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Climate Change - CDM [Clean Development Mechanism]

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Options for Addressing Equity Concerns under the Clean Development Mechanism

As a market based mechanism, the CDM will provide low cost opportunities for GHG reductions while simultaneously promoting the flow of private capital toward CDM projects in less developed nations. Since the vast majority of finance for CDM projects will be private, the distribution of projects will be determined in large part by the market. In political terms, the question of equity, or the distribution of projects and funds under the CDM, will inevitably be raised at COP4. The equity question is based on the concern that the least developed nations, particularly African countries, will be unable to attract CDM investment due to limited infrastructure, low levels of current emissions (therefore fewer opportunities for immediate reductions in industry), and a limited existing presence of Annex-I investors. There exists the additional concern that these nations may begin competing against one another for projects, and furthermore, that the total flows of FDI (outside of the CDM realm) may be affected as investors move capital toward those nations where they can earn emission credits in addition to the financial return on their investments.

The current recommendations for resolving the CDM equity issue tend to be market distorting and economically inefficient. These proposals include the imposition of regional quotas for CDM projects or the creation of differentiated baselines for calculating a more generous allotment of reductions for specific nations. Although these approaches would do more to harm, than enhance the functioning of the CDM, the political concern over equity needs to be addressed in order for developing nations to fully support the creation of the CDM. The following points outline options to address CDM equity in a more efficient manner. Policy options are listed in order of least cost to highest cost, in terms of additional funding needed and/or impact on economic efficiency of CDM transactions. It should also be noted that these options are not mutually exclusive.

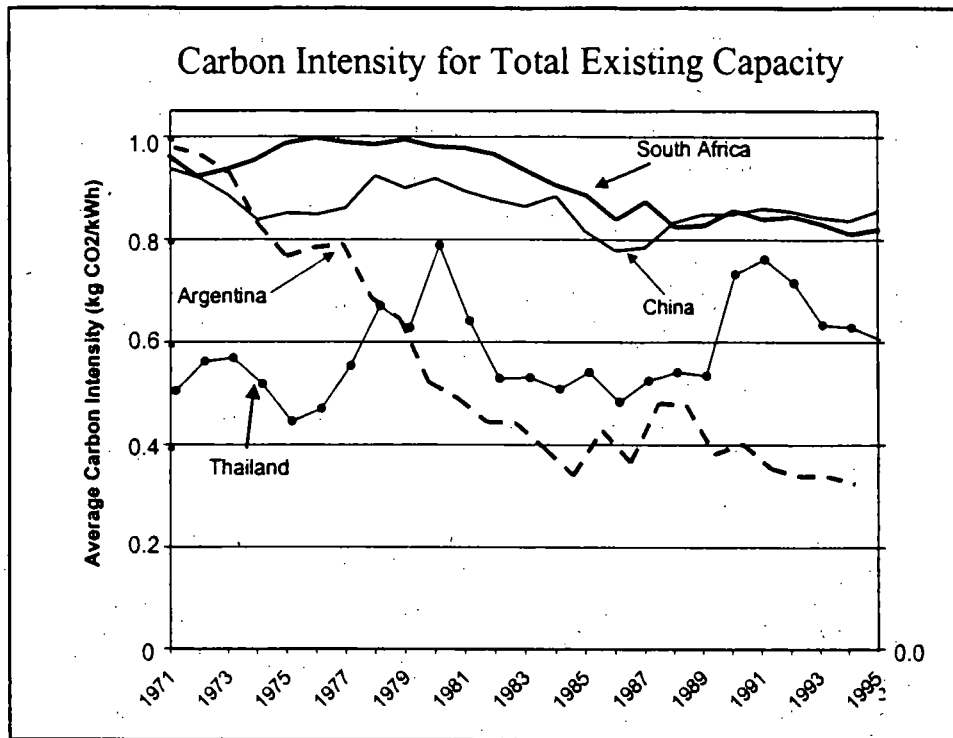
- **Clearinghouse Function** - In order to promote the introduction of projects in specific countries, the CDM could play a clearinghouse role in order to match investors with investment opportunities. This function would not manage capital flows, but serve to bridge information gaps which may otherwise inhibit project development in countries where cost effective GHG reduction opportunities exist.
- **Project Bundling** - Due to their size or stage of economic development some countries may be unable to attract large scale CDM projects. At the same time, large scale projects may be preferred by project developers, over small scale projects which will not provide immediate returns, but may have the same up-front costs. To overcome this hurdle without distorting the market, small CDM projects could be bundled in a type of CDM mutual fund. In this case, investors pool private resources in order to implement a number of projects simultaneously in a country or region. .

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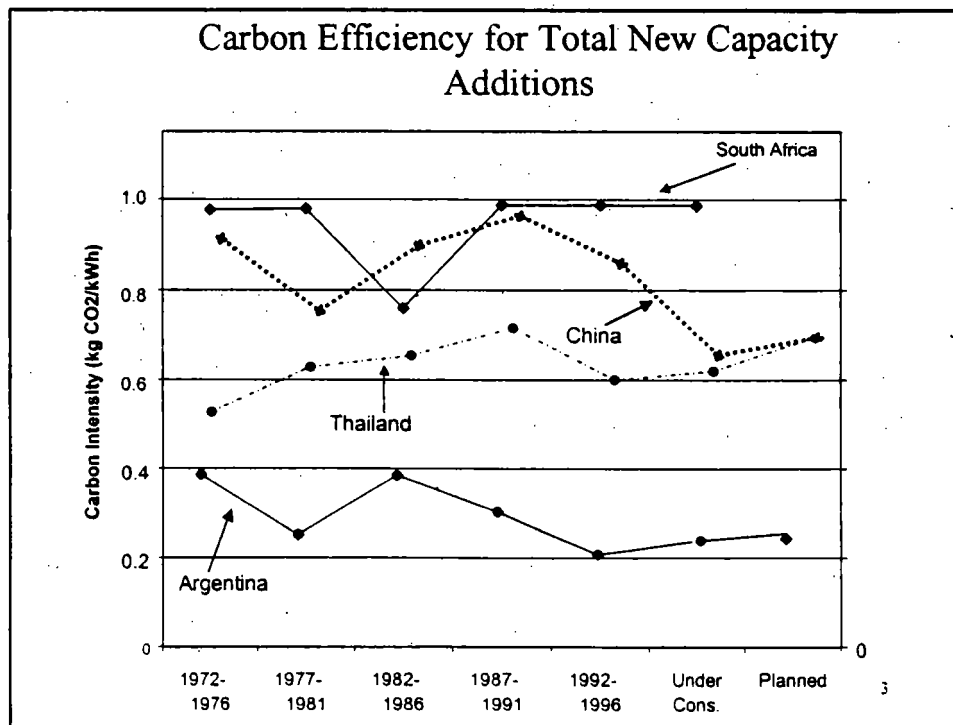
- **Technical Assistance** - Concerns over equity may also be mitigated if some guarantee is provided for technical assistance or the provision of seed funds in those nations which are least able to attract investment under the CDM. This lower cost approach does not distort the market function of the CDM, but necessitates additional funding from either private or public sources for capacity building. Potentially, countries could be eligible for technical assistance until a certain number of CDM projects had been established domestically.
- **Regional Projects** - Discussion to date has focused on CDM projects in specific countries. An alternative approach may be to include regional CDM projects, in which a number of countries could host a project which is not country specific, such as a transnational LUCF project or improving a shared natural gas pipe-line. This approach may be particularly advantageous in regions where a relatively more developed non-Annex I country is surrounded by a number of less developed nations.
- **Range of Projects** - Inclusion of a wide range of projects will create more investment opportunities under the CDM for the least developed nations. For example, limited infrastructure and existing industrial base would not negatively impact a nation's potential to attract investment, if LUCF projects were included as eligible project types under the CDM.
- **Investment Insurance** - Like OPIC or the EX/IM Bank, the CDM could provide some level of publicly financed insurance for investors to mitigate risk in those nations facing difficulty in attracting CDM investment. Although this approach does not distort the market as much as subsidizing investment directly, it would require additional funding for the CDM. Moreover, country risk may be only a small factor in the determination of CDM project placement globally.
- **Awarding Additional CERs** - Equity concerns could be addressed through inflating the number of certified emission reductions (CERs) that are awarded to projects in countries least able to attract CDM investment. This approach would not change the baselines used to calculate emission reductions, but award an additional percentage of credits to those project undertaken in specific nations. The drawback of this option is that the market for CERs is distorted, investment is not occurring where GHG reductions can be achieved at lowest cost, and the total amount of CERs generated is raised in the form of "CDM hot air".

Benchmarking as a Measure for Certification and Additionality for CDM: Background Data

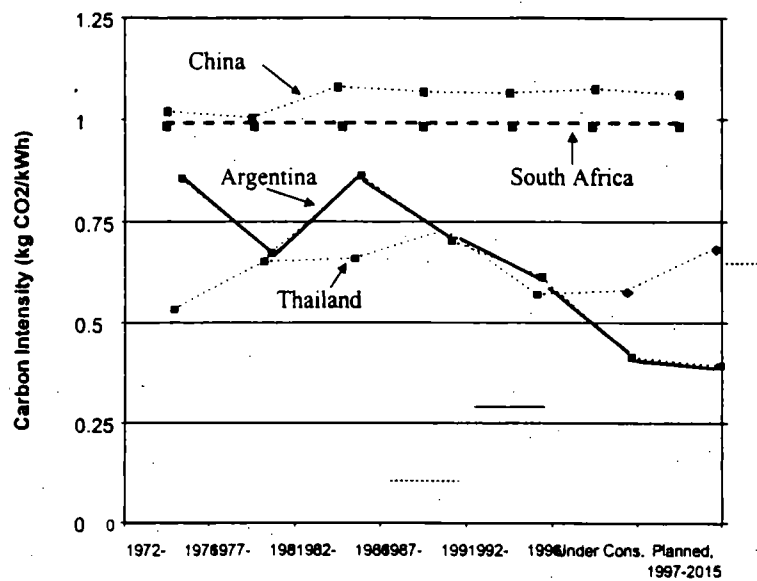
February 1999



All electricity
generation
(on-grid)



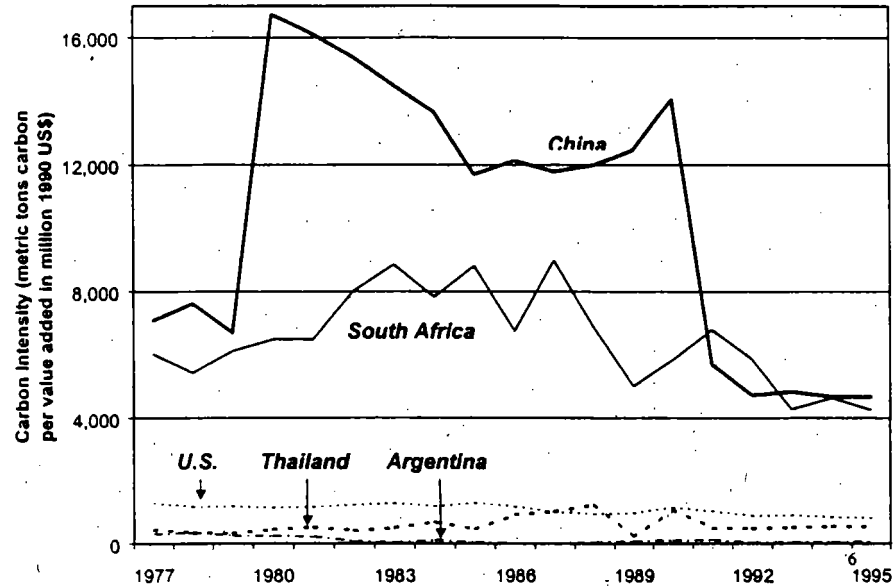
Carbon Efficiency for Fossil Only New Capacity Additions



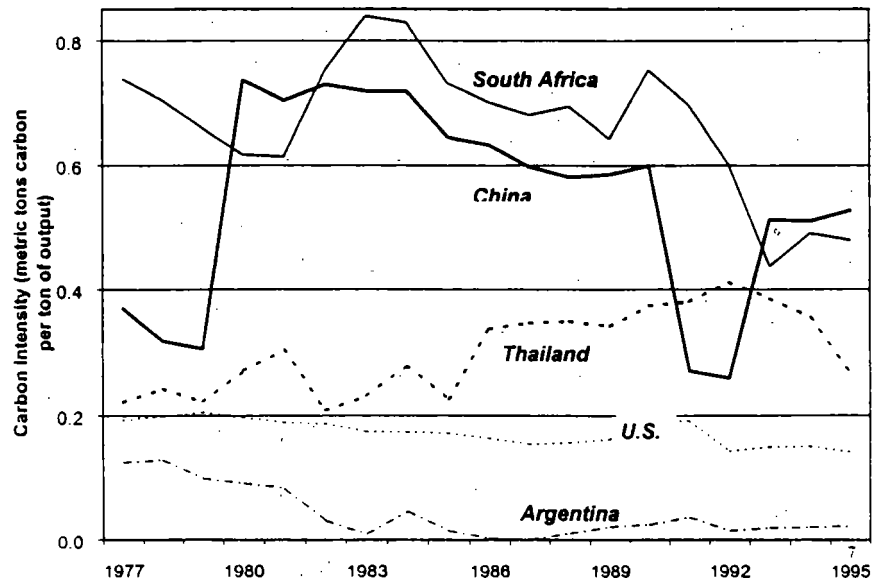
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Carbon Intensity by value added in the iron and steel industry for study countries, 1977-1995



Carbon Intensity by weight of output in the iron and steel industry for study countries, 1977-1995



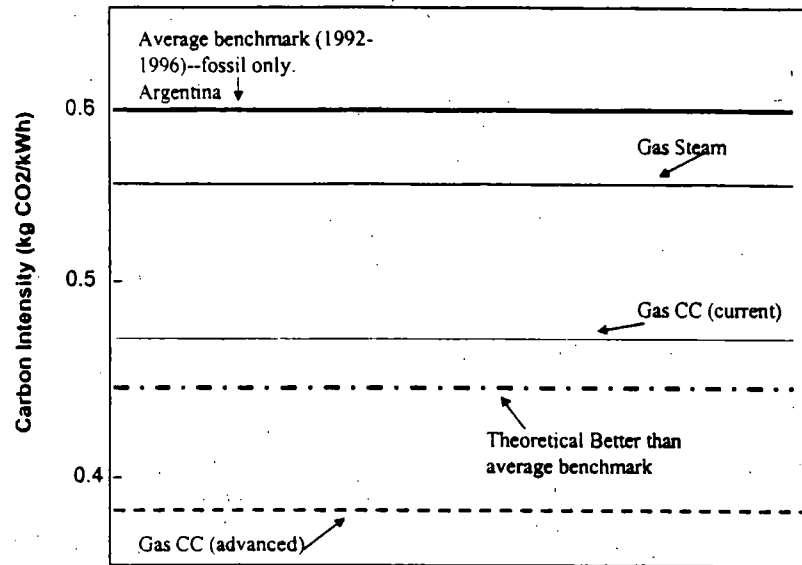
Carbon Intensity Comparison: All existing Capacity and New Capacity Additions

Country	Carbon intensity of all existing capacity (1995)	Carbon intensity of capacity additions (last 5 year period)	Difference
Argentina	0.33	0.19	-42 %
China	0.86	0.84	- 2 %
South Africa	0.83	0.99	+ 19 %
Thailand	0.61	0.56	- 8 %
United States	0.57	0.68	+19 %

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Benchmark Examples: Argentina



Argentina's 'fossil only' benchmark is an approximation based on graphical data.

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Better-than-average Benchmarks: Percentile Approach

U.S.

	share	Carbon Intensities (Kg CO ₂ /kWh)		
		Average	25th %ile	10th %ile
All Generators	100%	0.81	0.0	0.0
Coal, Steam	55.2%	0.95	0.84	0.80
Nuclear	22.5%	0.0	0.0	0.0
Hydro	10.0%	0.0	0.0	0.0
Gas, Steam	8.5%	0.62	0.60	0.60
Oil, Steam	1.8%	0.85	0.81	0.80
Gas, CC	1.2%	0.51	0.46	0.44
Gas, CT	0.4%	0.77	0.69	0.55

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Allowable credits/kWh Under Given Historical Averages

Technology	Carbon Intensity	Marginal Historical Averages (Kg or CO2 Credit/kWh)	
		Argentina (0.20)	S. Africa (0.99)
zero carbon electricity production technologies	0	0.20	0.99

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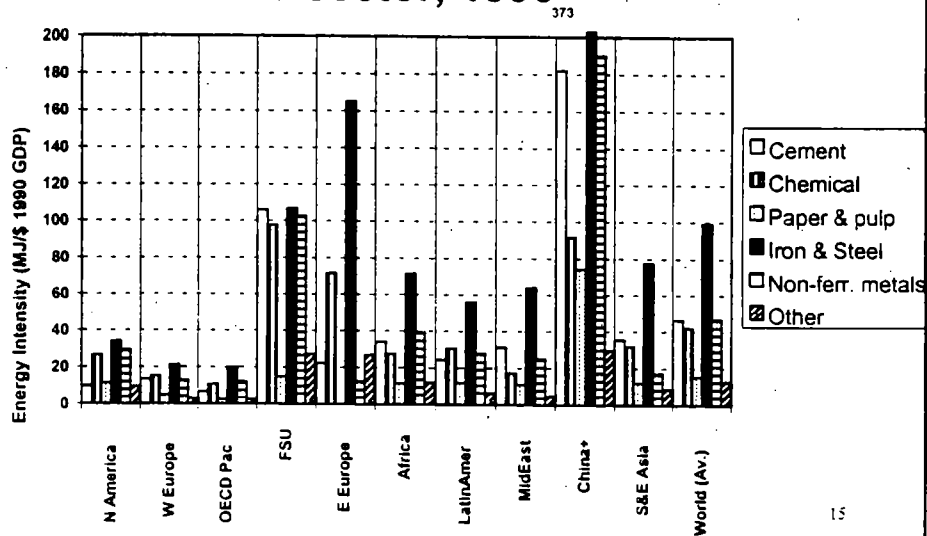
Demand Sector: Heterogeneity I

Total production & energy intensity of the Pulp & Paper industry in So. Africa

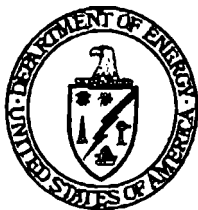
Product	production (tons)	steam (GJ/ton)	electricity (GJ/ton)	total (GJ/ton)
Tissue	114,000	20	17	37
Uncoated mechanical	61,000	19	10	29
Uncoated woodfree	238,000	19	9	28
Coated woodfree	53,000	24	11	35
Newsprint	320,000	8	8	16
Linerboard	550,000	12	8	20
Fluting	220,000	12	6	18
Paperboard	145,000	16	9	25
Other	108,000	19	9	28
Pulp exports	450,000	8	4	12

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Industrial Energy Intensity By Sub-sector, 1990



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**Department of Energy**

Washington, DC 20585

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February 9, 1999

TO: DISTRIBUTION

FROM: Mark Mazur

SUBJECT: CDM Papers for Wednesday, February 10 Meeting

Attached you will find a redraft of DOE's example paper that will be discussed at David Sandilow's meeting on Wednesday, February 10.



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Example of Step-by-step Process for CDM Power Plan Project in China

This paper provides an example of how a project would go forward under CDM using one benchmarking approach to calculate certified emissions reductions (CERs) generated from a project. We provide only the CDM-related issues as this is the only variable in a potential CDM project. Appendix I contains a list of issues that have been identified for further consideration. Appendix II contains an example of calculations to establish the range of baselines that might be chosen as benchmarks, which would then lead to different values for emissions additionality.

Step I: Company Develops Project

- Description of a potentially real Project:

A 800 megawatt IGCC coal-fired power plant is being planned in Shandong Province in China. It will be partially financed by a U.S. company, say Southern Company, and owned and operated by the Shandong International Power Company (SIPC), which is the local planning commission that plans to use the electricity generated from the project for Shandong's electric grid. Approval for the project must come from China's State Power Corporation (who oversees power plants and grids for China) and China's State Development Planning Commission (who approves projects in excess of \$30 million). Southern Company and SIPC expect that the carbon emissions from this plant per megawatt hour (MWh) will be lower than the carbon emissions associated with the approved benchmark for power-plant projects in China.

- Provide Calculations of Project's Projected Emissions:

The project developers (Southern Company and SIPC) estimate emissions based upon the plant design, expected operating parameters, and analysis of the carbon content of the intended fuel source to be 417 pounds (lbs) of carbon per MWh of output. The plant's life expectancy is 40 years. Given that the developers expect the plant to be baseload with a 90 percent availability factor, annual generation from the plant is projected to be:

$$800 \text{ MW} (8760 \text{ Hr/Yr}) (0.90) = 6.3 \text{ million MWh}$$

$$\text{Annual carbon emissions: } 417 \text{ lbs} \times 6.3 \text{ million MWh} = 2627 \text{ million lbs or } 1.1941 \text{ million metric tons of carbon (MMT) per year}$$

- Determine "Emissions Additionality"

The CERs generated from a project will vary considerably depending upon the exact specifications of the baseline used to determine the benchmark (i.e., average or better than average of last 5 units, last 5 years, coal-fired plants only, all plants in last 5 years). Thus, benchmarks could vary significantly depending on country/regional circumstances. See Appendix 2.

The project developers collect information from the China's State Power Corporation to estimate the range of possible benchmarks. Based upon Executive Board guidelines for power plants of this project's type and size range, the rate of emissions from all power plants built in the past 5 years will be used to establish baseline conditions.

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The appropriate benchmark would be 504 lbs of carbon per MWh of output. The expected number of CERs generated, therefore, would be:

$$[(504 \text{ lbs/MWh}) - (417 \text{ lbs/MWh})] \times 6.3 \text{ million MWh} = 548 \text{ million lbs or } 0.249 \text{ million tons of carbon per year.}$$

Assuming a market price of \$20/CER, the value of the expected CERs generated per year is estimated to be worth \$5.48 million.

- Southern Company negotiates with Shandong International Power Corporation to determine division of CERs. In this case, Shandong agrees to keep 25 percent of the CERs generated after 2 % is collected for "proceeds." Regal Power will keep 75 percent of the CERs generated after payment of "proceeds."

Step II: Submit to Host Government for Approval

- The project developers submit the project for approval to China's designated approving authority, the State Development Planning Commission (SDPC). The SCPC has established a set of guidelines that must be met before it grants its approval, including consideration of how this project meets China's sustainable needs and objectives.
- The Chinese Government approves the project. Such approval implies that the project is consistent with China's sustainable development needs and objectives.

Step III: Submit to Operational Entity for Registration:

- The project developers provide a letter from China's SDPC to the Operational Entity that indicates China's approval of the project. China's approval implies "voluntary participation by both Parties," a requirement of Article 12.5a of the Kyoto Protocol
- The project developers provide calculations from Step I to demonstrate that the project provides "real, measurable, and long-term benefits" and that the savings in emissions are "additional."

Step IV: Emissions Monitoring, and Reporting:

- The project developers use monitors to ascertain CO₂ flows from the project on a real-time basis, consistent with guidelines set forth by the COP/MOP.
- The project developers report on emissions and emissions saved annually to the Operational Entity based on the approved benchmark. For year Y, the project developers report that the plant actually operated at an 80 percent availability factor, and reported the following:

$$800 \text{ MW} (8760 \text{ Hr/Yr})(0.80) = 5.6 \text{ million MWh}$$

$$\text{Actual emissions: } 5.6 \text{ million MWh} \times 417 \text{ lbs} = 2335.2 \text{ million lbs or } 1.06 \text{ MMT}$$

$$\text{Saved emissions for year Y are:}$$

$$[(504 \text{ lbs/MWh}) - (417 \text{ lbs/MWh})] \times 5.6 \text{ million MWh} = 487.2 \text{ million lbs or } 22 \text{ MMT}$$

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Step V: Verification

- The project is subject to random, independent audit. Auditor X has been certified by the Executive Board to do random, third-party audits for Chinese CDM projects to verify information contained in annual reports. In this case, the project developers' Year Y report was audited by Auditor X, which verified the emissions generated and saved as reported by Southern Company and SIPC. Auditor X communicates its conclusions to the Operational Entity.

Step VI: Certification

- Operational Entity "checks" submitted report to ensure that the project developers have completed correctly the standard format approved by the Executive Board. An additional "check" for this project has occurred in the form of a random audit by Auditor X.
- Once the Operational Entity approves the report, thereby certifying the results, it transfers the CERs, minus the 2% deducted for "proceeds," to SIPC. SIPC, in meeting its contract with Southern Company, then transfers 75 percent of the remaining CERs to Southern Company.
- The Operational Entity reports all CERs to the Executive Board.
- Southern Company reports its CERs [$.75 \times .98 \times .22 \text{ MMT} = .16 \text{ MMT}$] to the U.S. National Registry for adjustment of its holding of CERs. Shandong International Power Corporation reports its CERs [$.25 \times .98 \times .22 \text{ MMT} = .05 \text{ MMT}$] to China's National Registry (assuming there is one).

Step VII: Appeal Process (if necessary):

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Appendix I

Issues that Arise for further consideration**Step I: Company Develops Project**

- Some of the benchmarking issues: Who determines benchmark? For historical information about Chinese power plants, who provides information? If Chinese government is charged with responsibility, what happens if it doesn't cooperate or work fast enough? How prove accuracy? Who is responsible for proving accuracy? Should historical information create a baseline for sector (i.e., electric power generation) or sub-sector (coal-fired electricity)? For industrial projects, level of aggregation will be even bigger problem? Should benchmarks be determined by province, country or region? What is process for case-by-case determination of a project's baseline?
- In determining additionality, should baseline calculations be based on the average or marginal plant?
- Regarding division of CERs, should this be between project developers in both countries, between U.S. partner and Chinese government, or should be left to host government to decide?
- Is calculation of proceeds for developers' use only or should it be required in submission to operational entity?

Step II: Submit to Host Government for Approval

- Is host government required to have CDM point of contact with decision-making authority?
- Should there be a deadline for host government approval process?

Step III: Submit to Operational Entity for Registration

- Who should provide proof of host government approval?
- What is the nature of verification? Is it pro-forma or is there an evaluation? Does operational entity do verification or authorize third party verification? Or are project developers required to submit verification plan?
- Should there be a requirement for a submission on other environmental implications, such as transboundary effects?
- Regarding "voluntary participation approved by each Party involved" (section 12.5a of KP), how is this proved? Is host government certification enough or must each government provide such a certification (this could involve more than 2 if a multinational company wanted to divide CERs among more than one Annex B Party)? Does this language imply that only Parties to the Kyoto Protocol can engage in CDM projects? [Need State/Legal to evaluate]

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Step IV: Emissions Monitoring and Reporting.

- Must every CER be entered into a national registry (to ensure double entry accounting and verification) or could developers sell CERs without notifying national authority? Who reports CERs to national registry?

Step V: Verification

- Does verification occur before or after certification?
- Which independent entities will be allowed verify emissions reductions?
- Will each project be subject to a verification process, or will projects be verified selectively?

Step VI: Certification

- Is certification of CERs by operational entities automatic (unless an audit determines inappropriate calculation) or should an affirmative decision to certify be required by the operational entity each year? Should the IRS random audit model be used?
- Does operational entity have a formal auditing process? If so, does Executive Board write the rules for this or does the COP/MOP? If there is an auditing process, who does audits? Third-Parties or Operating Entity?
- Should Operational Entity report CERs to Executive Board or the UNFCCC to allow third parties to verify that CERs were indeed certified?

Step VII: Appeal Process (if necessary):

- What type of audit can overturn certification of CERs?
- Should there be a review process established that allows Executive Board to overturn CERs?
- What type of appeal process should be established?
- Would a project developer or its government represent its interests in an appeal?
- If appeal process imposed, should there be a deadline for resolution of appeal?
- Is revocation of CERs the worst consequence? Is Executive Board the final authority?

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Appendix II

Hypothetical Alternatives for Calculating CERs Using Benchmarks

[note: numbers in calculations are hypothetical because detailed information was not available]

Historical information used to develop benchmark

- Hypothetical average and marginal emissions per unit of output:
 From coal-fired facilities of 200 MW built [commissioned] in the last five years: 660 lbs/MWh
 From the last ten coal-fired facilities of 200 MW or more: 620 lbs/MWh
 From all coal-fired facilities in the past year: 620 lbs/MWh
 From the last five coal-fired facilities of 200 MW or more: 600 lbs/MWh.
 From all units (coal, nuclear, oil, gas-fired, hydro, wind) of 200 MW or more built in the last five years: 504 lbs/MWh [*Benchmark used in example*]
 From last (marginal) coal-fired unit built: 417 lbs/MWh

Range of "Emissions Saved" (or CERs generated) based on benchmark chosen [based on above values]

Based upon coal-fired units built (commissioned) during last five years:
 $(660 \text{ lbs/MWh}) - (417 \text{ lbs/MWh}) \times 6.3 \text{ million MWh} = 1531 \text{ million lbs or } .70 \text{ MMT}$
 or ~~70,000~~ ^{100,000} CERs

Based upon last ten coal-fired units:
 $(620 \text{ lbs/MWh}) - (417 \text{ lbs/MWh}) \times 6.3 \text{ million MWh} = 1279 \text{ million lbs or } .58 \text{ MMT}$
 or 580,000 CERs

Based upon all coal-fired units built during past year:
 $(620 \text{ lbs/MWh}) - (417 \text{ lbs/MWh}) \times 6.3 \text{ million MWh} = 1279 \text{ million lbs or } .58 \text{ MMT}$
 or 580,000 CERs

Based upon last five coal-fired units:
 $(600 \text{ lbs/MWh}) - (417 \text{ lbs/MWh}) \times 6.3 \text{ million MWh} = 1153 \text{ million lbs or } .52 \text{ MMT}$
 or 520,000 CERs

Based upon all units (including nuclear, gas, oil, etc.) built during last five years:
 $(504 \text{ lbs/MWh}) - (417 \text{ lbs/MWh}) \times 6.3 \text{ million MWh} = 548 \text{ million lbs or } .25 \text{ MMT}$
 or 250,000 CERs [*Benchmark used in example*]

Based upon last coal-fired unit built:
 $(417 \text{ lbs/MWh}) - (417 \text{ lbs/MWh}) \times 6.3 \text{ million MWh} = 0 \text{ lbs or } 0 \text{ MMT}$

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COMMENTS:

Attached is a copy of the paper on benchmarks for next Wednesday's meeting on CDM. This paper is an attachment to the paper that was previously faxed to you, *CDM Design and Operations Recommendations*.

David

cc. JAF
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Draft: Do not Cite or Quote**ATTACHMENT:
Issues Associated with Creating Effective Benchmarks for the CDM
February 10, 1999*****Background***

Project-level greenhouse gas (GHG) emissions reductions have historically been evaluated using project-by-project baselines. Under this approach, the project developer evaluates what would have happened without the project and then estimates resulting emissions from this project. The difference between these two numbers is the net GHG reductions or removal from the project. Experience with US LJ has indicated that this process is extremely time intensive and can be quite subjective. It is difficult to estimate what would have happened in the absence of the project and assumptions made can be manipulated by the parties involved. Establishing a more straightforward method to determining additionality would lower transaction costs and streamline the crediting process.

Benchmark Concept:

Benchmarks can be used to determine certified emission reductions resulting from projects within the Clean Development Mechanism (CDM). The purpose of benchmarks, rather than project specific counter-factual baselines is to lower transaction costs and reduce subjectivity. Any project that is more efficient than the benchmark will be considered additional. Certified emission reductions (CERs) can be determined based on the difference between the benchmark and the project performance.

Benchmark Development:

Once guidelines are established, developing the benchmark could be quite straightforward. Agreeing upon the guidelines, however, may be a difficult process. There are few clear answers and most decisions will entail a trade-off between competing goals. EPA has evaluated the options theoretically and by using real data for selected developing countries. This analysis can help frame the trade-offs and the implications of different choices. Additional analysis is needed to choose the appropriate method that will help the U.S. meet its environmental and economic priorities within the CDM.

The main characteristics of an effective CDM benchmark will be:

- High Environmental Integrity. A benchmark will have high environmental integrity if it allows minimal non-additional credits.
- Low Transaction Costs. Creating a benchmark will incur some costs that can be added to the overall transaction costs of the CDM. The fewer permutations needed, the lower the cost of the benchmark system. In the following graphs, 'high' means that the option ranks well for low transaction costs (i.e., has relatively low transaction costs).
- High Participation. High participation in CDM will allow more tradeable credits and therefore reduce the overall cost of compliance with the Kyoto protocol.
- High Investor Certainty. Theoretically, CDM credits will provide incentives to reduce emissions. Prior to making an investment, the investor will want to increase his or her certainty of the amount of credits that will eventually be awarded.
- Incorporates New Technologies and Trends. New technologies and trends may change our estimate of what would have occurred in the absence of CDM credits.

The following paper outlines some of the choices and the associated trade-offs among the above goals.

Draft: Do not Cite or Quote**Issues and Trade-offs****Global versus Regional Benchmark**

More regionally-specific benchmarks may lead to higher accuracy, but also higher transaction costs. Resources and situations vary by country and thus one benchmark may not fit all countries. Equity issues between countries may also be a consideration.

Choices:

- *Global benchmarks:* Lower transaction costs and perhaps the appearance of greater equity among countries. Lower accuracy of benchmark for most countries.
- *Regional/national/local benchmarks:* higher transaction costs, but higher accuracy. May appear inequitable for some sectors.
- *Vary by sector:* Adjust the regional specificity according to the individual sector's situation. Regional disaggregation should be balanced between the transaction costs and the level of accuracy. (Equity?)

