
2034			17.1	16.3	33.4
2035			0.5	0.0	0.5
2036			0.0	0.0	0.0
Total					4429.8

* Provisional figures awaiting peer review

Assuming that these projects are accepted as eligible CDM projects, they will generate approximately 4.4 million CERs over the next 6 commitment periods (assuming commitment periods are five years in length and run concurrently). 2.5 million of these will be awarded during the first commitment period because of the provision to allow banking from 2000 onwards. In subsequent commitment periods, these projects will contribute less than 0.5 million CERs.

SGS's experience shows that by applying appropriate accounting methodologies and additionality tests, combined with the boundary conditions proposed for the first commitment period, scale becomes a non-issue for CDM LULUCF projects.



Project References

SGS has assessed 9 LULUCF projects to date and has completed and issued Validation Statements / Certificates of Project Design to five: Costa Rican Protected Areas Project; Kilombero Forests Ltd, Tanzania; Face Foundation Netherlands; Rio Condor Forest Carbon Sequestration Project, Chile; Face Ecuador. Face Netherlands, Face Ecuador and Kilombero Forests Ltd. have been awarded with *ex-post* verified GHG Credits. Two more Face projects in Uganda are in the late stages of report preparation. Two projects have MAJOR Corrective Action requests outstanding and therefore did not fulfil the SGS Eligibility Criteria.

Executive Summaries of all validated projects are publicly available by contacting climatechange@sgs.com, gphillips@sgs.com or irma.lubrecht@sgs.com, visiting www.sgs.nl or writing to SGS Agrocontrol, Malledijk 18, PO Box 200, 3200 AE Spijkenisse, The Netherlands. A description of the service (GHG Validation and Verification Service) and the SGS Eligibility Criteria are also available from these contacts.

About the authors

Gareth Phillips, Edwin Aalders and Irma Lubrecht make up the core of the SGS Centre of Technical Competence for the Climate Change. Based in the Netherlands and UK, they provide technical input to the Group's Climate Change Programme, with the assistance of staff in Latin America, East and West Africa and Australasia. To compliment a wide range of trained assessors, SGS has formed strategic alliances with leading international consultancy firms AEA Technology and ICF Consulting who can provide top level expertise in a variety of climate change sectors.

About SGS

SGS is the world's largest verification, testing and certification organisation. Founded in 1878, SGS is recognised as the global benchmark for the highest standards of expertise, quality and integrity. With more than 30,000 employees, SGS operates a network of over 850 offices and subsidiaries and 330 laboratories in 140 countries. The SGS Group is a leading force in verification and monitoring services for international trade in agricultural, mineral, petroleum and consumer products, together with certification and other services to governments and international institutions (Global Trade Solutions). As a professional, independent and reliable partner, SGS is committed to the delivery of enhanced value for shareholders, clients, employees and the public at large.

SGS runs a Climate Change Programme that offers a range of services designed to bring transparency and credibility to climate change mitigation efforts. SGS Global Trade Solutions (GTS) supports a Technical Competence Centre based in The Netherlands. To date, SGS has validated five sinks-based projects against the SGS Eligibility Criteria and issued GHG Credits to three of those projects. SGS has also validated biomass energy projects for the ERU-PT programme run by the Dutch Government; applied for accreditation to offer services to members of the UK Emissions Trading Scheme; is an active member of both IETA and WBCSD; is a member of cdm-marketplace.com and CO2E.com; and, finally, has formed several key strategic alliances to broaden the range of services which we have to offer. For more information, visit our website at www.sgscclimatechange.com or email SGS on climatechange@sgs.com.



About IETA

IETA is a non-profit organization consisting of a coalition combining a wide range of private sector interests from across the globe, and dedicated to ensuring that the objectives of the UN Convention on CC and ultimately climate protection are met through the establishment of effective systems for market based approaches. IETA provides a platform for the promotion of new ideas and solutions to problems encountered in the operationalisation of the flexibility mechanisms. To date, IETA has organised a range of events and working groups to tackle issues such as Accreditation of Operational Entities; has initiated in the UK the development of a Statement of Recommended Practice in relation to disclosure of GHG emissions; is examining conditions for the harmonization of national trading schemes; is working towards the establishment of a voluntary database to record trades in GHG emission reduction units; integration of non-Annex 1 market with emerging national trading schemes.

