

Background paper

Expert meeting on Economic Diversification

Implementation of Article 4, Paragraphs 8 and 9 of the Convention

Bonn, May 16–17 2006

This paper has been commissioned by the secretariat of the United Nations Framework Convention on Climate Change and was prepared by Mr. Aaron Cosbey. The information contained in the paper had been prepared by the author, although in some instances the secretariat introduced some modifications.

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I. Introduction

A. Overview and purpose of the paper

1. This paper serves as background to a UNFCCC expert meeting to be held in Bonn May 16–17, on the subject of Annex I Parties’ obligations to avoid and address negative impacts that might occur in non-Annex I Parties as a result of UNFCCC-mandated response. Specifically, the expert meeting will “explore how economic diversification might be integrated into, and support sustainable development strategies and to discuss what technical assistance may be needed to develop structural and institutional capacity for facilitating efforts to achieve economic diversification, as well as how foreign and domestic private sector investments in these areas may be encouraged.”¹

2. The paper starts by setting the context, discussing the nature of the textual obligations from the UNFCCC (and, subsequently, the Kyoto Protocol) for this work, and surveys the actions taken to date toward fulfillment of those obligations. It then considers the underlying problem of commodity dependence and vulnerability to response measures, focusing primarily on those countries highly dependent on fossil fuel exports, and briefly considers the nature and extent of possible negative impacts. It then fleshes out a number of areas for further consideration – following on the results of a previous workshop on this subject, with the aim of laying adequate foundations for continued progress in this area.

B. Context: Obligation to address the impacts of response measures

3. The United Nations Framework Convention on Climate Change sets the context for the analysis in this paper and, more broadly, for the program of work that this paper aims to help further. It lays out the responsibilities of Annex I Parties to assist in addressing the needs of those countries that might be negatively affected by Annex I response measures to climate change. Specifically, Article 4.8 states that:

“In the implementation of the commitments in this Article, the Parties shall give full consideration to what actions are necessary under the Convention, including actions related to funding, insurance and the transfer of technology, to meet the specific needs and concerns of developing country Parties arising from the adverse effects of climate change and/or the impact of the implementation of response measures, especially on:

...

(h) Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products; ...”

In addition, Article 4.10 states:

*“The Parties shall, in accordance with Article 10, take into consideration in the implementation of the commitments of the Convention the situation of Parties, particularly developing country Parties, with economies that are vulnerable to the adverse effects of the implementation of measures to respond to climate change. **This applies notably to Parties with economies that are highly dependent on income generated from the production, processing and export, and/or consumption of fossil fuels and associated energy-intensive products and/or the use of fossil fuels for which such Parties have serious difficulties in switching to alternatives.**”*

¹ Decision 1/CP.10, para. 16(b).

4. These obligations on Annex I Parties are again emphasized and further elaborated in the text of the UNFCCC's Kyoto Protocol. Article 2.3 states:

“The Parties included in Annex I shall strive to implement policies and measures under this Article in such a way as to minimize adverse effects, including the adverse effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, especially developing country Parties and in particular those identified in Article 4, paragraphs 8 and 9, of the Convention, taking into account Article 3 of the Convention. The Conference of the Parties serving as the meeting of the Parties to this Protocol may take further action, as appropriate, to promote the implementation of the provisions of this paragraph.”

And Article 3.14 states:

“Each Party included in Annex I shall strive to implement the commitments mentioned in paragraph 1 above in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. In line with relevant decisions of the Conference of the Parties on the implementation of those paragraphs, the Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, consider what actions are necessary to minimize the adverse effects of climate change and/or the impacts of response measures on Parties referred to in those paragraphs. Among the issues to be considered shall be the establishment of funding, insurance and transfer of technology.”

C. Actions to date: Working toward fulfillment of the obligations on the impacts of response measures

5. Acting on the above mentioned UNFCCC obligations, the Parties noted in 1998 (Decision 5/CP.4) the need for more information on, inter alia, the impacts of response measures, the specific needs and concerns of developing country Parties arising from such impacts, and actions to address those concerns. They mandated the SBSTA and SBI to conduct further work in this area, and requested that the TAR include relevant analysis as well. Finally, they set out a multi-year programme of work, mandating COP-6 to take a decision on any further actions.

6. COP6 delivered the Bonn Agreements on the Implementation of the Buenos Aires Plan of Action, and with it agreement on the implementation of Article 4.8 and 4.9 of the Convention. This included the establishment of the Special Climate Change Fund, mandated in part to support economic diversification, and a mandate to the GEF to support other implementation activities, including supporting developing country Parties in development, distribution and dissemination of clean technologies, and capacity building to strengthen efficiency of upstream and downstream activities related to fossil fuels.

7. The Parties agreed in 2001 (Decision 5/CP.7, Part III) on a number of actions that would begin to refine the work in this area, inter alia:

- (a) Encouraged non-Annex I Parties to provide information on their specific needs and concerns in relation to the impacts of response measures in their national reports and other communications;
- (b) Requested Annex II Parties to provide, in their national communications, details as to the efforts they might undertake in fulfillment of their obligations in this context;
- (c) Requested Annex II Parties to assist developing countries in building capacity to implement programmes to address the impacts of response measures;
- (d) Encouraged Annex II activities to support development, diffusion and transfer of new technologies in such areas as carbon capture and storage, natural gas development, renewable energy, and increased efficiency in upstream and downstream activities

relating to fossil fuels, and designated the GEF and the Special Climate Change Fund as two possible vehicles for such support;

- (e) Charged the Subsidiary Bodies with considering, at their subsequent sessions, the response of the Parties to these provisions;
- (f) Requested that the Secretariat organize a series of workshops to further refine the issues in this area, inter alia:
 - (i) One on the status of modeling activities to assess the adverse effects of climate change and the impacts of existing response measures, also considering approaches to minimize the adverse effects of response.
 - (ii) Two on insurance- one on related actions to address the specific needs and concerns of developing country Parties arising from the adverse effects of climate change and from the impact of the implementation of response measures and another on actions to address the specific needs and concerns of developing country Parties arising from the adverse effects of climate change and from the impact of the implementation of response measures
 - (iii) One on the needs and options of non-Annex I Parties for economic diversification (as a bulwark against adverse impacts of response measures) and on support programmes by Annex II Parties to support those.

8. The former subject was addressed in a May 16–18, 2002, UNFCCC workshop in Bonn, held before the sixteenth SB sessions.² The latter subject was addressed in an October 18-19, 2003, UNFCCC Workshop in Tehran.³

9. At COP10 the Parties agreed to the Buenos Aires programme of work on adaptation and response measures (Decision 1/CP.10) – a major achievement. As part of that programme they undertook to convene two expert meetings. The first, held in conjunction with SBI23, on November 23–24 in Montreal, considered the outcomes of the workshops on modeling and on insurance that were held pursuant to decision 5/CP.7⁴

10. The second, to be held in conjunction with SBI24, was to consider further:

“...how economic diversification might be integrated into, and support sustainable development strategies and to discuss what technical assistance may be needed to develop structural and institutional capacity for facilitating efforts to achieve economic diversification, as well as how foreign and domestic private sector investments in these areas may be encouraged.”

11. This paper serves as background to the above-mentioned expert meeting, to be convened May 16–17 in Bonn. The SBI is mandated by Decision 1/CP.10 to report the results of these expert meetings to SBI-25 (November 2006). The SBI will then consider what actions may be mandated by the COP at its thirteenth session in 2007.

D. Results of the Tehran workshop

12. As further background to the present paper, it is worth considering the highlights and main issues raised in the Tehran meeting of 2003. A background paper for the workshop (Zhang 2003) laid out the context for the meeting, surveyed the literature on economic diversification and assessed the linkages with the impacts of response measures.⁵ In concluding, the paper considered options for mobilizing

² <http://unfccc.int/meetings/workshops/other_meetings/items/1028.php>

³ <See http://unfccc.int/meetings/workshops/other_meetings/items/1021.php>

⁴ <See <http://unfccc.int/meetings/items/3593.php>>

⁵ <http://unfccc.int/files/meetings/workshops/other_meetings/application/pdf/bgpaper.pdf>

resources to further economic diversification in affected states. The meeting also focused on existing support programmes by Annex II countries.