	Global Benchmarks	Country-specific Benchmarks
Environmental Integrity	Low	High
High Participation	No Impact	No Impact
Low cost to create benchmark	High	Low
Investor Certainty	No Impact	No Impact
Incorporating New Technologies or Trends	No Impact	No Impact

Average versus better-than-average benchmark

A historical 'average' benchmark would allow any project that has better than average carbon intensity to qualify for CDM credits. By definition, this would allow half of the existing production in any given sector to qualify as additional. A better-than-average benchmark risks being so stringent that few projects can qualify.

Choices:

- *Average:* A benchmark based on an average of the activity data, by definition, will credit half of the capacity within that sector without any changes in behavior. This choice is likely to allow a significant amount of non-additional credits to be awarded.
- *Better-than-average:* A better-than-average benchmark sets a higher standard and limits the amount of non-additional credits that are awarded. It does run the risk of not allowing some valid reductions from being credited. Better-than-average choices include:
 - Top 25 percentile of new or existing capacity.
 - Top 10 percentile of new or existing capacity.
 - Most efficient new capacity addition
 - Best Available Technology/Practice (the most carbon efficient alternative available to that situation regardless of price)

The magnitude of trade-offs between these choices will depend on how each sector is aggregated. For example, in the United States electricity sector, if all types of generation are included, the lowest 25th percentile of GHG emissions is zero. On the other hand, if you use a fossil-only benchmark, veering into lower percentiles is likely to yield a more appropriate benchmark.

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	Average	Better-than-average
Environmental Integrity	Low	High
High Participation	High	Low
Low cost to create benchmark	No Impact	No Impact
Investor Certainty	No Impact	No Impact
Incorporating New Technologies or Trends	No Impact	No Impact

Updating the benchmark.

The benchmark established for any given year will apply to any project that qualifies for the CDM in that year. Updated benchmarks for future projects, however, will be needed to account for new trends and technologies. The intervals in which benchmarks are updated will depend largely on the level of effort needed to create the benchmarks. If the cost is high, then the intervals between updates will be longer. It is possible to tighten the benchmarks using an automatic deflator to account for technology improvements. Although trends in developing countries have not suggested that efficiencies historically improve over time, decreasing the benchmark between updates could create the correct incentive for efficiency improvements.

Choices:

- *Frequent Updates* (every year). High transaction costs, fewer non-additional credits.
- *Infrequent Updates* (every 10 years). Low transaction costs, more non-additional credits. (Note: benchmarks could be established at longer intervals, with estimated slopes between updates).

	Infrequent updates	Frequent Updates
Environmental Integrity	Low	High
High Participation	No Impact	No Impact
Low cost to create benchmark	High	Low
Investor Certainty	High	Low
Incorporating New Technologies or Trends	Low	High

Note: Incorporating New Technologies is ranked low for frequent updates because projects may take a while before they begin operation. Longer periods between updates may allow a project to apply under the benchmark that exists during the initial stages of project development (prior to benchmark lock-in)

Length of Time that A Given Benchmark Applies to a Project

Benchmarks will be revised periodically. The benchmark will apply to the project for a given amount of time. The length of time that a project is measured against its initial benchmark will affect the level of investor certainty about how many credits the project may yield.

Choices:

- *Full lifetime of a project:* Allowing benchmarks to apply to the lifetime of the project may continue to credit obsolete equipment that should be retired.

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- *Benchmark applies to estimated capital recovery of project.* This would provide the incentive to upgrade technologies once the investment is paid off, however, it is unlikely that the promise of new credits will prompt capital turnover prior to some profit yield.
- *Benchmark applies to estimated lifetime of project.* Each project and technology has an estimated lifetime. The estimated lifetime could be determined at the pre-certification phase.
- *Until New Update:* Applying each new update to a given project lowers the investor certainty of the number of credits.

	Actual Lifetime of Project	Until New Update
Environmental Integrity	Low	High
High Participation	High	Low
Low cost to create benchmark	No Impact	No Impact
Investor Certainty	High	Low
Incorporating New Technologies or Trends	Low	High

Level of Sectoral Disaggregation

Benchmarks could be created at various levels of aggregation for a given sector. Disaggregation leads to more precision, but at a greater transaction cost. The level of aggregation will vary among sectors, however, there is often too much dispersion within individual sectors to aggregate across an entire sector. For example, electricity generation in China is mostly coal and hydro. A fully aggregated benchmark would incorporate all the hydro (~25% of new capacity from 1992-1996), and therefore be below any possible efficiencies for coal-based production. In this case, two benchmarks may need to be developed in order to appropriately reflect efficiencies for both coal and hydro within the electricity power generation sector.

Choices:

- *Aggregate:* Lowers transaction costs, but most sectors have distinct sub-sectors or activities that vary significantly in carbon intensity/benefit.
- *Disaggregate:* Increases transaction costs since more benchmarks need to be made. However, the accuracy improves since aggregate sectors often subsume sub-sectors with distinct markets and carbon reduction opportunities.
- *Level of aggregation varies by sector.* Adjust the sectoral aggregation according to the individual sector's situation. Sectoral disaggregation should be balanced between the transaction costs and the level of accuracy.

	Aggregate	Disaggregate
Environmental Integrity	Low	High
High Participation	Undetermined	Undetermined
Low cost to create benchmark	No Impact	No Impact
Investor Certainty	High	Low
Incorporating New Technologies or Trends	Low	High

Draft: Do not Cite or Quote**Data Used: Total Past Emissions/Trends or New Capacity/Trends.**

Some countries' emissions/sequestration within a sector have remained consistent over time, however new capacity in other countries is completely different than past trends. For example, historically, Argentina's electricity generation was largely oil based. However, recent trends are toward natural gas and large-scale hydro. The choice entails a trade-off between incorporating new technologies/trends and using a large enough sample to minimize the effect of unrepresentative years.

Choices:

- *Total existing capacity/trends:* Total existing capacity is the capacity that is in operation at any given time. In many sectors, equipment lasts for 30 years or more. Therefore, equipment choices 30 years ago would influence the benchmark. In the forestry sector, relevant data would focus on harvesting, growth, and conservation trends.
- *Rolling average of selected years (3 year, 5 year, 10 year).* This option would reduce the impact of old, outdated technologies, while still accounting for unrepresentative years. As you increase the years, you lower the impact of any one given year, but also increase the effect of older technologies. The effect of each option will vary by sector and region.
- *Last year of available data.* While capturing the most recent potential technologies, using only one year could risk allowing a benchmark to be set on a year that is not representative of the current trends.

	Total Existing Capacity	Last Year of Available Data
Environmental Integrity	Undetermined	Undetermined
High Participation	Undetermined	Undetermined
Low cost to create benchmark	No Impact	No Impact
Investor Certainty	No Impact	No Impact
Incorporating New Technologies or Trends	No Impact	No Impact

Sectors Conducive to Benchmarks

Sectors that are most conducive to benchmarks have a homogenous output, quantifiable reductions, and available data. It is also important that these sectors attract enough CDM projects to warrant the cost of creating a benchmark. Electricity, some industrial demand sectors, energy supply (e.g., natural gas pipelines or coal mining methane recapture), energy consuming equipment may qualify for benchmarks. Land use change and forestry are sectors that need further investigation.

- Electricity sector
- Industrial sectors
- Forestry
- Coal bed methane
- Energy consuming equipment

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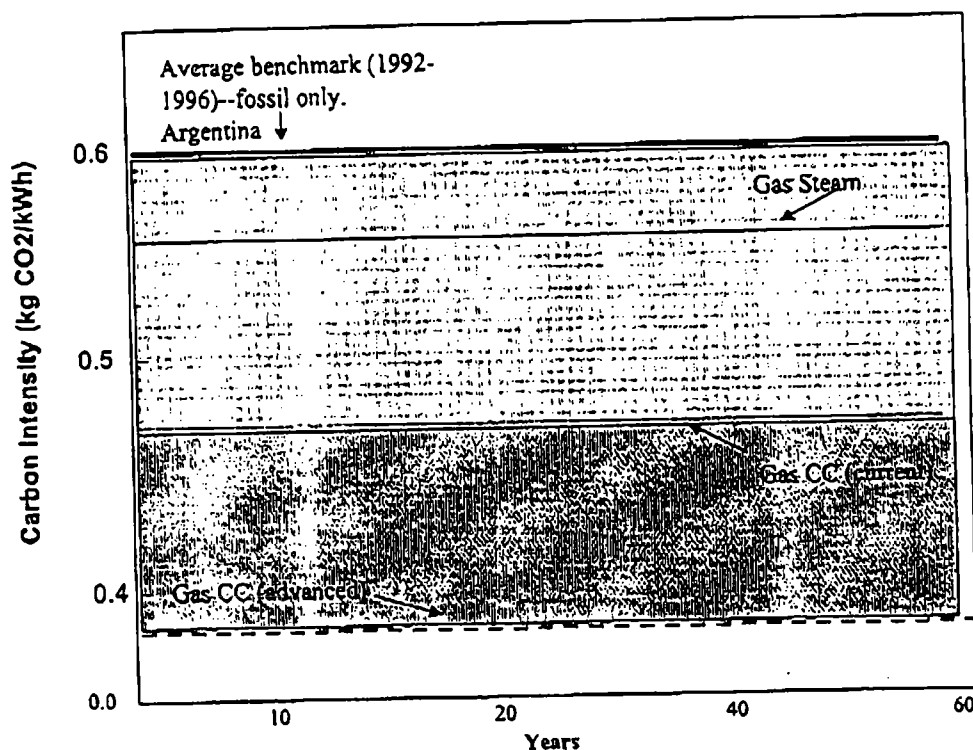
EXAMPLES

The following are two examples of benchmarks in the electricity sector and a brief discussion of the related trade-offs.

Benchmark #1:

- By country (example: Argentina)
- Average of last 5 years of capacity additions
- For fossil only
- Updated every 10 years
- Benchmark lasts for the lifetime of the project

Benchmark Example #1: Argentina



In this example, the number of credits allowed for a current technology combined cycle are illustrated by the checked box. Argentina's new capacity is likely to be gas combined cycle regardless of CDM. This would mean that most of the awarded credits for this project are not really additional. Using a fossil only benchmark increases the overall benchmark above many new natural gas technologies since Argentina's historic mix for the 5 year period includes oil. Also, allowing the credits to be awarded for the lifetime of the project exacerbates the number of non-additional credits. If capital recovery occurs at 20 years, then these credits may be sustaining an inefficient plant (in comparison to modern technologies) for an additional 30 - 40 years.

The darker box illustrates the additional credits that may be gained by moving from a typical natural gas combined cycle to an advanced model. A combined cycle natural gas plant would accrue the additional credits, plus all the non-additional credits in the above box. Although some of these credits are additional for the time the capacity was built, the plant may not be carbon efficient compared to future electricity generation options. Extending the life of the benchmark to the full life of the plant may help keep an obsolete plant in operation.

Since this benchmark is fossil only, large-scale hydro and nuclear don't apply and therefore the amount of

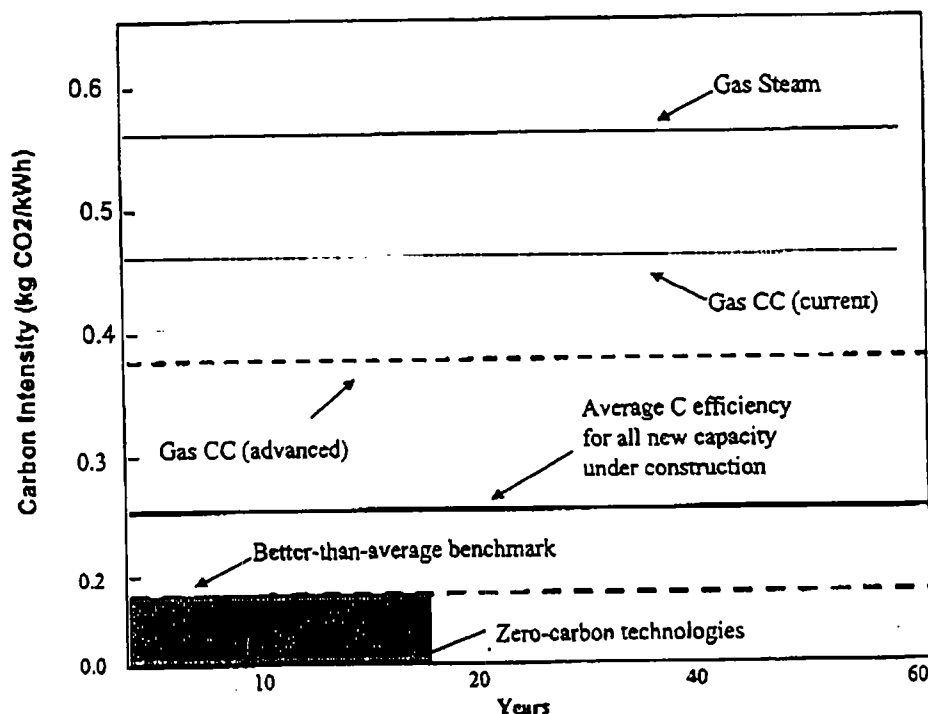
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non-additional credits is limited to the upper box.

If the benchmark is updated every 10 years, then the number of non-additional credits will continue to flood the market. While additional credits lower the overall cost of compliance for Annex B countries, they also lower the environmental effectiveness of the Kyoto Protocol.

Benchmark #2:

- By country (example: Argentina)
- Better than average of new capacity additions under construction
- For all generation (all types of fossil, all zero-carbon)
- Updated every year
- Benchmark lasts until capital recovery

Benchmark Example #2: Argentina

Benchmark #2 is so environmentally stringent that even the most advanced and carbon efficient fossil technology does not get credit. Under this benchmark, only zero-carbon technologies are credited. It is unclear whether these technologies are additional or not since Argentina already has significant portions of hydro and nuclear. In this case, even if the benchmark is set at the average carbon efficiency for all new capacity under construction, it would still be lower than most carbon-efficient fossil technology. In this case, the driving factor is the mix of zero-carbon technologies in an average electricity benchmark.

The benchmark is updated every year which will increase the cost of creating a benchmark to which very few projects will qualify.

Since the benchmark for each project is only applicable until the point of capital recovery, any non-additional emissions from hydro or nuclear will be limited.

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COMMENTS:

Attached is a copy of the draft *CDM Design and Operation Recommendations Paper* for next Wednesday's meeting. The paper on benchmarks will follow under separate fax cover.

David

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Clean Development Mechanism Design and Operation Recommendations Paper

The “flexibility mechanisms” included in the Kyoto Protocol (international emissions trading, the Clean Development Mechanism, and Joint Implementation) are key to meeting the emissions targets in the Protocol at a modest cost. The Clean Development Mechanism (CDM) offers the opportunity to generate greenhouse gas emissions credit beginning in the year 2000, adding to the global stock of emissions credits required by developed countries to meet their targets under the Kyoto Protocol. This paper is intended to help policymakers decide on key issues involved in devising rules for an operational CDM.

A major difference between the CDM and emissions trading is the motivations of agents involved in the transaction. Participants in an emissions trading transaction have opposing motivations – one wishes to purchase tons and one wishes to sell; in entering into this transaction, each will provide a check on the other. In a CDM transaction, however, both parties involved in the project may have a similar motivation to overstate the Certified Emission Reductions (CERs) generated from a project. Thus, in determining the framework for the CDM, it is important to strike a balance between the pursuit of a sufficient number of cost-effective projects and procedures that result in protection of the environment. We need to make policy choices somewhere on this spectrum of distinct objectives. Identifying this position will also help inform the discussion about the extent to which the U.S. should lead internationally on CDM issues versus allowing the agenda to be developed primarily by other Parties.

The following sections outline key CDM design and operation issues by topic area. The policy recommendations stress the core objectives of establishing the CDM on a timely basis; achieving real and verifiable GHG reductions; maintaining low transaction costs; and engaging developing countries.

1. Institutional Structures

The institutional structure of the CDM should support sustainable development in non-Annex 1 countries and provide a means for industrialized countries to reduce the costs of meeting their targets under the Kyoto Protocol. The recommendations below provide specific guidance on key institutional aspects of the CDM.

(1a) Executive Board Structure – The U.S. favors a relatively small Executive Board (e.g., 12-14 members); the UNFCCC should provide administrative support for the Board.

The Executive Committee of the Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol may serve as an example. In this case, the Executive Board should be comprised of seven members each from Annex I and non-Annex I Parties, each member serving two-year terms with the ability to serve consecutive terms. The chair and vice-chair of the Board alternate each year between the two groups. Nomination of Annex I members is limited to Annex I Parties; nomination of non-Annex I members is limited to non-Annex I Parties. Decisions are made by consensus of the Board.

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(1b) Executive Board Functions – The U.S. position is that the Conference of Parties would set overall guidance for the CDM; the Executive Board should implement this guidance and elaborate on methodological, operational and technical issues.

As mandated by the Kyoto Protocol, the Executive Board supervises the CDM and implements guidance provided by the Conference of Parties through the Subsidiary Bodies to ensure transparency, efficiency and accountability. In some cases, the Executive Board may rely on outside experts or technical panels to develop methodological or technical guidance. Decisions of the Executive Board should represent the interests of both developed and developing countries.

(1c) Operational Entity Selection – The U.S. supports a decentralized network of specialized private sector or non-profit institutions to serve as operational entities.

Standardized criteria should be used by the entities for evaluating all projects and certifying CERs. Operational entities will be selected to ensure broad coverage of all regions and qualified to ensure that CERs are credible. Strict measures should be taken to avoid conflict of interest among participating institutions. These guidelines should clearly restrict any operational entity from involvement in CDM project development, promotion, financing or implementation.

(1d) Operational Entity Functions – Operational entities should be responsible for registration of projects and the certification of emission reductions in accordance with standard and transparent methodologies to evaluate and certify projects.

The Executive Board should develop these guidelines and ensure that they are followed through periodic evaluation of operational entities.

2. Transparency and Review

The central challenge within the CDM is to ensure the environmental integrity of the mechanism without creating an overly burdensome and costly structure. U.S. policy should support clear guidelines for ensuring transparency and review of transactions under the CDM that will help to achieve both of these objectives.

(2a) Transparency and Accountability – The U.S. supports clear and standardized rules/guidelines for all elements and institutions operating within the CDM.

Consistent rules/guidelines will promote equitable treatment of participants.

(2b) Third Party Verification – The U.S. supports third-party verification as a key element under the CDM.

The Executive Board should provide guidance to determine what institutions may request third-party verification, how verification is undertaken, and identify repercussions for project developers, hosts and operational entities if CERs are found invalid through the verification process. A time limitation for both requesting audits and appealing decisions as well as an efficient and equitable system for appealing decisions should be established.

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The most desirable form of this verification still needs to be worked out. Options will be identified in an interagency process with recommendations forwarded by late March 1999.

(2c) Project compliance under the CDM – The U.S. supports the development of a transparent and standardized set of rules and guidelines to ensure project compliance under the CDM.

These requirements should include rules/guidelines for: the registration of projects and accrual of CERs; the oversight of activities of operational entities; and the consequences for violations by Parties or private entities participating in the CDM.

(2d) Compliance by Parties – The U.S. may want to seek parallel consequences for similar violations under any of the flexibility mechanisms, including CDM.

Consequences beyond restriction/suspension of the right to participate in a flexibility mechanism have not been resolved in the negotiations. Options will be identified in an interagency process with recommendations forwarded by late March 1999.

3. Operational Issues

The U.S. seeks the resolution of many operational issues related to the CDM by COP5. The following are policy recommendations on key operational issues.

(3a) Project Registration – The U.S. supports a project registration phase prior to project development.

Projects should register with an authorized operational entity to confirm that the project is voluntary, meets sustainability goals of the host country, and that emission reductions are additional. Project registration should identify the baseline or benchmark to be used for the ex-post calculation of credits. Actual emissions reductions would be certified by operational entities only after they occur (e.g., after the end of the year, project performance will be compared to the baseline and emissions reductions calculated accordingly). This step removes most elements of uncertainty for the investor other than actual project performance.

(3b) Comprehensive Inclusion – The U.S. supports comprehensive inclusion of project categories (reduction and sequestration) and all gases, unless one or more is shown to be ineligible (e.g., because of high potential for leakage from individual projects).

All categories should be eligible from the start of the CDM using project-by-project baselines, but benchmarks may be applied to sectors at different stages in the development of the mechanism. Although the U.S. has supported the inclusion of sinks as allowable CDM projects (a controversial position in the international negotiations), a final position on this issue should work in parallel with IPCC technical discussions on developing sound methodologies for assessing sinks.

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(3c) Eligibility Requirements – The U.S. does not support additional CDM eligibility requirements of non-Annex I Parties other than the existing requirement of a first National Communication to participate in the CDM.

(3d) Sustainable Development Criteria – The U.S. does not support standardized methodologies to determine sustainable development criteria for projects.

Determination of sustainable development should be the sole responsibility of the host country of a project activity. It may be prudent not to explicitly state a position on this issue since it may serve as a point of leverage in negotiations with developing countries.

(3e) Transaction Relationships – All transactional relationships should be allowed under the CDM (e.g. bilateral, multilateral, or national governments).

Both public and private institutions should be able to participate in project development or CER transactions. Non-Annex I Parties and private entities should be able to generate CERs without an Annex I partner.

(3f) Definition of “part of” under the CDM – The U.S. does not support limiting the amount of CDM credits that can be used to meet Annex B targets.

“Part of” should mean anything less than 100% of the abatement required to achieve compliance with Parties’ quantified emission limitation and reduction commitments under the Protocol.

(3g) Prompt-start for CDM – The U.S. favors a prompt-start for the CDM.

Complete methodologies need not be established for all sectors before the CDM can become operational. The CDM may initially move forward in sectors with greenhouse gas quantification experience, while other sectors may not have established benchmarks, baselines, or methodologies for calculating reductions. Methodological or technical problems in any single project category should not restrain other project categories from CDM activity. In addition, the U.S. should seek opportunities to promote capacity building in those countries interested in hosting projects.

(3h) AIJ and the CDM – AIJ projects should be eligible for inclusion under the CDM, however, they must meet all established CDM criteria.

4. Equity Concerns

As a market-based mechanism, the CDM will provide low-cost opportunities for GHG reductions while simultaneously promoting the flow of private capital toward GHG reduction projects in less developed nations. Because the vast majority of financing for CDM projects will be from the private sector, the market will largely determine the distribution of projects. At the same time, some developing countries are concerned that the majority of projects will be developed only in countries where investment is already going, or where abatement costs are very low. In order to address this equity concern, the structure of the CDM should ensure broad participation of developing countries without market distortions.

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(4a) Measures to Ensure Broad Participation – The U.S. supports non-market-distorting measures to ensure broad inclusion of CDM projects in a wide range of host countries.

Several non-market distorting policy measures could be used to achieve this objective. These measures include: a CDM clearinghouse function to match hosts with potential investors; the inclusion of a comprehensive range of project types in the CDM; and the provision of U.S. financial and technical assistance to support capacity building in countries interested in hosting projects.

(4b) Measures to Assist Financing – The U.S. supports project bundling for smaller countries or the creation of CDM “mutual funds” led by private sector institutions to provide opportunities to facilitate financing of projects in countries where they may otherwise not occur.

(4c) Projects Initiated by Developing Countries – The U.S. believes that non-Annex I countries may unilaterally develop CDM projects in their country or in another non-Annex I country.

Standardized registration criteria as well as monitoring, verification and certification protocols should be used for assessing these projects. Unilaterally generated projects would be subject to the CDM administrative and adaptation fees just like projects bilaterally.

(4d) Other Incentives -- The U.S. does not support using other financial incentives to ensure regional dispersion of CDM projects such as quotas, differentiated baselines, CER bonuses, and valuing CERs from select countries at a higher rate.

These incentives may raise costs, promote activities where abatement costs are not low, and distort the market functioning of the CDM.

(4e) Use of ODA and/or Public Funds – The U.S. does not support the use of Official Development Assistance (ODA) for the purchase of CERs, directly or indirectly through a “laundering” process under the CDM.

ODA or other public funds may play a role in supporting capacity development or technical assistance that supports host countries in participating in the CDM. This issue is particularly important since Japan strongly supports the use of ODA for developing CDM projects, while the EU opposes its use. Developing countries are also particularly sensitive about reprogramming limited ODA away from traditional uses.

The context and circumstances under which these funds are used will be identified with interagency recommendations by the beginning of March 1999. In addition, the Japanese will be engaged bilaterally to assess their thinking on this matter.

(4f) Earning CERs through Policies or Measures – The U.S. has not yet developed a position on the inclusion of government policies in the CDM.

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Two options exist: (1) CERs are earned only through project level reductions and not through policies or measures. Policies and measures can be difficult to monitor and verify, allow leakage and gaming, and create disincentives for countries to take on a target; (2) allow CERs to be earned under policies and measures but with specific parameters for assessing and crediting reductions. This option would provide more opportunities for developing countries to participate in the CDM.

An interagency group will analyze this issue and report back by the end of March 1999.

5. Division of CERs and Share of Proceeds

As a commodity with market value, CERs may be sold or banked for future use by both Annex I and non-Annex I Parties. The U.S. does not support pre-determined rules on how credits should be divided between involved parties. After a percentage of CERs is taken to cover CDM administrative costs and the fund for adaptation, the remainder shall be apportioned between the project host and developer based on private contractual arrangements. Operational entities will be responsible for the certification of these credits and will report total CERs issued for each project to the Executive Board.

(5a) Unit of Measure for Certified Emission Reductions – CERs shall be measured in tonnes of carbon dioxide equivalent and be calculated using the appropriate GWP for all gases included in Annex A of the Kyoto Protocol. CERs should be fungible with other tradable units at their full value. CERs should be serialized to some degree for identification and tracking, depending on how CERs are brought into the market and whether CERs can be “de-certified.”

(5b) Share of Proceeds – The U.S. position is that between 1-3 percent share of CERs generated by project activities should be allocated for administrative costs of the Executive Board and toward the adaptation fund to support activities in the most vulnerable countries

The majority of this share should go towards the adaptation fund since administrative costs of the Executive Board are expected to be low. A sliding scale, depending on project size, may also be considered for determining the CER share charged to projects.

(5c) Use of Adaptation Funds – Adaptation funds should only be used to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change.

The Executive Board should develop an objective process for the selection of particularly vulnerable countries based on standardized criteria. The disbursement of these adaptation funds should be conducted through appropriate international institutions.

(5d) Role of Private Entity – The CER share awarded to the investor and the host should be determined by private contract between participants. These CERs shall be the property of each private party and may be held for future use, traded, or sold.

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6. Baselines and Benchmarking

In general, the U.S. supports standardized methodologies for generating emissions baselines to determine CERs under the CDM. Top-down baselines (e.g., benchmark, performance standard, whole-sector, technology standard) should be considered. For sectors where top-down baselines are not possible or have not yet been constructed, project specific baselines should be used. Project baselines will be established during the registration of the project. This baseline should be fixed for the lifetime of the project.

(6a) Choosing a Baseline or Benchmark – The U.S. supports flexibility to project developers for bottom-up baseline development. However, if an appropriate top-down baseline has been established, a project developer/host should be required to use that baseline for their calculations.

(6b) Additionality – The U.S. believes that only emissions additionality should be assessed in the CDM.

Programmatic and financial additionality should not be assessed for projects relying on private capital. Experience with USJI has shown both of these categories of additionality to be subjective, and too complicated to determine.

(6c) Other Technical Elements – While there is strong agreement on the desirability of baselines and benchmarks, other technical elements of baselines are currently being addressed in an inter-agency process. The interagency technical group will make recommendations by May 1999 in advance of the June SBSTA/SBI sessions. The USG should have a position on key issues by COP5 so that top-down baselines can begin to be developed by January 2000. The interagency group will address issues such:

- **Level of Aggregation** - Project-specific methodologies and top-down baselines should be set at the highest level of aggregation that still provides reasonable accuracy. In this context, greater definition of “sector” and “sub-sector” is needed as well as identification of sectors where country, regional or global baselines are most appropriate and/or feasible.
- **Period for Earning CERs** - The time frame for accruing CERs against the initial baseline will vary depending on project type. Timeframe options being considered include criteria based on: capital lifetime (estimated or actual); budget periods within the protocol; average time for capital recovery; and other factors.
- **Choice of Data** (applies to top-down only) - Top-down baselines should be based on historic data. This data could be for projected installed capacity during the last year, all existing capacity, or a rolling average of selected years.
- **Updates** (applies to top-down only) - Top-down baselines will need to be updated periodically to incorporate new trends and technologies (applied to new projects only). The appropriate update cycle will depend on the cost of benchmark construction and the expected rates of change in a given sector.

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- **Average versus Better-than-average** (applies to top-down only) - Better-than-average benchmarks provide more assurance that emission reductions/sequestration are truly additional, while average benchmarks would include more projects. A balance must be sought based on U.S. government objective for the CDM.
- **Who Establishes Baselines?** - Project-specific baselines should be developed by the project developer and approved by an operational entity. Top-down baselines should be developed with cooperation from, but not solely by, the host country. Other involved parties could be: the Executive Board; a body designated by the Executive Board; or operational entities.

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FRANK LOY
DAVID SANDALOW
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MEMORANDUM TO DISTRIBUTION

FROM: David Gardiner

SUBJECT: CDM Papers

DATE: January 11, 1999

Attached are two papers on 1) CDM Design and Operation Policy Issues and 2) whole sector CDM. David Sandalow requested that I circulate these papers in advance of the White House Climate Change meeting that is scheduled for Wednesday, January 13, 1999.

Please note that the whole sector CDM paper is the product of a joint effort between EPA's Office of Policy and DOE's Office of Policy and International Affairs.

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CDM Design and Operation Policy Issues
Initial Draft
January 12, 1998

General

- What is the scope of the Clean Development Mechanism?
 - Individual projects only
 - Pooled projects
 - Targets for selected sectors
 - Project-specific reductions driven by policies and measures
- What activities should be included in the CDM?
 - Comprehensive: all project categories (reduction and sequestration) and all gases
 - Comprehensive, however, LUCF activities adhere to definitions in Article 3 of Kyoto Protocol
 - Determination of inclusion of project categories by host country
 - Staged approach to project inclusion (e.g., begin with categories of greatest certainty)
 - Are there any activities that should not be included in the CDM?
- Is there a linkage between certified emission reductions resulting from CDM and reductions subject to early crediting?
 - Early crediting only for domestic actions
 - Early crediting can be for either domestic and international actions (with provisions to ensure that double counting of credits does not occur)
 - No linkage between CDM and early crediting
- Should there be any requirements to participate in CDM?
 - Submit national communications
 - Require national plan for total emission reductions
 - Schedule for adopting a target

Baselines

- How should "baselines" be established to determine additionality and certified emission reductions?
 - Bottom-up project baseline (e.g., project-by-project)
 - Top-down baseline (e.g., benchmark, performance standard, whole-sector, technology standard)
 - Allow different options for different sectors and situations

- How should top-down baselines be designed?
 - > Based on historical data or projections?
 - > Based on total existing capacity or new capacity additions (marginal capacity)?
 - > Sector or sub-sector?
 - > Country/regional or global?
- What are the key characteristics of any baseline?
 - > Static or dynamic?
 - > Straight line or declining slope?
 - > Rate-based or absolute?

Additionality

- What forms of additionality should be included in the CDM?
 - > Programmatic
 - > Financial
 - > Emissions

Accounting

- How should certified emission reductions (CERs) be measured and credited?
 - > Absolute amount of GHG emission reductions (in "tonnes of CO₂ equivalent" bundled to appropriate project size – calculate using GWPs)
 - > Rate-based approach (e.g., C/kwH)
 - > Full credit for all CERs from all project activities
 - > Discounted credits for CERs for certain activities (e.g., address leakage, baseline uncertainty, externalities)
 - > Units fungible with emissions trading and JI units
- How should the share of proceeds and use of adaptation funds be determined?
 - > Market value of the emissions reductions achieved
 - > What percentage share is acceptable?
 - > How should use of adaptation funds be determined?
 - > How should "particularly vulnerable" countries be identified, and with what criteria?
 - > Who should disburse/administer adaptation funds?

Process

- Should the CDM have a "pre-certification" or "registration" stage?
 - > Pre-certification of project activity to ensure project is voluntary, meets sustainable goals, additionality, but actual emissions reductions certified only after they occur
 - > Pre-certification of claimed certified emission reductions

- No pre-certification stage
- What should be the relationship between projects under AJJ and CDM
 - AJJ projects grandfathered into CDM as is
 - AJJ projects grandfathered into CDM with new baseline assessment
 - AJJ projects not incorporated into CDM
- What should the sequence be for certification and verification?
 - Operational entity certifies the CERs and then a "body" verifies these reductions
 - Operational entity verifies CERs then UNFCCC (or other body) certifies reductions

Compliance

- How should compliance issues be addressed in relation to CDM?
 - Institutionally built into the operation/design at the domestic and international levels
 - Compliance with broader obligations under the Protocol or Convention
 - Compliance with terms of Article 12 of the Protocol (addressed by Executive Board, UNFCCC)
 - Private sector compliance liability (e.g., contracts between private sector investors)
- How should "part of" be defined in the CDM?
 - Qualitative but no numerical "cap" ("part of" totality of Annex I Party reductions from the flexibility mechanisms and domestic actions)
 - Numerical "cap" for offsets achieved through all three mechanisms
 - Numerical cap only for CDM
 - No qualitative or quantitative caps imposed on the CDM

Sustainability and Equity:

- How should sustainable development component of project activities be determined?
 - By host country
 - Formulaic approach
 - Internationally agreed upon standards
- What policy mechanisms are available to address equity concerns under the CDM
 - Adjusted baselines
 - Discounting credits
 - Special fund to ensure geographical distribution of projects
 - Project Bundling, Regional Projects, Clearing house function
 - No consideration for equity - CDM operates as a market-based mechanism

Whole Sector CDM

Concept

The Clean Development Mechanism (CDM) of the Kyoto Protocol allows for emission reduction credits for projects in non-Annex B countries. While CDM credits are expected to be project-based, the term 'project' is not defined. Under "whole sector" CDM, credits would be generated from GHG emissions reductions for an entire sector (e.g., the electricity sector) relative to a preestablished baseline. Individual projects within this sector would not be credited.