IETA members seek the development of an emissions trading regime that combines economic efficiency with environmental integrity and societal equity. IETA's main activities focus on the development of the elements of the framework for GHG, promotion of market mechanisms and active participation in helping to start the GHG market. For Additional information please contact Andrei Marcu, Executive Director, +41 22 839 3154 or marcu@ieta.org.

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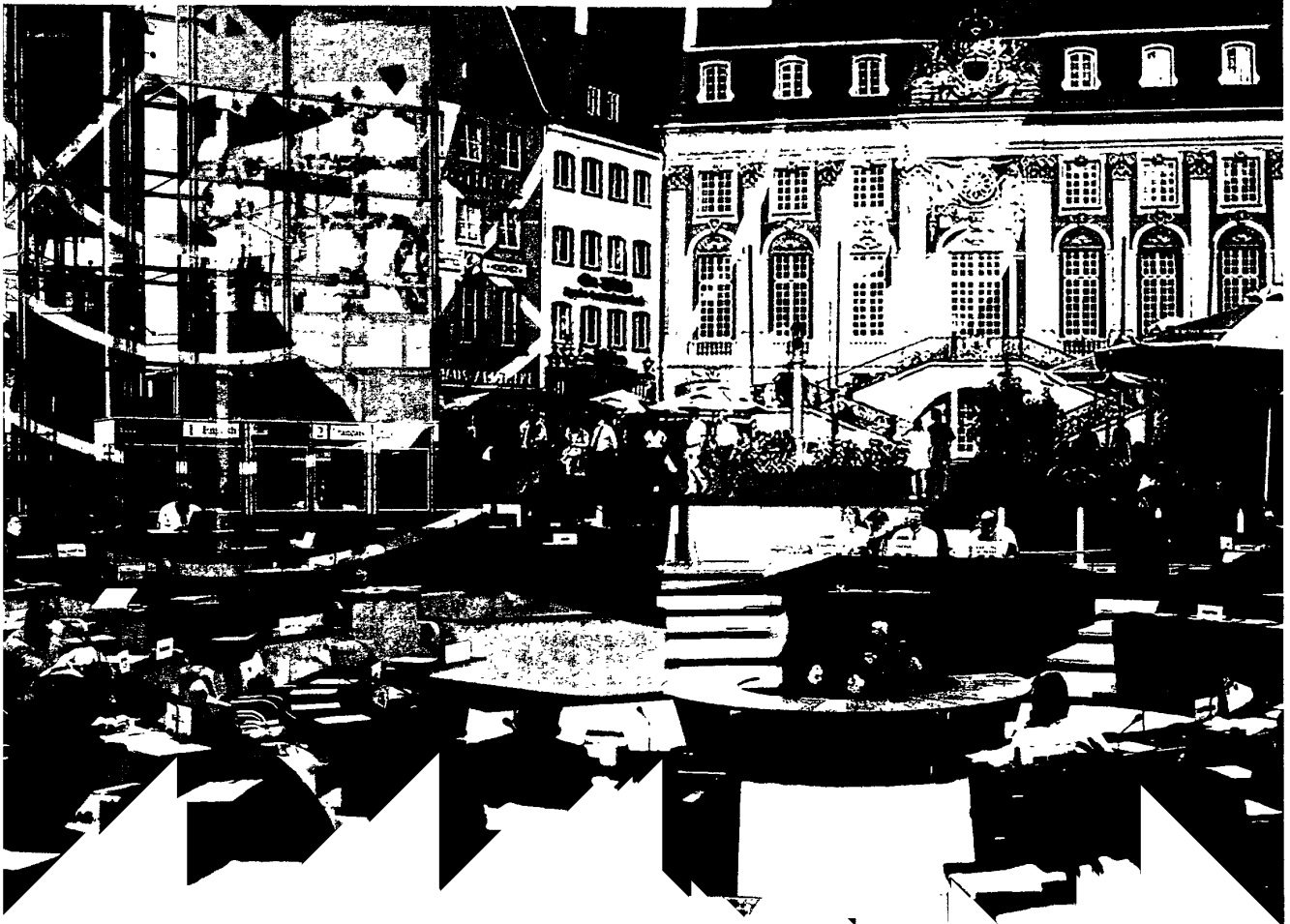
BONN