13. The difficulties of achieving economic diversification were noted, based on past experience. It was suggested that economic diversification was most appropriately situated as one element in the process of economic development, which encompasses broader objectives such as poverty reduction and increased employment. As such, it was argued that it is important for any efforts toward economic diversification to be integrated into national development planning processes. As well, and mindful of the need for sustainable initiatives to make economic development really work, it was argued that to be successful economic diversification needed to be integrated in the broader framework of sustainable development. This emphasis on sustainable development as a framework for progress is in line with the explicit mandate from Decision 1/CP.10, and will be returned to below.

14. The workshop ranged broadly to cover the impacts of climate change on vulnerable states, and the role that economic diversification might play in preventing any potential damage. It also considered success stories in economic diversification among LDCs, and the lessons—both positive and negative—that can be drawn from their experience. And it considered the impacts of response measures, with discussion on the extent of impacts that might be expected, and on the specific challenges facing oil-exporting developing countries in particular. A number of presentations noted the efforts to date to diversify the economies of these countries, and argued the need for further efforts and support.

15. Finally, the workshop participants noted a number of specific areas for further consideration:

- (a) Support for the integration of sustainable development in efforts aimed at economic diversification in developing countries;
- (b) Creation of a forum for the exchange of experience in economic diversification and lessons learned, national efforts in meeting this goal, and identification of activities that can promote further economic diversification and create sustainable development opportunities;
- (c) Providing support to develop structural and institutional capacity, not only through financial and technical assistance, but also through improving market assess and facilitation of technology transfer and capital inflow;
- (d) Establishing special funds to facilitate national efforts for economic diversification in developing countries; and
- (e) Establishing broader partnerships with the private sector and civil society to better achieve expected objectives and results of economic diversification initiatives.

16. These themes will be considered in greater depth in Section 3, below. First we will turn to a review of the literature and issues on economic diversification as it relates to vulnerability and the impacts of response measures.

II. Commodity Dependence: The Problem Statement

17. This section of the paper will examine the problem case; why have the Parties found it necessary to deal with the issue of the impacts of response measures? It begins by briefly updating the survey of the literature found in Zhang (2003) on commodity dependence, and arguing that the literature on “resource curse” is helpful in setting the debate in the broader context of economic development. It argues that sustainable development may be an even more useful framework for analysis. It then asks about the state of commodity dependence in those economies and sectors most likely to be affected by Annex I response measures. And it concludes by briefly assessing the nature and magnitude of potential impacts.

A. The nature of commodity dependence

18. Zhang (2003) gives a useful overview of the nature of commodity dependence, and the need for economic diversification. Economic diversity, as she notes, can be measured in various ways, but the

general aim is to identify those states that have a disproportionate dependence on a narrow basket of merchandise exports – typically commodities. Table 1 shows the export structure of developing countries, by region and by broad product category for 1980-2003. Note in particular the high percentage of exports in the fuel sector for Africa and West Asia, at 50.6% and 72.2% respectively.

Table 1: Export Structure of Developing Countries
(percentage of total exports)

	Fuels			Non-fuel primary commodities			Manufactures			Other		
	1980-1983	1989-1992	1999-2003	1980-1983	1989-1992	1999-2003	1980-1983	1989-1992	1999-2003	1980-1983	1989-1992	1999-2003
Developing countries	38.8	22.5	18.0	26.0	19.7	12.7	31.4	55.7	68.1	3.9	2.2	1.2
Lat. Am. & Caribbean	23.3	22.6	16.2	42.9	40.7	25.7	32.6	35.9	56.6	1.3	0.9	1.5
Africa	40.8	47.9	50.6	32.7	24.9	24.0	12.7	15.7	23.0	13.8	11.5	2.4
West Asia	70.0	73.4	72.2	11.5	8.6	6.1	16.8	17.7	21.0	1.7	0.2	0.6
East and South Asia	18.5	7.2	4.9	24.3	15.1	9.1	54.9	76.5	84.8	2.3	1.2	1.1

Source: UNCTAD (2005:91).

19. While identifying the need for diversity is more or less straightforward, the policy prescriptions that follow are somewhat more difficult. Rudiger (2006:12) puts it succinctly:

“First, it must be clear that there is no miracle recipe to achieve diversification overnight. Fostering diversification will be a long drawn out process, and should hence be seen as a long-term goal. Second, there is no shortage of examples of failed diversification policies, and economists know fairly well on the basis of international experience what does not work. Fiscal irresponsibility as well as large-scale state investment in pet industrial projects ranks at the top of the list of what should be avoided. Unfortunately, there is less agreement among economists about what does work, as policies that work well in one place often fail dramatically elsewhere. Indeed, failures have been so common (and sometimes so spectacular) that, in recent years, economists have often preferred not to give any advice at all with respect to diversification policies.”

20. It is particularly important to note the argument that there is no single policy prescription that will work in all cases – a theme to which we will return later in this paper. There are, however, some elements of policy on which most economists agree. For the most part they consist of the standard prescriptions for improving the investment climate: strengthening the banking system, improving access to credit in particular for SMEs, making the bureaucracy more efficient, creating a stable macroeconomic environment (low inflation, stable currency, etc.), and removing regulatory barriers to foreign ownership/participation in key sectors. A recent line of argument calls for “new style” industrial policy that supports key sectors in ways that avoid the known dangers. Rodrik (2004), for example, calls for transparent, time-limited support determined in collaboration with the private sector. His recommendations are discussed in greater depth in Section 3.1 below.

21. In the end, however, the quest for economic diversity is only one part of a broader quest for economic development. Zhang (2003) makes this argument strongly, and there was some agreement in the Tehran workshop on the need to embed the quest for economic diversity in a broader pursuit of economic development and sustainable development:

“There was long discussion on the important link between economic diversification and economic development. It was suggested that the latter is, in many ways, a fuller and more complex process, encompassing not only a structural transformation of the economy (including

economic diversification), but also a reduction in poverty and income disparity. Moreover, it implies progress in values, attitude and institutions, all of which are important ingredients for strengthening adaptive capacity. Thus, it was argued, economic diversification cannot be pursued in isolation from sustainable development, which is key in dealing with the adverse effects of climate change and the impact of the implementation of response measures. It followed, therefore, that the issue of economic diversification in the context of climate change should be integrated into the broader framework of sustainable development.” (UNFCCC, 2003:4-5).

22. The workshop report also noted in particular the vulnerabilities of SIDS and LDCs, both of which are particularly vulnerable to the impacts of climate change and response measures. Here vulnerability is a function of comprised of two basic elements: the nature and magnitude of the potential impacts, and the resilience of the impacted economy – its capacity to adapt to and recover from any negative effects. Huq et al. (2004:6) observe that:

“The LDCs ... are the most vulnerable countries to the effects of climate change and have the least capacity to adapt to these changes. They ... lack the necessary institutional, economic and financial capacity to cope with climate change impacts and to rebuild the infrastructure damaged by natural disasters. ... The LDCs also have the least capacity to adapt to climate change, as they lack the resources and money both to carry out adaptation studies and to implement the strategies emerging from these studies.”

23. The connection between vulnerability and economic diversification in this context stems from the over-dependence of many of the LDC and SIDS economies on sectors that may be negatively impacted by climate change: agriculture, tourism (particularly important for many SIDS) and fisheries. Another aspect to the connection is that a diverse economy provides a more stable base for initiatives related to adaptation.

24. Table 2 shows the export structure of LDCs. Particularly noteworthy is the trend in unprocessed primary commodities, where concentration has steadily increased for all sub-groups of LDCs. This is sobering evidence of a “backward slide” in the pursuit of increased commodity processing and value-added in these economies.