Qualifying Under the CDM

Credits to whole-sector emission reductions would have to meet the same conditions as all other CDM projects:

- Participation would be voluntary;
- The credited actions must assist the non-Annex I Party in achieving sustainable development objectives;
- The credited actions must result in reductions or removals that are real, measurable and long-term;
- The credited actions must result in emission reductions or removals that are additional to any that would occur in the absence of the certified project activity; and,
- A share of the proceeds from the sectoral (based on reductions) would be used to cover administrative and adaptation expenses.

Process

Setting the Baseline:

An emissions baseline would have to be established for the identified sector for some future period.

- The first step would be to estimate the projected emissions for the sector in a business as usual scenario.
- The BAU projections could be based on absolute net emissions from a given sector over a period of time or a generic measure of emissions intensity (e.g., tonnes of carbon per megawatt hours of electricity generated) over a period of time.
- The baseline could be
 - the BAU projection itself (where any emissions below BAU would be credited),
 - or a designated amount under the BAU projection (where credits would be attainable only for reductions that are a given percent below what would have happened anyway).
- The baseline could be set for each budget period or for other designated periods.
- This baseline might be determined by an internationally agreed upon formula or by a country-specific negotiating process.

Awarding Credits:

Credits could be awarded to the host country government, ministry, or designated entity within the host country (e.g., an association or conglomeration). Credits would be awarded if emissions reductions for a whole sector were below a pre-established baseline for a given period.

Credits would be certified only after the emissions reductions had been achieved and verified. Individual projects within a whole-sector baseline would be ineligible for additional credits through other CDM processes. If emissions exceed the pre-established sectoral baseline, the participating country would not be penalized.

Implications / Assessment

Benefits of whole-sector credits over credits to individual projects:

- Allows for the inclusion of amorphous emission reductions such as those resulting from domestic policies otherwise be difficult to quantify and reward.
- Total reduction potential could be greater since the entire sector is being addressed as opposed to attempting to affect total sector emissions through crediting individual projects.
- Sectoral crediting could reduce some of the additionality concerns associated with crediting individual projects.
- Could eliminate some types of leakage problems associated with individual projects (e.g., forestry projects where logging on one plot is displaced to another).
- Whole-sector CDM would be a largely risk-free way for a country to obtain many of the benefits of full participation in emissions trading, without the risks associated with accepting a binding emissions target.
- Whole-sector reductions may better advance "meaningful participation" from developing countries beyond project-by-project reductions.
- Could have lower transaction costs since only one baseline needs to be established and only one 'project' emissions needs to be calculated, certified, and verified. No need to verify and certify individual projects.

Drawbacks of whole-sector credits over credits to individual projects:

- No market until whole-sector emissions have been measured and verified. The time periods of measurement and verification would depend on the level of effort needed to measure emissions for a whole sector and the available data. Longer intervals between credit awards could make capital recovery for efficiency investments more difficult.
- Could substantially reduce the incentive to accept a binding target, especially if the sector baselines were comparable to (or higher than) the levels that would be considered acceptable binding targets.
- Most projections are extremely uncertain, often dependent on factors that are difficult to predict (e.g. economic conditions) and are therefore more likely to be influenced by political posturing.

- Can create distortions by shifting activities from a capped sector (e.g., electricity) to an uncapped one (e.g., industry self generation).
- Total incentive for private investment may be diluted because credits would not be directly allocated to individual projects, and individual private investors would have little or no control over whether the country meets its whole-sector target.
- All developing countries may not have the data and capacity to develop these targets so some may be advantaged over others.
- Developing countries may perceive this as a back-door target.

Example: Whole-Sector Baseline for Electricity Generation in China

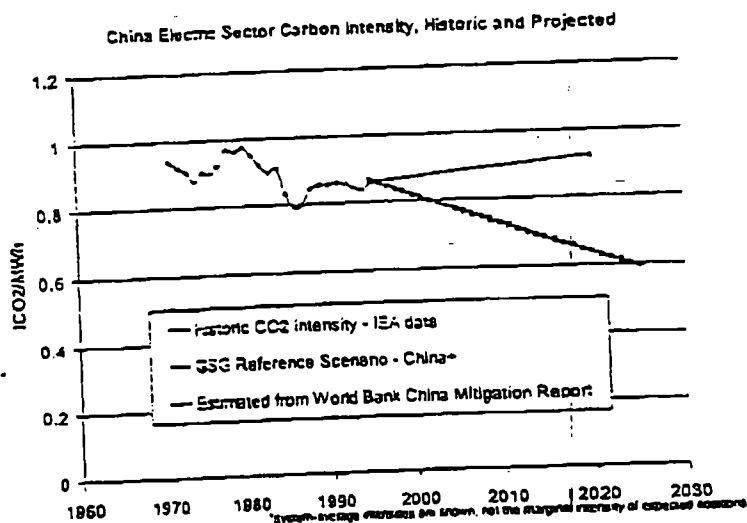
The following is a step-by-step description of how whole sector CDM would generate credits. The example sector used is the electricity sector in China.

Step 1: Choose relevant sector (Host country and body designated by the Executive Board)

China and a body designated by the Executive Board will approve a sector for Whole-sector CDM. Not every sector will be conducive to this approach, so the approved body would evaluate the proposal based on available data to create a baseline, capacity to gather data for measurement within project years, and the benefits of this approach over other approaches for this sector.

Step 2: Develop a baseline (Host country and body designated by the Executive Board)

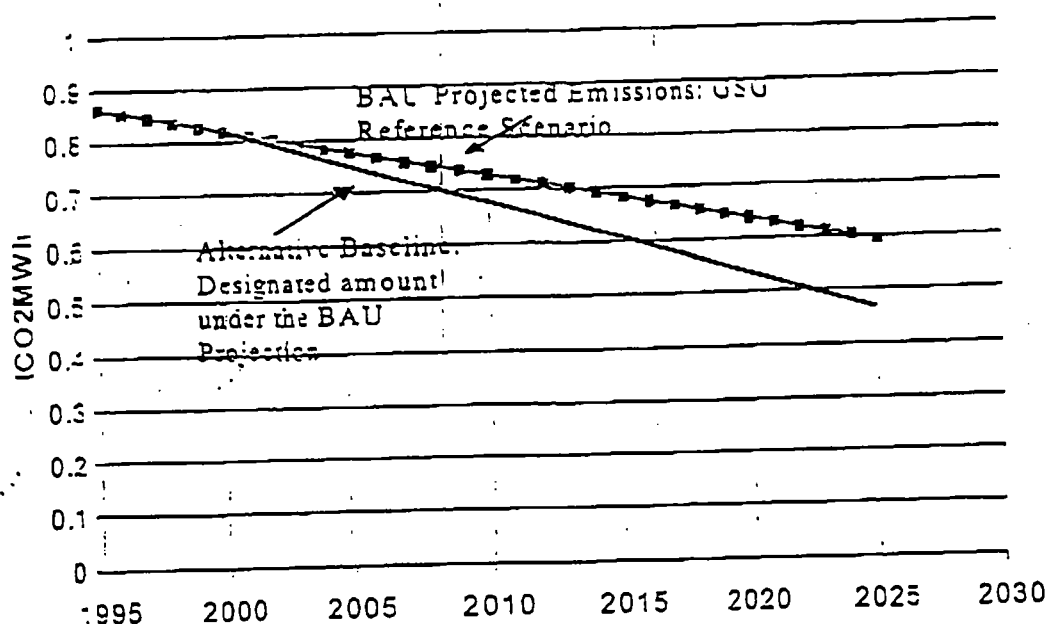
The first step in developing a baseline for the whole sector is to estimate projected emissions (either absolute or an emissions rate) for the given sector in a BAU scenario. Projections can often vary widely as shown in the example below of the projected efficiency rates (CO_2/MWh) for the Chinese electricity sector.



In this example, the Global Scenario Group (GSG) Reference scenario (based largely on IPCC 92a with some added technical detail) shows the Chinese electricity sector becoming more efficient and the World Bank Mitigation Report estimates that the Chinese electricity sector will become less efficient.

The baseline would either be the BAU projection itself, or a designated amount under the projection (see figure below). The baseline would be either developed through a set formula for that sector or through a negotiating process between the China and designated body. The baseline would need to be set prior to the period for which credits would be considered. In this example, the BAU projection and the baseline are rate based, however they could be based on absolute emissions.

In the example below, the baseline is based upon the BAU Projections from the GSG Reference Scenario for the Chinese electricity sector. The BAU projection is the upper line, however the baseline to which reductions would be compared could be either line. Actual baselines would need to be revisited and updated periodically.



Step 3: Determine method for calculating actual emissions from the whole sector.

Many developing countries may never have estimated emissions from an entire sector. Methodologies can be standardized across all developing countries or may be based upon IPCC guidelines for developed countries. The methodology would determine the boundary of the sector, the required data (including the source), coefficients and factors, time period and other information relevant to creating a sector emissions estimate. This methodology would need to be agreed upon before the first eligible year. A methodology for the Chinese electricity sector could be:

Boundary: On-Grid Electricity Production (no industrial or residential production)
 Time Period: First budget period
 Required Data: Fuel input by fuel type (coal must be designated by type of coal)
 Factors: IPCC carbon factors for each type of fuel
 Equation:
$$\text{Total Emissions} = (\text{Fuel Input}_a * \text{C factor}_a) + (\text{Fuel Input}_b * \text{C factor}_b) + \dots$$

Step 4: Begin Emission Reduction Policies and Projects (Host country and Private Sector)

China would be responsible for creating incentives for emissions reductions. Incentives could be country-wide policies, incentives for regional policies, incentives for private investment etc. The policies themselves, GHG reduction projects or other measures taken to reduce emissions within the given sector would not be individually evaluated.

Step 5: Emission Monitoring and Reporting (Host country)

Monitoring refers to the measurement of GHG reductions/sequestration and other related socio-economic and environmental effects of the sector. Monitoring does not involve the actual calculation or certification of GHG reductions nor does it involve comparisons with baseline measurements.

The Chinese government or designated ministry would monitor the electricity sector performance in accordance with guidelines set forth in step 3. Monitoring methods for GHG emissions for the China electricity sector could include engineering methods, statistical sampling (including multivariate statistical models), end-use metering, short-term monitoring and integrative methods.

The Chinese government or designated ministry would monitor socioeconomic and sustainability performance of the projects within the sector in accordance with guidelines set forth by the COP/MOP but based on objectives designated by China.

Step 6: Emissions Reporting (Host country)

At the end of the time interval set in Step 3, China will compare the actual emissions for the sector for the given period to the whole-sector baseline set forth as the beginning of the project. China will incorporate this information onto a standard reporting format that includes the environmental, social and economic status of the sector. There are two options for emissions reporting:

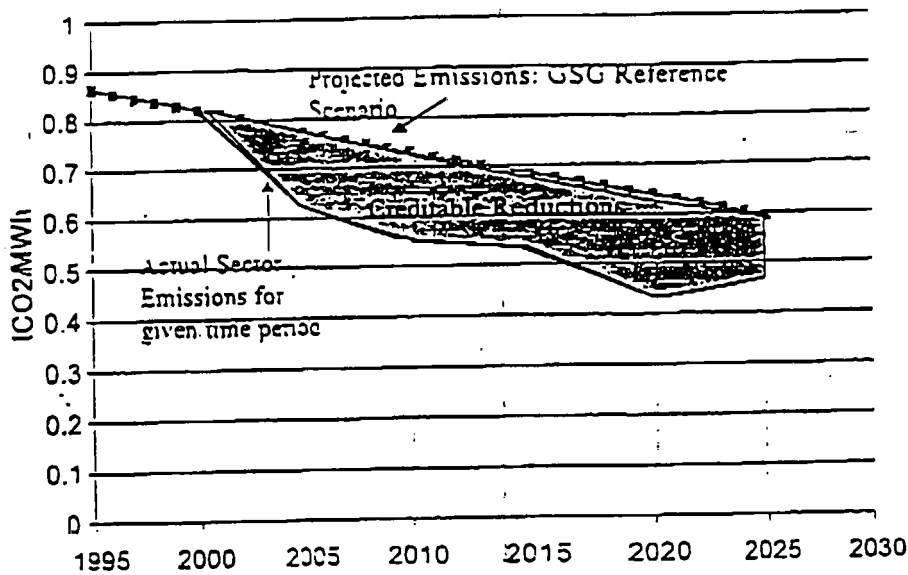
- (1) The Chinese government or designated ministry will report actual emissions to the [CDM, Operational Entity, third party verification] in accordance to the standard methodologies set forth in step 3. The benefit of this approach is that it incurs small transaction costs, however, confidence in the report may decrease since the operators have an incentive to inflate emission reduction estimates.
- (2) A third party [auditor] is hired by the Chinese government to check the operators monitoring data and to complete the report to the [CDM, Operational Entity, etc.]. The benefit of this approach is that gaming is less likely to occur, however, transaction costs increase as you include a third party.

Step 7: Certification (Operational Entity)

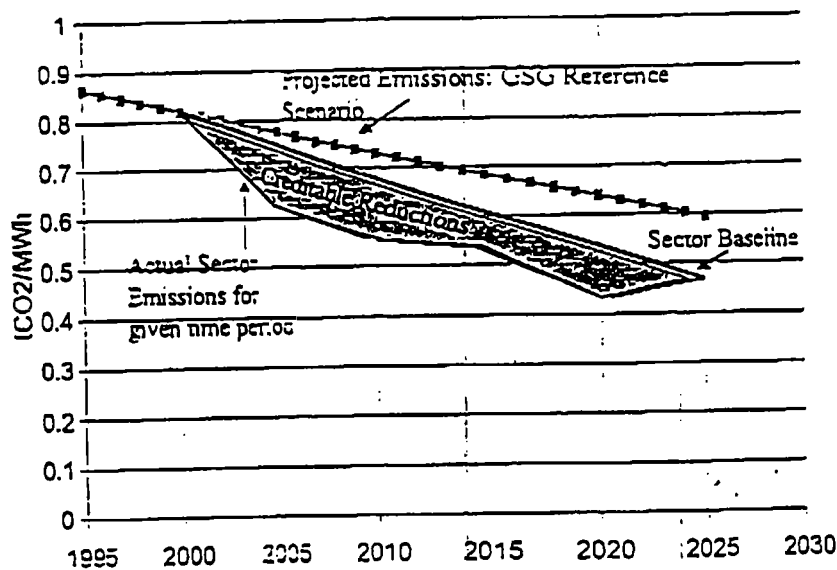
The calculation of project GHG reductions is conducted at this stage and would include GHG reductions, non-GHG impacts, determination of proper project performance baselines against the stated reference scenario, estimation of project leakage, etc.

The Operational Entity would review the reports submitted by the project operator/developer (which state the results of measuring, monitoring, and evaluating the project) and compare the actual emissions to the baseline. Actual credits would be awarded to reductions that fall under the baseline. As illustrated below, the baseline could be either the BAU projection itself, or a given level under the BAU projections.

Option 1: Provide Credits to Any Reductions Under BAU Projection



Option 2: Set Sector Baseline Under Projected Emissions



Step 8: Audit and Verify Emission Reductions (Third Party Auditor)

Verification of whole sector emissions would occur in a similar fashion to other CDM systems. A third party auditor would review the Chinese electricity data for the whole sector and verify that the sector emissions are the same as are reported in Step 6. An operational entity would report the verified emissions to the COP/MOP.

Draft Benchmarking Scoping Paper for the AIXG Meeting

* note: Figures will be labeled in final draft.

BACKGROUND

The Clean Development Mechanism (CDM) allows countries with greenhouse gas emissions targets (Annex 1) to meet these targets through greenhouse gas (GHG) emission reduction/sequestration projects in countries without GHG emissions targets (non-Annex 1). In order for CDM to be effective, both environmentally and economically, it must meet several criteria. According to the Kyoto Protocol, creditable emission reductions (CERs) must be "real, measurable, and long term." The CDM, however, will be effective only if transaction costs are kept low to encourage greater participation.

Meeting these objectives is largely reliant on baseline methodology. An effective baseline will ensure the following:

High Environmental Integrity. A baseline will have high environmental integrity if it allows minimal non-additional credits.

Low Transaction Costs. Creating a baseline will incur some costs that can be added to the overall transaction costs of the CDM. The fewer permutations needed, the lower the cost of the benchmark system. In the following graphs, 'high' means that the option ranks well for low transaction costs (i.e., has relatively low transaction costs).

- High Participation. High participation in CDM will allow more tradable credits and therefore reduce the overall cost of compliance with the Kyoto protocol.
- High Investor Certainty. Theoretically, CDM credits will provide incentives to reduce emissions. Prior to making an investment, the investor will want to increase the certainty of the amount of credits that will eventually be awarded. High investor certainty will generally lead to greater participation.

Creating a baseline to meet the above criteria is very difficult. One of the most difficult factors is accurately estimating what would have occurred anyway. The need for environmental integrity often competes with retaining low transaction costs, encouraging broad participation, and ensuring high investor certainty.

This paper explores the use of benchmarks as a means of assessing emissions additionally¹ in CDM projects while lowering transaction costs and decreasing the subjectivity of project-by-project baselines. Benchmarks have potential to create effective baselines for some sectors, but are not likely to apply to all projects. Other baseline methods, including project-by-project baselines, will remain viable options in many instances.

¹ Demonstrating 'additionality' refers to proof that emissions reductions would not have occurred in the absence of incentives provided by the CDM.

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PROJECT-BY-PROJECT BASELINES

Project-level greenhouse gas (GHG) emissions reductions have historically been evaluated using project-by-project baselines. Under this approach, the project developer evaluates what would have happened without the project and then estimates resulting emissions from this project. The difference between these two numbers is the net GHG reductions or removal from the project. Experience has indicated that this process is extremely time intensive and can be quite subjective. It is difficult to estimate what would have happened in the absence of the project and involved parties can manipulate these assumptions.

Establishing a more straightforward method to determining additionality would lower transaction costs, provide a greater degree of environmental stringency, and streamline the crediting process.

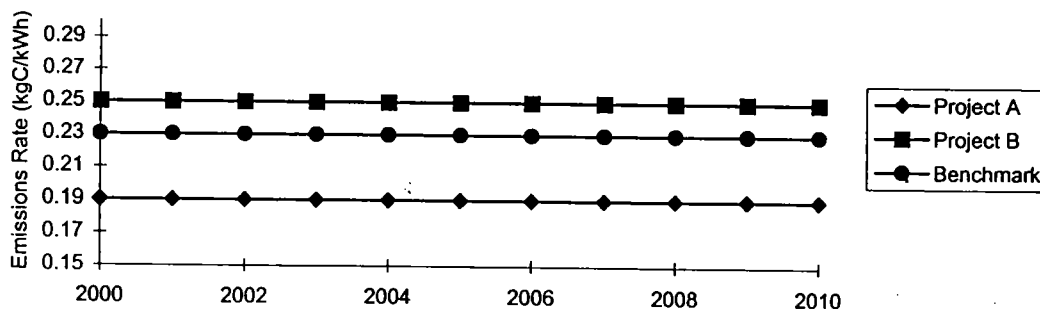
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THE BENCHMARK APPROACH

One approach that might satisfy the above criteria is the *benchmark* approach, which is sometimes referred to as the "sector baseline" method in contrast to the standard "project baseline" method. A benchmark sets a standardized emissions/sequestration performance standard across a sector. Any project that is more carbon efficient than the benchmark can be considered additional. For the CDM, certified emissions reductions (CERs) could be determined based on the difference between the benchmark and the project performance. Thus the benchmark serves as the baseline for an entire sector or sub-sector, eliminating the need for project-specific baselines. Figure 2 illustrates a simple example of a benchmark

sector-specific?
- fairly aggregate



In this example, a benchmark is set for electricity generation. Project A would not be considered additional, but project B would be considered additional. Project B would accrue credits for the generation under the benchmark (i.e., 0.04kg of C/kWh).

Benchmarks, often referred to as "indicators" or "performance metrics," have been considered for many other applications that involve assessing and comparing environmental or financial performance of firms, plants, or sectors. Benchmarks have also been used to gauge compliance with environmental regulations, for internal auditing of plant productivity, for assessing financial viability, and for developing industry-wide reporting formats.

The benchmark approach could potentially help the CDM meet the goals set forth above. Set correctly, a benchmark would improve additionality estimates because the crediting process is

may

less subjective and less open to gaming. A benchmark is likely to provide greater transparency, since a single sector-wide, baseline-setting exercise is easier to review than a multitude of project-specific, potentially idiosyncratic analyses. In addition, benchmarks increase investor certainty because project developers will be able to identify their benchmark without having to go through the creation and review of a project-specific baseline. Finally, benchmarking provides an important means to reduce transaction costs to project developers. Although benchmarks will require up-front sector-wide analysis, benchmarks would lower the costs and complexity of analyzing and agreeing upon baselines for individual projects.

TYPES OF BENCHMARKS

A benchmark will take different forms depending on the constraints and needs of individual sectors. Types of benchmarks include:

- *Output-based benchmark.* An output-based benchmark for GHG emissions sets a standard for the amount of carbon per output. This type of benchmark can be used when a wide sector has a definable homogenous output. For example, the electricity production benchmark can be defined as carbon/ kWh.
- *Binary benchmark.* Some activities are not effectively portrayed by output. In this case, the benchmark would be a 'yes' or 'no', where 'yes' indicates that all GHG benefits from the project are additional. For example, forestry conservation projects either occur or do not. No rate is involved. In this case, the benchmark may set forth basic criteria to determine if the conservation project is likely to have occurred anyway. If these criteria are met, then the project is additional and all carbon sequestration may be credited.
- *Technology-based benchmark.* Output based benchmarks are not effective for some sectors either because they do not have a definable homogenous output or because adequate data is not available. In these cases, technology-based benchmarks may be applicable. A technology benchmark credits GHG efficient technologies as compared to a benchmark technology. In this case, average efficiency of a standard technology could be used as the benchmark. The credits could be based upon either: (a) the assumed efficiency of the approved technology, or (b) actual performance of the approved technology. For example, super efficient industrial boilers may be credited based either on the engineering efficiency estimate or actual fuel in and energy out would be measured for the project and compared to the benchmark technology. This benchmark method circumvents the need to measure total output. On the other hand, technology-based benchmarks do not create an incentive for total process efficiency gains.

ISSUES IN CONSTRUCTING BENCHMARK BASELINES

A benchmark has the potential to create effective and efficient baselines, however, the degree to which a benchmark meets these goals depends on how it is designed. There are a wide variety of possible methodologies for constructing benchmarks. Constructing the methodology for benchmarks will demand decisions and judgements. There are few clear answers and most decisions will entail a trade-off between competing goals. Environmental integrity of the benchmark will need to be weighed against low transaction costs and high participation.

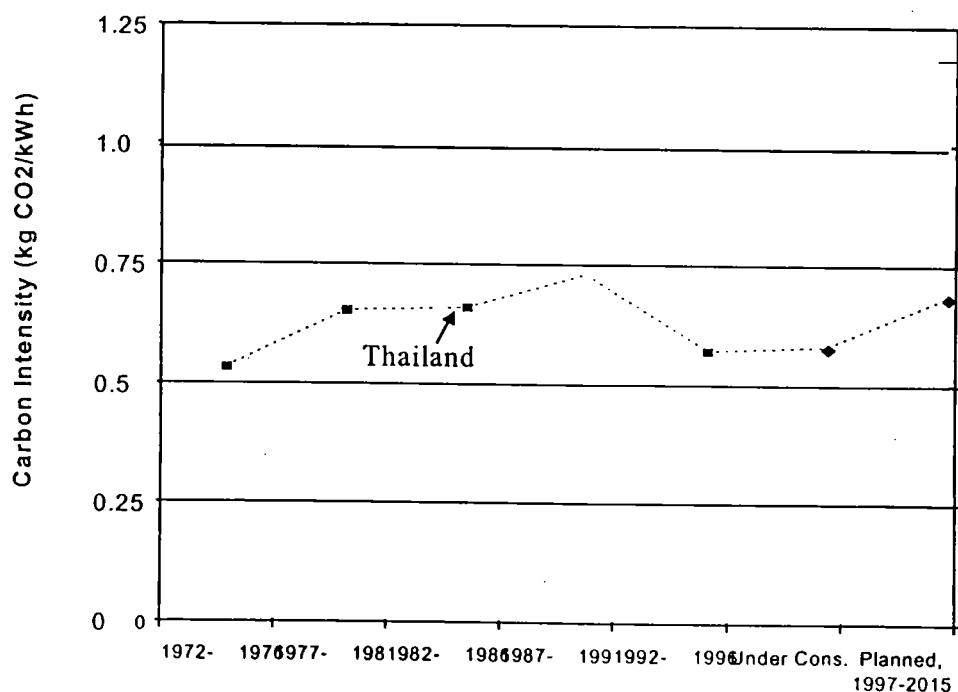
Choosing Appropriate Data for the benchmarks—A benchmark can be based on many different types of data. The data that is chosen should be the best reflection of current trends without allowing unrepresentative years to drive the estimate or allowing too much subjectivity in the methodology.

Historic benchmarks— Historic benchmarks are based on measurements of past performance of existing facilities. In many countries and sectors, systems are already in place for collecting and assembling data regarding key indicators such as amount and type of fuels consumed, physical amount or economic value of product output, and type of process used. These data are a logical starting point for constructing benchmarks, providing that reliable data are available and that past performance is an accurate indicator of future performance.

Historical data can be further divided into total existing capacity or trends, or new capacity additions or trends.

- Total existing capacity is the capacity in operation at any given time. In many sectors, equipment lasts for 30 years or more. Therefore, equipment choices 30 years ago would influence the benchmark. In the forestry sector, relevant data would focus on harvesting, growth, and conservation trends.
- New capacity additions or trends would incorporate only those trends or capacity addition for a given set of years. Rolling averages can be used for a given set of years. This option would reduce the impact of old, outdated technologies, while still accounting for unrepresentative years. As you increase the years, you lower the impact of any one given year, but also increase the effect of older technologies.

The choice of years is important. The last few capacity additions are not necessarily more efficient than the last ones. Figure X shows that the carbon efficiency for Thailand's fossil fuel electricity generation has increased and decreased over the past 25 years.



Projection-based benchmarks - Projection-based benchmarks attempt to project future behavior in light of emerging and expected changes: demand growth, market responses to resource prices, capital stock turnover, sector restructuring, availability of capital, and policies relating to greenhouse gas and other environmental objectives. Although they are, by design, more representative of "what would otherwise occur" than historically based benchmarks, projection-based benchmarks are also easier to game, more subjective, and are difficult to construct. As a result, different projections can vary significantly both in magnitude and direction.

Average versus Better-than-Average. -- A benchmark can represent average performance or some degree better-than-average. Historical 'average' benchmark would allow any project that has better than average carbon intensity to qualify for CDM credits. By definition, this would allow half of the existing production in any given sector to qualify as additional.

A better-than-average benchmark sets a higher standard and limits the amount of non-additional credits. It does run the risk of excluding valid reductions from attaining credits. Better-than-average benchmarks include:

- Top 25 percentile of new or existing capacity.
- Top 10 percentile of new or existing capacity.
- Most efficient new capacity addition
- Best Available Technology/Practice (the most carbon efficient alternative available to that situation regardless of price)

✓ The magnitude of trade-offs between these choices will depend on how each sector is aggregated. For example, in the United States electricity sector, if all types of generation are included, the lowest 25th percentile of GHG emissions is zero. On the other hand, if you use a fossil-only benchmark, veering into lower percentiles is likely to yield a more appropriate benchmark.

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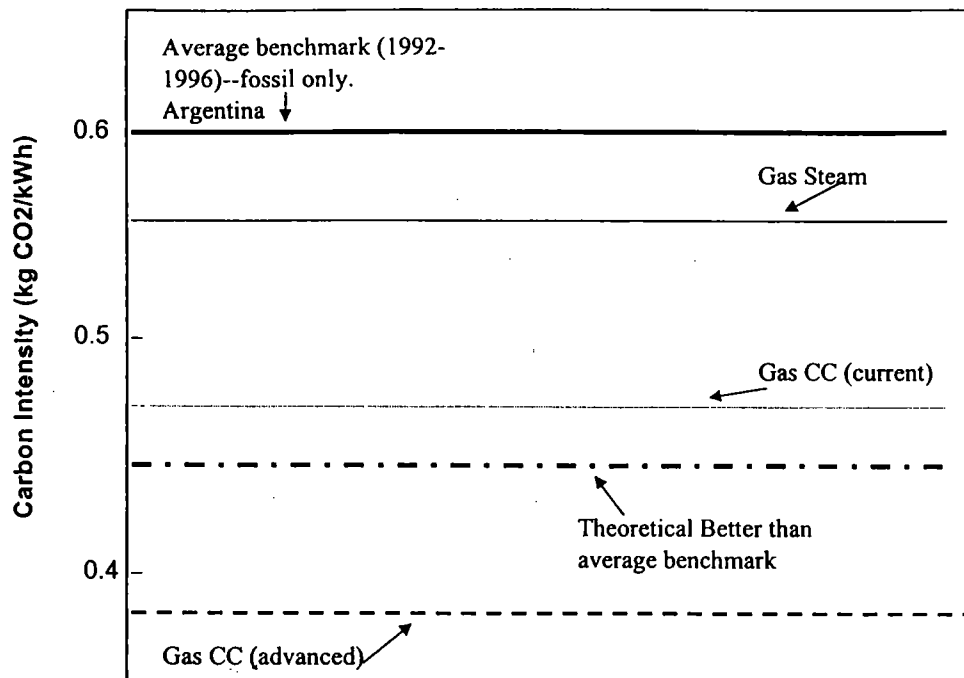


Figure X above shows illustrates the potential effects of an average or a better-than-average benchmark. Argentina's average emissions rate for fossil electricity generation from capacity additions between 1992 and 1996 is approximately 0.6kg of CO₂/kWh. Argentina's new capacity is likely to be gas combined cycle regardless of CDM. This would mean that almost all new capacity is likely to receive CDM credit. The theoretical better-than-average benchmark would create an incentive to move from the average gas combined cycle to the more advanced gas combined cycle. If a better-than-average benchmark were to be more stringent than the gas combined cycle, then it is unlikely that most projects would be able to qualify, thus eliminating the incentive for to move from the current natural gas technologies to more advanced ones.

Level of Sectoral Aggregation -- Benchmarks could be created at various levels of aggregation for a given sector. Disaggregation leads to more precision, but at a greater transaction cost. The level of aggregation will vary among sectors, however, there is often too much dispersion within individual sectors to aggregate across an entire sector.