COPing with Climate Change
- Challenges and Opportunities -

Special and cultural events guide

COP 6 (Part 2)
of the United Nations Framework
Convention on Climate Change
UNFCCC

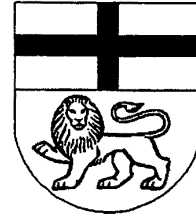
Bonn, Germany



COPing with Climate Change - Challenges and Opportunities -

16 -27 July, 2001 - Bonn

**Welcome address
by the
Lady Mayor of the City of Bonn
Bärbel Dieckmann**



Dear guests, dear participants,

I would like to welcome you in Bonn. Our city has the honour to host the second part of the sixth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).

The City of Bonn takes very seriously the efforts to combat climate change. Bonn is one among 1005 municipalities committed to the protection of the earth's climate by adhering to the Climate Alliance of European Cities with the indigenous peoples of the rainforest, one of the biggest European networks. One of the main targets of the Alliance is to halve the CO₂ emission up to the year 2010. This was the background for the kick-off of a climate campaign in Bonn in 1995 which includes the promotion of the reinforced use of renewable energy types by Bonn's municipal energy supply, the intensification of information campaigns, the offer of advice service close to the citizens, the construction of heating networks close to the user, the promotion of thermographic diagnosis of buildings as well as a pilot project of four schools in Bonn called the "fifty-fifty-programme" where the schools are rewarded with 50% of their energy and water costs savings. Meanwhile, roughly one third of Bonn's schools partake in this campaign.

Bonn is not only the nodal point of the network of the German Federal Republic international and development cooperation and a seat to United Nations secretariats. Bonn is as well a city of research and telecommunication and last but not least – as Beethoven's birthplace - a city with sound cultural traditions. In this booklet you will find some cultural events taking place during your stay which might be interesting for you.

This guide has been compiled to assist you in getting oriented. It contains information about the city, about venues in Bonn and some practical advice. Though your conference agenda will be difficult to manage, I want to invite you warmly to find some time to get to know our lovely city on the banks of the Rhine.

I wish you a successful conference and an enjoyable stay here in Bonn.

B. Dieckmann

Bärbel Dieckmann

(Lady Mayor of the City of Bonn)

COPing with Climate Change - Challenges and Opportunities -

16 -27 July, 2001 - Bonn



Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit

**Welcome address
by the
Federal Environment Minister
Jürgen Trittin**

Ladies and Gentlemen, Participants and Guests,

I would like to extend a warm welcome to Bonn for the 6th Conference of the Parties to the Framework Convention on Climate Change. You have come here from all over the world to continue the international negotiations for the protection of the world's climate. We all bear the great responsibility of dealing with what is probably the greatest environmental challenge facing mankind. To do this we must make decisions that advance the cause of climate protection.

The latest IPCC assessment report has again dramatically highlighted the serious impact which the man-made greenhouse effect has on the world's climate. If developments in global greenhouse gas emissions continue unchanged, we must expect the rise in sea level to lead to the flooding of entire island states and low-lying areas of mainland; we must also expect extreme weather conditions such as hurricanes and drought to become more frequent, food production and biological diversity to decline in many regions, and tropical diseases to spread to regions previously unaffected by them. It is therefore vital that the international community quickly succeeds in reducing greenhouse gas emissions throughout the world and in achieving sustainable development.