Table 2: Commodity Sector Diversification in LDCs
(percentage of total primary commodity exports)

	Non-oil commodity exporting LDCs			Oil Exporters			Manufactures and /or Services Exporting LDCs			Total LDCs		
	1981-1983	1987-1989	1997-1999	1981-1983	1987-1989	1997-1999	1981-1983	1987-1989	1997-1999	1981-1983	1987-1989	1997-1999
Unprocessed primary commodities	70.9	69.4	83.9	92.7	96.2	98.0	67.1	72.5	79.6	75.5	77.4	88.9
<i>Static ag products</i>	37.4	36.9	42.6	5.7	2.1	2.1	29.5	24.2	27.8	31.9	28.5	28.2
<i>Dynamic ag products*</i>	9.8	10.6	12.2	0.0	0.3	1.3	27.7	39.2	45.0	10.8	12.0	13.5
<i>Minerals, metals and fuels</i>	23.7	21.9	29.1	86.9	93.8	94.5	9.9	9.1	6.8	32.8	36.9	47.2
Processed primary commodities	29.1	30.6	16.1	7.3	3.8	2.0	32.9	27.5	20.4	24.5	22.6	11.1
<i>Static ag products</i>	5.1	4.5	2.6	0.0	0.1	0.0	13.3	8.0	6.2	5.5	3.8	2.3
<i>Dynamic ag products*</i>	3.2	2.5	1.4	0.0	0.2	0.0	9.4	10.4	3.2	2.3	1.9	1.1
<i>Minerals, metals and fuels</i>	20.8	23.6	12.1	7.3	3.5	1.9	10.2	9.2	10.9	16.7	16.9	7.7

Source: UNCTAD (2002), Table 35. Figures are weighted averages, but no data is available for Cambodia, Eritrea, LPDR, Lesotho and Yemen.

** Dynamic agricultural products include items whose income elasticity of demand is greater than unity and much higher than that of traditional agricultural products. The group includes meat and meat products, fish and fish products, fruits, vegetables, nuts, spices and vegetable oils.*

25. States that might be vulnerable to the impacts of response measures are primarily those that are highly dependent on fossil fuel exports. The concern is that Annex I response measures may reduce the demand for those exports, with attendant negative economic, social and environmental impacts outside of Annex I.

26. As such, and in light of the need to broaden the discussion from the need for greater economic diversity, the extensive literature on the question of a “resource curse” is valuable. The focus of this debate has been almost exclusively on states dependent on mineral or oil exports, where rents are generally higher than is the case for other types of commodities (e.g., agricultural). And the policy prescriptions and analysis that flow from this debate are broad in scope, encompassing the traditional elements of development economics.

27. The resource curse literature was spawned by the observation that countries rich in mineral or oil resources did not seem to show higher rates of economic growth—and in many cases showed lower rates—than countries without such resource endowments.⁶ The analysis of the problem has tended to centre on three aspects, with various authors arguing for the greater significance of one or the other:

- (a) The problem of volatility: commodity dependence subjects states to the cyclical nature of global commodity markets;
- (b) So-called “Dutch disease”: the appreciation of the exchange rates arising from resource booms, and the subsequent crowding out of other tradable sectors; and
- (c) Institutional impacts: the damaging effects of rent-seeking that can be spawned by the presence of high resource rents.

28. The problem of volatility is most acute in those cases where the export concentration is particularly pronounced, and where the export to GDP ratio is highest. (UNCTAD, 2005) Shaxson (2005) suggests that it may be a particularly important problem for oil exporters. The key concerns with volatility are several: the direct income losses associated with falling prices of exported commodities; the

⁶ See Sachs and Werner (1995), Auty (2004), Ross (2001). For a good survey of the resource curse literature, see Stevens (2003).

crippling state of foreign exchange constraint that can follow price shocks, and the deleterious impacts of the shocks themselves, felt in terms of lowered long term growth and reduced investment.

29. Most agree that volatility is essentially a fiscal management issue, calling for prudent fiscal policy in boom times and appropriate spending in bad, to balance out the cycles. Stabilization funds are a frequently used instrument, and need to be established so as to insulate them from the short-term demands for budget balancing (Rudiger, 2006). Davis and Tilton (2005) suggest that volatility is not all bad, arguing that downturns allow governments to kill off programs that have outlived their usefulness, and may impel the private sector to make productivity-enhancing investments in key sectors.

30. The Dutch disease is not much analyzed in recent literature. In part this is because, like volatility, it is a straightforward matter of proper economic management—taxing the rents of the ascending industry and distributing them appropriately so as to foster increased competitiveness in other tradable sectors.⁷ That is not to imply that the task of judicious distribution is a simple one. Rudiger (2006) proposes using the revenues to lower non-wage labour costs across all sectors of the economy, helping to increase productivity across the spectrum of traded goods.

31. It should be noted that the crowding out of other tradable sectors is in itself not necessarily a negative outcome, but rather depends on the relative characteristics of the crowded and crowding sectors. For example, if commodity exports crowd out manufacturing exports, and if we assume that there are positive spillover effects (learning, technology transfer, etc.) that accrue to the manufacturing sector that do not accrue to commodities, then the final effect is negative. But fossil fuels are not typical commodities, and some are much more akin to manufacturing in the technical complexity of their processing. As such, they might be expected to foster spillovers comparable to any fostered by manufacturing activity. As well, there is no solid consensus in the literature on the presence of spillovers from FDI.⁸ It may also be that the oil and minerals sectors are less labour-intensive than the sectors that they crowd out, which would work against development goals.

32. Institutional impacts arise from the presence of sizable rents, and the diversion of energies from productive activities to rent-seeking.⁹ It has been argued that this has at least two undesirable outcomes. First, it will necessarily decrease the competitiveness of the sector involved vis-à-vis international competitors. Second, it provides scope for corruption among those charged with managing the rents. Some have argued that civil unrest and civil war constitute the extreme cases of fallout from battles for resource rents (Collier and Hoeffler, 2004). It has also been argued that the presence of ample rents allows governments to postpone necessary economic and social reforms, in the long run undermining the very human well-being that short-run spending aims to achieve.

33. Managing potential institutional impacts is not as straightforward a proposition as managing volatility and exchange rate appreciation. The specifics of each case will necessarily differ, depending on the social, historical and economic context. Several proposals advocate some form of openness, as for example in the form of increased transparency of revenue streams (Salah-i-Martin and Subramanian, 2003; Global Witness, 2004). Others advocate appropriating most of the rents from oil and minerals development, with the proceeds used for general welfare such as social programs (Rudiger, 2006). The challenges here are at least three-fold: in setting tax levels that still allow for necessary investments in the sector; in finding programs that will enhance productivity, such as education and training; and in efficiently and fairly administering the disbursement.

34. Much of the resource curse debate has, unfortunately, tended to polemic sterility, with analysts focusing on whether the oil and mineral sectors are necessarily a burden to economic growth. In recent years, however, a more productive line of analysis has emerged that argues as follows:¹⁰

⁷ See Usui (1997). In fact, the Dutch themselves did an adequate job of addressing it when they were afflicted.

⁸ Gallagher and Zarsky (2004) survey eleven studies and find that most conclude that spillover benefits depend on local production, policy or financial conditions. Schiff and Winters (2003) argue the prevailing wisdom: that spillovers will occur primarily in the sectors where FDI creates backward and forward linkages.

⁹ See Salah-i-Martin and Subramanian (2003); Auty (2004); Pegg (2006).

¹⁰ See, in particular, Rudiger (2006); Maxwell (2004); Davis and Tilton (2005).

- (a) Resource rich states are going to continue to exploit their resources;
- (b) Oil and mineral resources are neither a blessing nor a curse *a priori*, but rather represent potent opportunities;
- (c) The most interesting question, then, is how to successfully exploit the opportunities to create economic development, and avoid the pitfalls that others have suffered.