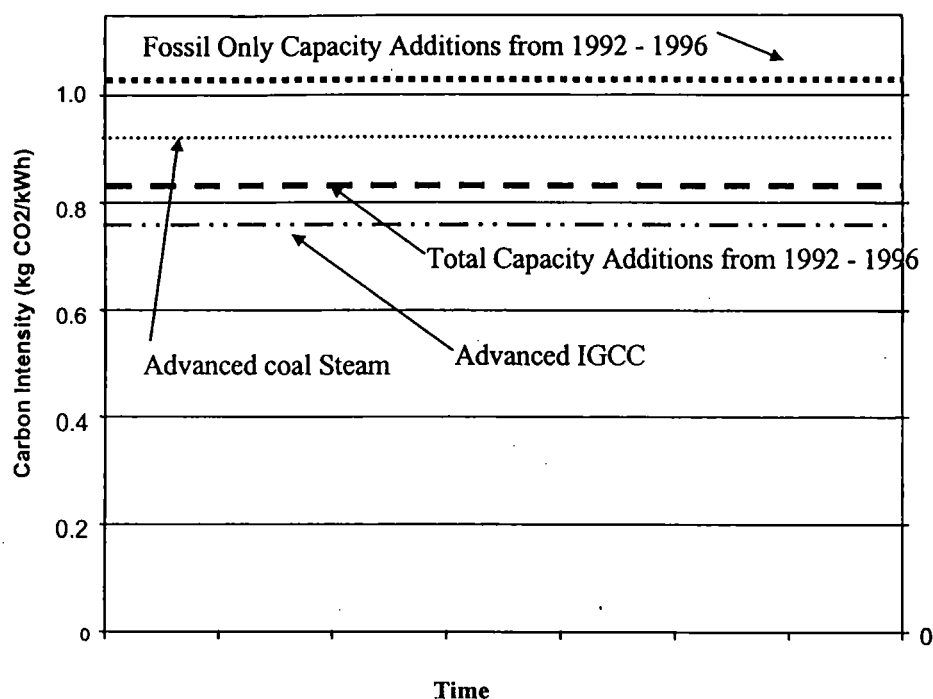
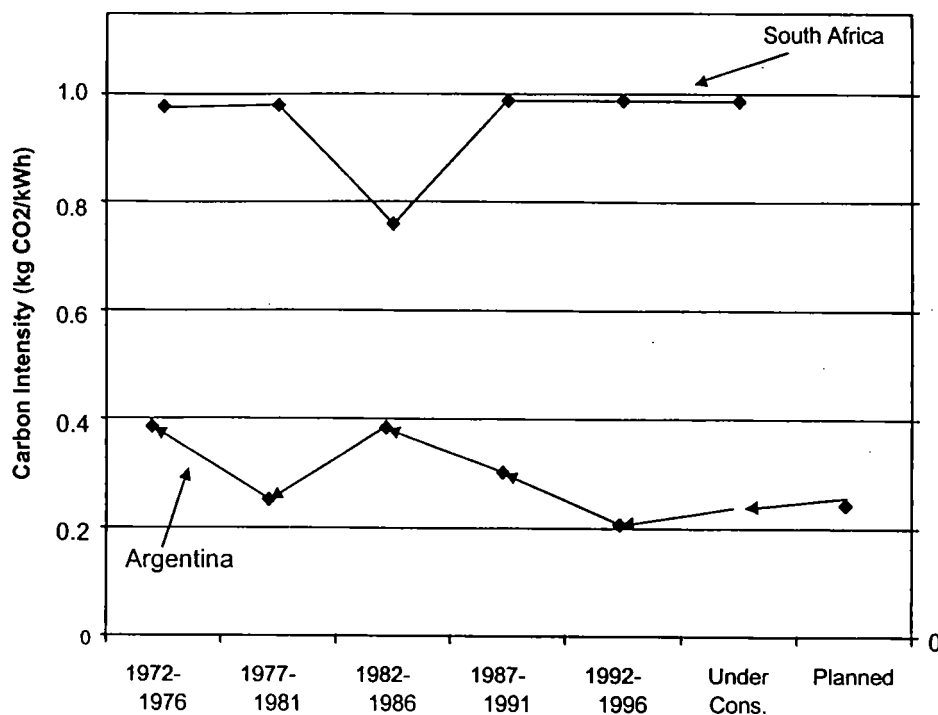


Figure X illustrates electricity generation in China which is mostly coal and hydro. A fully aggregated benchmark would incorporate all the hydro (~25% of new capacity from 1992-1996), and therefore be below most efficiencies for coal-based production (except the IGCC (gassification combined cycle) which is not a possibility in many cases. In this case, two benchmarks may need to be developed in order to appropriately reflect efficiencies for both coal and hydro within the electricity power generation sector.

Global versus Regional/national/local— More regionally specific benchmarks may lead to higher accuracy, but also higher transaction costs. Resources and situations vary by country and this one benchmark may not fit all countries. Figure X shows the variance of electricity generation for two very different countries, Argentina and South Africa.



why not do fuel-specific benchmarks for electricity generation

If a global benchmark were to be created for all of electricity, it is conceivable that all new capacity in some countries would be considered additional.

Avoiding Perverse Economic Incentives. —The CDM must actively avoid p incentives wherever possible. For example, crediting electricity production pr subsidize the electricity sector, thus lowering the price of electricity and increa Ideally, CDM credits will cover only the incremental cost of more carbon-effie and practices. Thus, the total cost of production will remain the same as with credit.

del 1st FF

Baselines in general and benchmarks specifically, play an important role in affecting the degree of perverse economic incentives. First, setting a benchmark to allow significant amounts of non-additional credits may create the wrong effect. In this case, the credits are granted to activities that would have occurred anyway. Production as opposed to incrementally improved investment is subsidized.

? [Second, a benchmark must account for competitiveness issues between countries. Regional benchmarks could create an incentive to move investment toward countries with higher benchmarks in order to receive more credits. Realistically, credits are unlikely to drive location decisions for new investments. Most location decisions are based upon demand for the good and labor costs. Particularly in the first budget period where credit prices are very uncertain, CDM credits will probably not be high enough to change existing investment patterns.

Third, we must consider the total cycle effects of credits. Fossil fuel use leads to GHG emissions far before the fuel is burned. Extraction and distribution are sources of GHG emissions and therefore, are potential categories for CDM projects. If the CDM allows credits for projects throughout a fuel cycle, we may create a compounded subsidy for fossil fuels. A potential

example of this could be awarding credits for (1) methane recapture from oil extraction, (2) then for efficient petroleum refining practices and, (3) then for efficient oil burning electricity generation. Even if individual processes do not effect the price of oil, the compounded result may drive oil prices down and affect demand.]

Updating the Benchmark - The benchmark established for any given year should apply to any project that qualifies for the CDM in that year. Updated benchmarks for future projects, however, will be needed to account for new trends and technologies. Frequent updates (such as yearly updates) will cost more, but are likely to result in fewer non-additional credits. Infrequent updates (such as every 10 years) will cost more, however, are likely to yield fewer non-additional credits.] ?

The intervals in which benchmarks are updated will depend largely on the level of effort needed to create the benchmarks. If the cost is high, then the intervals between updates will be longer. It is possible to tighten the benchmarks using an automatic deflator to account for technology improvements. Although trends in developing countries have not suggested that efficiencies historically improve over time, decreasing the benchmark between updates could create the correct incentive for efficiency improvements.]

Length of Time that A Given Benchmark applies to a Project-- Benchmarks will be revised periodically. The benchmark will apply to the project for a given amount of time. The length of time that a project is measured against its initial benchmark will affect the level of investor certainty about how many credits the project may yield. Examples of choices include: (1) the full lifetime of a project; (2) until capital recovery; (3) estimated lifetime of a project; (4) until new update.

Allowing a benchmark to apply for longer periods of time increases investor certainty, however, it prolongs the effect of non-additional credits and may inadvertently create an incentive to retain old, obsolete equipment.] ?

Label 1 -

Sector	Sub-Sector (Level of Aggregation)	Type of Baseline	Regional or Global	Discussion
Electricity Generation (Data Quality: Good)	Fossil Fuel	Benchmark	<u>Regional</u> : If benchmark applies to total fossil fuel. <u>Global</u> : If specific for fossil fuel (e.g. coal benchmark, oil benchmark, natural gas benchmark).	Some countries (e.g., Argentina, Thailand) use different fossil fuels for electricity generation. In these cases, one benchmark may create an incentive for fuels with moderate carbon intensity, but low carbon fuels would automatically qualify (without really being additional). High carbon fuels would not be close enough to create an incentive to be more efficient. Therefore, global fuel-specific benchmarks may be more appropriate, however, they would not create any incentive for fuel switching. The key determinant in setting the benchmarks is the elasticity of substitution between different types of fossil fuels in most developing countries.
	Emerging Renewable	Benchmark	Global	One global benchmark for all emerging renewables would create an equal incentive for projects regardless of the location. In addition, one benchmark is less onerous to create.
	Large-scale Hydro and Nuclear	Project Specific	--	Large scale hydro and nuclear should not be completely excluded from CDM since each has significant potential to reduce GHG emissions. However, including them in a benchmark creates additionality problems since many countries already have significant portions of large-scale hydro and nuclear. For example, just under half of electricity projects under construction in 1996 in China are large-scale hydro. All of these would qualify under any benchmark since they result in zero emissions.

Sector	Sub-Sector	Type of Baseline	Regional or Global	Discussion
Fossil Fuel Supply (Data Quality: See Subsector)	Coal bed methane <u>Data Quality:</u> Good, but since there have not been many projects, it may not be a representative sample	Benchmark or Project Specific	Depends on method	Benchmarks could be either: (1) set at zero where all projects get credit. This would be a global benchmark. Given the low number of existing and planned projects, this is a viable possibility. (2) set at best practice. Global efficiencies are at about 25% and could be increased to about 30%. Could do global benchmark that varies depending on the gassiness of the mine, or regional benchmarks. The cost of the benchmark will need to be weighed against the number of estimated projects in this field.
	Natural gas production <u>Data Quality:</u> Poor	Project by project	--	It is unlikely that the reduction in transaction costs needed to justify benchmarks would be achieved in this sector because of the wide range of project options and the dominance of only one country (China)
	Natural gas distribution <u>Data Quality:</u> Poor	Project by project	—	Getting good data on natural gas transmission and distribution is very difficult because the source is spread out along the distance of the pipeline.
Industrial Energy Demand (Data Quality: Questionable)	Iron and Steel, Cement, Petroleum Refining (?)	Benchmark (possible)	Global	Benchmarks for industrial demand sectors should be global for two reasons: (1) to create an equal incentive for efficient projects among countries. Unlike electricity supply, commodity production is less regionally tied. It therefore makes sense to create an incentive in countries that can produce the commodity more efficiently (2) Each subsector would need to be disaggregated further in order to create an effective benchmark (e.g. type of steel) since carbon intensity varies by type of end-use product. Global benchmarks would significantly cut down the transaction costs.
	Pulp and Paper Chemicals	Benchmark or Project Specific*	Global	These subsectors may have so many different products (that are not fungible between each other) that benchmarks are not possible. Any decision would need more investigation.

Sector	Sub-Sector	Type of Baseline	Regional or Global	Discussion
Transportation <i>(Data quality: ?)</i>	Policies	Whole-Sector	—	Transportation policies to lower GHG emissions such as fuel taxes, reformulated gasoline, etc. could lower GHG emissions, but would be difficult to quantify. Whole-sector CDM would be the only way to estimate these emissions. However, creating a baseline for a whole sector would exclude any other projects within that sector from qualifying for CDM.
	Infrastructure	Project Specific	--	Projects such as HOV lanes, public transportation, etc. have the potential to lower GHG emissions, but would be difficult to benchmark
	Fleets	Benchmarks or Project Specific	Regional	It could be possible to benchmark fleet performance, but the cost of creating the benchmark may be high since the benchmarks would need to be regional. The benefit of a benchmark approach would hinge on the cost versus the number of potential projects.
Residential and commercial energy use	Appliances and Equipment	Benchmarks	Global	Global benchmarks based on the best available technologies could be created for residential and commercial appliances and equipment. Further work needs to be done to determine the regional dispersion of such equipment to determine if benchmarks are applicable.
Building	Energy efficient buildings	Project Specific	—	
Forestry and Land use ** Additional work needs to be done to assess the potential for forestry benchmarks	Conservation	Project Specific	--	Benchmarks are difficult for conservation projects because determining additionality is based upon too many site specific factors.
	Management practices	Benchmarks (??)	Global	Management practices such as sustained yield and high crop rotation may be considered for benchmarks. The actual carbon benefits, however, may be difficult to assess in aggregate since each forest is different.

*Either a benchmark or a project specific baseline would apply. The project would not have the opportunity to choose.

** Assumes forestry projects are eligible in the CDM

Draft Benchmarking Scoping Paper for the AIXG Meeting**Background**

Project-level greenhouse gas (GHG) emissions reductions have historically been evaluated using project-by-project baselines. Under this approach, the project developer evaluates what would have happened without the project and then estimates resulting emissions from this project. The difference between these two numbers is the net GHG reductions or removal from the project. Experience has indicated that this process is extremely time intensive and can be quite subjective. It is difficult to estimate what would have happened in the absence of the project and these assumptions can be manipulated by involved parties. Establishing a more straightforward method to determining additionality would lower transaction costs, provide a greater degree of environmental stringency, and streamline the crediting process. To reach these objectives, such methodologies will need to be:

- *credible* – to ensure that environmental objectives are satisfied;
- *transparent* – to ensure that assumptions are explicit and well-vetted; and,
- *practical* – to ensure that undue transaction costs are not incurred.

The Benchmark Approach

One approach that might satisfy the above criteria is the *benchmark* approach, which is sometimes referred to as the “sector baseline” method in contrast to the standard “project baseline” method used for all pilot JI activity to date. Benchmark “baselines” offer a common reference situation to be approved and applied across a broad category of projects, based on a general analysis of the relevant sector. The benchmark approach could potentially provide greater transparency, since a single sector-wide, baseline-setting exercise is easier to review than a multitude of project-specific, potentially idiosyncratic analyses. Finally, benchmarking provides an important means to reduce transaction costs to project developers. Although they would require substantial up-front sector-wide analysis, benchmarks would lower the costs and complexity of analyzing and agreeing upon baselines for individual projects.

The application of benchmarks is not unique to the problem of quantifying additionality for CDM/JI projects. Benchmarks, often referred to as “indicators” or “performance metrics,” have been considered for many other applications that involve assessing and comparing environmental or financial performance of firms, plants, or sectors. Benchmarks have also been used to gauge compliance with environmental regulations, for internal auditing of plant productivity, for assessing financial viability, and for developing industry-wide reporting formats.

Benchmark Issues

Two major features distinguish benchmark baselines from project-specific, counterfactual baselines:

- (1) *Intensive vs. extensive baselines:* Benchmark baselines will generally be derived from *intensive* measures of emission rates, i.e., carbon intensity, without respect to the *extent* (size or output) of a specific project. For example, an intensive baseline would use a metric such as grams of carbon dioxide per kWh, or tons of carbon dioxide per ton of steel. Additionality is then assumed to be satisfied as long as the project has an anticipated carbon intensity that is an improvement over the benchmark. Additional carbon savings are then *defined* to be: $PO * (BCI - PCI) = \text{Carbon Savings}$. Where PO = Projected Output, BCI = Benchmark Carbon Intensity and PCI = Project Carbon Intensity.
- (2) *Aggregation:* The benchmark approach aggregates on the level of the sector (or subsector), and abandons the goal of predicting what would have happened at a particular site in the absence of a specific project (project approach). A benchmark is applied to all projects within a given sector, looking at the historical or projected sectoral activities beyond the individual project. An assumption of this approach is that inaccuracy at the project level is statistically unimportant when averaged over a larger sample size, and that consolidating baseline-setting efforts across an entire class of projects offers an economy of scale that ultimately reduces transaction costs.

Three General Bases for Benchmark Setting

There are a wide variety of possible methodologies for constructing benchmarks. These benchmark approaches are classified below primarily by the source of information used to derive them: *historical* observation, *projections*, or *normative* standards. Illustrative examples of each are provided in the Table 1.

Historic benchmarks – Historic benchmarks are based on measurements of past performance of existing facilities. In many countries and sectors, systems are already in place for collecting and assembling data regarding key indicators such as amount and type of fuels consumed, physical amount or economic value of product output, and type of process used. These data are a logical starting point for constructing benchmarks, providing that reliable data are available and that past performance is an accurate indicator of future performance.

Projection-based benchmarks - Projection-based benchmarks attempt to project future behavior in light of emerging and expected changes: demand growth, market responses to resource prices, capital stock turnover, sector restructuring, availability of capital, and policies relating to greenhouse gas and other environmental objectives. Projection-based benchmarks are presumably more accurate than historic benchmarks insofar as they recognize that “the future can be different from the past.” Unlike historic benchmarks, they are not merely extrapolations of past behavior. Projection-based benchmarks can be drawn from existing plans (e.g., power sector expansion plans), scenario and forecasting exercises, expert opinion, or anecdotal evidence. Although they are, by design, more representative of “what would otherwise occur” than historically based benchmarks, projection-based benchmarks are also easier to game, more subjective, and are difficult to construct.

Normative benchmarks - Unlike the above two examples, normative benchmarks do not presume to represent what is likely to happen in a given sector in the absence of project activity. Rather, they explicitly incorporate policy or strategic objectives with the intent of providing incentives to certain types of projects or technologies or disincentives to others. This approach may be desirable if benchmarks based on historical evidence or available projections appear to enable crediting projects of dubious merit, or disallow sufficient crediting for those of obvious benefit. A normative approach might be used to “raise the bar” so that only less ambiguously beneficial projects are credited. It may also be desirable to create a more level playing field across sectors, countries, and regions, in order to avoid leakage or concentration of project activities in a small number of countries. In cases where there is simply too much uncertainty to make credible projections, normative benchmarks might also be more appropriate. Here we consider three types of normative benchmarks:

- *Performance-based benchmarks*, which can be based on best available technology, efficiency standards, carbon content standards, consistency with environmental policies (such as meeting Kyoto targets), etc.
- *Percentile benchmarks* that are based on a relative definition of “good performance”. Like historic benchmarks (above), they are generally derived from past performance data. The distribution of existing facilities in terms of carbon intensity (or efficiency) is established, and a normative criterion for good performance is set, such as the best 5% or 25%. The USEPA EnergyStar program is an example of a percentile-based normative approach.
- *Composite/other benchmarks* encompass all other approaches that might be envisioned for benchmark setting. For instance, an aggregate, sector-wide benchmark might be defined on the basis of most likely expected marginal additions (e.g., natural gas combined cycle in the electric sectors of some countries). But such a simple one-number-fits-all approach might run counter to some policy objectives such as encouraging technology development and transfer, or could ignore local constraints (e.g., limits to the availability of natural gas networks in some parts of a country). For this reason, a composite benchmark could combine additional policy considerations with a benchmark determined through the above methods. For example, in the electric sector, a benchmark might limit credits available to large, conventional low-carbon options such as nuclear or large-scale hydro under certain conditions.

Table 1: Illustrative benchmark examples

Benchmark basis	Project category	Example
Historical	steel production	- carbon intensity (kgCO ₂ /ton steel) of all steel plants, averaged 1992-1995
	electricity generation	- carbon intensity (kgCO ₂ /kWh) of electric power plants brought on line in 1990-1995
	natural gas	- carbon intensity (kgCO ₂ /million m ³ natural gas per

	distribution	km) due to leakage from current natural gas pipeline system
Projection	steel production	- carbon intensity of future steel sector, 2000-2010 under projected 1%/year efficiency improvement
	electricity generation	- carbon intensity of entire electric power sector under national electricity authority's most recent power development plan, 1998-2015
	natural gas distribution	- carbon intensity assuming planned extension and retrofits to pipeline system.
Normative	steel production	- carbon intensity of state-of-the-art direct reduction steel plant.
	electricity generation	- carbon intensity reflecting the top 10 percentile of existing coal steam power plants.
	natural gas distribution	- carbon intensity if all cost-effective improvements were made to pipelines, compressors and valves.

Other Distinctions and Issues in Constructing Benchmark Baselines

Average vs. Marginal - Benchmarks can be based on the analysis of *all activity or equipment* ("average approach") in a given project category. For the electric sector, for example, this would mean looking at the average carbon intensity of all electricity generation (either historical or projected) in a given system. Statistics summarizing all existing facilities are a very broad measure of total sector performance, however, they might be too aggregate to accurately characterize activity that would have happened in lieu of a project. To the extent that benchmarks should be a plausible estimate of the counterfactual scenario, in many cases there will be more accurate bases for benchmarks than the average performance of all activity.

Especially in sectors that are growing, a reasonable approximation of the activity that would be displaced by projects would be new capacity additions. Such ***marginal activity or equipment*** reflects the next increment to be added within a system in response to incremental demand. In the electric sector, for example, this is reflected in the source of marginal capacity or generation, i.e., the next unit to be built or operated in response to expanding electricity demand. Marginal additions therefore more accurately reflect what would have happened in lieu of a project if the alternative were capacity expansion, and therefore are a more appropriate basis for baselines (whether benchmarks or other baseline methodologies). Just as microeconomic theory argues that open markets respond to marginal, not average, price signals, a parallel argument could be made in favor of using marginal activity as the benchmark for CDM/JI markets to respond to. The standard project-counterfactual baseline approach asks the question of what would happen "to fill the margin in demand" for energy, for industrial capacity, for forest resources, etc., were a project not undertaken. In practice, marginal activity analysis is easiest for project categories such as the electric or petroleum production sectors that are composed of large incremental facilities or activities built and used by a limited set of actors.

Benchmarks based on all existing (average) units and marginal additions can differ greatly, for example, where the stock turnover is slow, the sector is large, or the growth rate is slow. Consider, for example, the Argentine electric sector. In recent years, capacity expansion has been largely based on hydro and high-efficiency (combined cycle) natural gas. The resulting carbon intensity of marginal additions is therefore considerably lower than the sector as a whole, which still includes a considerable amount of the higher carbon units: oil, coal, and less efficient natural gas. A significantly different benchmark would result from a calculation of carbon intensity based on marginal additions versus the entire electric sector.

Fixed vs. Updated Baselines - Although the procedures have not been finalized, it is likely that projects will be awarded credits as they are earned over the lifetime of the project, rather than in a lump sum when the project is initially accepted and implemented. This leaves open two possible approaches in terms of setting baselines and awarding credits: *updated* and *fixed* baselines. Fixed baselines refer to baselines that would be agreed upon when the project is conceived, and the awarding of credits would rely only on the performance of the project. Updated baselines refer to baselines that may be subsequently updated or otherwise adjusted during the course of the project based on ongoing observation. The awarding of credits therefore would rely not only on the performance of the project but also on the revisions to the baseline. Updated baselines in general are likely to yield more accurate estimates of additional carbon benefits. However, they also introduce more risk and uncertainty to the project partners in terms of the expected carbon credits generated by their project, over and above the existing risk from the inherent uncertainty about project performance.

Aggregation in Heterogeneous Sectors - An inherent problem that arises when attempting to simplify a process such as setting baselines by aggregating across an entire sector is that details within a sector that might be important are neglected. Industrial sectors are highly heterogeneous. Most sectors are responsible for a range of different outputs or products. For example, the pulp and paper sector produces newsprint, tissue, corrugated cardboard, chipboard, pulp, etc., which vary by more than a factor of two in their specific energy intensity. Similarly, within a given sector very different inputs or feedstocks are consumed (e.g., scrap steel vs. iron ore, recycled paper vs. pulpwood, natural gas vs. coal for electricity generation). This underlying heterogeneity must be considered when devising benchmarks for a given sector.

The proper balance between aggregation and disaggregation within a sector will depend on a case-specific determination of what are the proper incentives for investments in efficiency. Some degree of disaggregation might be necessary in those cases where switching between feedstocks, processes, or products isn't a viable option, and a sector-wide benchmark would provide no incentive for improvements within a subcategory.

Level of Geographic Aggregation - At first blush, it might appear obvious that benchmarks should be set at the national level, and separately for each country. Nations are the recognized Parties to the convention, Parties have specific responsibilities with respect to Convention, and much of the data upon which benchmarks can be readily set

are collected at the national level. However, there are three principal reasons to look more closely:

- (1) Some parts of a country may lack access to key low-carbon resources available in other parts. For example, one region may be located far from natural gas pipelines and exploitable wind resources that are available in other regions. Since project-based counterfactual methods can consider location, a higher baseline (i.e., one assuming greater emissions) might be established for this region. A benchmark set nationally, on the other hand, might be too low to credit a worthwhile project located in such a region. The converse also holds true, with a low-carbon-resource-rich conceivably generating false credits from an unduly high benchmark.
- (2) National benchmarks set independently without regard to benchmarks in other non-Annex I countries could create a market wherein countries with the highest benchmarks, all other factors equal, attract the bulk of investment.
- (3) National benchmarks set independently without regard to benchmarks in other non-Annex I countries or the value of equivalent investments within Annex I countries might lead to other, perverse situations, with respect to *projects that involve the production internationally traded goods*, such as steel or paper. For instance, project proponents might locate an efficient aluminum plant in a country with a high benchmark for electricity generation in order that its electricity savings yield the highest credit. However, this means that the electricity actually consumed would generate higher emissions than in a lower benchmark country that might otherwise have hosted the aluminum plant. Perversely, the existence of a CDM/JI regime could provide an incentive to expand energy consumption in regions with high-emissions energy.

Boundaries: Full Fuel Cycle Accounting, Project Lifetime and Leakage Effects -

In determining the carbon emissions of a given generating system, the standard problem of defining the system boundary obtains, most notably with respect to determining what carbon emissions in addition to stack emissions should a benchmark measurement incorporate. For most fuels, the magnitude of the upstream GHG emissions owing to the extraction, transportation, and processing of fuels is considerable – a 10% effect or more – but also highly variable, region specific, and difficult to reliably ascertain (ORNL/RFF, 1998; SEI/UNEP, 1995). Full fuel-cycle analysis is neither straightforward nor simple, and could result in double-counting if CDM projects occur at more than one point in the fuel chain.

Similarly, any baseline methodology must account for the even more subtle boundary issue of leakage. Leakage refers to cases in which a project does not reduce carbon emissions but merely displaces them to some off-site location. For example, this problem can arise in the context of forest protection projects, in which the underlying demand for forest products or land has not been reduced and deforestation activity might simply migrates to nearby unprotected forests. Energy efficiency improvements can reduce the overall cost of energy services (and energy prices), resulting in increased consumption that partially offsets the efficiency gains. (An opposing effect might also occur, if increased demand for renewable or efficient technologies reduces their cost of production, which in turn increases their level of market penetration outside the project.)

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Attached please find two documents for your review:

- Revised draft of the CDM options paper. In order to focus discussion, the paper only addresses those issues covered in the last meeting (institutional issues) and other key issues which need to be addressed in Wednesday's meeting. These include Equity Concerns (paragraph 2), Use of ODA (paragraph 2g), and CDM as Lever for Developing Country Engagement (paragraph 3). The last page includes a final recommendation that the remainder of issues be delegated to a staff level interagency group for further analysis. It is also proposed that this group establish a timetable for producing clear recommendations on each of these issues.
 - A redraft of the benchmark paper. This paper outlines implications of key policy decisions related to benchmarking. This paper is not intended to drive decisions for each issue, but to provide a framework to define priorities for benchmarking outcomes.
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Clean Development Mechanism Design and Operation Options Paper

The Clean Development Mechanism (CDM) offers the opportunity to generate greenhouse gas emissions credit beginning in the year 2000. This paper is intended as an initial effort to define the CDM and to help policymakers take decisions on key issues involved in establishing an operational CDM.

A major difference between the CDM and emissions trading involves the motivations of agents involved in the transaction. Participants in an emissions trading transaction have complementary motivations – one wishes to purchase tons and one wishes to sell; in registering this transaction, each will provide a check on the other. In a CDM transaction, however, both agents in the project may have a similar motivation to overstate the Certified Emission Reductions (CERs) generated from a project. Thus, in establishing the mechanisms and procedures that underpin the CDM, it is important to balance incentives – pursuit of a sufficient number of cost-effective projects and procedures that result in protection of the environment. Policy choices made will impact where on the spectrum our position falls relative to these two distinct, though not necessarily mutually exclusive, objectives. Identifying this position will also influence to what extent the U.S. should lead internationally on CDM issues versus allowing the agenda to be developed by other Parties.

The following sections outline key CDM design and operation issues by topic area. The policy recommendations stress the core objectives of establishing the CDM on a timely basis; achieving real and verifiable GHG reductions; maintaining low transaction costs; and engaging developing countries.

1. Institutional Structures

The institutional structure of the CDM should support sustainable development in developing countries and provide a means for Annex B Parties to reduce the costs of meeting their targets under the Kyoto Protocol. An Executive Board supervises the CDM and implements guidance provided by the Conference of Parties through the Subsidiary Bodies to ensure transparency, efficiency and accountability by overseeing activities of participating Parties, operational entities, and public/private entities. The recommendations below provide specific guidance on key institutional aspects of the CDM.

Policy Recommendations:

(1a) Executive Board Functions: The Conference of Parties would set overall guidance for the CDM; the Executive Board would implement this guidance and elaborate on methodological, operational and technical issues. In some cases, the Executive Board may need to rely on outside experts or technical panels to develop methodological or technical guidance. Decisions of the Board would represent the interests of both developed and developing countries.

(1b) Executive Board Structure: A relatively small board would be preferable (e.g., 12-14 members). The CDM Executive Board could draw upon the model of the Executive Committee of the Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol as an

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example. In this case, the Executive Board would be comprised of seven members each from Annex I and non-Annex I Parties, each serving two-year terms with the ability to serve consecutive terms. The chair and vice-chair of the Board would alternate each year between the two groups. Nominations of Annex I members would be limited to Annex I Parties and nomination of non-Annex I members would be limited to non-Annex I Parties. Decisions would be made by consensus of the Board. The UNFCCC Secretariat would provide administrative support to the Executive Board.

(1c) Operational Entity Functions: Under the Protocol, operational entities will be responsible for the certification of emission reductions resulting from project activities under the CDM. In order to ensure environmental legitimacy while maintaining low transaction costs operational entities would use standard and transparent methodologies in evaluating and certifying projects. The Executive Board would develop these guidelines and ensure that they were being followed through periodic evaluation of these entities.

(1d) Operational Entity Selection: Operational entities should be qualified to ensure that CERs are credible and selected to ensure broad coverage of all regions. A decentralized network of specialized private sector institutions may best serve these needs, but all efforts would be made to ensure that standardized criteria is used by the entities for evaluating all projects and certifying CERs. Strict measures would be taken to ensure no conflict of interest among participating institutions. These guidelines would clearly restrict any operational entity from involvement in CDM project development, promotion, financing or implementation.

2. Equity Concerns

As a market-based mechanism, the CDM will provide low-cost opportunities for GHG reductions while simultaneously promoting the flow of private capital toward CDM projects in less developed nations. Because the vast majority of financing for CDM projects will be private, the distribution of projects will be determined in large part by the market. At the same time, there is a fear among many developing countries that virtually all projects will be developed in countries where investment is already going, or where abatement costs are very low. In order to address this equity concern, the structure of the CDM and related policies can be developed to ensure broad participation of developing countries in this flexibility mechanism.

Policy Recommendations:

(2a) Comprehensive Inclusion – Comprehensive inclusion of project categories (reduction and sequestration) and all gases, unless one or more is shown to be ineligible (e.g., because of high potential for leakage from individual projects), will promote broader participation in the CDM. Although the U.S. has supported the inclusion of sinks (a controversial position), the development of a position on sinks should work in parallel with the IPCC process on this issue. All projects should be eligible for CDM certification, however, they must meet established CDM criteria.

(2b) Measures to Ensure Broad Participation - Broad inclusion of CDM projects in a range of host countries may be achieved through non-market distorting policy measures. These measures include: the creation of a CDM clearinghouse function to match hosts with potential investors;

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the inclusion of a comprehensive range of project types; and the provision of technical assistance to host countries interested in hosting projects.

(2c) Measures to Assist Financing - Project bundling for smaller countries or the creation of CDM “mutual funds” led by private sector institutions may provide unique opportunities to facilitate financing of projects in countries where they may otherwise not occur. Valuing CERs from select countries at a higher rate may improve investment flows as well.

(2d) Projects Initiated by Developing Countries– In addition to hosting CDM projects using financing from project developers, non-Annex I countries may unilaterally develop CDM projects in their country or in another non-Annex I country. CERs generated from this project activity may be either traded or banked for use against future commitments. Standardized registration criteria as well as monitoring, verification and certification protocols would be used for assessing these projects. In addition, unilaterally generated projects would be subject to the CDM administrative and adaptation fees.

Policy Issues Needing More Discussion:

(2e) Other Incentives: In addition to the above options, other financial incentives could be used to ensure regional dispersion of CDM projects such as quotas, differentiated baselines, and CER bonuses. Although useful, these policies may raise costs, promote activities where abatement costs are not low, and distort the market functioning of the CDM. A decision should be made on whether incentives should be considered despite their effects on the functioning of the market.

(2f) Policies as Projects - Policies that lead to project-level reductions could also be allowed under the CDM, however, CERs would only accrue from actual project activities that resulted from the policy. Baselines for this type of CDM project may be difficult to develop and verify, and create disincentives for countries to move toward a trading regime. A decision should be made on under what specific circumstances policies may be included under the CDM, and the requirements needed to transparently assess resulting additional reductions.

(2g) Use of ODA and/or Public Funds - Although the bulk of CDM financing will come from private sources, these funds may be used in various ways to finance or provide support to CDM project development. The context and circumstances under which these funds are used need to be identified. This issue is particularly important since Japan strongly supports the use of ODA, while the EU opposes its use. Developing countries are also particularly sensitive about reprogramming limited ODA away from traditional uses.

3. CDM as Lever for Developing Country Engagement

The CDM is unique in that it engages both Annex I and non-Annex I Parties in project activities. Although it is the U.S. position that Annex I Parties must necessarily be in compliance with Article 5 and 7 of the Protocol to use flexibility mechanisms, there is no policy position on requirements for CDM participation of non-Annex I countries. Additionally, the Kyoto Protocol does not clearly state eligibility requirements/compliance measures for non-Annex I Parties.

DRAFT – Do Not Cite or Quote – 2/9/99**Policy Recommendations:**

(3a) Eligibility Requirements - Additional CDM eligibility requirements of non-Annex I Parties should be explored as a means to ensure that the CDM helps to move developing countries to further commitments and toward participation in a trading regime. Currently only the requirement of a first National Communication under the FCCC exists. Other options include: developing countries be Parties to the Kyoto Protocol to participate in CDM or to receive proceeds; or, the requirement to do regular inventories in those sectors where CDM projects are taking place.

4. Issues Recommended for Review under an Interagency Process at the Staff Level

A large number of outstanding issues related to the CDM still need to be reviewed at the staff level. It is proposed that the following list of issues not be raised to the Assistant Secretary level at this time, but delegated to an interagency staff working group for discussion and technical analysis. This group should also establish a timetable for producing a set of recommendations on each of these issues.