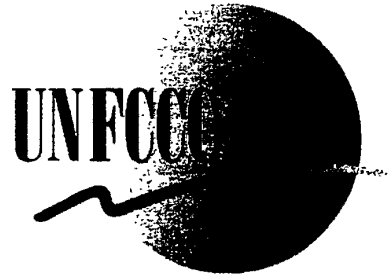
The Kyoto Protocol of December 1997 created an important basis for effective international climate protection, representing the first time that industrialised countries announced that they were prepared to reduce their greenhouse gas emissions gradually, within the framework of binding reduction targets. Along with the major part of the international community, the German government remains convinced that there is no sensible, politically justifiable alternative to the reduction targets agreed in the Kyoto Protocol. Our joint obligation here in Bonn is to develop the Protocol by adopting effective rules which will create the conditions necessary to ensure that, by 2002, the Protocol is ratified, enters into force under international law and is swiftly implemented. In view of the already visible and growing threat of danger, the international community cannot afford to further postpone the introduction of an effective climate protection policy. The peoples of this world and the generations to come rightly expect us to prove our capacity to act. Not only is this imperative from an ecological viewpoint, it also makes economic sense, as we are thus providing incentive to modernise our industries, and to create innovative and sustainable employment. I call on all the Parties to work constructively towards the success of this Conference.

With this in mind, I would like to wish you a productive stay here in Bonn.

Jürgen Trittin
Federal Environment Minister

UNFCCC COP 6 (part 2)
Conference of the Parties of the United Nations
Framework Convention on Climate Change
16-27 July, 2001 - Bonn

Welcome address
by the
Executive Secretary of the
United Nations Framework
Convention on Climate Change
Michael Zammit Cutajar



Dear participants,

Welcome to Bonn, the home city of the Climate Change Convention.

It is only a short time since we last met in The Hague for the sixth session of the Conference of the Parties. We all went there with strong hopes for a successful conclusion to the negotiations on the implementation of the Kyoto Protocol and the reinforcement of the Convention. Unfortunately, differences between negotiating positions proved too difficult to resolve and the much desired success eluded the Conference.

Here in Bonn, the resumed sixth session gives the Parties a second opportunity to find a way forward. Though they meet in a turbulent political environment, they are kept together by the unifying framework of the Convention. There are indeed differences between delegations on the issues under negotiation, but there is a global consensus on the significance of the threats posed by human-induced climate change. To move forward, Governments must commit to the next steps towards the emission limitations that are needed to ensure climatic stability by the end of this century.

The City of Bonn has kindly compiled this guide to help you settle in here during your stay. It contains information on a special programme offered by the city to participants in the Conference and gives useful information about the city, including a wide range of cultural events.

Bonn is a friendly and comfortable city, nourished by long traditions of cultural, intellectual and political accomplishments. It will provide a calm setting for your work and I do hope that you will find some time in your busy conference schedules to enjoy it and its green surroundings.

I wish you a very pleasant stay and every success in our common endeavour.

A handwritten signature in black ink, appearing to be 'M. Cutajar', written in a cursive style.

Michael Zammit Cutajar

Executive Secretary
United Nations Framework Convention on Climate Change

**COPing with Climate Change
- Challenges and Opportunities -
16 -27 July, 2001 - Bonn**



**Protecting the Climate
Securing the Future**



Center for International Cooperation

**„People are hoping for a positive
signal from the international climate
negotiations.“**

Bonn takes over the Baton

This was the message the final runner of the relay run initiated by the Climate Alliance of the Cities (Alianza del Clima) brought to the conference venue of part 2 of the Sixth Conference of the Parties on June 29, 2001. Thirty Lord and Lady Mayors of North-Rhine-Westphalian cities participating in the Climate Alliance have signed the document which - enclosed in a wooden baton from ecological timber production - has been handed over to the Secretariat of the UNFCCC in Bonn. On the first conference day, on behalf of 1005 local authorities adhering to the Alianza del Clima, the representatives of these cities will call upon the governments to make every effort for the Bonn negotiations to be successful and to ratify the Kyoto Protocol.

They raise their voices in the name of millions of people all over the world who are deeply concerned about the severe consequences of the global climate change. All of them expect solutions and agreements resulting in an absolute reduction of CO₂ emissions.

This brochure gives you some information about important events accompanying COP6 (2), in the first place a joint evening event on the 17th of July, organised by the City of Bonn and the Federal Minister for the Environment. Furthermore, it comments on Bonn's efforts relating to sustainability and climate protection on the local level and within networks.