35. The key lessons of the ongoing analysis in this area are instructional for the work on the impacts of response measures. They are, in essence, that commodity dependence in the oil and mineral sectors raise the stakes, making it imperative to pursue sound fiscal and monetary policy. In addition the importance of functioning institutions, such as open and efficient bureaucracy and judiciary, is highlighted as a bulwark against the deleterious effects of excessive rent-seeking.

B. Commodity dependence and sustainable development

36. Sustainable development is one of the objectives of the UNFCCC (Art. 3.4). It has also been widely accepted in international law as an objective of the global community.¹¹ The results of the Tehran meeting included a recommendation that sustainable development be integrated into efforts aimed at economic diversification in developing countries (UNFCCC, 2003) – a recommendation that is explored further in Section 3.

37. The concept of sustainable development adds yet another dimension to the discussion of commodity dependence and diversification. That is, economic development itself is but one part of the broader pursuit of sustainable development, which is widely recognized to encompass economic, environmental and social objectives. In the specific context of commodity dependent fossil fuel exporters, the sustainable development framework raises several important issues.

38. First, it emphasizes the need to account for resource depletion in some sort of national accounting sense. There is long-standing debate about whether natural capital and man-made capital are in fact substitutable, but a widely-respected tenet of sustainable development in the context of resource depletion is the need to reinvest a stream of the rents in ways that will replenish overall capital stocks. (For a technical treatment of this proposition, see Annex 1.) The objective is that this generation's depletion of non-renewable stocks should not diminish the bundle of man-made and natural capital bequeathed to future generations. Typically the recommendation is to invest some portion of the rents in augmenting natural capital stocks, in new technologies that will allow for more efficient use of the diminished resource base, or in capital stock in sectors that can succeed the eventually declining resource currently being exploited.

39. Second, it seeks solutions that achieve objectives in all three areas- economic, environmental and social (so-called win-win, or triple-bottom-line solutions). Examples of this type of investment include:

- (a) Energy efficiency investments in the processing sectors, increasing productivity, increasing economic resilience and decreasing GHG emissions.
- (b) Domestic demand-side investments in energy efficiency, which free up more fossil fuels for export, reduce energy expenditures by households and reduce GHG emissions.
- (c) Indigenous development of new clean energy technologies and applications, seeking in the long term to replace dominance in the fossil fuel sector with dominance or prominence in alternative energy sectors.

40. This line of analysis is simply a different angle on the familiar themes of economic development and diversification, discussed above. But it is useful in emphasizing that policy making toward economic

¹¹ See Cordonier-Segger and Khalfan (2005). Explicit acknowledgement occurs in the Rio Declaration on Environment and Development and the WSSD Johannesburg Declaration on Sustainable Development, among others.

development does not occur in a vacuum. Rather, it is set in the context of a wider drive for sustainable improvement in human wellbeing. As such, policymaking for diversification and economic development should be cognizant of the potential synergies between those objectives and broader social and environmental objectives.

C. Commodity dependence and vulnerability to the impacts of Annex I response measures

41. As noted in Section 1.2, the UNFCCC (Art. 4.8) identifies a number of countries that are vulnerable to the impacts of climate change and/or the impacts of response measures by Annex I Parties:

- (a) Small island countries;
- (b) Countries with low-lying coastal areas;
- (c) Countries with arid and semi-arid areas, forested areas and areas liable to forest decay;
- (d) Countries with areas prone to natural disasters;
- (e) Countries with areas liable to drought and desertification;
- (f) Countries with areas of high urban atmospheric pollution;
- (g) Countries with areas with fragile ecosystems, including mountainous ecosystems;
- (h) Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products; and
- (i) Land-locked and transit countries.

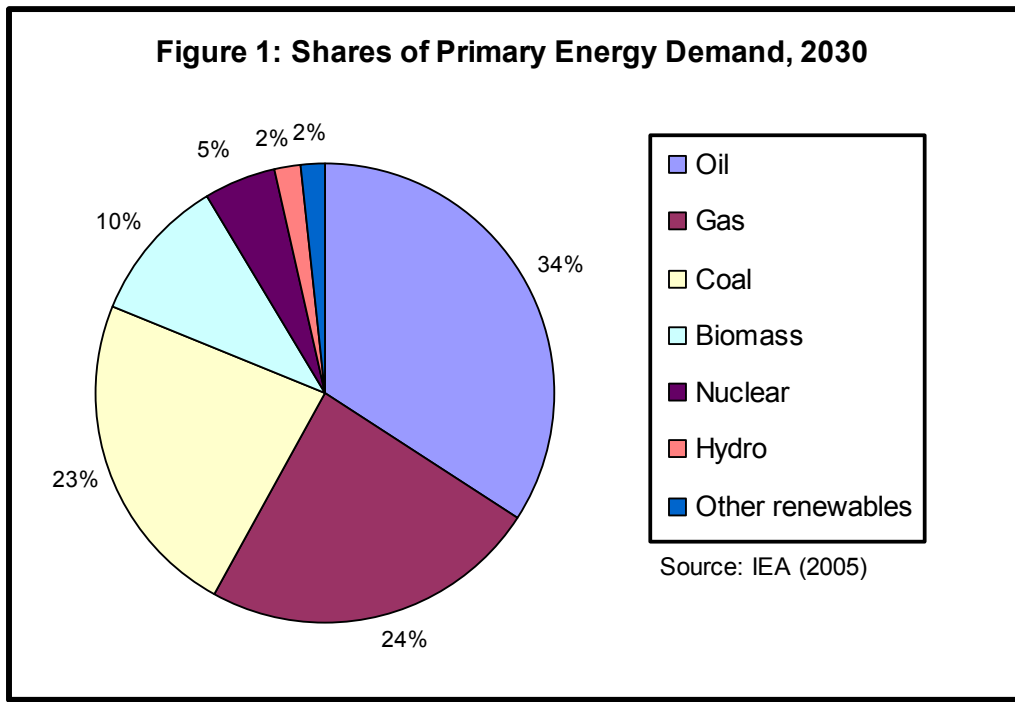
42. For the purposes of this paper we are concerned with those countries that are vulnerable to the impacts of response measures most notably: countries whose economies are highly dependent on income generated from the production, processing and export of fossil fuels. The vulnerability of these countries lies in the possibility that the policies and measures taken by Annex I Parties in fulfillment of their UNFCCC related obligations will lower the demand for fossil fuels, and thus negatively impact on their economies. This effect might come in any of three ways:

- (a) Through possible decreases in income in Annex I Parties as a result of their climate related policies and measures. Decreased income in these countries results in lower demand overall, including for fossil fuel imports;
- (b) Through spillover effects. Even if there is no decrease in income, policies in Annex I Parties might result in decreased fuel use through, for example, measures that increase fuel efficiency; or
- (c) Through direct taxes levied on fossil fuels, which would increase prices and decrease demand (with consuming country governments appropriating most of the increased rent via taxation).

43. Terms of trade effects might also matter, if Annex I energy-intensive goods become more costly, and income effects cause a drop in Annex I demand for all exports from non-Annex I producers. The subsequent worsening of non-Annex I terms of trade would arguably constitute a negative impact. This is not a straightforward effect, however; to model it properly we would also need to account for possible migration of Annex I energy-intensive production to non-Annex I Parties (so-called “carbon leakage”), which would have *positive* terms of trade effects. There has been little work to date that attempts to quantify these effects, and more is clearly needed.

44. The lack of diversity that was the subject of the previous section leaves fossil fuel exporting non-Annex I Parties open to significant impacts if indeed demand does follow any or all of the three scenarios described above.

45. The discussion in the present context might seem out of place; there is currently unprecedented demand for fossil fuels in the global market, primarily driven by growth in the Chinese and Indian economies; China accounted for some 30% of global demand increase in 2004 (IEA, 2005). IEA (2005) sees an overwhelming predominance of fossil fuels in the growing energy mix over the next few decades. The predicted growth of more than 50% in primary energy demand will be more than 80% met by fossil fuels (see Figure 1). The strength of current demand, and the associated price impacts, has led to an increase of some 30% in the terms of trade for countries with a dominant share of fuels in their exports in the period 2002 – 2004 (UNCTAD, 2005).