CDM Eligibility and Compliance Issues

- Participation of Parties
- Independent Auditing and Verification
- Transaction Relationships
- Definition of “part of” under the CDM
- Sustainable Development Criteria
- Project compliance under the CDM
- Compliance with Protocol

Baselines and Benchmarking

- Project Registration
- Choosing a Baseline or Benchmark
- Additionality
- Prompt-Start Approach to the CDM
- Level of Aggregation
- Period for Earning CERs
- Key Characteristics of a Top-Down Baseline
- Marginal versus Average
- Design of Top-Down Baselines
- Who Establishes Baselines

Division of CERs and Share of Proceeds

- Unit of Measure for Certified Emission Reductions
- Share of Proceeds
- Use of Adaptation Funds
- Role of Private Entity

Issues Associated with Creating Effective Benchmarks for the CDM

February 10, 1999

Background

Project-level greenhouse gas (GHG) emissions reductions have historically been evaluated using project-by-project baselines. Under this approach, the project developer evaluates what would have happened without the project and then estimates resulting emissions from this project. The difference between these two numbers is the net GHG reductions or removal from the project. Experience with US LJ has indicated that this process is extremely time intensive and can be quite subjective. It is difficult to estimate what would have happened in the absence of the project and assumptions made can be manipulated by the parties involved. Establishing a more straightforward method to determining additionality would lower transaction costs and streamline the crediting process.

Benchmark Concept:

Benchmarks can be used to determine certified emission reductions resulting from projects within the Clean Development Mechanism (CDM). The purpose of benchmarks, rather than project specific counter-factual baselines is to lower transaction costs and reduce subjectivity. Any project that is more efficient than the benchmark will be considered additional. Certified emission reductions (CERs) can be determined based on the difference between the benchmark and the project performance.

Benchmark Development:

Once guidelines are established, developing the benchmark could be quite straightforward. Agreeing upon the guidelines, however, may be a difficult process. There are few clear answers and most decisions will entail a trade-off between competing goals. EPA has evaluated the options theoretically and by using real data for selected developing countries. This analysis can help frame the trade-offs and the implications of different choices. Additional analysis is needed to choose the appropriate method that will help the U.S. meet its environmental and economic priorities within the CDM.

The main characteristics of an effective CDM benchmark will be:

- High Environmental Integrity. A benchmark will have high environmental integrity if it allows minimal non-additional credits.
- Low Transaction Costs. Creating a benchmark will incur some costs that can be added to the overall transaction costs of the CDM. The fewer permutations needed, the lower the cost of the benchmark system. In the following graphs, 'high' means that the option ranks well for low transaction costs (i.e., has relatively low transaction costs).
- High Participation. High participation in CDM will allow more tradeable credits and therefore reduce the overall cost of compliance with the Kyoto protocol.
- High Investor Certainty. Theoretically, CDM credits will provide incentives to reduce emissions. Prior to making an investment, the investor will want to increase his or her certainty of the amount of credits that will eventually be awarded.
- Incorporates New Technologies and Trends. New technologies and trends may change our estimate of what would have occurred in the absence of CDM credits.

The following paper outlines some of the choices and the associated trade-offs among the above goals.

Issues and Trade-offs

Global versus Regional Benchmark

More regionally-specific benchmarks may lead to higher accuracy, but also higher transaction costs. Equity issues between countries may also be a consideration.

	Global Benchmarks	Country-specific Benchmarks
Environmental Integrity	Low	High
High Participation	No Impact	No Impact
Low cost to create benchmark	High	Low
Investor Certainty	No Impact	No Impact
Incorporating New Technologies or Trends	No Impact	No Impact

Average versus Better-than-average data

A benchmark can be set at either an average or a better than average level. The associated trade-off is between environmental integrity and high participation.

	Average	Better-than-average
Environmental Integrity	Low	High
High Participation	High	Low
Low cost to create benchmark	No Impact	No Impact
Investor Certainty	No Impact	No Impact
Incorporating New Technologies or Trends	No Impact	No Impact

The benchmark could be set at a range of better-than-average benchmarks. For example: the best 25th percentile, the best 10th percentile, the last most efficient unit, the best available technology/practice. As you move toward more strict benchmarks, you risk less participation. The magnitude of trade-offs among these choices will also depend on how each sector is aggregated. For example, in the U.S. electricity sector, the best 25th percentile is zero emissions (due to the high portion of hydro and nuclear). This problem would be less severe if you used a fossil only benchmark.

Frequency of Benchmark Updates

Benchmarks will need to be periodically updated to account for new technologies and trends. The frequency of these updates depends on the relative value of higher costs as opposed to the accuracy of benchmarks. More frequent updates will increase the cost of benchmarks. Infrequent updates will not account for new technologies and trends. Note that this is not necessarily a matter of environmental stringency since carbon efficiencies within a sector do not necessarily go down over time.

	Every 10 years	Every year
Environmental Integrity	Low	High
High Participation	No Impact	No Impact
Low cost to create benchmark	High	Low

Investor Certainty	High	Low
Incorporating New Technologies or Trends	Low	High

Note: Incorporating New Technologies is ranked low because projects may take a while before they begin operation. Longer periods between updates may allow a project to apply under the benchmark that exists during the initial stages of project development (prior to benchmark lock-in)

Length of Time that A Given Benchmark Applies to a Project

Benchmarks will be revised periodically. The benchmark will apply to the project for a given amount of time. The length of time that a project is measured against its initial benchmark will affect the level of investor certainty about how many credits the project may yield. Allowing benchmarks to apply to the lifetime of the project may continue to credit obsolete equipment that should be retired. Applying each new update to a given project lowers the investor certainty of the number of credits.

	Actual Lifetime of Project	Until New Update
Environmental Integrity	Low	High
High Participation	High	Low
Low cost to create benchmark	No Impact	No Impact
Investor Certainty	High	Low
Incorporating New Technologies or Trends	Low	High

Additional choices may provide a good compromise between allowing

- *Benchmark applies to estimated capital recovery of project.* This would provide the incentive to upgrade technologies once the investment is paid off, however, it is unlikely that the promise of new credits will prompt capital turnover prior to some profit yield.
- *Benchmark applies to estimated lifetime of project.* Each project and technology has an estimated lifetime. The estimated lifetime could be determined at the pre-certification phase.

Level of Sectoral Disaggregation

The appropriate level of sectoral disaggregation will vary by sector. Higher sectoral aggregation will lower the cost to develop the benchmark, however, highly aggregated sectors may not create the correct incentive. For example, China's electricity is largely coal and hydro. Establishing a benchmark for all fossil fuel will create one line for a bi-modal distribution. This would credit all hydro (whether additional or not) and create a benchmark that is too stringent for the cleanest coal to qualify.

	Aggregate	Disaggregate
Environmental Integrity	Low	High
High Participation	Undetermined	Undetermined
Low cost to create benchmark	No Impact	No Impact
Investor Certainty	High	Low
Incorporating New Technologies or Trends	Low	High

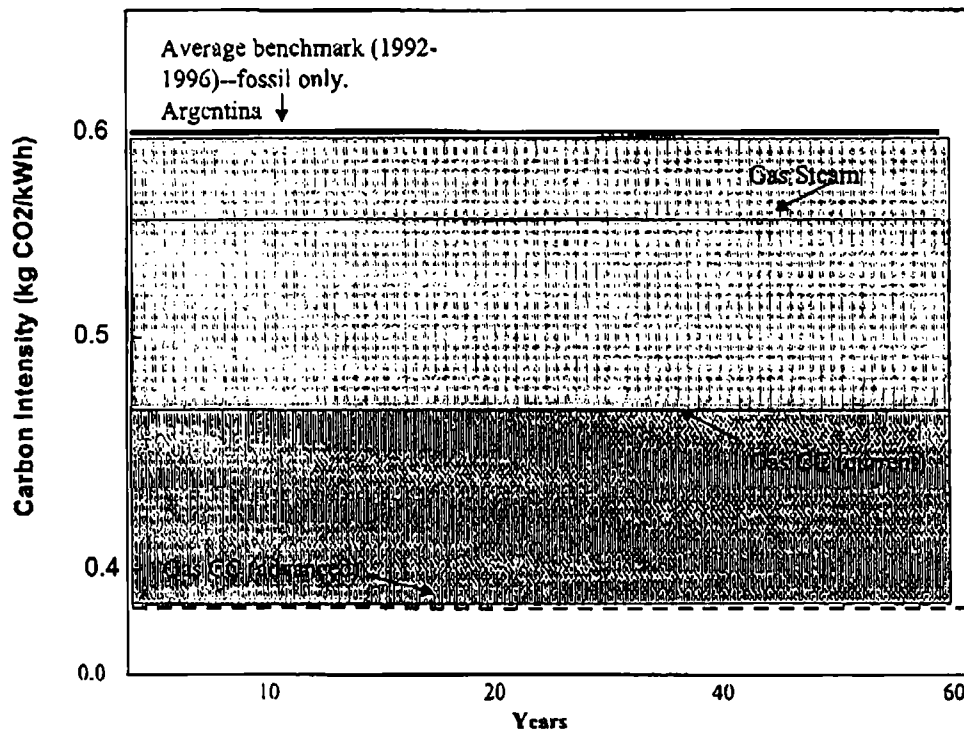
EXAMPLES

The following are two examples of benchmarks in the electricity sector and a brief discussion of the related trade-offs.

Benchmark #1:

- By country (example: Argentina)
- Average of last 5 years of capacity additions
- For fossil only
- Updated every 10 years
- Benchmark lasts for the lifetime of the project

Benchmark Example #1: Argentina



In this example, the number of credits allowed for a current technology combined cycle are illustrated by the checked box. Argentina's new capacity is likely to be gas combined cycle regardless of CDM. This would mean that most of the awarded credits for this project are not really additional. Using a fossil only benchmark increases the overall benchmark above many new natural gas technologies since Argentina's historic mix for the 5 year period includes oil. Also, allowing the credits to be awarded for the lifetime of the project exacerbates the number of non-additional credits. If capital recovery occurs at 20 years, then these credits may be sustaining an inefficient plant (in comparison to modern technologies) for an additional 30 - 40 years.

The darker box illustrates the additional credits that may be gained by moving from a typical natural gas combined cycle to an advanced model. A combined cycle natural gas plant would accrue the additional credits, plus all the non-additional credits in the above box. Although some of these credits are additional for the time the capacity was built, the plant may not be carbon efficient compared to future electricity generation options. Extending the life of the benchmark to the full life of the plant

may help keep an obsolete plant in operation.

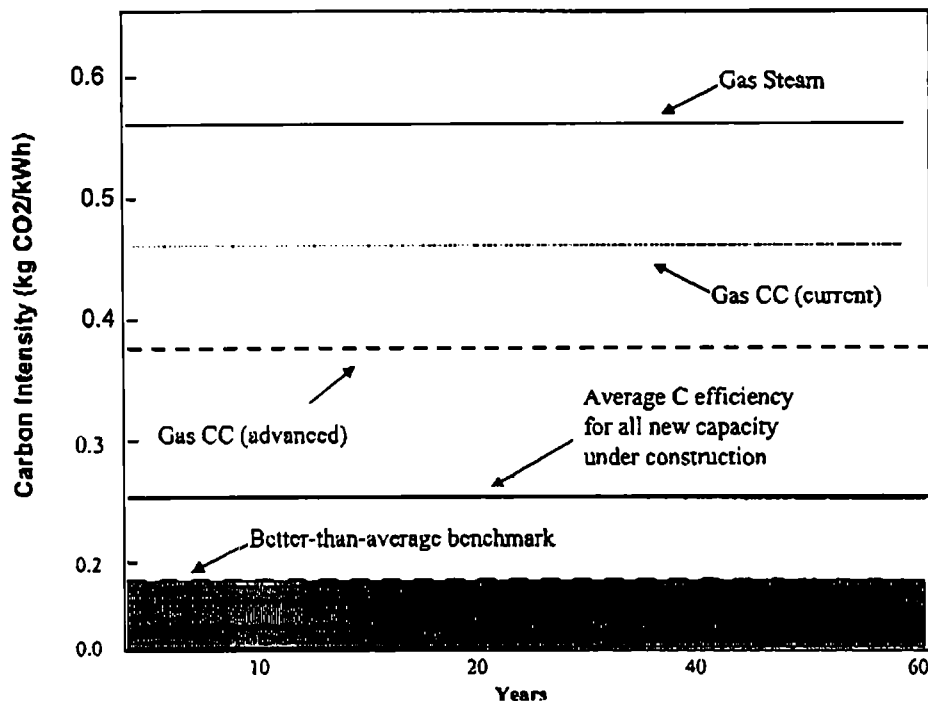
Since this benchmark is fossil only, large-scale hydro and nuclear don't apply and therefore the amount of non-additional credits is limited to the upper box.

If the benchmark is updated every 10 years, then the number of non-additional credits will continue to flood the market. While additional credits lower the overall cost of compliance for Annex B countries, they also lower the environmental effectiveness of the Kyoto Protocol.

Benchmark #2:

- By country (example: Argentina)
- Better than average of new capacity additions under construction
- For all generation (all types of fossil, all zero-carbon)
- Updated every year
- Benchmark lasts until capital recovery

Benchmark Example #2: Argentina



Benchmark #2 is so environmentally stringent that even the most advanced and carbon efficient fossil technology does not get credit. Under this benchmark, only zero-carbon technologies are credited. It is unclear whether these technologies are additional or not since Argentina already has significant portions of hydro and nuclear. In this case, even if the benchmark is set at the average carbon efficiency for all new capacity under construction, it would still be lower than most carbon-efficient fossil technology. In this case, the driving factor is the mix of zero-carbon technologies in an average electricity benchmark.

The benchmark is updated every year which will increase the cost of creating a benchmark to which very few projects will qualify.

Since the benchmark for each project is only applicable until the point of capital recovery, any non-additional emissions from hydro or nuclear will be limited.



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February 16, 1999

TO: DISTRIBUTION

FROM: Mark Mazur

SUBJECT: CDM Papers for Tuesday, February 16 Meeting

Attached you will find a redraft of DOE's example paper that will be discussed at this afternoon's meeting with Todd Stern.



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Example of Step-by-step Process for CDM Power Plant Project in China

This paper provides an example of how a project might go forward under CDM using one benchmarking approach to calculate certified emissions reductions (CERs) generated from a project. Appendix I lists issues that have been identified for further consideration. Appendix II contains an example of calculations that establish a range of baselines that might be chosen as benchmarks. Note that each of these choices would lead to a different value for emissions additionality.

Step I: Company Develops Project

- **Description of a potential Project:**
An 800 megawatt IGCC coal-fired power plant is being planned in Shandong Province in China. It will be partially financed by a U.S. company, say Southern Company, and owned and operated by the Shandong International Power Company (SIPC), which is the local planning commission. SIPC plans to use the electricity generated from the project for Shandong's electric grid. Approval for the project must come from China's State Power Corporation (which oversees power plants and grids for China) and China's State Development Planning Commission (which approves projects in excess of \$30 million). Southern Company and SIPC are using a highly efficient technology and expect that the carbon emissions per megawatt hour (MWh) for this plant will be lower than the carbon emissions associated with the approved benchmark for power-plant projects in China.
- **Provide Calculations of Project's Projected Emissions:**
The project developers (Southern Company and SIPC) estimate emissions based upon the plant design, expected operating parameters, and analysis of the carbon content of the intended fuel source. They estimate emissions to be 417 pounds of carbon per MWh of output. The plant's life expectancy is 40 years. Given that the developers expect the plant to be baseload with a 90 percent availability factor, annual generation from the plant is projected to be:
$$800 \text{ MW} (8760 \text{ Hr/Yr}) (0.90) = 6.3 \text{ million MWh}$$
$$\text{Annual carbon emissions: } 417 \text{ lbs} \times 6.3 \text{ million MWh} = 2627 \text{ million lbs or } 1.1941 \text{ million metric tons of carbon (MMT) per year}$$
- **Develop Proposal and Estimate "Emissions Additionality"**
The CERs generated from a project will vary considerably depending upon the exact specifications of the baseline used to determine the benchmark (e.g., average or better than average of last 5 units, coal-fired plants in last 5 years only, all plants in last 5 years). Thus, benchmarks could vary significantly depending on the data used. See Appendix 2.

The project developers collect information from the China's State Power Corporation to estimate the range of possible benchmarks. Based upon Executive Board guidelines for power plants of this project's type and size range, the rate of emissions from all power plants built in the past 5 years will be used to establish baseline conditions for this example.

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The appropriate benchmark would be 504 lbs of carbon per MWh of output. The expected number of CERs generated, therefore, would be:

$[(504 \text{ lbs/MWh}) - (417 \text{ lbs/MWh})] \times 6.3 \text{ million MWh} = 548 \text{ million lbs or } 0.249 \text{ million tons of carbon per year.}$

Assuming a market price of \$20/CER, the value of the expected CERs generated per year is estimated to be worth \$5.48 million.

- Southern Company negotiates with Shandong International Power Corporation to determine division of CERs. In this case, Shandong agrees to keep 25 percent of the CERs generated after 2 % is collected for "proceeds." Southern Company will keep 75 percent of the CERs generated after payment of "proceeds."
- No CERs are generated at this time; actual CERs are generated annually after certification (see Step VI)

Step II: Submit to Host Government for Approval

- The project developers submit the project for approval to China's designated approving authority, the State Development Planning Commission (SDPC). The SDPC has established a set of guidelines that must be met before it grants approval, including consideration of how this project meets China's sustainable needs and objectives.
- The Chinese Government approves the project. Such approval implies that the project is consistent with China's sustainable development needs and objectives.

Step III: Submit to Operational Entity for Registration:

- The project developers provide a letter from China's SDPC to the Operational Entity that indicates China's approval of the project. China's approval implies "voluntary participation by both Parties," a requirement of Article 12.5a of the Kyoto Protocol
- The project developers provide calculations from Step I to demonstrate that the project provides "real, measurable, and long-term benefits" and that the estimated savings in emissions are "additional."
- Baseline is approved by Operational Entity.

Step IV: Emissions Monitoring, and Reporting:

- The project developers use monitors to ascertain CO₂ flows from the project on a real-time basis, consistent with guidelines set forth by the COP/MOP.
- The project developers report on emissions and emissions saved annually to the Operational Entity based on the approved benchmark. For year Y, the project developers report that the plant actually operated at an 80 percent availability factor, and reported the following:
 $800 \text{ MW} (8760 \text{ Hr/Yr})(0.80) = 5.6 \text{ million MWh}$
 Actual emissions: $5.6 \text{ million MWh} \times 417 \text{ lbs} = 2335.2 \text{ million lbs or } 1.06 \text{ MMT}$
 Saved emissions for year Y are:
 $[(504 \text{ lbs/MWh}) - (417 \text{ lbs/MWh})] \times 5.6 \text{ million MWh} = 487.2 \text{ million lbs or } .22 \text{ MMT}$

Step V: Verification

- The project is subject to random, independent audit. Auditor X has been certified by the Executive Board to do random, third-party audits for Chinese CDM projects to verify information contained in annual reports. In this case, the project developers' year Y report was audited by Auditor X, which verified the emissions generated and saved as reported by Southern Company and SIPC. Auditor X communicates its conclusions to the Operational Entity.

Step VI: Certification

- Operational Entity "checks" submitted report to ensure that the project developers have completed correctly the standard format approved by the Executive Board. An additional "check" for this project has occurred in the form of a random audit by Auditor X.
- Once the Operational Entity approves the report, thereby certifying the results, it transfers the CERs, minus the 2% deducted for "proceeds," to SIPC. SIPC, in meeting its contract with Southern Company, then transfers 75 percent of the remaining CERs to Southern Company.
- The Operational Entity reports all CERs to the Executive Board.
- Southern Company reports its CERs [$.75 \times .98 \times .22 \text{ MMT} = .16 \text{ MMT}$] to the U.S. National Registry for adjustment of its holding of CERs. Shandong International Power Corporation reports its CERs [$.25 \times .98 \times .22 \text{ MMT} = .05 \text{ MMT}$] to China's National Registry (assuming there is one).

Step VII: Appeal Process (if necessary):

Appendix I**Issues that Arise for Further Consideration****Step I: Company Develops Project**

- Some of the benchmarking issues: Who determines benchmark? For historical information about Chinese power plants, who provides information? If Chinese government is charged with responsibility, what happens if it doesn't cooperate or work fast enough? How to prove accuracy? Who is responsible for proving accuracy? What is the appropriate level of aggregation for the benchmark (e.g., electric power generation vs. coal-fired electricity)? For industrial projects, level of aggregation will be even bigger problem? Should benchmarks be determined by province, country or region?
- What is the process for case-by-case determination of a project's baseline?
- In determining additionality, should baseline calculations be based on the average or better than average plant? Should these calculations be based on total existing capacity/trends or new capacity/trends?
- Is calculation of proceeds for developers' use only or should it be required in submission to operational entity?

Step II: Submit to Host Government for Approval

- Is host government required to have CDM point of contact with decision-making authority?
- Should there be a deadline for host government approval process?

Step III: Submit to Operational Entity for Registration

- Who should provide proof of host government approval?
- What is the nature of registration? Is it pro-forma or is there an evaluation?
- Should there be a requirement for a submission on other environmental implications, such as transboundary effects?
- Regarding "voluntary participation approved by each Party involved" (section 12.5a of KP), how is this proved? Is host government certification enough or must each government provide such a certification (this could involve more than 2 if a multinational company wanted to divide CERs among more than one Annex B Party)? Does this language imply that only Parties to the Kyoto Protocol can engage in CDM projects? [Need State/Legal to evaluate]

Step IV: Emissions Monitoring and Reporting.

- Must every CER be entered into a national registry (to ensure double entry accounting and verification) or could developers sell CERs without notifying national authority? Who reports CERs to national registry?

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Step V: Verification

- Does verification occur before or after certification?
- Which independent entities will be allowed to verify emissions reductions (operational entity or other third-party verifier)?
- Will each project be subject to a verification process, or will projects be verified selectively?

Step VI: Certification

- Is certification of CERs by operational entities automatic (unless an audit determines inappropriate calculation) or should an affirmative decision to certify be required by the operational entity each year? Should the IRS random audit model be used?
- Does operational entity have a formal auditing process? If so, does Executive Board write the rules for this or does the COP/MOP? If there is an auditing process, who does audits? Third-Parties or Operating Entity?
- Should Operational Entity report CERs to Executive Board or the UNFCCC to allow third parties to verify that CERs were indeed certified?

Step VII: Appeal Process (if necessary):

- What type of audit can overturn certification of CERs?
- Should there be a review process established that allows Executive Board to overturn CERs?
- What type of appeal process should be established?
- Would a project developer or its government represent its interests in an appeal?
- If appeal process imposed, should there be a deadline for resolution of appeal?
- Is revocation of CERs the worst consequence? Is Executive Board the final authority?

[note: numbers in calculations are hypothetical because detailed information was not available]

- Hypothetical average and marginal emissions per unit of output [note that a “better than average” performance standard could have been used here, but for simplicity, average performance is used]:
 - From coal-fired facilities of 200 MW built [commissioned] in the last five years: 660 lbs/MWh
 - From the last ten coal-fired facilities of 200 MW or more: 620 lbs/MWh
 - From all coal-fired facilities in the past year: 620 lbs/MWh
 - From the last five coal-fired facilities of 200 MW or more: 600 lbs/MWh.
 - From all units (coal, nuclear, oil, gas-fired, hydro, wind) of 200 MW or more built in the last five years: 504 lbs/MWh [*Benchmark used in example*]
 - From last (marginal) coal-fired unit built: 417 lbs/MWh

Based upon coal-fired units built (commissioned) during last five years:
 (660 lbs/MWh) - (417 lbs/MWh) x 6.3 million MWh = 1531 million lbs or .70 MMT
 or 700,000 CERs

Based upon last ten coal-fired units:
 (620 lbs/MWh) - (417 lbs/MWh) x 6.3 million MWh = 1279 million lbs or .58 MMT
 or 580,000 CERs

Based upon all coal-fired units built during past year:
 (620 lbs/MWh) - (417 lbs/MWh) x 6.3 million MWh = 1279 million lbs or .58 MMT
 or 580,000 CERs

Based upon last five coal-fired units:
 (600 lbs/MWh) - (417 lbs/MWh) x 6.3 million MWh = 1153 million lbs or .52 MMT
 or 520,000 CERs

Based upon all units (including nuclear, gas, oil, etc.) built during last five years:
 (504 lbs/MWh) - (417 lbs/MWh) x 6.3 million MWh = 548 million lbs or .25 MMT
 or 250,000 CERs - [Benchmark used in example]

Based upon last coal-fired unit built:
 (417 lbs/MWh) - (417 lbs/MWh) x 6.3 million MWh = 0 lbs or 0 MMT

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To: Addressees

From: David Doniger

February 16, 1999

The attached paper, for the meeting Wednesday, Feb. 17, at 5:30, addresses U.S. strategy on international emissions trading between now and COP-6. A summary is also included.

In addition to input from EPA staff, I had help on the compliance/liability section from Sue Biniarz at State.

Please give me any comments you may have.

Phone: 260-7400

Fax: 260-5155

E-mail: Doniger.David@EPA.GOV

EMISSIONS TRADING STRATEGY TOWARDS COP-6: SUMMARY

The U.S. and its Umbrella Group partners have made substantial strides on emissions trading. We still face three kinds of obstacles, however, before our blueprint commands sufficient acceptance to be adopted at COP-6:

- Continued lack of understanding and fear.
- Continued pursuit of restrictions by many countries.
- Collateral linkages to other matters, both related (like CDM) and unrelated (like compensation).

This summary of the attached paper focuses on five areas where the U.S. can take steps to overcome the first two kinds of obstacles (linkage issues fall outside the scope of this paper):

(1) Guidelines for emissions measurement and reporting. To address concern that countries and legal entities participating in emissions trading will not accurately monitor or report their emissions, the U.S. should continue to emphasize the need for strong monitoring and reporting requirements for *all* Annex I Parties, traders and non-traders alike. We should continue our leadership role in efforts in the IPCC, Annex I Experts Group, and other venues, to develop the guidelines required under Articles 5 and 7 for national systems to estimate emissions and for reporting on emissions inventories. This includes the IPCC process for preparing "good practice guidance" to beef up the existing measurement methods; the U.S. is a co-chair of that process and is represented on a task force to coordinate activities relating to the measurement and reporting guidelines. Monitoring and reporting is an area where common interest is already evident among participants from the Umbrella Group, the EU, and the G-77.

(2) Guidelines for national registries. To address concern over how to keep track of trading activity, the U.S. should continue to push proposals for a system of computerized and interlinked "national registries" (based on our acid rain program), which has generally found favor with American and foreign business interests, and which has reduced concerns in the EU and elsewhere about the participation of legal entities.

Our goal for COP-6 is (1) to include a requirement for national registries in the trading rules, and (2) to adopt a guideline containing technical specifications for compatible computer hardware and software for registries. This would enable countries that want to move ahead right away with trading (and CDM and JI) to set up compliant registries immediately thereafter. The next phase of our efforts is focused on showing more concretely how a computerized registry system would work, with presentations at the workshop on mechanisms in Bonn in April and a two-computer demonstration planned for the SBSTA meeting in June.

(3) Compliance and liability. In the context of emissions trading, "compliance" has been used as a shorthand for a range of measurement, reporting, and accountability issues. The U.S. has tried, with increasing success, to bring order and structure to this discussion, by breaking the issues down into three groups:

First, as already described, we have focused attention on the need to elaborate the measurement and reporting requirements of Articles 5 and 7 applicable to *all* Parties with binding

Uncleared draft, do not quote or cite, Feb. 16, 1999

Summary p.1

emissions targets, whether they trade or not. Second, in order to bolster the credibility of the trading regime itself and to promote compliance with the Protocol's key accountability requirements, we have proposed to suspend a Party's access to trading if the Party has been determined to be out of compliance with Articles 5 or 7, or with its obligation to maintain a national registry. Third, we need to address procedures should used to determine if a Party is in non-compliance with trading-related requirements, and what consequences should follow. These are a subset of broader issues being discussed in the compliance process set up in Buenos Aires.

The specific issue of "liability" — how to address the risk that a Party may exceed its target in part because it traded away some of its assigned amount that it needed — is difficult to resolve on its own. Our strategy has been not to concede anything, if at all, until the end-game, when other major issues, including supplementarity, are resolved. In the meantime, we should take steps summarized below to address the EU's fear of potential Russian overselling, the primary concern underlying the liability issue.

(4) Reducing pressure for "supplementarity" restrictions. It is a fundamental objective of the U.S. position that the rules for the flexibility mechanisms must not be restricted by elaborating the meaning of the word "supplemental," setting "concrete ceilings," or placing other "quantitative or qualitative" restrictions on trading. The strongest tool we have to resist these restrictions is the knowledge on the EU side that they are incompatible with a strategy to obtain U.S. ratification. The greatest danger is that the EU will be under some equally strong compulsion to stand its ground, potentially leading to a stalemate. Our goal in the meantime should be to find ways to make it easier for the EU to back down on this position.

One avenue is domestic action. We should recognize, however, that more measures on the scale of our current voluntary programs, tax incentives, and budget proposals are unlikely to have the desired impact on international perceptions.

A second avenue is to work with Russia and the other economies in transition (EITs) to take steps that mitigate EU concerns about those countries' participation in trading. We are discussing with the Russian government a possible commitment to dedicate all or part of the proceeds from the first phases of emissions trading to (1) building their emissions monitoring system and (2) making project-level investments in energy efficiency and other emission-reducing or sink-enhancing measures. We also intend to work with Russia to establish its national registry. Getting the appropriate commitments from Russia will take sustained highest-level diplomacy and technical cooperation. If successful, however, these steps might be sufficient, if put forward at the right time, to allow the EU to retreat from its proposed restrictions without losing face.

We should also address potential EU fallback positions. As a "qualitative" measure, a simple reporting requirement on how much use a country made of the flexibility mechanisms might not be objectionable as an end-game outcome. On the other hand, an effort to couch harmonized policies and measures as a "qualitative" response to emissions trading concerns would be completely unacceptable.

(5) Communications and education. A wide array of education and outreach activities on trading is listed in the strategy memo.

EMISSIONS TRADING STRATEGY TOWARDS COP-6

Since the adoption of the Kyoto Protocol in December 1997, the U.S. and its Umbrella Group partners have made substantial strides in showing concretely how the international emissions trading system could work, and in designing a simple set of rules and guidelines under which it could operate. We still face obstacles, however, before our blueprint commands sufficient acceptance to be adopted at COP-6.

The obstacles appear to be of three kinds. The first is continued lack of understanding and fear. Despite our many papers and presentations, too many key players still do not have a clear grasp of how emissions allowance trading works and of the components needed to make a trading system function (e.g., emissions measurement and allowance tracking). Second, many countries are still pursuing restrictions such as ceilings on the amount of emissions allowances that a country may buy or sell. Third, a number of countries are seeking to link decisions on trading to other matters, both related (like CDM) and unrelated (like compensation). This paper focuses on five strategic areas where the U.S. can take steps over the next two years to overcome the first two kinds of obstacles (linkage issues fall mainly outside the scope of this paper):

- Guidelines for emissions measurement and reporting
- Guidelines for national registries
- Compliance and liability
- Reducing pressure for "supplementarity" restrictions
- Communications and education

(1) Guidelines for emissions measurement and reporting

Concern is often expressed that international emissions trading will lack accountability because participating countries and legal entities will not accurately monitor or report their emissions. In responding to this argument, the U.S. has staked out a leadership position on the necessity of strong monitoring and reporting requirements for *all* Parties that are subject to binding emissions budgets, traders and non-traders alike.

As a result, in several decisions last year, the Parties established a process to strengthen the existing monitoring and reporting guidelines adopted under the Framework Convention. In June 1998, SBSTA asked the IPCC to prepare "good practice guidance" to beef up the existing measurement methods. In November, COP-4 asked the Secretariat to develop by COP-6 the guidelines for monitoring and reporting required under Articles 5 and 7 of the Protocol, including guidelines for "national system[s] for the estimation of anthropogenic emissions" (which must be in place in all Annex I countries by 2007), and for "supplemental reporting" on emission inventories.

U.S. technical and policy staff will have a leading role in guiding this effort. This process will require coordination of four bodies with a piece of the action (an IPCC subgroup on

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inventories, the Secretariat, the Annex I Experts Group, and a Japanese technical support unit) so as to complete the necessary technical work and ready the needed decisions by COP-6. A "task force" of 8-12 representatives appointed by governments will be the key coordinating group; the U.S. is nominating an EPA monitoring methods expert (Dina Kruger), who also co-chairs the "good practice guidance" process. She is working with a team of technical experts from DOE, EPA, and other agencies, several of whom are directly involved in developing the guidelines for specific industrial sectors. (Where policy issues arise for the U.S., this team will bring them forward for decision through the IWG and Assistant Secretaries process.)

The "good practice guidance" will cover all of the greenhouse gases and all types of emission sources (except sinks, which are subject to a separate IPCC special report). There will be a half-dozen technical workshops on different sectors over the coming year, the first of which was successfully held in Washington in January. The result will be improved IPCC measurement guidelines that include more rigorous data collection and quality assurance procedures, as well as more complete and transparent requirements for reporting.

At some point later this year, this work will move from predominantly technical issues to more policy-laden questions such as the level of rigor that should be deemed "good practice," and the institutional requirements for "national systems" for collecting and managing emissions inventory data. The Annex I Experts Group and the Secretariat will play a greater role here. This effort will also intersect with other ongoing projects, such as revision of the guidelines for Annex I Parties' third national communications. It will culminate in the framing of guidelines for adoption by SBSTA and COP-6. The "task force" mentioned above will have to play a crucial role in keeping things coordinated.