In case you were looking for some relaxation after a straining day of negotiations, we kindly invite you to consult our cultural events Bonnjournal. For Bonn has not only a lot to offer as a conference venue. Some of these possibilities are to be found in this booklet (pages 30-38).

Should any further problem arise, the Bonn Information Desk in the lobby of the Maritim Hotel will be happy to assist you.

**We wish your conference the best
results and an agreeable stay in
Bonn.**

UNFCCC COP 6 (part 2)
Conference of the Parties of the United Nations
Framework Convention on Climate Change
July, 2001 - Bonn
Venue and Services

Services available to NGOs

There are offices, meeting rooms and one NGO press room available for non-governmental organizations accredited by the UNFCCC secretariat. The offices are equipped with PC work stations and printers. For the location of these facilities, please see the brochure "Information for Participants" available at the conference information desk.

Media Services

An international media centre is located in the **Ministry of Education** across the street from the Maritim. The media centre offers various services, including a media information desk and TV/radio/writing press facilities, to accredited members of the press. For more details on the services available, please see the brochure "Information for Participants".

Bonn Information

Information on hotel reservations, local transportation, train and air travel, as well as tourist information about Bonn and Germany is available at the Bonn information desk near the main entrance of the Maritim.

Bank

Deutsche Bank, located in the foyer of the Maritim, provides banking services for participants of the conference.

Security

Access to the conference venue is restricted to registered participants of the meetings. In order to help enforce the high security standards of the secretariat, participants are expected to wear their badges as soon as they are issued. They must be worn at all times and in all areas for the duration of the conference. Badges are issued only on the basis of a letter of nomination from Parties, Observer States or accredited Observer organizations. Lost badges must be reported to the registration desk immediately.

COPing with Climate Change - Challenges and Opportunities -

16 -27 July, 2001 - Bonn



Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit

The Climate Protection
Programme of the
German Government

These days it is incontestable that human-induced greenhouse gas emissions are leading to an evident, continuous warming of the Earth's atmosphere. Just recently, the latest IPCC assessment report dramatically reconfirmed that the man-made greenhouse gas effect is having a serious impact on the world's climate.

Climate Protection Programme

Germany has long shared in the concern about the balance of the global climate. In view of the threatening findings of climate research, Germany is convinced that a clear reduction in greenhouse gas emissions must be achieved as quickly as possible. For this reason, under the leadership of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany already began to develop a **detailed climate protection programme** at the beginning of the 1990s. The aim of this national climate protection strategy is to reduce, by the year 2005, CO₂ emissions by 25% compared to 1990 levels – exceeding the binding reduction commitments in the Kyoto Protocol. In order to achieve this goal, the Climate Protection Programme provides for over 150 separate measures for all those sectors which contribute to global warming.

A number of measures from the Climate Protection Programme are already being implemented. We should note in particular here the **ecological tax reform**, which uses a gradual increase in energy prices to provide incentives in every sector for the development and the market launch of new technologies, and for the rational, economical use of energy; **the Renewable Energy Sources Act**, which promotes the generation of electricity from renewable energy sources, a **market launch programme for renewable energy sources** and the **100,000 Roofs Programme**, which supports investments in photovoltaics equipment.

The Goal: 25 % CO₂ Reduction until 2005

In order to achieve the goal of a 25% reduction by the year 2005, the German government has decided further important measures: considerable reductions in emissions, amounting to 10 million tonnes CO₂, are expected to be achieved from accelerating the **development of combined heat and power generation** (c.h.p.). **The Energy Saving Ordinance** will reduce the energy requirements of new buildings by a further 30% compared to current standards. The "**Climate Protection Programme for Existing Buildings**" will reduce energy consumption in this sector and the German government will provide additional funding of 2 billion DM up to 2005 for this. Another important measure focuses on the transport sector, promoting in particular **rail transport and fuel-efficient passenger vehicles**.

([www.bmu.de](http://www.bmu.de/english)
[/english](#))

Information on these and other measures of Germany's Climate Protection Programme can be found in the Programme itself on the **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety** website under the headings "current topics" → "climate change".