46. This extraordinary dynamic, however, is in fact a graphic illustration of the strength of impact that movements in fossil fuel demand can have on those countries. The vulnerability to cyclical price movements is precisely what gives rise to the concerns that underpin the Parties' work on Articles 4.8 and 4.9.¹²

47. The key vulnerabilities of relevance to this work are in the oil and coal sectors. Natural gas, as a cleaner burning fuel, may prosper or suffer, depending on the assumptions used – Ghasemzadeh and Alawadhi (2000) show that there is no consensus on the literature on the nature of these impacts (but argue that on balance negative impacts seem probable). IPCC (2001), surveying a number of studies, also fails to find consensus. All analysts, however, agree that trade in coal, as the most carbon-intensive of the three major primary energy suppliers, will be negatively affected, as will trade in oil.

48. Vulnerability to Annex I response measures can be cast as a function of a country's dependence on coal or oil exports, and the percentage of those exports that go to Annex I Parties. Tables 3 and 4 show the figures for the coal and oil sectors, respectively.

¹² Indeed, UNCTAD (2005) warns that current trends in terms of trade gains could be easily reversed, and raises concerns about global imbalances that might lead to this result.

Table 3: Coal Exports of Selected Countries

	Coal exports as share of GDP	Share of exports to OECD	Share of exports to rest of world
China	2.6%	71.9%	28.1%
Columbia	20.6%	70.8%	29.2%
Indonesia	18.2%	48.7%	51.3%
South Africa	21.6%	68.2%	31.8%

Sources: Pershing (2000), World Bank Development Indicators, IEA (2001), US Embassy, Jakarta (2005), South African Department of Minerals and Energy (2005).

Notes: Shares of exports are 2000 figures. Coal export and GDP figures are 2004 except for South Africa (2003) and Indonesia (2000). Price of coal is assumed at average 2004 value: USD50/ton.

Table 4: Petroleum Exports of Selected Countries

	Value of petroleum exports	Share of GDP	Petroleum exports to N. America, W. Europe, Japan	Petroleum exports to rest of world
Algeria	23,062	27.4%	83.4%	16.6%
Indonesia	11,191	4.4%	47.6%	52.4%
IR Iran	34,289	20.3%	56.8%	43.2%
Iraq	17,751	77.2%	96.6%	3.4%
Kuwait	26,363	50.9%	79.7%	20.3%
SP Libyan AJ	18,653	64.3%	93.0%	7.0%
Nigeria	32,337	45.3%	64.4%	35.6%
Qatar	11,694	41.1%	65.4%	34.6%
Saudi Arabia	106,189	42.7%	49.1%	50.9%
UAE	38,099	36.9%	48.5%	51.5%
Venezuela	29,379	27.7%	81.5%	18.5%

Source: Based on OPEC (2004), Tables 3, 5, 51, 53.

Notes: All figures are 2004. Values of exports are in current USD millions. Export figures are based on an aggregation of crude oil and refined products.

49. In the context of coal, Table 3 shows that China's exports are an insignificant portion of its total exports, and therefore China cannot be considered vulnerable. Indonesia, Colombia and South Africa, however, seem potentially vulnerable, due to coal's significant role in total exports, and the high proportion of exports destined to Annex I Parties. Exports volumes from Annex I Parties (Australia, Canada and the US) are higher in volume, but these are more or less dominated by metallurgical coal, which is not likely to be as sensitive to response measures as is thermal coal (Knapp, 2000). The exports from the countries in Table 3, on the other hand, are almost completely made up of thermal coal.

50. In the context of oil exports, Table 4 shows a number of countries potentially vulnerable to response measures by virtue of their export patterns. Iraq, Libya and Kuwait all have annual exports of petroleum products valued at more than 50% of GDP. And Iraq and Libya currently export more than 90% of their product to North America, Western Europe and Japan; Kuwait's figure is also high at just under 80%. Pershing (2000) notes that Oman and Angola (not included in Table 4) are also particularly vulnerable by these criteria. Nigeria, United Arab Emirates, Saudi Arabia and Qatar also appear to be vulnerable to reduced demand from Annex I Parties.

51. As noted above, there is little consensus on how to treat natural gas exports in the context of this discussion. Gas has a lower carbon content than oil or coal, and is increasingly being used for peak

power generation in Annex I Parties and others, at least in part because of its “clean” characteristics. As such, it may even benefit from Annex I response measures. IPCC (2001) notes that in the long term there may be increased demand for gas as a feedstock for hydrogen.

52. On the other hand, the possibilities for switching to gas in the transport sector are very limited, and even in power generation many switching opportunities are not economical in the short term. As such, some models predict that overall energy use reductions will be a more important force than switching, resulting in decreased gas use. In the final analysis gas exporters should also be considered as potentially vulnerable, along with oil and coal exporters. Further research might be helpful in clarifying the nature and extent of that vulnerability.

D. Assessment of the nature and magnitude of impacts from Annex I response measures.

53. The previous section assessed the vulnerability of various fossil fuel exporters to negative impacts of Annex I response measures. This section explores the body of work that has been devoted to articulating the nature and magnitude of those impacts. The intent is not to arrive at a definitive judgement on the modelling done to date, or to revisit the debates that surround that work. It is rather to give an overview of the key results—where is there consensus, and what is the basis of the disagreements?—as a basis for moving forward.

1. Coal

54. Coal is widely acknowledged to suffer the greatest impacts of the three fossil fuels (though this says nothing about the relative magnitude of the impacts in fossil fuel exporting countries—vulnerability also matters, as noted above). Pershing (2000) cites IEA analyses that find the demand for coal for power production is extremely price sensitive. And as the fuel with the highest carbon content, many measures aimed at GHG mitigation will target it more heavily than its substitutes.

55. Pershing’s (2000) analysis finds that Annex I policies and measures might result in a GDP drop of between 1% (Indonesia) and 4% (South Africa) by 2010. Indonesia and Colombia are less vulnerable because they have growing domestic demand for primary energy that may compensate for export losses, while South Africa has low prospects for domestic demand growth.

56. South Africa’s national communication to the UNFCCC notes this potential as a concern, warning that “a reduction in the importation of coal by Annex 1 countries would lead to a profoundly negative impact on the South African economy.” (South Africa 2000:44)¹³ South Africa also raises the possibility that Annex I response measures may result in increased South African exports of energy-intensive goods, a line of analysis also pursued by Knapp (2000).

57. Another recent analysis comes from the IEA’s (2004 Ch. 11; 2005) *Alternative Scenario*. This is a multi-sectoral bottom-up model that assumes the full implementation of a broad suite of measures—by developed and developing countries alike—presently being considered to address energy security and environmental concerns. While *Alternative Scenario* is *not* intended to be a model of Kyoto Protocol’s implementation, its results look very much like a Kyoto scenario (Annex 2 to this document makes this argument in greater detail). Under this model coal demand takes the biggest hit of all three fuels relative to the reference case, dropping 23% by 2030 (compared to 10% reductions for oil and gas). Some 90% of this drop comes from increased efficiency and fuel switching in power generation. It should be noted that the predicted drops are a result of *global* policies and measures, of which Annex I Parties’ -related impacts would be only one component. In the case of coal, most of the reductions relative to the baseline come from *developing* country measures to increase the efficiency of power generation.

2. Oil

58. Oil is the world’s most heavily traded commodity by value, with the majority of its use in the transport sector. IPCC (2001) surveys a range of models to gauge the impacts of Annex I measures on non-Annex I oil exports, and finds basic agreement that the impacts will be negative, but a wide range of

¹³ There is no mention of this concern in the Communications from Indonesia or Colombia.

estimates of magnitude. Müller (2005) also finds a range of results, all negative, ranging from the minor (0.2% decline in real GDP by 2010) to the significant (13% drop in oil revenues, or a 5.5% drop in GDP assuming the 2004 ratio of oil exports/GDP).