While a large and complex undertaking, this is an area where common interest is already evident among participants from all factions. Experts from the Umbrella Group (including Russia), the EU, and the G-77 have contributed positively in a low-key, non-political manner in initial phase of this work. Thus this area represents an opportunity to bridge differences and come to practical decisions on something approaching a consensus basis. At the same time, building up the monitoring structure will help build confidence that emissions trading can be conducted on a rigorous and accountable basis.

This process should allow us to sort out the suggestion made on occasion by some EU representatives and others that the participation of legal entities in emissions trading requires some special level of monitoring and reporting rules at the international level. Our best approach is to argue that each type of national program needs its own type of monitoring and reporting regime. For example, programs based on policies and measures or taxes may also require certain kinds of entity-level reporting. Given the variety of possible program structures, the best way for the international guidelines to address this subject probably is to set forth principles regarding the "fit" between the type of program a Party chooses and the type of monitoring and reporting it needs. In this way, we can address a legitimate issue without focusing disproportionately on trading programs.

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In short, the U.S. seems to be well positioned on monitoring and reporting issues for the coming two years.

(2) Guidelines for national registries

Concern is also expressed over how to keep track of trading activity. The U.S. has begun making substantial progress on this issue with our proposals for a system of computerized and interlinked "national registries" (based on our acid rain program), which has generally found favor with American and foreign business interests and some EU governments. The registry concept is proving successful in giving newcomers a concrete vision of how trading works and in reducing concerns in the EU and elsewhere about the participation of legal entities.

Our goal for COP-6 is to include a requirement for national registries in the trading rules under Article 17 (or possibly the reporting rules under Article 7). We also want to develop and gain acceptance of technical specifications for compatible computer hardware and software for registries, which could be embodied in a technical guideline referenced in the rules. This would enable countries that want to move ahead right away with trading (and CDM and JI) to set up compliant registries immediately thereafter.

Towards that end, the next phase of our efforts is focused on showing more concretely how a computerized registry system would work. For the Annex I Experts Group in March and the Kyoto Mechanisms workshop in April, we plan to present a slide show illustrating such a computer system and simulating the making of international trades by countries and companies. For the June meeting of the subsidiary bodies in Bonn, we plan to have an actual demonstration with two interlinked computers representing the registries of two different Parties. We presented a draft of the registry presentation to the Umbrella Group in Australia and it was very well received.

The presentations and the demonstration will tangibly show how each Party's "assigned amount" under Kyoto would reside in a computer system, with a serial number assigned to each tonne of carbon dioxide equivalent. Each Party's national registry would contain accounts recording which agency or entities have what holdings of that assigned amount. The system would leave each country the flexibility to handle emission trading in the manner it found best: A country could retain all of its assigned amount at the national government level, or to devolve some or all of it into the hands of legal entities. The country could trade countries (or their companies) directly from its national account, or it could allow its own legal entities to engage in such trading. Brokers and other kinds of non-emitting middlemen could also be involved, holding accounts in the country's registry.

Under any variation that a Party chose, international trading would take place by electronically transferring the appropriate serial numbers from an account in one Party's registry to an account in another Party's registry. Registries could also serve to track JI and CDM credits and to make them fungible with emissions allowances. As it does for acid rain, the registry

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system could provide for transparency, accountability, and protection against fraud in both domestic and international greenhouse gas trading.

Moving beyond the June meeting in Bonn, our next step would be to begin detailed design and vetting of the computer software needed for registries. Several Umbrella countries are interested in sharing the costs of developing the full-scale computer software.

In summary, we are well positioned for further work on registries.

(3) Compliance and liability

Compliance. In the context of emissions trading, "compliance" has been used as a shorthand for a range of measurement, reporting, and accountability issues. The U.S. has tried, with increasing success, to bring order and structure to this discussion. We have broken this bundle of issues down into three groups:

First, as described in part 1 of this paper, we have been able to focus the Parties' attention on the need to elaborate the measurement and reporting requirements of Articles 5 and 7 that are applicable to *all* Parties with binding emissions targets, whether they trade or not; these issues are now getting serious attention.

Second, in order to bolster the credibility of the trading regime itself and to promote compliance with the Protocol's key accountability requirements, we have supported a linkage between trading and those requirements. Specifically, we have proposed to include a provision in the Article 17 rules suspending a Party's access to the trading system if the Party has been determined (after an appropriate procedure, see below) to be out of compliance with Articles 5 or 7, or with its obligation to maintain a national registry.

The EU supports the linkage we have proposed, but with the twist that a Party's compliance with Articles 5 and 7 and the registry obligation must be determined *in advance* before the Party may trade. In other words, we take the view that Parties should be presumed to be in compliance with their accountability requirements and may trade unless they are proved to be out of compliance, the EU takes the view that Parties must prove their compliance before they may trade.

The EU view is unacceptable, because it creates the risk that an Annex I Party's ability to trade could be held hostage by even a single Party opposed to trading or pursuing a collateral agenda (such as compensation). Our differences with the EU on this point are probably best engaged through discussion of the appropriate procedures to resolve non-compliance issues; there is some reason to believe that they have not themselves thought through the "hostage-taking" potential of their own proposal.

The third group of trading-related compliance issues involves the question already mentioned of what procedure should be used to determine if a Party is in non-compliance with trading-related requirements, and what consequences should follow. These are a subset of the broader compliance issues being discussed in the compliance process set up in Buenos Aires. Key questions to be addressed in our upcoming compliance and emissions trading submissions include:

- *What procedure will be used?* Do we want non-compliance issues generally to be addressed by a subgroup of the COP, such as an implementation committee? If so, do we want a single such committee for all types of non-compliance issues, or do we want a special committee to address trading-related compliance issues? In either case, should the committee have the authority to make final determinations, or should it only recommend determinations for action by the COP? (The answers may turn on the balance of seats on the committee(s), and on whether we feel the integrity of the trading regime requires swift decisions.)
- *What consequences can be imposed?* We have suggested that the main consequence for trading-related non-compliance should be suspension of access to trading. This can be accomplished under Article 17, avoiding the "binding consequences" amendment required under Article 18. Further questions include how to ensure that *de minimis* shortcomings (such as truly minor delays in reporting, or minor flaws in monitoring) do not result in suspension from trading. Closely related questions that might have to be addressed under Article 18 include: What consequences should fall on a Party that has exceeded its budget (whether or not because of trading)? Should the Party have to deduct the excess, with a penalty, from its next budget?

Liability. "Liability" in the emissions trading context has been used as shorthand to address the risk that a Party may exceed its target in part because it traded away some of its assigned amount that it actually ended up needing to meet its own target. There appear to be at least three different approaches, proposed sometimes alone or in combination, to dealing with this possibility.

First, this case could be treated the same as any other case of exceeding assigned amount. In short, the problem would be that the Party has exceeded the target, not that it has violated the emissions trading regime. Thus, if the generally-applicable penalty for exceeding the target — whether or not the Party is trading — is to deduct the excess tonnes from the assigned amount for the next commitment period with a penalty, then that would be the sole penalty that would apply to this case. This is referred to as "seller liability" (or "issuer liability").

Second, the transferring Party's excess could be made up by somehow returning some or all of the transferred assigned amount to the transferring Party (e.g., through an across-the-board devaluation of all allowances transferred, or by canceling the sales in reverse order until the shortfall is made up). This is referred to as "buyer liability."

Third, the Parties could build additional safeguards into the trading regime that seek to reduce the likelihood of such a situation's arising. In addition to current reporting and tracking provisions, these could include additional provisions limiting on how much may be transferred each year, or annual requirements to retain and retire enough assigned amount to cover the year's emissions (rather than waiting for such accounting until the fifth year).

The EU favors buyer liability, notwithstanding the fact that seller liability prevails under their Article 4 bubble.¹ To date, the U.S. and other members of the Umbrella Group have favored some variant of seller liability, coupled with some additional safeguards (so-called "seller-plus").

The liability issue is difficult to resolve on its own, because it depends in part on how other compliance issues are resolved. It is also linked (in perhaps a more political than logical way) to EU concerns about the monitoring and tracking issues covered earlier in this paper, and to their "supplementarity" agenda to be discussed below. Consequently, our strategy has been to engage internationally in analyses of various options (including through the Annex I Experts Group), but not to concede anything — if at all — until the end-game, when other major issues, including supplementarity, are resolved.

At the same time, it should be noted that the concern underlying the liability issues is fear of potential Russian overselling. Thus, steps we can take to reduce international anxiety about Russian overselling will be helpful in reducing tension over liability. In this regard, we should continue to work with the Russians to get them to announce responsible steps concerning emissions trading, such as the dedication of proceeds from trading to emissions measurement and to concrete emission reduction projects (see below).

In sum, we are basically on track concerning compliance and liability issues specific to emissions trading, and we have a sound domestic and international process underway to address broader compliance issues.

(4) Reducing pressure for "supplementarity" restrictions

It is a fundamental objective of the U.S. position that the rules for the flexibility mechanisms must not restrict either the fraction of a Party's target that can be met through the mechanisms or the fraction of its assigned amount that a Party may transfer under those mechanisms. Consequently, we have consistently rejected EU proposals to elaborate the

¹ Under the EU reallocation agreement, Germany gives part of its assigned amount to Greece. If the EU exceeds its aggregate target, Germany is individually responsible for meeting its reallocated (smaller) target; it may not look to Greece for a return of the assigned amount it transferred away.

meaning of the word "supplemental," to set "concrete ceilings," or to place other "quantitative or qualitative" restrictions on trading.

In the COP-6 end-game, the strongest tool we have to resist these restrictions is the knowledge on the EU side that they are incompatible with a strategy to obtain U.S. ratification. The greatest danger is that the EU will be under some equally strong compulsion to stand its ground, potentially leading to a stalemate. We know, however, that while several EU countries (especially Germany) feel their position very strongly, most EU countries are not in fact deeply dug in on this issue, and some in fact are quite sympathetic to our view. Our goal, then, should be to find ways to make it easier for the EU to back down on this position. There are several avenues we can pursue toward this end.

One avenue is domestic action. The more we can show we are doing at home, the more we respond to concern that the U.S. merely wants to buy its way out and keep emissions growing. We should recognize, however, that bringing forward more measures on the scale of our current voluntary programs, tax incentives, and budget proposals is unlikely to have the desired impact on international perceptions.

A second avenue is to work with Russia and the other economies in transition (EITs) to take steps that mitigate EU concerns about those countries' participation in trading. EU officials are angry that the assigned amounts negotiated in Kyoto reflect Russia's 1990 emission levels, rather than the lower level that prevails as a result of the country's economic collapse. They believe Russia's surplus will be traded without any further emission reductions ("hot air" trading). They are also concerned that Russia will not monitor its emissions accurately, and fearful that Russia will deliberately oversell its allowances.

Steps we are currently pursuing with Russia have the potential to address these issues and lessen EU anxiety about Russia's participation in trading. Following up initial suggestions by Russian officials, we are discussing with the Russian government a possible commitment to dedicate all or part of the proceeds from the first phases of emissions trading to two purposes: (1) building their emissions monitoring system and (2) making project-level investments in energy efficiency and other emission-reducing or sink-enhancing measures. We also intend to work with Russia to establish its national registry. Similar steps could be taken with the Ukraine and Kazakhstan. It may be worth exploring further measures Russia could take to allay fears of overselling: Could Russia commit to limit its sales in the early or middle years of the budget period to a rate that (considering its emissions) appears consistent with compliance at the end of the period?

Steps of this kind would meet EU (and U.S.) interests in ensuring good measurement and making further cost-effective reductions in Russia and the other EITs, without restricting the number of allowances available to be traded. These steps might be sufficient, if put forward at the right time, to allow the EU to retreat from its proposed restrictions without losing face.

Getting the appropriate commitments and actions from Russia and the other EITs, however, will take sustained high-level diplomacy as well as technical cooperation. In the near-term, communications are needed at the highest levels in order to get the issues and opportunities on the "radar" of Russian officials with enough clout to make something happen.

We must also communicate clearly with the EU on fallbacks they may propose. The EU position speaks of "quantitative and qualitative" limits. Assuming the failure of a quantitative limit, there appear to be two views in the EU on the meaning of the latter term. Last year at least one EU official (from the Netherlands) floated the idea that a qualitative limit could be simply a reporting requirement, e.g., a report on how much use a country made of the flexibility mechanisms, expressed as a percentage of the country's original assigned amount. Since this figure is readily calculated from reports that the U.S. supports, it probably should not be objectionable as an end-game outcome. On the other hand, some EU countries may be tempted to argue for some form of harmonized policies and measures under the guise of establishing "qualitative" limits. If this line of argument arises, the U.S. will need to reject it quickly and firmly.

(5) Communications and education

In addition to the activities already described, U.S. agencies will continue a vigorous program of education on emissions trading and related issues. Bilateral efforts include: *[Note: This listing may be supplemented with additional information from other agencies.]*

- *Russia/Ukraine/Kazakhstan:* EPA is providing technical assistance to Russia focusing on legal, institutional, and investment issues specific to emissions trading in Russia and on emissions trading education. In addition, EPA is assisting in a project aimed at improving Russia's national monitoring system for greenhouse gases and allowing the country to meet the minimum monitoring preconditions for participation in emissions trading. EPA intends to expand both of these types of outreach to other Newly Independent States, specifically Ukraine and Kazakhstan. AID has provided travel money and supported workshops in Russia and Ukraine, and both AID and State may contribute funds to these efforts.
- *Argentina/Chile:* EPA, CEA, DOE, and Treasury are working with the Argentine government on the development of an emissions target. We are supporting efforts by both governments to conduct outreach to domestic stakeholders on the benefits of emissions trading.
- *China:* EPA is working with the Chinese environment agency to design a pilot SO₂ trading program in China. In addition to helping China develop a least-cost approach to address its serious domestic air pollution problem, this effort could be an excellent educational tool to inform the Chinese about the benefits of emissions trading in general, and could help efforts to gain Chinese participation in greenhouse gas reduction efforts.

- *Mexico:* EPA is helping Mexico to develop monitoring and compliance capabilities that will be needed for eventually taking on a target and entering the international emissions trading system. DOE has established a high-level U.S.-Mexico group working on climate change issues, including emissions trading. EPA is also working under the tri-national NAFTA environmental commission to help Mexico consider the use of economic instruments, including trading, to address both conventional pollutants and greenhouse gases.
- *Poland:* EPA has provided educational materials on sulfur dioxide trading to the Polish government and, as a result of contacts between Polish and U.S. officials at COP-4, offered further technical assistance focusing on domestic emissions trading for both conventional and greenhouse pollutants.
- *Emissions Trading Education Initiative:* EPA is funding development of educational materials on emissions trading by the Emissions Marketing Association (an pro-trading industry group) and the Environmental Defense Fund. The project will include a web site and published materials will be aimed at improving both domestic and international understanding of trading.
- *International Visitors Program:* EPA's trading experts regularly meet with foreign visitors to discuss the acid rain SO₂ trading program and the application of emissions trading to climate change. Japan, in particular, has sent many delegations from government, business, and academia. EPA has also established an international residency program to allow foreign officials working on climate change and emissions trading to visit our office for an extended period to gain hands-on experience in operating an emissions trading program. Our first visitor, from New Zealand's Economic Ministry, was here in January-February 1999 (with New Zealand funding). With sufficient funding, we could host visitors from countries with economies in transition and developing countries.
- *Climate Technology Initiative:* CDM and emissions trading were discussed in a joint CTI/industry workshop on technology diffusion in Beijing last year. Additional workshops will take place this year in Zimbabwe and Poland.

Except where indicated, these activities are funded in current budgets. If an expansion of such activities were desired, resource needs would be substantial.

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Meeting on Benchmarking
Monday, February 8, 1999

Purpose of Meeting:

- Share current data on benchmarking
- Begin to address some of the key questions
- Set up a time line for future work.

This paper is meant to facilitate discussion at this meeting and is not a comprehensive explanation of benchmarking or the related issues.

Should the Benchmark be based on total existing capacity/trends or new capacity/trends?

- Considerations: Should the benchmark be determined based on past or future trends? This is not solely a matter of environmental stringency since carbon efficiency trends do not necessarily go down. For example, South Africa's electricity sector has been more carbon intensive during the past 5 years than the average of total existing capacity.
- Choices:
 - *Total existing capacity/trends:* Total existing capacity is the capacity that is in operation at any given time. In many sectors, equipment lasts for 30 years or more. Therefore, equipment choices 30 years ago would influence the benchmark. In the forestry sector, relevant data would focus on harvesting, growth, and conservation trends.
 - *New capacity additions/trends:* 'New' could be defined as the past year, the past 5 years, etc. The relevant time period would depend on the sector.

Should the benchmark be based on average or better-than-average carbon efficiencies/trends/equipment?

- Considerations: Is it more important to reduce the risk of allowing non-additional credits to be certified or potentially disallow a creditable project from earning credits?
- Choices:
 - *Average:* A benchmark based on an average of the activity data, by definition, will credit half of the capacity within that sector without any changes in behavior. This choice is likely to allow a significant amount of non-additional credits to be awarded.
 - *Better-than-average:* A better-than-average benchmark sets a higher standard and limits the amount of non-additional credits that are awarded. It does run the risk of not allowing some valid reductions from being credited.

Updating the benchmark

- Considerations: How much certainty do we want to provide to investors regarding their potential to earn credits? Should the benchmark reflect future improvements (e.g. new technologies) in the sector as compared to static project reductions? What is the correct balance between high transaction costs (frequent updates of the benchmark) and allowing non-additional CERs to be granted (infrequent updates of the benchmark).
- Options:
 - Applying to new projects*
 - Benchmark locked in at registration (pre-certification) phase for the lifetime of the project. Updates apply only to new projects (high investor certainty).
 - Benchmark locked in for a set amount of years and then the project is subject to a new benchmark (low investor certainty).

Frequency of Updates

- Update benchmarks frequently (every year). High transaction costs, fewer non-additional credits.
- Update benchmarks less frequently (every five years). Low transaction costs, more non-additional credits. (Note: benchmarks could be established at longer intervals, with estimated slopes between updates).

Which sectors are the highest priority for benchmarks?

- Considerations: Of the sectors that allow benchmarks, which characteristics are highest priority for the first benchmarked sectors: ease of creating benchmarks, likely equal distribution of potential projects, high number of likely projects, political considerations.
- Options:
 - Electricity sector
 - Industrial sectors
 - Forestry
 - Coal bed methane
 - Energy consuming equipment

Level of Sectoral and Geographic Specificity

- Considerations: More regionally and sectorally specific benchmarks may lead to higher accuracy, but also higher transaction costs. Equity issues between countries may also be a consideration.
- Options:
 - Geographic specificity*
 - *Sector-specific*: Adjust the regional specificity according to the individual sector's situation. Regional disaggregation should be balanced between the transaction costs and the level of accuracy. (Equity?)
 - *Global benchmarks*: Lower transaction costs and perhaps the appearance of greater equity among countries. Lower accuracy of benchmark for most

countries.

- *Regional/national/local benchmarks:* higher transaction costs, but higher accuracy. May appear inequitable for some sectors.

Sectoral Specificity

- *2 digit SIC code:* Lowers transaction costs, but most sectors have distinct sub-sectors or activities that vary significantly in carbon intensity/benefit.
- *Level of aggregation varies by sector.* Adjust the sectoral aggregation according to the individual sector's situation. Sectoral disaggregation should be balanced between the transaction costs and the level of accuracy.

Using a Benchmark to Award CDM Credits: An Example from the Electricity Sector

Project: Advanced Natural Gas Combined Cycle Unit

ARGENTINA

Benchmark		Project			
		C Intensity	Credits		
Type	kgC/Kwh	NGCC	Credit/kwh output (GWh)		Total credits
Average carbon intensity, all existing capacity (1995)	0.33	0.38	0	3,942	0
New Capacity Additions, historical (1986-96)	0.22	0.38	0	3,942	0
New Capacity Additions, historical (1992-96)	0.19	0.38	0	3,942	0
New Capacity Additions, under construction	0.19	0.38	0	3,942	0
New Capacity Additions, historical (1992-96)- fossil only	0.6	0.38	0.22	3,942	867240
New Capacity Additions, under construction- fossil only	0.43	0.38	0.05	3,942	197100

*fossil only numbers are approximations based on graphical data

UNITED STATES

Benchmark		Project			
		C Intensity	Credits		
Type	kgC/Kwh	NGCC	Credit/kwh output (GWh)		Total credits
Average Generation, 1995	0.66	0.38	0.28	3,942	1103760
Median Capacity, 1995 (50th percentile by C int)	0.81				0
Top 25th percentile of capacity, 1995	0	0.38	0	3,942	0
New Capacity Additions, historical (1986-96)	0.39	0.38	0.01	3,942	39420
New Capacity Additions, historical (1992-96)	0.68	0.38	0.3	3,942	1182600
New Capacity Additions, under construction	0.7	0.38	0.32	3,942	1261440
New Capacity Additions, under construction- fossil only	0.92	0.38	0.54	3,942	2128680
Natural gas CC average	0.51	0.38	0.13	3,942	512460
Natural gas CC top 25%	0.46	0.38	0.08	3,942	315360
Natural gas CC top 10%	0.44	0.38	0.06	3,942	236520

* the carbon efficiency for the NGCC is based upon an advanced model

* Plant generation is based on a 500 MW plant operating 8760 hrs/yr at 90% capacity factor.

** fossil only numbers are approximations based on graphical data

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Example of Step-by-step Process for CDM Power Plan Project in China

This paper provides an example of how a project would go forward under CDM using a benchmarking approach to ascertain additionality. We provide only the CDM-related issues as this is the only variable in a potential CDM project. Appendix I contains a list of issues that have been identified for further consideration. Appendix II contains an example of calculations to determine emissions additionality.

In a future paper, we will provide an example of a project that would develop its own baseline either because its unique properties do not allow for a benchmark approach or because no benchmark is available for such a project.

Step I: Company Develops Project

- **Description of Project:**
A 500 megawatt IGCC coal-fired power plant is being planned for the province of ____ in China. Project developers expect that the carbon emissions from this plant per unit of electricity output will be lower than the carbon emissions associated with the benchmark for power-plant projects in China.
- **Provide Calculations of Project's Projected Emissions:**
Estimate emissions using standard methodologies from the plant. Since plant emissions will be a function of actual plant performance, projected emissions need to be cast in the form of an operational variable such as units of carbon per kWh.
- **Determine "Emissions Additionality"**
The "additional" CERs generated from a project will vary considerably depending upon the exact specifications of the baseline used to determine the benchmark (i.e., average or better than average of last 5 units, last 5 years, coal-fired plants only, all plants in last 5 years). Thus, benchmarks could vary significantly depending on country/regional circumstances.
- **Project developers negotiate with appropriate entity in China to determine division of CERs**
- **Project developers calculate estimate of annual "proceeds" for own use**

Step II: Submit to Host Government for Approval

- **Project developers submit for project approval to Chinese Government under its self-defined guidelines.**
- **Chinese Government would approve the project. Such approval would, by implication, indicate that the project is consistent with China's sustainable development needs and objectives.**

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- Project developers provide host government certification [implies “voluntary participation by both Parties”]
- Project developers prove “real, measurable, and long-term benefits”
-- baseline and projected emissions will demonstrate this
- Project developers demonstrate how project meets “additionality” requirements
-- saved emissions should satisfy “additionality” test

Step IV: Emissions Monitoring, and Reporting:

- Project developers monitor project on a regular basis, using guidelines set forth by the COP/MOP
- Project developers reports on emissions and emissions saved annually to Operational Entity

Step V: Verification

- Independent auditor verifies the project emissions reported in Step IV.

Step VI: Certification

- Operational Entity “checks” report
- Operational Entity reports all CERs to [UNFCCC]
- CERs are considered certified
- Project Developer reports CERs to National Registry(ies) for adjustment of its holding of CERs

Step VII: Appeal Process (if necessary):

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Appendix I

Issues that Arise for further consideration**Step I: Company Develops Project**

- Some of the benchmarking issues: Who determines benchmark? For historical information about Chinese power plants, who provides information? If Chinese government is charged with responsibility, what happens if it doesn't cooperate or work fast enough? How prove accuracy? Who is responsible for proving accuracy? Should historical information create a baseline for sector (i.e., electric power generation) or sub-sector (coal-fired electricity)? For industrial projects, level of aggregation will be even bigger problem? Should benchmarks be determined by province, country or region? What is process for case-by-case determination of a project's baseline?
- In determining additionality, should baseline calculations be based on the average or marginal plant?
- Regarding division of CERs, should this be between project developers in both countries, between U.S. partner and Chinese government, or should be left to host government to decide?
- Is calculation of proceeds for developers' use only or should it be required in submission to operational entity?

Step II: Submit to Host Government for Approval

- Is host government required to have CDM point of contact with decision-making authority?
- Should there be a deadline for host government approval process?

Step III: Submit to Operational Entity for Registration

- Who should provide proof of host government approval?
- What is the nature of verification? Is it pro-forma or is there an evaluation? Does operational entity do verification or authorize third party verification? Or are project developers required to submit verification plan?
- Should there be a requirement for a submission on other environmental implications, such as transboundary effects?
- Regarding "voluntary participation approved by each Party involved" (section 12.5a of KP), how is this proved? Is host government certification enough or must each government provide such a certification (this could involve more than 2 if a multinational company wanted to divide CERs among more than one Annex B Party)? Does this language imply that only Parties to the Kyoto Protocol can engage in CDM projects? [Need State/Legal to evaluate]

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Step IV: Emissions Monitoring and Reporting.

- Must every CER be entered into a national registry (to ensure double entry accounting and verification) or could developers sell CERs without notifying national authority? Who reports CERs to national registry?

Step V: Verification

- Does verification occur before or after certification?
- Which independent entities will be allowed verify emissions reductions?
- Will each project be subject to a verification process, or will projects be verified selectively?

Step VI: Certification

- Is certification of CERs by operational entities automatic (unless an audit determines inappropriate calculation) or should an affirmative decision to certify be required by the operational entity each year? Should the IRS random audit model be used?
- Does operational entity have a formal auditing process? If so, does Executive Board write the rules for this or does the COP/MOP? If there is an auditing process, who does audits? Third-Parties or Operating Entity?

Step VII: Appeal Process (if necessary):

- What type of audit can overturn certification of CERs?
- Should there be a review process established that allows Executive Board to overturn CERs?
- What type of appeal process should be established?
- Would a project developer or its government represent its interests in an appeal?
- If appeal process imposed, should there be a deadline for resolution of appeal?
- Is revocation of CERs the worst consequence? Is Executive Board the final authority?

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Appendix II

Example of Calculation of “Additionality”**[note: numbers in calculations are contrived]****Assumptions:**

- Based upon the plant design, expected operating parameters, and analysis of the carbon content of the intended fuel source, the developers project emissions to be 50 units per kWh.
- Given that the developers expect the plant to be baseload with a 90 percent availability factor, annual generation from the plant is projected to be:
 $500 \text{ MW} (8760 \text{ Hr/Yr}) (0.90) (1000 \text{ kW/MW}) = 3,942 \text{ million kWh}$
 Annual carbon emissions being: $3,942 (50 \text{ units/kWh}) = 197,100 \text{ million units}$

Historical information used to develop benchmark

- Hypothetical average and marginal emissions per unit of output:
 From the last five coal-fired facilities of 200 MW or more: 70 units/kWh.
 From the last ten coal-fired facilities of 200 MW or more: 80 units/kWh
 From coal-fired facilities of 200 MW built [commissioned] in the last five years: 90 units/kWh
 From all coal-fired facilities in the past year: 75 units/kWh
 From all units (coal, nuclear, oil, gas-fired, hydro, wind) of 200 MW or more built in the last five years: 60 units/kWh
 From last (marginal) coal-fired unit built: 55 units/kWh

Range of “Emissions Saved” based on benchmark chosen [based on above values]

Calculating the emissions saved could be based on the average or on a better than average benchmark for the above choices. Better than average choices include a given percentage below the benchmark or the BAT. For simplicity, the following example uses the average.

Based upon last five coal-fired units:

$$(70 \text{ units/kWh}) - (50 \text{ units/kWh}) \times 3,942 \text{ million kWh} = 78,840 \text{ million units}$$

Based upon last ten coal-fired units:

$$(80 \text{ units/kWh}) - (50 \text{ units/kWh}) \times 3,942 \text{ million kWh} = 118,260 \text{ million units}$$

Based upon coal-fired units built (commissioned) during last five years:

$$(90 \text{ units/kWh}) - (50 \text{ units/kWh}) \times 3,942 \text{ million kWh} = 157,680 \text{ million units}$$

Based upon all coal-fired units built during past year:

$$(75 \text{ units/kWh}) - (50 \text{ units/kWh}) \times 3,942 \text{ million kWh} = 98,550 \text{ million units}$$

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Based upon all units (including nuclear, gas, oil, etc.) built during last five years:
(60 units/kWh) - (50 units/kWh) x 3,942 million kWh = 39,420 million units

Based upon last coal-fired unit built:
(55 units/kWh) - (50 units/kWh) x 3,942 million kWh = 19,710 million units

Baselines:

The potential for using Benchmarks to determine additionality in the Clean Development Mechanism

Background

Project-level greenhouse gas (GHG) emissions reductions have historically been evaluated using project-by-project baselines. Under this approach, the project developer evaluates what would have happened without the project and then estimates resulting emissions from this project. The difference between these two numbers is the net GHG reductions or removal from the project. Experience with US LJ has indicated that this process is extremely time intensive and can be quite subjective. It is difficult to estimate what would have happened in the absence of the project and assumptions needed can be manipulated by the parties involved. Establishing a more straightforward method to determining additionality would lower transaction costs and streamline the crediting process.

Benchmark Concept:

Benchmarks can be used to determine certified emission reductions resulting from projects within the Clean Development Mechanism (CDM). The purpose of benchmarks, rather than project specific counter-factual baselines is to lower transaction costs and reduce subjectivity. Benchmarks would create a rate-based baseline for an entire sector. Any project that is more efficient than the benchmark would be considered additional. Certified emission reductions (CERs) can be determined based on the difference between the benchmark and the project performance.

Policy Issues and Options:

General (applies to all sectors):

- Should the benchmark be based on total past emissions or new capacity? Some countries have remained consistent over time, however new capacity in other countries is completely different than past trends. For example, historically, Argentina's electricity generation was largely oil based. However, recent trends are toward natural gas and large-scale hydro. Since the additionality criteria applies to what would have happened next, current trends (e.g., new capacity additions) are more applicable.
- Should the benchmark be based on historical average, projections, or normative values? Normative values (e.g., percentile approach, BAT, etc.) are likely to create the most effective benchmark. A historical 'average' benchmark would allow any project that has better than average carbon intensity to qualify for CDM credits. By definition, this would allow half of the existing production in any given sector to qualify as additional. Projections, while correct in intent, rely on many factors that are difficult to predict. Projections can vary not only in magnitude, but directionally as well.
- Updating the benchmark. The benchmark established for any given year will provide the baseline for the lifetime of a project that qualifies for the CDM in that year. Updated benchmarks for future projects, however, will be needed to account for new trends and technologies. The intervals in which benchmarks are updated will depend largely on the level of effort needed to create the benchmarks. If the cost is high, then the intervals between updates will be longer. It is possible to tighten the benchmarks using an automatic deflator to account for technology improvements. However, the trends in developing countries have not suggested that efficiencies historically improve over time. Decreasing the benchmark between updates, however could create the correct incentive for efficiency improvements.

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Sector Specific:

- Which sectors are most conducive to Benchmarks? Sectors that are most conducive to benchmarks have a homogenous output, quantifiable reductions, and available data. It is also important that these sectors attract enough CDM projects to warrant the cost of creating a benchmark. Electricity, some industrial demand sectors, energy supply (e.g., natural gas pipelines or coal mining methane recapture), residential appliance may qualify for benchmarks. Land use change and forestry are sectors that needs further investigation. See chart below for further explanation.
- Level of Aggregation for the sector. Benchmarks could be created at various levels of aggregation for a given sector. Disaggregation leads to more precision, but at a greater cost. The level of aggregation will vary among sectors, however, there is often too much dispersion within individual sectors to aggregate across an entire sector. For example, electricity generation in China is mostly coal and hydro. A fully aggregated benchmark would incorporate all the hydro (~25% of new capacity from 1992-1996), and therefore be below any possible efficiencies for coal-based production. In this case, two benchmarks may need to be developed in order to appropriately reflect efficiencies for both coal and hydro within the electricity power generation sector.
- Should the benchmark be global or regional? For the electricity sector, regional (e.g., country specific) benchmarks are likely to be more effective. Each country will have some electricity production, however, the available resources and existing infrastructure will vary among countries. If a global benchmark is created for historical marginal capacity, all electricity production from some countries would be considered additional. Global benchmarks for the electricity sector could be effective if the benchmark is technology-fuel based (e.g., coal benchmark). In this case, incentives for lower-carbon fuels could be provided by looser benchmarks or by discounting credits for high carbon intensive fuels.

Commodity-based sectors (e.g., iron and steel), although also varying greatly between countries, have more tradeable products. Therefore, it may make more sense to have global commodity benchmarks to encourage production in more energy-efficient countries. Global commodity benchmarks would also allow more disaggregation without higher costs.

The following table outlines how baselines may be formulated for potential CDM sectors. Our analysis has relied on existing data. Time constraints have precluded intense host country cooperation or capacity building. Data quality could improve with a clear incentive (CDM credits) and host country cooperation.

To date, EPA's work has focused primarily on the electricity sector, followed by energy supply and industrial demand. Recommendations on other sectors are preliminary. Additional analysis is necessary to allow for more concrete recommendations.

094

coal bas w. u.