59. Pershing (2000) suggests that these models may overstate the extent of damages, *inter alia* because they ignore the market power of the oil producing countries (more general critiques of models are explored below). Ragland (2005), on the other hand, suggests that most models ignore the market structure of the oil sector, assuming that price equals short-run marginal cost (when in fact it is often higher), and using supply curves that assume alternate uses will be found for input resources (ultimately, an elasticity argument).

60. Saudi Arabia, in its national communication to the UNFCCC, argues that it is particularly vulnerable to the impacts of Annex I response measures in terms of absolute value of potential damage (Saudi Arabia, 2005), a finding echoed by Ragland (2005). Iran (2003), in its national communication, presents modelling results that predict revenue losses of 900 million 1995 US dollars by 2010, or a decrease in welfare of 0.52%.¹⁴ South Africa and Singapore have also raised concerns about the possible vulnerability due to the fact that their economies are dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products.

61. IEA (2005) predicts a 10% drop in demand for oil by 2030 in its Alternative Scenario, resulting in a price drop of 15%. These decreases are relative to the reference scenario; oil demand does not actually drop, but increases over the period by 1.0%/year. Again, not all of this decrease is due to Annex I policies; China's oil demand, for example, reduces by some 12% from the reference case. Some 2/3 of the overall shortfall comes from the transport sector, the result of increased fuel efficiency and substitution of non-carbon fuels.

2. Gas

62. As noted above, there is no consensus on the nature of impacts of Annex I response measures in the gas sector. IPCC (2001) find results for the year 2010 relative to baseline demand that range from -36.4% to +15.3%. Ghasemszadeh and Alawadhi (2000) find similarly mixed results.

63. IEA (2005) predicts a 10% drop in demand for gas by 2030 in its Alternative Scenario. Power generation makes up almost 2/3 of this difference, with residential and commercial constituting another 20%. The figures here understate the expected impact from Annex I Parties, since Chinese demand for gas actually increases in the Alternative scenario relative to the baseline—the result of mandated increased gas use in power generation.

III. Issues for Consideration: A Critical Assessment

64. The October 2003 UNFCCC Workshop in Tehran focused on the needs and options of non-Annex I Parties for economic diversification, and on support programmes by Annex II Parties and others to address these needs. In the course of the event, a number of areas for further consideration were raised (UNFCCC 2003):

- (a) “Support for the integration of sustainable development in efforts aimed at economic diversification in developing countries;
- (b) Creation of a forum for the exchange of experience in economic diversification and lessons learned, national efforts in meeting this goal, and identification of activities that can promote further economic diversification and create sustainable development opportunities;
- (c) Providing support to develop structural and institutional capacity, not only through financial and technical assistance, but also through improving market assess and facilitation of technology transfer and capital inflow;

¹⁴ This scenario assumes no trading of AAUs (international emissions trading), and as such may overstate the actual impacts.

- (d) Establishing special funds to facilitate national efforts for economic diversification in developing countries;
- (e) Establishing broader partnerships with the private sector and civil society to better achieve expected objectives and results of economic diversification initiatives.”

65. These themes formed the basis of the terms of reference for the May 2006 expert meeting, as described in Decision 1/CP.10:

- (a) Consider how economic diversification might be integrated into, and support sustainable development strategies;
- (b) Discuss what technical assistance may be needed to develop structural and institutional capacity for facilitating efforts to achieve economic diversification;
- (c) Discuss how foreign and domestic private sector investments in these areas may be encouraged.

66. This section will examine each of these themes in turn.

A. Integrating sustainable development in diversification strategies

67. It was noted above that sustainable development constitutes a promising framework within which to pursue the work related to economic diversification. Diversification, at the end of the day, is aimed at improving social and economic conditions in a sustainable way.

68. Sustainable development, however, is not a one-size-fits-all concept, and needs to be defined in the context of each nation according to its particular circumstances and priorities. As such, the pursuit of sustainable development in any country with the aim of minimizing the impacts of response measures needs to be carried out according to a country-driven agenda.

69. That said, there are some obvious ways in which sustainable development could be pursued in a general sense in the context of this work, keeping in mind that the framework of sustainable development encourages the pursuit of win-win opportunities that can advance economic, social and environmental objectives simultaneously.

70. Energy regimes might be a prime candidate for focus. In most non-Annex I Parties there is a clear need for support to fundamentally transform energy regimes, with both a focus on existing operations and on new investment. IEA (2005) forecasts the need for some \$16 trillion in new energy infrastructure investment in developing countries between now and 2030—infrastructure that will often have useful lifespans measured in many decades. Supporting decisions that will adopt best available technologies is crucial if developing countries are to maintain and enhance their international competitiveness in the years to come, not to mention efficiently serve the development aspirations of their citizens with respect to energy provision.

71. Diversification objectives in this context might be served by development and dissemination of new technologies on a wider scale. As a rule such efforts should build on domestic strengths. Fossil fuel exporters might, for example, become exporters of solar expertise, given their indigenous strengths: strong engineering know-how built up in the petroleum field, and favourable solar regimes.

72. Ideally, adaptation objectives would also be served by the pursuit of sustainable development in this context. For example, some Middle Eastern non-Annex I Parties are well-positioned to pursue world leadership in the area of desalinization technologies, achieving economic and social goals while reducing vulnerability to climate change. (No middle east LDCs with desalination prospects)
Sustainable development is about more than energy policy and adaptation to climate change. There may well be scope for support to initiatives that have nothing to do with the primary subject area of the UNFCCC (for example, education, investment climate, support to SMEs), if they result in less vulnerability in non-Annex I Parties to Annex I response measures.

73. As noted above, though, any such sustainable development initiatives need to be country-led, to ensure that they fit with prevailing needs and circumstances. A number of OPEC countries, for example, have expressed interest in the emerging field of carbon capture and storage as a method of enhanced recovery of reserves. This reality underscores the importance of domestic-level capacity to identify priority areas of interest.

74. It is worth noting, however, that paragraphs 22-29 of decision 5/CP.7 lay out a promising array of objectives that properly fit the sustainable development framework proposed above, including:

- (a) Encouraging all Parties to cooperate in creating favourable conditions for investment in sectors where such investment can contribute to economic diversification;
- (b) Requesting Annex II Parties to assisting developing countries, in particular those most vulnerable to the impact of the implementation of response measures, in meeting their capacity-building needs for the implementation of programmes which address these impacts;
- (c) Consideration of appropriate technological options in addressing the impact of response measures, consistent with national priorities and indigenous resources;
- (d) Encouraging Parties to cooperate in the technological development of non-energy uses of fossil fuels, and requests Annex II Parties to support developing country Parties to this end;
- (e) Encouraging Parties to cooperate in the development, diffusion and transfer of less greenhouse gas-emitting advanced fossil-fuel technologies, and/or technologies relating to fossil fuels, that capture and store greenhouse gases, and requests Annex II Parties to facilitate the participation of the least developed countries and other non-Annex I Parties in this effort;
- (f) Urging Annex II Parties to provide financial and technological support for strengthening the capacity of developing country Parties identified in Article 4, paragraphs 8 and 9, of the Convention for improving efficiency in upstream and downstream activities relating to fossil fuels, taking into consideration the need to improve the environmental efficiency of these activities;
- (g) Encouraging Annex II Parties to promote investment in, and to support and cooperate with, developing country Parties in the development, production, distribution and transport of indigenous, less greenhouse gas-emitting, environmentally sound, energy sources, including natural gas, according to the national circumstances of each of these Parties;
- (h) Urging Annex II Parties to provide support for research into, and the development and use of, renewable energy, including solar and wind energy, in developing country Parties;

75. A number of sobering challenges need to be addressed in pursuing these and other sustainable development avenues as a bulwark against the negative impacts of response measures. How to pick the “right” sectors for diversification, and how to foster infant industries that actually mature? How best to foster technology transfer? How to ensure adequate flows of domestic and foreign investment? How best to manage Annex I support? What sorts of collaborations will best serve the objectives?