Sector	Sub-Sector (Level of Aggregation)	Type of Baseline	Regional or Global	Discussion
Electricity Generation (Data Quality: Good)	Fossil Fuel	Benchmark	<u>Regional:</u> If benchmark applies to total fossil fuel. <u>Global:</u> If specific for fossil fuel (e.g. coal benchmark, oil benchmark, natural gas benchmark).	Some countries (e.g., Argentina, Thailand) use different fossil fuels for electricity generation. In these cases, one benchmark may create an incentive for fuels with moderate carbon intensity, but low carbon fuels would automatically qualify (without really being additional). High carbon fuels would not be close enough to create an incentive to be more efficient. Therefore, global fuel-specific benchmarks may be more appropriate, however, they would not create any incentive for fuel switching. The key determinant in setting the benchmarks is the elasticity of substitution between different types of fossil fuels in most developing countries.
	Emerging Renewable	Benchmark	Global	One global benchmark for all emerging renewables would create an equal incentive for projects regardless of the location. In addition, one benchmark is less onerous to create.
	Large-scale Hydro and Nuclear	Project Specific	0	Large scale hydro and nuclear should not be completely excluded from CDM since each has significant potential to reduce GHG emissions. However, including them in a benchmark creates additionality problems since many countries already have significant portions of large-scale hydro and nuclear. For example, just under half of electricity projects under construction in 1996 in China are large-scale hydro. All of these would qualify under any benchmark since result in zero emissions.

why not?

yes, but by def, it would be additional.

DOE

yeah.

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Industrial Energy Demand <u>Data Quality:</u> Questionable)	Iron and Steel, Cement, Petroleum Refining (?)	Benchmark (possible)	Global	Benchmarks for industrial demand sectors should be global for two reasons: (1) to create an equal incentive for efficient projects among countries. Unlike electricity supply, commodity production is less regionally tied. It therefore makes sense to create an incentive in countries that can produce the commodity more efficiently (2) Each subsector would need to be disaggregated further in order to create an effective benchmark (e.g. type of steel) since carbon intensity varies by type of end-use product. Global benchmarks would significantly cut down the transaction costs.
	Pulp and Paper Chemicals	Benchmark or Project Specific*	Global	These subsectors may have so many different products (that are not fungible between each other) that benchmarks are not possible. Any decision would need more investigation.
Fossil Fuel Supply <u>Data Quality:</u> See Subsector)	Coal bed methane <u>Data Quality:</u> Good, but since there have not been many projects, it may not be a representative sample	Benchmark or Project Specific	Depends on method	Benchmarks could be either: (1) set at zero where all projects get credit. This would be a global benchmark. Given the low number of existing and planned projects, this is a viable possibility. (2) set at best practice. Global efficiencies are at about 25% and could be increased to about 30%. Could do global benchmark that varies depending on the gassiness of the mine, or regional benchmarks. The cost of the benchmark will need to be weighed against the number of estimated projects in this field.
	Natural gas production <u>Data Quality:</u> Poor	Project by project	--	It is unlikely that the reduction in transaction costs needed to justify benchmarks would be achieved in this sector because of the wide range of project options and the dominance of only one country (China)

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	Natural gas distribution <i>Data Quality:</i> Poor	Project by project	—	Getting good data on natural gas transmission and distribution is very difficult because the source is spread out along the distance of the pipeline.
Transportation <i>(Data quality: ?)</i>	Policies	Whole-Sector	—	Transportation policies to lower GHG emissions such as fuel taxes, reformulated gasoline, etc. could lower GHG emissions, but would be difficult to quantify. Whole-sector CDM would be the only way to estimate these emissions. However, creating a baseline for a whole sector would exclude any other projects within that sector from qualifying for CDM.
	Infrastructure	Project Specific	--	Projects such as HOV lanes, public transportation, etc. have the potential to lower GHG emissions, but would be difficult to benchmark
	Fleets	Benchmarks or Project Specific	Regional	It could be possible to benchmark fleet performance, but the cost of creating the benchmark may be high since the benchmarks would need to be regional. The benefit of a benchmark approach would hinge on the cost versus the number of potential projects.
Residential and commercial energy use	Appliances and Equipment	Benchmarks	Global	Global benchmarks based on the best available technologies could be created for residential and commercial appliances and equipment. Further work needs to be done to determine the regional dispersion of such equipment to determine if benchmarks are applicable.
Building	Energy efficient buildings	Project Specific	—	

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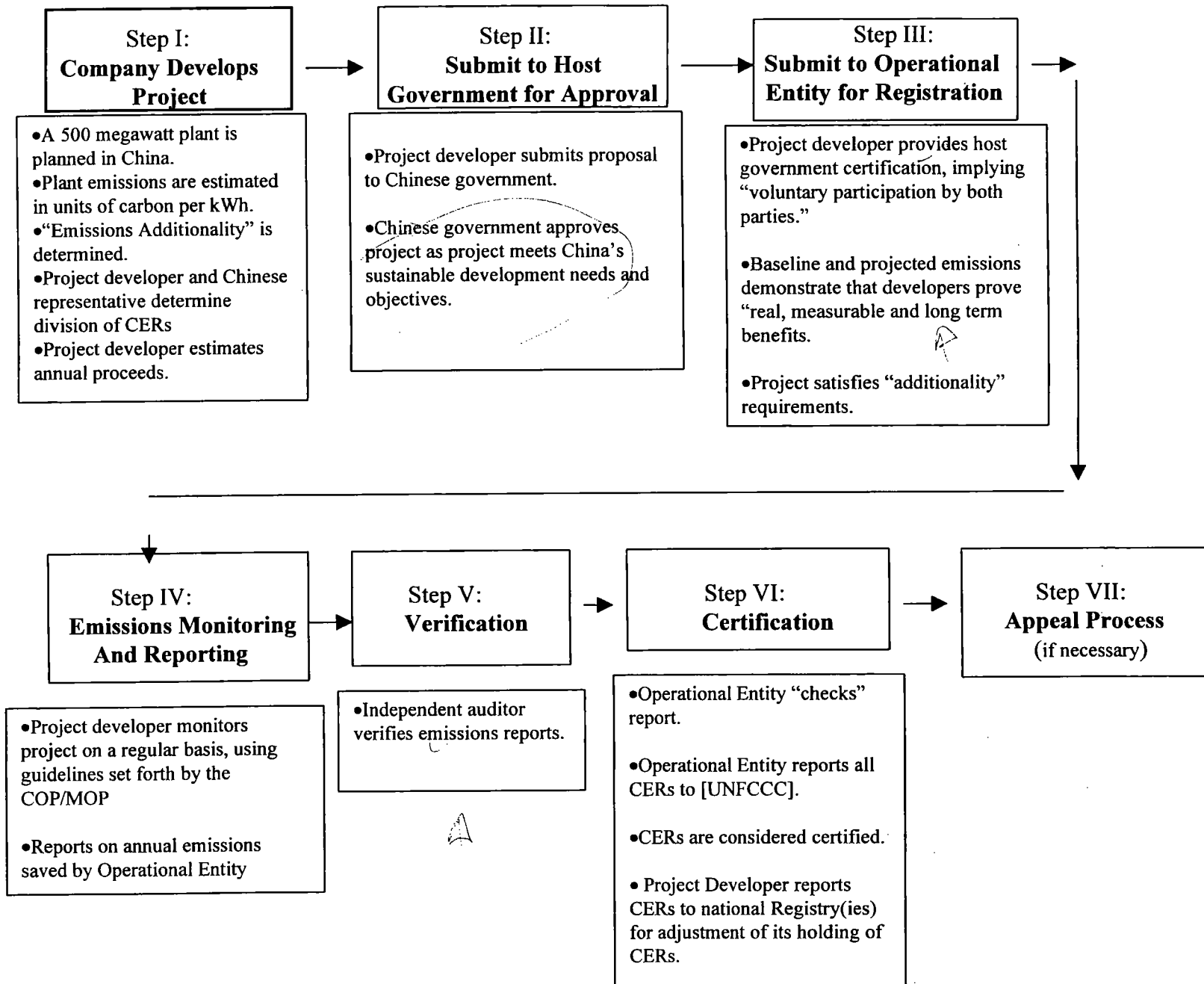
Forestry** Additional work needs to be done to assess the potential for forestry benchmarks	Conservation	Project Specific	--	Benchmarks are difficult for conservation projects because determining additionality is based upon too many site specific factors.
	Management practices	Benchmarks (??)	Global	Management practices such as sustained yield and high crop rotation may be considered for benchmarks. The actual carbon benefits, however, may be difficult to assess in aggregate since each forest is different.

*Either a benchmark or a project specific baseline would apply. The project would not have the opportunity to choose.

** Assumes forestry projects are eligible in the CDM

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CDM Step by Step



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Clean Development Mechanism Design and Operation Options Paper

The Clean Development Mechanism offers the opportunity to generate greenhouse gas emissions credit in 2000. This paper is intended as the initial effort to define the CDM and to help policymakers take decisions on the issues involved in establishing an operational CDM system.

A major difference between the CDM and emissions trading involves the motivations of agents involved in the transaction. Participants in an emissions trading transaction have opposite motivations - one wishes to purchase tons and one wishes to sell; in registering this transaction each will provide a check on the other. In a CDM transaction, however, both agents in the project have a similar motivation to overstate the CERs generated from a project. Thus, in establishing the mechanisms and procedures that underpin the CDM, it is important to balance incentives - pursuit of cost-effective projects and procedures that result in protection of the environment.

The following sections outline key CDM design and operation issues by topic area. The policy recommendations stress the core objectives of: establishing the CDM on a timely basis; achieving real and verifiable GHG reductions; maintaining low transaction costs; and engaging developing countries. The design and operation of the CDM will determine how the above objectives are met, and greatly influence the environmental effectiveness and equity of this flexibility mechanism. Since the greatest challenge of the CDM is to balance the need for an environmentally credible mechanism with the objective of low transaction costs and bureaucracy, the institutional structure and functions of the CDM will prove critical. For each following topic area, an additional section is included which identifies those policy issues requiring further analysis and discussion to ensure that appropriate policies are developed.

Institutional Structures

The functions of the CDM are to support sustainable development in developing countries and to provide a means for Annex B Parties to reduce the costs of meeting their targets under the Kyoto Protocol. The CDM is subject to the authority and guidance of the Conference of Parties serving as the Meeting of Parties to the Protocol. An Executive Board supervises the CDM and implements guidance provided by the Conference of Parties through the Subsidiary Bodies to ensure transparency, efficiency and accountability by overseeing activities of participating Parties, operational entities, and public/private entities. Operational entities will also play a critical role in the functioning of the CDM, but little consensus has been achieved in terms of who may serve as an operational entity, how they will be approved, and in what order they will carry out their functions. The recommendations below provide some guidance on this matter, however, further discussion is needed to identify and stress the linkages of institutional issues to other methodological and technical aspects of the CDM.

Policy Recommendations:

- **Executive Board Functions:** The Conference of Parties would set overall guidance for the CDM; the Executive Board would implement this guidance and elaborate on methodological, operational and technical issues. In some cases, the Executive Board may need to rely on outside experts or technical panels to develop methodological or technical guidance.

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Decisions of the Board would represent the interests of both developed and developing countries. The Board would function as a separate standing body of the COP/MOP and report to the SBI.

- **Executive Board Structure:** A relatively small board would be preferable (e.g., 12-14 members). The CDM Executive Board could draw upon the model of the Executive Committee of the Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol as an example. In this case, the Executive Board would be comprised of seven members each from Annex I and non-Annex I Parties, each serving two-year terms with the ability to serve consecutive terms. The chair and vice-chair of the Board would alternate each year between the two groups. Nominations of Annex I members would be limited to Annex I Parties; nomination of non-Annex I members would be limited to non-Annex I Parties. Decisions would be made by consensus of the Board. The UNFCCC Secretariat would provide administrative support to the Executive Board.

Policy Issues Needing More Discussion:

- **Operational Entity Functions:** Under the Protocol, operational entities will be responsible for the certification of emission reductions resulting from project activities under the CDM. In order to ensure environmental legitimacy, while maintaining low transaction costs, it may be useful for operational entities to be independent and decentralized but required to use standard, consistent and transparent methodologies in evaluating and certifying projects. Although it would be appropriate for the Executive Board to certify operational entities, it needs to be determined who would develop this criteria for certification and the guidelines used by the operational entities in carrying out their duties. In order to avoid conflict of interest, operational entities which certify project activities, should not be involved in project development, promotion, financing or implementation.
- **Operational Entity Selection:** Operational entities should be qualified to ensure that certified emission reductions (CERs) are credible and selected to ensure broad coverage of all regions. Although efforts should be made to avoid creating new entities, a number of existing institutions may potentially serve as operational entities, including: private sector institutions (e.g., international accounting firms); international financial institutions; other multilateral organizations; or a combination of these (see Annex A). More discussion is needed to determine what institutions may best carry out the functions outlined above, but particular institutions may be ruled out due to opposition from particular Parties. For example, the role of multilateral banks or UN agencies such as UNDP or UNEP should most likely not be considered due to developing country opposition.

Operation of the CDM

The central challenge in developing the CDM is ensuring the environmental integrity of the mechanism without creating an overly burdensome and costly structure. The assessment of emissions additionality will play a key role in resolving this dilemma, since the rigor of the emissions additionality assessment can potentially lead to a failure of the CDM either through standards which are too strict to attract investment or too weak to ensure environmental

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credibility. As a result, each stage in the design and operation of the CDM should employ standardized procedures and methodologies to approve and assess projects even if the actual functioning of the CDM is carried out in a relatively decentralized fashion.

Policy Recommendations:

- **Comprehensive Inclusion** - All project categories (reduction and sequestration) and all gases, unless one or more is shown to be ineligible (e.g., because of high potential for leakage from individual projects), should be included. Opinions on inclusion of sinks activities in CDM are divided at this time, and it is unclear if substantial progress will be made by COP6. The USG needs to decide the importance of this policy issue. Policy makers should ensure that the development of positions on sinks works in parallel with the IPCC process on this issue. As for AII projects, they should be eligible for CDM certification, however, they must meet the CDM criteria that are eventually established, including additionality criteria.
- **Participation of Parties** - Eligibility to participate in CDM by Annex I Parties should be no less strict than to participate in Annex I trading. There is a need to explore means by which non-Annex I Parties would have eligibility requirements (e.g., compliance with all reporting requirements, submission of National Communication that meets guidelines, establishment of a national inventory in sector proposed for the project).
- **Transaction Relationships** - All transactional relationships should be allowed under the CDM (e.g. bilateral, multilateral, or national governments). In addition, both public and private institutions should be able to participate in project development or CER transactions and non-Annex I Parties and companies should be able to generate CERs without an Annex I partner.
- **Unit of Measure for Certified Emission Reductions** - CERs shall be measured in tonnes of carbon equivalent and be calculated using the appropriate GWP for all gases included in Annex A of the Kyoto Protocol. CERs should be fungible with other tradeable units at their full value. Depending on how CERs are brought into the market and whether CERs can be "decertified", CERs will need to be serialized to some degree for identification and tracking.
- **Definition of "part of" under the CDM** - "Part of" should mean anything less than 100% of the abatement required by Annex I Parties in order to achieve compliance with Parties' quantified emission limitation and reduction commitments under Article 3 of the Protocol.
- **Sustainable Development Criteria** - Determination of sustainable development criteria should be the sole responsibility of the host country of a project activity. In order to address any transboundary environmental or socioeconomic effects of a project, a facilitative mechanism could be established. At the same time, it may be prudent not to explicitly state a position on this issue since it may serve as a point of leverage in negotiations.
- **Prompt-Start Approach to the CDM** - It is likely that the CDM may initially move forward in those sectors where experience has already been gained, while other sectors may



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not have established baselines or methodologies for calculating reductions. In these cases, methodological or technical problems in any single project category should not hold up inclusion of other project categories for CDM activity. In other words, methodologies do not need to be established for all sectors before the CDM can become operational.

Policy Issues Needing More Discussion:

- YES*
- **Eligibility Requirements** -- We may need to explore whether it is advantageous to require additional eligibility requirements of non Annex I Parties, who currently have only one requirement – a first National Communication under the FCCC. Some options: should developing countries be Parties to the Kyoto Protocol to participate in CDM or to receive “proceeds?” Should they be required to do regular inventories? The CDM may be the only hook to get developing countries to do more.
 - **Project compliance under the CDM** - Further work is needed on project compliance under the CDM. For example, a CDM compliance system may require more than procedures and mechanisms to respond to non-compliance. This may include the development of rules/guidelines for: the certification of projects and certified emission reductions; the activities of the operational entities; reporting; procedures for audit/review of activities of operational entities (including occasional project audits); and the consequences for violations by Parties. These issues will need to be assessed in greater detail.
 - **Compliance with Protocol** - With respect to Protocol compliance, the primary concern is parallelism - that is parallel consequences for similar violations, be they under trading, JI, CDM or the bubble. In compliance discussions to date, the question of whether violation of the rules of the flexibility mechanisms should result in any consequences other than restriction/suspension of the right to participate in the mechanism have not been resolved. This issue will need further discussion and evaluation.
 - **Policies as Projects** - Policies that lead to project level reductions could also be allowed under the CDM, however, CERs would only accrue from actual project activities that resulted from the policy. Baselines for this type of CDM project may be difficult to develop and verify, may create disincentives for countries to move toward a trading regime, and should be examined in greater detail.
 - **Article 12.5a** - Under Article 12.5 of the Protocol, the need for “voluntary participation approved by each Party involved” is noted. The use of “Party” raises the question of whether a country could participate in the CDM before ratifying the Protocol. This would apply to Annex I and non-Annex I countries and should be further addressed due to its legal and political implications, including options for an interim approach for participation in the mechanism. It should be noted that the USG would not need to approve projects developed by private entities. Credits should not accrue to Party, from private entity, until ratification and application of assigned amount.
 - **Use of ODA and/or Public Funds** – Although there is a general consensus that ODA should not be used for purchasing credits, a policy position should be made on whether ODA/Public Funds can be used for CDM projects. Although the bulk of CDM financing will mostly

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likely come from private sources, these funds may be used in various ways to finance or provide support to CDM project development. A decision should be made regarding the extent to which these types of funds may be used in the context of the CDM and under what circumstances. This issue is particularly important since Japan strongly supports the use of ODA, while the EU (France in particular) opposes its use. Developing countries are particularly sensitive about reprogramming ODA away from traditional uses.

- **Verification of Reductions** - Verification is a critical step within the stages of a CDM project since it ensures the environmental legitimacy of the flexibility mechanism. A number of issues should be addressed at this point, including: who should serve as a third party verifier; what criteria should be used; what kind of an appeal process should be established; when, how, and at what frequency should verification occur; and should CERs be invalidated if project emissions are not verified.

Baselines and Benchmarking

Methodologies for calculating emission reductions will be critical to the CDM. Standardized methodologies for generating baselines (including the use of benchmarks) may provide a streamlined approach for assessing reductions from project activities. Baselines used in calculating these reductions can be developed on a project-by-project basis (bottom-up) or through a more standardized benchmarking approach (top-down). In the interest of minimizing transaction costs, top-down baselines (e.g., benchmark, performance standard, whole-sector, technology standard) should be included as an option for project assessment. In the initial stages of project development, the appropriate baseline for the project will be established during the registration of the project. Once a project is registered, its baseline becomes fixed for the lifetime of that project.

Policy Recommendations:

- **Project Registration** - In advance of actual project initiation, projects will be registered with an authorized operational entity to confirm that the project is voluntary, meets sustainability goals of the host country, and is additional. At the same time, project registration would identify the baseline or benchmark to be used for the ex-post calculation of credits. Actual emissions reductions would be certified by operational entities only after they accrue. This step removes most elements of uncertainty for the investor other than actual project performance.
- **Choosing a Baseline or Benchmark** - Flexibility should be provided to project developers in developing a bottom-up baseline for determining additionality and calculating emission reductions. At the same time, if a top-down baseline based on benchmarks has been established, a project developer/host should be required to use that baseline for their calculations.
- **Additionality** - Unlike criteria established under the USJI program, programmatic and financial additionality should not be included in CDM project criteria for projects relying on private capital. This recommendation is supported by experience in the USJI, which

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indicated that both of these categories of additionality are subjective, or are too complicated to determine. Therefore, only emissions additionality should be assessed in the registration phase of the project development.

- **Rate-Based Calculations** – In some cases, baselines established during the registration phase of a project activity may be set as a rate, with the absolute quantity of CERs calculated after the reductions have accrued as the rate times the quantity of activity. For example, a project may need a rate-based calculation if it is unsure of the total production expected under actual project activity.

Policy Issues Needing More Discussion:

- **Level of Aggregation** - In order to minimize the costs and difficulties, top-down baselines should be set at the highest level of aggregation that still provides reasonable accuracy. In this context, greater definition of “sector” and “sub-sector” is needed as well as greater analysis to see in what sectors country, regional or global baselines may be feasible. The question of who develops the level of aggregation and the data one uses to assess a sector will also be critical to ensuring the quality and legitimacy of the baselines.
- **Period for Earning CERs** – More analysis is needed to determine what the appropriate period for earning CERs may be for a given project. Although CERs can be accrued against the agreed baseline for a given amount of time, this time frame is likely to vary depending on project type. Timeframe options could be based on the following criteria: capital lifetime (estimated or actual); budget periods within the protocol; average time for capital recovery; or other factors. It may also be useful to consider the accuracy of a benchmark over time in the given sector, when evaluating the period for earning credits.
- **Key Characteristics of a Top-Down Baseline** – Further discussion is needed to determine what the key characteristics of a top-down baseline should be. For example, the baseline for project types or sectors should mostly likely be updated for new projects, perhaps with periodic (e.g., 3-5 year) recalculations or as a rolling average of a given interval (e.g., rolling 5-year averages) recalculated annually. Under this recalculation, baselines (both bottom-up and top-down) will tend to decline at some rate, based on projections of improvement. However, there may be important exceptions to this trend that should be accounted for in particular sectors or countries.
- **Marginal versus Average** - The data used to create a benchmark is a major determinant of the credits allowed under the benchmark. Two key choices are between (1) marginal and total capacity and (2) average and ‘better-than-average’ choices. Marginal capacity is more likely to be representative of current trends than total capacity. Better-than-average benchmarks (e.g. top 10%, expected new technology) are likely to create a more solid incentive and allow less free riders than an average baseline which, by definition, would allow half of the existing projects to qualify for credits. The decision of which choices to employ will significantly impact the functioning of the CDM and should be analyzed in greater detail.

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- **Design of Top-Down Baselines** – The design of top-down baselines will require greater analysis and discussion. One option for discussion would be deriving these baselines from recent historical data (e.g., the last 5 years), but aiming to approximate what the “next” unit of investment would be (e.g., the project on the margin). Projections may also be useful in checking the validity of baselines established using recent historical data.
- **Who Establishes Baselines** – Although the development of baselines should be based on standardized and transparent methodologies, there is the question of who develops and establishes the benchmark or baseline, and whether a decision on a particular baseline can be appealed by either the investor, host or a third party. This issue will need to be resolved both for project-by-project baselines and top-down baselines. In both cases, an independent review process may be necessary to ensure that baselines are methodologically sound, credible, and verifiable.

Equity Concerns

As a market based mechanism, the CDM will provide low cost opportunities for GHG reductions while simultaneously promoting the flow of private capital toward CDM projects in less developed nations. Since the vast majority of finance for CDM projects will be private, the distribution of projects will be determined in large part by the market. At the same time, there is a fear among many developing countries that virtually all projects will be developed in countries where investment is already going, or where abatement costs are very low (e.g. China). In order to address this equity concern, CDM policies may need to be developed to ensure broad participation of developing countries under this flexibility mechanism.

Policy Recommendations:

- **Measures to Ensure Broad Participation** –To promote broad inclusion of CDM projects and host countries, non-market distorting measures can be taken such as: creation of a clearinghouse function under the CDM to match hosts with potential investors; inclusion of a comprehensive range of project types; and provision of technical assistance to host countries interested in hosting projects. Many related issues arise for each option, for example if a clearinghouse function is envisioned, who should perform this role?
- **Measures to Assist Financing** - Project bundling for smaller countries or the creation of CDM “mutual funds” led by private sector institutions may provide unique opportunities to facilitate financing of projects in countries where they may otherwise not occur.
- **Projects Initiated by Developing Countries**– In addition to hosting CDM projects using financing from project developers, non-Annex I countries may unilaterally develop CDM projects in their country or in another non-Annex I country. CERs generated from this project activity may be either traded or banked for use against future commitments. Standardized registration criteria as well as monitoring, verification and certification protocols would be used for assessing these projects. In addition, unilaterally generated projects would be subject to the CDM administrative and adaptation fees.



DRAFT – Do Not Cite or Quote – 2/1/99**Policy Issues Needing More Discussion:**

- **Other Incentives:** In addition to the above options, other financial incentives may also be used to ensure regional dispersion of CDM projects. Quotas, differentiated baselines, and CER bonuses for projects in particular regions may encourage project development in countries where CDM investment would otherwise not occur. The advantage of these incentives are that they send a clear message to developing countries that there is a genuine commitment to regional equity under the CDM, and would most likely achieve the desired result of broad geographic dispersion of projects. At the same time, these policies may raise costs, promote activities where abatement costs are not low, and distort the market functioning of the CDM.

Divison of CERs and Share of Proceeds

Certified Emission Reductions (CERs) will be generated by each project. As a commodity with market value, CERs may be traded, sold or banked for future use by both Annex I and non-Annex I Parties. CERs should be issued after the reductions have accrued and been verified by independent auditors on an annual basis. After a percentage of CERs is taken to cover CDM administrative costs and the fund for adaptation, the remainder shall be apportioned between the project host and developer based on private arrangements. Operational entities will be responsible for the certification of these credits and report total CERs issued to the Executive Board for each project.

Policy Recommendations:

- **Share of Proceeds** – A 1-3 percent share of CERs generated by project activities will be allocated for administrative costs of the Executive Board and toward the adaptation funds to support activities in the most vulnerable countries. The majority of this share should go towards the adaptation fund since administrative costs of the Executive Board are expected to be minimal. This allocation will be based on the percentage of total CERs generated by a particular project in a given year, not on their market value or on the estimated value of the project itself. A sliding scale, depending on project size, may also be considered for determining the CER share charged to projects. For any system, a decision will need to be made on who distributes these funds.
- **Use of Adaptation Funds** – This share of proceeds will be used to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation. The selection of particularly vulnerable countries will be based on standardized criteria to be agreed upon by the Executive Board. The disbursement of these funds may be conducted through appropriate international institutions.
- **Role of Private Entity** – The CER share awarded to the investor and the host shall be determined by private contract between the investor and the host country Party. These CERs shall be the property of each private party and may be held for future use, traded, or sold.



THE WHITE HOUSE
WASHINGTON

February 1, 1999

MEMORANDUM FOR DISTRIBUTION

FROM: DAVID SANDALOW

SUBJECT: Climate Change

There will be a meeting to discuss the Clean Development Mechanism Wednesday, February 3 from 4:00-5:30 in the Lincoln Room of the White House Conference Center. EPA/DoE will distribute a paper.

No clearance is needed for entry to the White House Conference Center. If you have questions, please call Verena Radulovic (456-6224).

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Growth Targets for GHG Emissions from Developing Countries:

Introduction and Summary of Findings

The United States has advocated emissions growth targets for non-Annex I countries. As these countries consider the possibility of adopting such targets, several have solicited assistance from the United States. The tasks of providing technical assistance to these countries and working with the international community to develop an understanding of what constitutes “appropriate non-Annex I targets” require a further refinement of the US position on developing country growth targets. This paper presents some basic principles for growth targets and discusses several proposals.

Principles **Recognizing the interests of developing countries, the United States interest, and the economic and environmental impacts of emissions targets, there are three basic guiding principles for emissions growth targets:**

- **Targets should result in environmental benefits;**
- **Targets should be consistent with continued economic development; and**
- **Targets should be of a form that allows developing countries to participate in international emissions trading, to reduce the economic costs of attaining given targets.**

Findings While there is a general consensus on these basic principles, a further elaboration on some of the key issues involving these principles can help facilitate the effort toward a position on the form, magnitude, and timing of a developing country growth target. In reviewing existing data, ongoing research, and in conducting our own analyses, we have found that:

- Growth targets even as high as BAU can yield significant reductions in global emissions by forestalling the leakage that would otherwise occur.
- Targets can result in economic gains from trade for all sides, if they are not too stringent.
- A “fair” allocation to expect of potential new participants might be a target that fits the apparent pattern among Annex B countries. This approach turns out to imply some degree of “progressivity” -- with richer countries asked to make bigger sacrifices than poor ones.
- Given uncertainty about the future, to fix the precise quantitative target now would create great risks regarding the ultimate stringency of the target; it would raise concerns that a target unintentionally constrains economic development, on the one hand, or that the target could result in hot air, on the other hand. These risks would be reduced by indexation approaches.
- Approaches to index targets to income growth between now and the commitment period have some advantages over carbon efficiency target approaches.
- CO₂ is the dominant greenhouse gas in developing countries (from fossil fuels and land-use). Measurement of other gases might be too difficult to justify their inclusion.

Guide to Contents

(I) Benefits of Targets-and-Trade A scheme in which non-Annex I countries are invited to adopt binding emission targets in the general vicinity of their BAU paths, and then to trade emission permits internationally, is a scheme that has real potential economic and environmental benefits, not just for Annex I countries, but for the developing countries as well. This gives them a genuine incentive to join, which would otherwise be lacking.

(II) What Should Determine Desired Targets? Non-Annex I countries could be asked to take on targets that make some small reductions relative to BAU, and still benefit. But large cuts would render them worse off, and therefore unlikely to agree to participate. Conversely, large increases relative to BAU are unlikely to be acceptable to the Annex I countries. We explore the range of targets that the developing countries could be expected to take on. A reasonable upper bound is their BAU paths.

Even a target as generous as this would result in global environmental benefits, by forestalling leakage, as shown in **Memo II.1: *Emissions leakage from Annex I to non-Annex I countries***.

A reasonable lower bound is the “indifference target” which entails cuts large enough that participation no longer brings them economic benefits, because the gains from selling permits are fully offset by the losses from a stringent target. (See **Memo II.2: *The Trade-off between target stringency and gains from trade***).

An alternative approach to formulating a “fair” target for developing countries is to estimate statistically what pattern holds among targets already accepted by Annex I countries, and then to extrapolate to developing countries. This statistical approach is explained in **Memo II.3: *Progressivity of existing targets, as a guideline for developing-country targets***. This approach turns out to imply some degree of “progressivity” -- with richer countries asked to make bigger sacrifices than poor ones -- without going nearly so far as the redistribution of wealth that some poor-country representatives seem to be asking for. As an example, when the pattern is extended to China, the implied target is a 5 percent cut relative to BAU. This happens to lie inside the range spelled out in Memo II.2.

(III) Uncertainty of Measurement and Forecasting complicates the analysis further. Because BAU forecasts are uncertain, a given numerical target could turn out to be unintentionally stringent (inflicting economic costs on the country) or unintentionally lax (creating “tropical hot air”). **Memo III.1, *Uncertainty about Target Stringency, and proposed solutions***, explores this problem and approaches to deal with it by indexation.

Another difficulty of extending targets to developing countries is measurement of emissions. **Memo III.2, *What greenhouse gases are necessary to include?***, suggests simple CO₂ targets might be good enough for these countries.

I. Benefits of Targets-and-trade

It would be useful to get developing countries to agree to binding limits, even if they involved only small (or no) cuts below Business as Usual (BAU) in the first budget period. Such targets, with trading, imply gains for their economies, gains for ours, and gains for the environment.

Reasons:

- We want to forestall increases over BAU, in response to Annex I cuts (leakage, as explained in Memo I.1 below).
- The ability for Annex I countries to buy reductions from LDCs would greatly reduce the costs of meeting our targets (as CEA testimony showed). In particular, it is estimated that trading with developing countries would lower U.S. costs more than 80 percent relative to the costs of achieving the Kyoto targets solely through reductions in domestic emissions. (This is as compared to 57 percent savings from trading among Annex I countries alone).
- With targets close to BAU, the developing countries would benefit from the ability to sell emission permits achieved at costs below the world price. This actually gives them a genuine economic incentive to join, which is otherwise lacking. Illustrative calculations by CEA suggest that China would stand to gain \$3.6 billion/year by joining Annex I, and India to gain \$1.6 billion/year. (See Table 2. The United States would save a preliminary-estimate \$11.6 billion if China joined, or \$2.5 billion if India joined.)
- Further, when permits are sold, reductions in carbon dioxide emissions generate ancillary air quality benefits in the developing countries through lower particulate matter, sulfur dioxide, and nitrogen oxides emissions.
- Establishing developing country targets now would meet the requirements of the Byrd-Hagel resolution. Agreement on modest targets in the nearer term is the first step to drawing LDCs into the system, where larger cuts relative to BAU might be possible in the longer term (in some proportion to the cuts made by richer countries that have gone before them).

II.1 Emissions leakage from Annex I to non-Annex I countries

Even if developing-country targets did no more than to hold developing countries at BAU emission levels, this would be a major environmental benefit. Several economic analyses indicate that for every 3 to 5 tons of carbon abated in Annex I countries, emissions in non-Annex I countries will increase by 1 ton. Often referred to as "leakage," this shifting in emissions reflects two economic impacts of abating emissions in Annex I:

World Oil Market Price Effects. Abating carbon dioxide in Annex I countries reduces the demand for oil, thereby lowering the price of oil. With lower oil prices, some non-Annex I countries will consume more oil and increase their emissions relative to what they would have without the Annex I abatement policies.

- **Energy-Intensive Industry Migration.** Annex I abatement policies that increase the price of energy may provide an incentive for energy-intensive firms to relocate to non-Annex I countries.

Leakage is positively correlated with permit prices: higher Annex I permit prices (and higher energy price effects) will likely result in higher rates of leakage.¹ Several modeling teams participating in the Stanford Energy Modeling Forum (EMF-16) have estimated the extent of leakage associated with an Annex I trading regime. These analyses assume that Annex I countries participate in international emissions trading while non-Annex I countries neither adopt targets nor participate through the CDM. While these results represent a wide range, they all reflect significant increases in emissions above BAU for non-Annex I countries. Thus, even if non-Annex I countries' emissions were only capped at business-as-usual levels, without reductions, that would yield significant environmental benefits in that it would forestall leakage.

Table 1. Increase in Non-Annex I Emissions Under Annex I Trading

MERGE (Manne and Richels)	MRT (Charles River Assoc.s)	G ³ (Shackleton et al)
325 MMTCE	115 MMTCE	55 MMTCE

EPRA (MIT)

37 tons (3%)

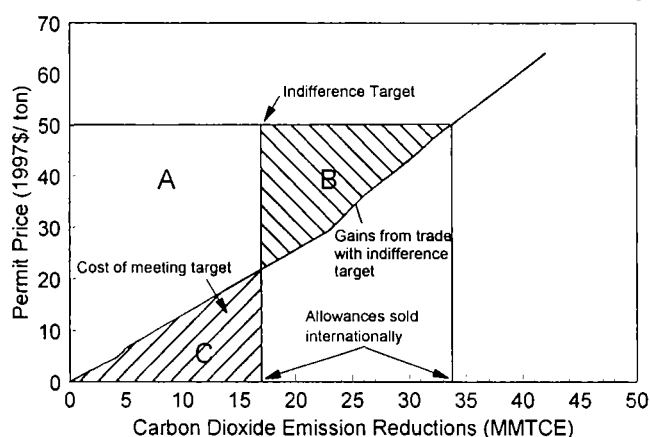
¹ However, international emissions trading can eliminate leakage among all trading participants. An effective trading market that results in equal marginal costs of abatement across all participating countries also results in equal energy price effects in all participating countries. Thus, there is no economic incentive for energy intensive firms to relocate to another country participating in trading. A full global trading system would then eliminate leakage completely. Some economic analysis indicates that while the CDM would lower costs some to Annex I countries, the project-by-project approach does not equalize energy price effects across all participating countries, and would not eliminate leakage to developing countries.

II.2 The trade-off between target stringency and gains from trade

The Administration has stated in bilateral and multilateral meetings, Congressional testimonies, and other public fora that if developing countries adopt emissions growth targets and participate in international emissions trading, they can enjoy economic gains from trade. Among other issues, this conclusion is sensitive to the stringency of the emissions growth target. The environmental gains from emissions reductions below BAU come at the price of economic costs incurred by a developing country that adopts the below-BAU target. In addition, in the cases of large non-Annex I countries, more stringent targets could have economic costs for buyers in international emissions trading. More stringent developing country targets could raise U.S. costs by restricting the supply of permits in world markets and so raising the price of permits relative to less stringent targets.

To assess the magnitude of this effect consider the target which just leaves a country no better off than no target at all. This “indifference” target is where the costs of meeting the target through domestic action just equal the net gains from selling permits in world markets.² Figure 1 illustrates gains from trade for a small country. For a target that is equivalent to a reduction from BAU of 17 MMTC, net gains from foreign exports are B, and the cost of meeting the target is C. Since $B = C$ in this example, the net costs from participation are nil.³

Figure 1. Illustrative 2010 Marginal Abatement Cost Curve and Indifference Target



Note. For simplicity, this indifference target is illustrated for a country whose participation in world permit markets does not affect world permit prices

As a numerical example of the effects of increasing the stringency of an emissions growth target, we present results from some modeling scenarios of Annex I trading with China. These analyses assume that no other non-Annex I countries participate in international emissions trading or the

² This analysis presumes that non-Annex I countries abate their emissions cost-effectively, e.g., through a tradable permit system or a carbon tax.

³ This hypothetical example assumes that the country in question does not consider participation in the Clean Development Mechanism (CDM). If this country were to participate in the CDM if it did not adopt a target, then its indifference target would not be at the level where net gains from trade are zero, but where expected net gains from trade would equal expected net gains from the CDM. This implies that the indifference target would be less stringent with the opportunity for participation in the CDM. However, including the ancillary air quality benefits associated with abating carbon dioxide, especially in countries with significant local air pollution problems, could imply that the indifference targets should be more stringent.

CDM. If other non-Annex I countries did participate in either flexibility mechanism, the world trading price could be lower, resulting in lower gains from trade and a less stringent indifference target for China.

Table 2 provides an illustration of the effects of emissions targets more stringent than BAU on China with Annex I plus China trading. A small reduction below BAU has no real effect on the Annex I trading price, and thus no economic effects on China. However, as the target becomes more stringent the trading price increases, resulting in higher total costs of compliance for the U.S.

Table 2. Effects of Various Chinese Emissions Targets with Annex I Trading

Emissions Target ¹	Permit Price (1997\$/ton)	Chinese Emissions Reductions (MMTC)	Chinese Emissions Sales (MMTC) ²	Chinese Gains from Trade (1997\$)	Increase in Total U.S. Cost Relative to China BAU Target
BAU	\$26/ton	276	276	\$3.6 billion	not applicable
BAU - 1%	\$26/ton	276	262	\$3.2 billion	~\$0
BAU - 5%	\$29/ton	304	235	\$2.4 billion	\$1.3 billion
Indifference	\$36/ton	343	172	\$0 billion	\$4.2 billion

¹ We employ the SGM BAU for China for the purposes of these calculations.

² Reductions in Chinese emissions less Chinese emissions sales yields net global reductions.

Imposing this “indifference” target on China, given that its participation lowers world permit prices, leads to the following conclusions.⁴

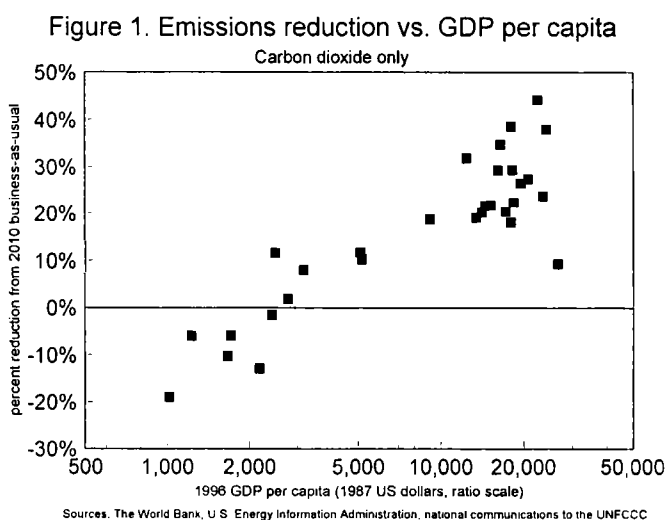
- An indifference target for China results in it foregoing \$3.6 billion relative to the gains it would obtain if it were to take a BAU target.
- An indifference target for China increases annual U.S. costs by \$4.2 billion or about 33% relative to a BAU target for China.

⁴ The reason that Chinese participation lowers world permit prices is because BAU or near BAU targets result in more permits available on the world market.

II.3 Progressivity of existing targets, as a guideline for developing-country targets

It appears reasonable on grounds of fairness that wealthier countries should undertake greater efforts to address climate change than less-wealthy countries. While the targets in the Kyoto Protocol reflect the outcome of political negotiations, it is possible to discern systematic economic patterns in the targets. A fair target for developing countries might be an emission target that fits whatever pattern seems to hold among existing targets. In particular, this approach would allow some degree of progressivity, with richer countries making larger reductions than poor ones -- without going nearly so far as the redistribution of wealth that some poor-country representatives seem to ask for.

The Annex B targets (including the EU bubble allocation), when presented in terms of reductions below 2010 BAU, follow a pattern of progressivity (see figure 1). Note that this pattern holds for CO₂ and for all greenhouse gas emissions, (although data on some non-CO₂ GHG emissions are not available for some Annex I countries; see memo III.2). For the 30 Annex I countries presented in this figure, the average reduction from BAU is 16.1%, and for the lower half of Annex I countries by per capita income, the average reduction is 5.2% below BAU.



We conducted statistical analyses to better understand the progressivity of the Annex B targets. We used data on Annex B countries' per capita income, emissions growth projected between 1990 and 2010, coal as a share of total energy consumption, and whether a country is a transition economy, to explain the trend in emissions targets in terms of deviations from BAU. The statistical analyses illustrate a pattern of progressivity among the existing targets: each 1% increase in per capita income implies a 0.11 to 0.17% greater sacrifice, expressed as emissions reductions from BAU. Levels of statistical significance are relatively high, suggesting that the results are meaningful. In absolute terms, an increase in income is associated with an increase in the level of the emission target. But the increase in income also implies an increase in the BAU level. The increase in BAU is *greater* than the increase in the target, implying that richer countries are making greater sacrifices. As an example, when the pattern is extrapolated to China the implied target is a 5 percent cut relative to BAU. This happens to lie inside the range spelled out in Table 2 of Memo II.2: both China and the rest of the world gain.

This statistical approach certainly has limitations, and the results reported here are preliminary. They are sensitive to decisions about the data used. Per capita income data can change depending on the year and exchange rate used to compare countries. Estimates of BAU emissions can vary too.

III.1 Uncertainty about target stringency and proposed solutions

Some developing countries have claimed that the uncertainty regarding projected economic performance is so great that they cannot risk adopting a binding emissions target for the first commitment period at this time. A natural response to this concern is that international agreements on these countries' targets should be structured to reduce the risk of inadvertent stringency and in particular to reduce the possibility of a target so stringent as to cause large economic losses to the developing countries. In addition to the concern expressed by some developing countries that adopting a binding target now for 2008 risks it being inadvertently stringent and constraining economic development, some have also expressed concern the symmetric concern on the other side, that a target may be too lax, creating "tropical hot air" and thus failing to result in environmental benefits in terms of actual emissions reductions. Thus, it is desirable both to mitigate the risk of inadvertent stringency and also mitigate the risk of inadvertently laxity. The idea is to reduce the variability of the effective stringency of the target without loosening or tightening the intended target, i.e., to reduce the variance without changing the expected value.

To attempt to address this uncertainty issue, a number of ideas have been forwarded. CEA has called its proposal an indexation or formula approach; EPA has referred to its proposal as efficiency standards. They are all versions of the general notion of agreeing today on a contract under which the numerical emission target is to depend in a specified way on future variables whose values are as yet undetermined. (The analogy is with a cost-of-living adjustment clause in a labor contract, that specifies a given increase in the wage for every cent increase in the Consumer Price Index -- thus reducing uncertainty over *real* wages.) In what follows, we assume that a country's aggregate emissions are indexed to future income alone. (We are thus omitting from past CEA proposals the possibility of including in the formula other variables like population; and are omitting from past EPA proposals the possibility of separate "efficiency standards" for individual sectors within an economy.)

It is useful to distinguish four proposals that appear in earlier memos.

- (1) CEA approach (Special-case): **For every percentage point that GDP in 2007 turns out to be higher (or lower) than forecast, the emissions target is raised (or lowered) by 1%.**
- (2) CEA approach (General): **For every percentage point that GDP in 2007 turns out to be higher (or lower) than forecast, the emissions target is raised (or lowered) by X%, where X is a number less than 1.** An advantage relative to proposal (1) is that countries that do well over the coming decade are asked to contribute a bit more than those that do not, while not being penalized unduly.
- (3) EPA approach (Special-case): **For every percentage point that GDP in the years 2008-2012 turns out to be higher (or lower) than forecast, the emissions target is raised (or lowered) by**

1%. (EPA phrases this as setting a number for the ratio of emissions to GDP; but that is the same thing.) The advantage relative to the CEA approach is it allows even more uncertainty-protection, with respect to fluctuations in income in the years after 2007. The disadvantage is that the country does not know how many tons it is entitled to until the end of the budget period, which could make trading difficult.

(4) EPA approach (General). **The target ratio of emissions/GDP that is set for the budget period (2008-2012) does not depend only on the country's own past emissions level (such as 1997 or 1990 plus K%, or BAU minus X%) but also on a common standard established for all countries.** It seems to CEA that this approach has two serious drawbacks:

(i) Because emissions/GDP varies widely across countries, a request that countries agree to a common standard would imply far greater sacrifice for some than for others (relative to their current positions, or to BAU). We wouldn't hear of this approach in setting the US target at Kyoto, and neither will many others who would be disadvantaged.

(ii) A comparison of GDPs across countries can easily vary by 100% or more, depending on whether a PPP basis is used or market exchange rates, what year is chosen, and how PPP or the exchange rate is measured; the implied large year-to-year swings in targets (tons of GHG emissions) would be unworkable. Note that approaches (1)-(3) do not have this problem, because measurement problems in yearly growth rates for a given country amount to a couple of percentage points at most.

III.2 What greenhouse gases are necessary to include?

In the Kyoto Protocol, Annex B countries have targets specified in terms of a basket of six types of greenhouse gases. These targets include both emissions sources and sinks. While this comprehensive approach provides more environmental benefits, it does increase the required effort and cost of inventorying greenhouse gas emissions. Many developing countries lack the monitoring infrastructure to assess emissions of all six types of greenhouse gases. Must developing country growth targets include all greenhouse gases, or is a subset of the Annex A list of gases sufficient?

In evaluating this question, it may be useful to consider several issues.

- **Greater Climate Benefits.** A developing country growth target set below what emissions would be otherwise for only one greenhouse gas (e.g., CO₂) would generate greater environmental benefits relative to a scenario where that country does not adopt a target.
- **Leakage Across Gases Unlikely.** There appears to be little opportunity in most economies for intergas leakage. For example, most efforts to abate fossil fuel-related carbon emissions would result in efficiency improvements, switching to leaner fossil fuels (e.g., natural gas) and to carbon-free sources of energy (e.g., hydropower, nuclear, wind), none of which have emissions of other types of greenhouse gases. Moreover, efforts to abate carbon dioxide in fossil fuel combustion may have ancillary reductions of energy-related methane.
- **CO₂ is Significant Majority of Greenhouse Gas Emissions.** In the United States, carbon dioxide comprises 85% of all greenhouse gas emissions (weighted by carbon equivalence). Across Annex I, carbon dioxide is, on average, 80% of each country's emissions. This trend appears to hold for some non-Annex I countries as well. In 1990, carbon dioxide comprised 88% of Korea's emissions, 85% of Mexico's emissions, and 85% of Kazakhstan's emissions. In Argentina, carbon dioxide comprised 63% of 1990 emissions, with methane comprising most of the rest. It appears that carbon dioxide dominates most countries' emissions, with methane a distant second (depending on the extent and nature of agriculture). Non-Annex I countries have not reported their emissions of the synthetic gases in their national communications to date. It is not clear how revisions to the N₂O emissions estimation methodology could affect estimates of non-Annex I countries' emissions.
- **Land Use Change Could be Significant.** Carbon dioxide emissions from land use change in non-Annex I countries appear to be quite significant. Some estimate that by including land use change emissions, non-Annex I emissions exceeded Annex I emissions in 1994 (Panayotou and Sachs 1998). Emissions from land use change in non-Annex I countries in 1994 were more than one-fifth of global carbon dioxide emissions. Some statistical analysis indicates that countries' land use change activities do not become net sinks, ceteris paribus, until per capita income exceeds \$3,600.

Brazil, Jacc, EU, US Side by Side V.6 draft

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(Rev. 9-25-98)

CLEAN DEVELOPMENT MECHANISM

BACKGROUND

The Clean Development Mechanism (CDM), created prior to and during the third session of the Conference of the Parties to the Framework Convention on Climate Change was largely the result of a merger between the U.S. proposals for "joint implementation with credit" between developed and developing countries, and the Brazilian proposal to establish a fund to support actions in developing countries.

The CDM provides for the functional equivalent of joint implementation with developing countries, allowing Annex I Parties to be able to meet "part of" their targets from project activities in non-Annex I countries. It calls for:

- emission reductions to be certified by operational entities to be designated by the COP/moP;
- guidelines to include methods for determining that projects are additional, and generate real, measurable and long-term benefits;
- the establishment of an Executive Board (EB) to supervise the CDM;
- an unspecified "share of the proceeds" to be used both to cover administrative expenses, as well as assist particularly vulnerable developing country Parties (such as small island states) to adapt to climate change; and
- early credit for certified projects beginning in 2000.

The Protocol text does not in any way limit private sector participation. In fact, it specifically provides for the participation of "private entities." We anticipate that capital (e.g. from the private sector) will flow based on the availability of qualifying projects, the potential rate of return on investments, and the market value of certified emission reductions. In those cases where funding does not exist, the CDM can assist in arranging such funding (Article 12.6), for example by acting as a clearing-house and making widely known the nature of the proposed projects for which funding is necessary. However, the CDM itself will not provide funding.

Little guidance is given as to how the Parties are to elaborate the mechanism. We expect to establish a work plan in Buenos Aires to move the process forward.

U.S. POSITION

The following are some of the key elements for which the U.S. has developed its position:

- **"Part of."** CDM project activities should not be capped; either in total or in the amount of CERs an Annex I Party can apply to its target. While Article 12.3(b) of the Protocol provides for a determination of the COP/moP regarding how Parties may use CERs resulting from projects to meet "part of" their targets, the COP should not seek to quantify "part of" because it would seriously reduce the benefits for both Annex I and non-Annex Parties derived from this flexibility mechanism.
- **Sinks.** Sink activities are allowed under the CDM. This will necessitate the development of better operational guidelines to allow a determination of "additionality" for sink projects. Such determinations should not be limited to projects in afforestation or reforestation -- for example, they should not preclude sustainable forest management.

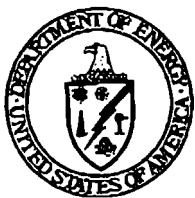
DRAFT

- why not discuss
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- **"Share of the Proceeds."** The "share of the proceeds" should be defined in terms of emissions and be based on the total amount of the emissions reductions achieved by the specific project activities – not the value of the underlying project itself; the total percentage that should be allowed should be low.
 - **Institutions.** A number of issues arise related to the organizational structure and its role in administering the CDM. For example:
 - ⇒ The constitution, character, and functions of the EB will depend in part on the various functions of the CDM as a whole. We believe the board members should be limited in number, have professional expertise in matters related to project development and project financing, with sufficient expertise in climate change mitigation efforts, and there should be a balance between Annex I and non-Annex I Parties.
 - ⇒ Existing organizations, both public and private, should be tapped to the extent possible to perform the various functions of the CDM including certifying emissions reductions, helping as necessary to arrange project funding, and administering adaptation funds.
 - **Additionality.** We should seek to develop project guidelines/criteria that promote real, measurable and long-term benefits, and include mechanisms for auditing and verification. Generalizable rules or "benchmarks" should be developed that allow objective decisions regarding project acceptance. A benchmark is a standard of performance, which can be either historical or forward-looking. Projects which would not be eligible under the benchmark approach, or for which criteria had not or could not be developed could be considered separately on a case-by-case basis. (The Executive Board may have a role in the development of such guidelines/criteria.)
 - **Certification, Auditing and Verification.** Operational entities can pre-certify projects as qualified CDM activities, but will certify emissions reductions after they occur. If modalities/procedures for the CDM are not in place by the year 2000, projects should be eligible for retroactive certification of emissions reductions, if they meet applicable criteria. To avoid any conflict of interest, entities involved in auditing and verification should not be the same as those involved in project development and promotion (see related comments above on administration of adaptation funds).

OTHER ISSUES

In recent interagency meetings, some participants have raised the issue of "banking" in the context of CDM. More specifically, they have sought to identify ways to allow developing countries to bank CERs forward from one period (e.g. the pre-2008 period) to apply to targets in future periods (e.g. the 2008-2012 period). At issue is whether a developing country that agrees to take on a target in a particular period (e.g. the 2008-2012 period) can continue to participate in the CDM prior to the onset of that period. If a developing country must curtail its participation in the CDM, it may be less interested in taking on a target. (The legal considerations surrounding this issue will be addressed shortly.)

DRAFT



Department of Energy
Washington, DC 20585

009

February 2, 1999

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FROM: Mark Mazur
David Gardiner

SUBJECT: CDM Papers for Wednesday, February 3 Meeting

Attached you will find 3 papers that will be discussed at David Sandilow's meeting on Wednesday, February 3. The papers are as follows:

1. CDM Issues paper (drafted by EPA)
2. A CDM step-by-step example paper, with additionality calculations (drafted by DOE)
3. A baselines/benchmarking paper (drafted by EPA)

The papers at this point are long, reflecting the many issues still to be resolved.

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U.S. AGENCY FOR
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AUG 18 1998

TO: Dan Reifsnyder, State
Maurice LeFranc, EPA
Debby Stowell, DOE
Abe Haspel, DOE
Jane Leggett, EPA
Jeffrey Frankel, CEA

FROM: Jeff Seabright, G/ENV/EET

Attached is a revised draft issues paper on a possible Clean Development Mechanism (CDM) registry proposal for COP-4, as discussed at the CDM meeting at EPA on July 30. Please share comments by COB Friday, August 21st and I will circulate a revised draft for the next CDM inter-agency meeting.

cc: DHales, DAA/G/ENV
Ckoppell, G/ENV/EET

The CDM Registry: Jump Starting the Clean Development Mechanism

Issue: The US should press for a non-binding resolution at COP-4 which would state the political intent of the Parties to retroactively credit valid Clean Development Mechanism projects from the year 2000 if such projects meet the criteria eventually established by the COP/MOP or CDM Executive Board. To help operationalize this intent, should a "Registry" be created at the UNFCCC Secretariat to document candidate CDM projects and opportunities?

Introduction and Background

The Clean Development Mechanism, defined in Article 12 of the Kyoto Protocol, allows certified emission reductions from project activities to accrue beginning in the year 2000. However, the necessary institutional infrastructure, rules and guidelines to govern a CDM crediting system will not be in place by 2000 and it could be several years beyond then before the COP/MOP decides on the mechanics of the system. Adopting a non-binding resolution at COP-4 and establishing a CDM Registry is one way of encourage early action.

The Registry is based on the premise that *early action* generates economic and environmental benefits. Early action enables a smoother, and less costly, transition to lower national emissions levels commensurate with Kyoto commitments. However, because of future regulatory uncertainty the current market will not promote strong early action. In order to act, the private sector needs reasonable expectations of investment returns. The Registry could overcome this barrier and promote CDM projects by boosting expectations that projects will be retroactively credited.

The US has experience with registries in other, analogous regulatory contexts in which there is a similar intent to document and recognize early action. Section 1605(b) of the Energy Policy Act of 1992, administered by the Energy Information Administration (EIA/DOE), establishes a means for US firms to voluntarily report greenhouse gas emissions reductions. The program allows firms to (1) report annual GHG emissions, for the purposes of recording a baseline from which to measure future actions, and (2) record specific GHG emissions-reducing and carbon sequestering projects, at both the domestic and international levels.

Documenting action under Section 1605(b) is simple and straightforward. Guidelines and forms are provided for a wide range of project activities that include, inter alia, electricity generation, cogeneration, energy end use, transportation and carbon sequestration. Several measures exist to ensure the accuracy of reported emissions including a third party certification requirement, self-assessments, clear guidelines and procedures, and a review process.

Climate Wise, USJI, and other government programs are vehicles for early action and voluntary reporting. A condition of participating in Climate Wise is annual reporting of GHG emissions through Section 1605(b). One driver of participation in the Climate Wise program and documenting GHG emissions through Section 1605(b) is to help insure fair treatment under future climate policies, such as a domestic emissions trading system. By documenting early action, companies can strategically position themselves and reasonably anticipate reduction

Have they
been promised
something?

credit. The same rationale exists for creating a CDM Registry. Once COP/MOP decisions have been made enabling the CDM to become operational, information about what projects have already taken place will help insure that appropriate emissions reduction activities are recognized (beginning in 2000), in the form of certified emission reductions (CER).

The CDM Registry

A CDM Registry would document and facilitate early CDM action, as well as serve as a "bulletin board" -- a clearinghouse of potential CDM projects that matches host country needs and investor specializations. The Registry would be UNFCCC Secretariat-based and include information on project proposals and investments that expect to be credited by the CDM, once the mechanism becomes operational. The Registry would complement and help actualize a non-binding resolution or statement of intent to retroactively certify acceptable projects.

The Registry is intended to be value free and non-prejudicial -- in no way will projects posted on the Registry be guaranteed retroactive credit. The only "guarantee" is that the CDM Executive Board will eventually review projects that are operationalized through the Registry (i.e. projects registered will be *considered* for crediting). Whether the project generates certified emission reductions (CERs) is a decision of the Executive Board or other UNFCCC body, and a function of the relevant baselines, monitoring provisions, additionality criteria, etc. that the COP/MOP eventually agrees to. This is analogous to Section 1605(b) in the US, where the review process is undertaken by the US government. Whether credit is eventually retroactively granted under 1605(b) will depend on, inter alia, the nature of the regulatory system adopted and the magnitude, robustness and credibility of emissions reported.

CDM Registry would add value for investors, hosts and the process itself:

Investors. Candidate CDM projects that have already been agreed to between investor and host country could be posted on the Registry for documentation and information sharing purposes. In addition, Annex 1 private sector entities could use the Registry to post projects that they are interested in financing. For example, a company specializing in photovoltaics or combined-cycle gas turbines could "advertise" their services in a CDM context.

Hosts. Non-Annex I entities (government agencies or private sector) could use the Registry to solicit sponsors for a project, or set of projects, that the host has identified as potentially CDM eligible and consistent with national sustainable development objectives. Thus, the Registry would be an enabling mechanism for Article 12.4 of the Convention, which states that "Developing country Parties may, on a voluntary basis, propose projects for financing, including specific technologies, materials, equipment, techniques or practices that would be needed to implement such projects, along with, if possible, an estimate of all incremental costs, of the reductions of emissions and incremental removal of greenhouse gases, as well as an estimate of the consequent benefits."

Process. By detailing projects that expect to earn credit, a CDM Registry would contribute to the growing body of experience on many of the difficult methodological issues -- such as baseline construction, additionality, leakage, monitoring, etc. -- which CDM rules and

procedures will address. If methodologies used by project developers are subsequently deemed unacceptable by the COP/MOP or Executive Board, emission reductions could be recalculated and verified *ex post*, for crediting purposes, using agreed upon methods.

The information posted on the Registry would be chosen at the discretion of the Parties or entities posting. Unlike Section 1605(b), there would not be required categories of information that project proponents or hosts would need to provide. The Registry would employ an easy-to-use interface (perhaps with a web-based option) and be accessible and available to any Party or domestic entity.

Pro:

Cultivate private sector interest. The private sector is showing strong interest in emissions reduction projects overseas. This interest is largely motivated by a return on investments that includes CERs -- an asset useful in demonstrating compliance in a domestic and/or international regulatory system. If COP-4 fails to make any progress on the CDM, the US business constituency's interest and support for the Kyoto Protocol could wane. A disillusioned private sector may lead to negative repercussions in the domestic political arena and discourage project initiation. In short, the private sector is ready, but international politics are not. The Registry may help balance this disjunction, and maintain some "Kyoto momentum."

Engage Developing Countries. In addition to Annex 1 private sector entities, constituencies in some developing countries already support early action. Gylvan Meira (at the Aspen CDM workshop in Sao Paulo) proposed a non-binding COP-4 resolution for retroactive crediting. Other developing country delegations could also be amenable to such a proposal, and should be engaged as early as possible to preclude concerted G77/China opposition. Because it is broad in scope, treating the needs and interests of all Parties, the Registry should garner considerable support from developing countries. Countries wary of unbridled CDM investment within their borders should be comforted, rather than intimidated, by an approach that gives them discretion and oversight over projects. Similarly, for countries fearing that the CDM -- like AIJ -- will overlook them, the Registry gives them an opportunity use the CDM as a vehicle to proactively promote their investment and development needs.

Kyoto Compliance. CERs generated by US entities between 2000 and 2012 will be added to the US assigned amount. An effective CDM, which generates CERs throughout the pre-budget period, will reduce compliance costs and domestic actions needed to comply with Article 3/Annex B commitments. The Registry would facilitate the crediting of emission reductions during the years before the CDM becomes officially operational (in 2000 and 2001, for example).

Environmental Benefits. Because of long atmospheric residency lives, GHGs emitted today will contribute to higher atmospheric concentrations in future decades. Without crediting provisions, or reasonable expectations of crediting, it is unlikely that GHG-reducing projects will be initiated en masse. The Registry would boost investor confidence and expectations in the system and therefore stimulate CDM investments. In addition, because the Registry facilitates the actual *initiation* of projects, helping to match project hosts and investors, transaction costs will be

lowered and more potential CDM flows will be generated.

Incremental Learning. This is one of the explicit functions of the CDM Registry. The Registry would contribute to the growing body of experience on yet to be determined methodological issues -- such as baseline construction, additionality, leakage, monitoring, etc.

Maintain the Kyoto momentum. Unlike Article 6 JI or Article 17 emissions trading, CDM negotiations entail some degree of urgency. The banking provision (Article 12.10) requires the CDM to be operational before the first budget period begins. Unless measures are taken at COP-4, the Parties will not be able to express their views on CDM crediting until COP-5, which will take place just a few months before the Protocol allows credits to be obtained.

Con:

Designing the Registry. Problems designing the Registry will be a function of the detail and information requested. If the Registry consists of a detailed set of questions, analogous to Section 1605(b), the issue of *who* designs the Registry, and *what* exactly the Registry consists of, will become highly contentious and politicized.

Therefore, design if the Registry should not presuppose a certain institutional structure or other CDM rules and modalities. To prevent design of the Registry from becoming a *de facto* design of the CDM itself, proponents should insist that specific information (such as additionality, monitoring, sustainable development benefits, etc.) not be *required* in the Registry. *The information offered is provided at the discretion of the registrant.*

Overstating Reductions. Section 1605(b) utilizes several measures that help ensure accurate reporting. These include standardized reports; a report review and assistance process; certification of data accuracy; criminal penalties for falsifying data; and a self-assessment of data accuracy conducted by the reporter. Agreement among Parties on similar measures for the Registry may not be possible at COP-4, nor are they necessarily appropriate or desirable. Without such measures however, CDM project developers and hosts may attempt to use unsanctioned methodologies to inflate emissions reduction estimates for the purposes of obtaining credit. The Registry would be unable to exclude certain methodologies and practices, which may become standard practice.

This potential problem can be eased by clearly stipulating that the "auditing" and "review process" (analogous to 1605(b)) are the functions of the yet to be formed Executive Board or other COP/ Secretariat-related body. If project developers anticipate a rigorous review process for obtaining CERs, the incentive should actually be to report as accurately as possible, because sloppy projects with weak monitoring and reporting may be denied CERs. *Thus, ideally, forward-thinking project developers will self-initiate third party verification, conservative estimation methodologies, etc. to strengthen their case for generating CERs retroactively.*

Developing country opposition. If not presented carefully, the Registry could become a "straw man" for some developing country delegations and harm the negotiating environment for the CDM and other issues at COP-4. In terms of operationalizing the CDM, developing countries' main priority is that CDM rules "should be determined on the basis of equity, sustainable

development and the other principles of the Convention" (FCCC/SB/1998/MISC.1/ Add.3). A G77/China position paper also states that studying methodological issues should be a first step (FCCC/SB/1998/MISC.1/Add.5), and this should take place under the full authority of the COP or other official bodies. Some developing countries may feel that the Registry -- which is geared toward documentation for the purpose of retroactive crediting -- runs counter to stated G77/China priorities. Registry "design" and the potential to overstate reductions, both discussed above, could also elicit developing country reticence.

These problems can be mitigated by enlisting the support of key developing countries before COP-4 and proposing the Registry as a joint initiative between several Annex 1 and non-Annex 1 Parties that cut across negotiating blocs. In addition, some countries may simply wish to retard the development of the CDM in any way possible. General anti-CDM sentiment does not constitute a legitimate argument against a Registry, and is not consistent with what has already been agreed to in the Kyoto Protocol.

Conclusion

A CDM Registry offers numerous benefits, as discussed above. The three drawbacks discussed -- designing the Registry, overstating reductions and developing country opposition -- are tractable problems which a carefully proposed Registry will overcome.

Overall, the Registry performs three important functions:

could do this otherwise! → "Registering" projects, thereby insuring they will be *reviewed* by the Executive Board and *considered* (although not guaranteed) for CERs. This will also serve as a key "signal of intent" from regulators, boosting private sector confidence in the CDM and bringing domestic political benefits.

Serving as a "bulletin board," or clearinghouse, to match the project needs of hosts and investment desires of project developers. Thus, the Registry lowers transaction costs, thereby promoting CDM projects that transfer technology and reducing GHGs.

Providing a formal "space" for information gathering and learning for estimation methodologies, additionality criteria, verification, monitoring, baseline formulation, etc.

Insuring that the statement of intent and the CDM Registry are agreeable to all Parties at COP-4 will depend on enlisting the support of key developing countries before COP-4 and packaging the Registry as a non-confrontational and non-institutional entity that will not pre-judge future COP/MOP/EB decisions.

① Benef. overstated