76. These questions will be pursued further in the sections that follow. Before proceeding, however, it is worth inserting a cautionary note: the subject of the proposed work in this area is and has been the work of legions of economists and other specialists since at least the advent of the Bretton Woods system over fifty years ago. The pursuit of economic growth and sustainable development has few success stories and many failures to show for decades of dedicated effort.

77. This is not to say the effort is not worthwhile, even imperative. But, in the words of one practitioner, “Anyone who claims to understand economic development completely, or to have found

‘the’ key to ‘the’ secret of economic growth, is likely to be a fool or a charlatan or both” (Herrick and Kindleberger, 1983:xvi).

78. However, decades of experience mean that there is a deep pool of available expertise on the matters of sustainable economic development outside the UNFCCC process that might be usefully drawn into a forum of the type envisioned. This includes other UN bodies such as UNCTAD, UNDP and UNEP, as well as the World Bank. It also includes research institutes, academics and NGOs. Any sort of institutional structure created by the Parties under the Buenos Aires programme of work would do well to tap into this community of practitioners.

B. Technical assistance for diversification

79. Decision 1/CP.10 asked that the expert meeting discuss what technical assistance may be needed to develop structural and institutional capacity for facilitating efforts to achieve economic diversification.

80. This discussion needs to be based in the first instance on an understanding of the problem that is to be addressed. That is, the problem is not simply how to materialize the Annex II Party commitments in this context, but at least as important is to have some agreement on what exactly any new technical assistance would aim to do, and what forms it would take.

81. Section 2 above surveyed the nature of the economic diversification problematique through the lens of the resource curse literature, and found three types of challenges arising from the dependence on fossil fuel and mineral exports: exposure to commodity market volatility, the “Dutch disease” and institutional impacts/rent seeking. The assistance necessary to address these problems would likely consist in the first instance of sound policy advice and additionally, in some cases, of financial assistance to implement the advice given.

82. As noted above, the first two issues involve classic problems in fiscal policy, involving counter-cyclical fiscal policy and appropriate taxation of the rents of the ascendant sector. The key challenge comes in deciding how to redistribute the appropriated rents in order to effectively foster a diverse economic development, and here solid policy advice is key.

83. There are good principles to guide efforts in this area. Rodrik (2004), for example, lays out 10 principles to guide the design of industrial policy that not only help in meeting the substantive challenge of diversification, but also help address the process concerns highlighted by the debates over institutional impacts and rent-seeking:

- (a) Incentives should be provided only to “new” activities;
- (b) There should be clear benchmarks/criteria for success and failure;
- (c) There must be a built-in “sunset clause”: a provision that envisions a timeline or conditions under which the incentives should eventually be terminated
- (d) Public support must target activities (e.g., key technologies, R&D, venture capital, training), not sectors;
- (e) Activities that are subsidized must have clear potential for providing spillovers and demonstration effects;
- (f) The authority for carrying out industrial policy must be vested in agencies with demonstrated competence;
- (g) The implementing agencies must be monitored closely by a principal with a clear stake in the outcomes, and who has political authority at the highest level;
- (h) The agencies carrying out the promotion must maintain channels of communication with the private sector;

- (i) Optimally, mistakes that result in “picking the losers” will occur;
- (j) Promotion activities need to have the capacity to renew themselves, so that the cycle of discovery becomes an ongoing one.

84. As well as this generic guidance it was noted above that, in a sustainable development framework, ideally support would go to new activities that have potential for win-win outcomes that provide environmental and social benefits as well as economic.

85. As argued above, given this problem statement the type of technical assistance needed is principally in the area of good policy advice, along the lines of a solid diagnostic exercise. There is no one-size-fits-all solution to the problem of economic diversification, and the first need is for a blueprint of the types of institutional and capacity improvements that are most pressing in each national context.

86. An excellent example of inter-institutional cooperation for the pursuit of this type of analysis is the Integrated Framework for Trade-Related Technical Assistance to Least-Developed Countries (IF). The participating agencies are the IMF, ITC, UNCTAD, UNDP, the World Bank and the WTO. The mandate of the programme is to diagnose the obstacles in LDCs to exploiting the potential gains from liberalized trade and investment, and help build capacity to overcome those obstacles. While the second part of this mandate has been rather weak to date, the diagnosis is widely considered to be excellent, and typically covers precisely the sort of detailed advice that non-Annex I Parties could use to elaborate their priorities for pursuing sustainable development as part of the Buenos Aires plan of work.

87. Some recommended policy measures for economic diversification need not entail a need for financial assistance. For example, loan guarantees to new activities can be structured so as to spread risk across a wide enough range of activities that exposure is minimal. But other types of initiatives will clearly involve significant government outlays. Infrastructural upgrades, training programs, R&D – these are all costly propositions. One of the failings of the IF Diagnostic Studies is that the LDCs in which they were carried out do not have the resources necessary to implement the blueprint for progress, and the needs are greater than the available multilateral finance.

88. Where this is a problem in the context of non-Annex I Parties vulnerable to the impacts of response measures, there is a need to consider what sources of assistance might be available. It is worth looking at what mechanisms are currently available, or have been mandated to give support in this area.

89. The Special Climate Change Fund was created with a mandate to finance activities, programmes and measures including those that assist developing country Parties referred to under Article 4, paragraph 8 (h), in diversifying their economies. The fund is operated under the guidance of the COP, financed by support from Annex II and other Annex I Parties, and operated by the GEF. Negotiations with respect to the Fund, and specifically its role supporting economic diversification, are still ongoing.

90. The GEF also operates a climate change focal area that lends for projects in the areas of GHG mitigation, adaptation and capacity building for fulfilling UNFCCC obligations. A number of the project types covered by the GEF might fit under the sustainable development approach discussed above, though funding would not be specifically aimed at economic diversification.

91. There are also a number of sources of funding outside the UNFCCC framework for sustainable development projects and economic diversification more specifically. These include multilateral development funding (World Bank), regional development banks, and bilateral aid flows. Private sector financing might also play an important role in fostering economic diversification, and the issues surrounding attracting FDI are discussed below.

92. Beyond the traditional modes of technical assistance for economic diversification, there are other sorts of Annex I and Annex II policies that might be pursued toward the same end, such as increased market access for vulnerable country exports, and more effective efforts at technology transfer.

93. The issue of market access for exports of non-Annex I Parties is for the most part bound up in the Doha round of multilateral trade negotiations. These talks, ongoing since 2001 and having already missed several deadlines for completion, are struggling to produce an outcome before the expiry of the

US Administration's ability to approve the results on a fast-track basis in mid-2007. For those non-Annex I Parties that are WTO members, or in the process of accession, these talks must be the focus of most efforts to ensure market access, though at this stage of the negotiations there may be little chance to influence outcomes. Many modalities have already been agreed, and small negotiating groups of influential countries are more or less managing the process in the various negotiating areas.

94. Moreover, even in the context of the sorts of unilateral liberalization efforts that many vulnerable countries have undertaken in recent decades, and even given preferential market access, economic growth (much less sustainable development) is not assured without meaningful forms of special and differential treatment. (UNCTAD 2004) The key problem is that most developing countries do not have the capacity to fully exploit the opportunities presented by trade liberalization.

95. The last few years have seen a startling rise in the number of bilateral and regional trade agreements as well, and it is possible that "WTO-plus" market access commitments might be secured under such agreements. Those sorts of concessions, however, typically come at some cost (Cosbey *et al.*, 2004).

96. There are strong obligations under the Convention for Annex II Parties to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to developing country Parties, to enable them to fulfil the provisions of the Convention. Technology transfer is a standing item of discussion at each COP, and an extensive program of activities is ongoing, including an active Expert Group on Technology Transfer and a Technology Information Clearinghouse.

97. In general, the issue of technology transfer has seldom been satisfactorily addressed at the international level for a number of reasons, not least of which being that most valuable technology and intellectual property is privately owned. It may be worth exploring the alternatives to conventionally conceived intellectual property rights as one manner of facilitating technology transfer. There have been a number of innovative proposals for open source "patenting" in the area of plant varieties or traditional knowledge, for example.

98. Adding to the inherent difficulty of this area from the international policy perspective, successful technology transfer demands a number of preconditions in the host country, including skilled workforce, supporting industrial structure, institutions and infrastructure—elements beyond the influence of most foreign governments.

99. There are, however, successful models of international technology *cooperation*, wherein a number of countries collaborate more or less as equals in pursuit of mutually beneficial results on development and diffusion. In the context of climate change examples include the Methane to Markets Partnership, the IEA's Climate Technology Initiative and a range of bilateral cooperation agreements. As well, the possibilities for indigenous technology development (as envisioned in Article 4.5 of the Convention) and regional cooperation should not be ignored as alternatives to the "transfer" model.

C. Encouraging foreign and domestic private sector investment

100. Facilitating capital inflow and, for that matter, facilitating the flows of *domestic* capital for sustainable development and economic diversification, are not easy challenges. Investment aimed at exports ("vertical" investment) is looking for efficiencies gained by production in the host country. As such, investment climate is key, and includes such things as market size, quality of labour force, macroeconomic stability, political risk, quality of infrastructure, quality of domestic institutions such as the bureaucracy and rule of law, and so on. These are important elements for both foreign *and* domestic investors, though the latter are typically more dependent on a functioning domestic banking sector than are the former.

101. As such, the challenges involved in attracting investment are not separable from those enumerated above. The agenda for institutional and capacity strengthening to foster economic diversity is intimately related to the agenda for stimulating increased foreign and domestic investment. Both involve domestic reforms aimed at creating a climate in which more robust economic development can take place.

102. It is worth noting, however, that few analysts support blanket-type incentives to attracting FDI. The consensus seems to be emerging that what is desired is not increased quantity of FDI alone, but that increased *quality* is the critical ingredient.¹⁵ In addition it was argued in Section 2 that there are legitimate questions about the existence of spillover benefits from FDI as a whole.¹⁶ Targeted incentives for both FDI and domestic investment, that aim to support activities with good potential for spillover benefits, are likely to be more effective. The challenge is to engage in this type of targeting without putting governments too far into the undesirable position of picking “winners.”

103. Moreover, the list of criteria to which FDI respond, described above, suggest that resources are better spent in creating an overall improvement in the investment climate—improvements that will in the process provide wider public goods.

104. International investment agreements (IIAs) are one often-touted mechanism for attracting FDI. Most existing IIAs are bilateral agreements, but they are increasingly part of the new wave of trade agreements. Cosbey and Mann (2004) argue that the evidence shows that these agreements in and of themselves do little to increase FDI, though they might be a useful element in a broader strategy of improving a country’s investment climate.

IV. Concluding Summary Remarks

105. The obligations set out in the UNFCCC are clear: Annex I Parties must take into account the impacts of their response measures in non-Annex I Parties, and should assist those Parties in addressing negative impacts that do occur. This paper is part of an ongoing process to determine how those obligations might be fulfilled.

106. It seems clear that until the modeling exercises achieve a much greater degree of comparability (an unlikely eventuality), it will be particularly difficult to quantify the sorts of impacts (both positive and negative) that might result from Annex I response measures. At the same time, there is a pressing need for greater economic diversification, as part of a broader agenda for sustainable development, in those countries that are particularly vulnerable to the impacts of Annex I response measures. This need exists independent of the nature and magnitude of those impacts; differing modeling results can imply greater or lesser urgency.

107. A pragmatic approach might involve proceeding even in the absence of consensus on quantifiable impacts. One possibility mooted above would avail vulnerable Parties of a mechanism modeled on one designed for LDCs: the Integrated Framework for Trade-Related Technical Assistance for Least-Developed Countries, designed to analyze the obstacles to achieving potential in terms of trade and investment. This type of technical assistance fits well with the nature of the problem faced by those countries vulnerable to the impacts of Annex I response measures. In many—but not all—cases, the strategy recommendations that result might be implemented without a significant burden to Annex II countries. The final result would obviously depend on the fiscal strength of the countries involved.

108. Whether or not this particular type of mechanism is used, a two-stage approach of this sort seems appropriate. The first stage would help identify the policy measures and strategies that might be undertaken in non-Annex I Parties to reduce vulnerability to Annex I response measures. Once those needs are identified in greater detail, it should become clearer (and easier to agree on) what types of support mechanisms might be created, or what existing mechanisms utilized, to address them.

109. This paper has suggested, based on the discussions to date, that there is a need to pursue economic diversification within a broader context of sustainable development, with increased investment and diversity leading to improvements in economic, social and environmental conditions. This would mean, for example, that improvement to the investment climate overall would go hand in hand with efforts to ensure *quality* investment—investment in sectors with high potential for spillover benefits, with positive environmental results and pro-poor outcomes. Some guidelines were offered for conducting this sort of “neo-industrial policy.”

¹⁵ See Cosbey *et al.* (2004).

¹⁶ Hanson (2001) has a good discussion of the issues involved.

110. In the end, a successful outcome will necessarily involve a collaboration of efforts in Annex I Parties and in vulnerable non-Annex I Parties, and a shared determination for progress. This paper, and the Expert Meeting for which it serves as background, should help to define in greater detail what next steps are appropriate in moving forward.

Natural Resource Extraction and Sustainable Development

El Serafy (1989, 1991) argues that, in the special case of exhaustible resources, depletion should not be thought of as depreciation of capital, but rather as a drawdown of inventories, and that it should therefore not be counted in GNP flow accounts. Even if the Net National Product (NNP) thus derived *did* reflect true national income—something El Serafy disputes—this would not serve as an adequate guide to policy since GNP, not NNP, is the commonly-used aggregate statistic.

He suggests dividing the rents from such depletion into “income” and “capital” elements, the former to be counted as true income in the national accounts (actually a *stream* of income over the duration of extraction) and the latter to be invested to create a perpetual stream of returns. The division should be into such proportions that the present value of the two streams is equal. Thus the true income derived from the depletion of resources is equal to the income that could be sustained in perpetuity through investment of the capital element. Formally expressed, this is:

$$X/R = 1 - \frac{1}{(1+r)^{n+1}}$$

where X is true income, R the receipts (net of extraction costs), r the discount rate, and n the number of periods over which the resource will be extracted. $(R - X)$ is the capital element, which can also be thought of a Keynesian user cost. The equation is constructed such that the stream of user costs $(R_0 - X_0, \dots, R_n - X_n)$, if invested at r , will yield a stream of income, the present value of which is equal to the present value of the stream of true income (X_0, \dots, X_n) .

One application of this technique, not fully explored by El Serafy, is a resolution of the seeming irreconcilability of sustainable development and natural resource extraction: that is, if sustainable development implies non-declining stock of natural capital, how can any rate of depletion of non-renewable resources be allowed? Some “capital element” of resource rents could be invested in the creation of natural capital (afforestation, habitat rehabilitation) such that, by the time of depletion of reserves, the investment would result in a “capital gain” equal to the present-valued “income element” of rents.¹ Note that a capital gain can result from anything which augments the value of existing natural capital stocks (i.e., which increases *effective* reserves), and might include improved technology for efficient use of natural capital, as well as such things as afforestation and rehabilitation. The result is analogous to Herfindahl's rule: that higher quality resources be exploited first, in order to build up the capital and knowledge to be able to exploit the lower quality resources later; well-being can be maintained with lower stocks through appropriate investment of receipts. So by investing an appropriate portion of net receipts, it is possible to exploit non-renewable resources while abiding by the principles of sustainable development.

¹ Note that it would have to be a net capital gain. All natural capital degradation which resulted indirectly from exploitation of the resource stock would have to be accounted for as well. This might imply rather low X/R ratios. Also note that the rate of return to investment of the capital stream is assumed to equal some r . Choice of this rate is tricky, since the nature of investment in Kn makes future benefits (returns) difficult to predict and/or monetize.

IEA's Alternative Scenario

The IEA's *World Energy Outlook 2004* first constructed an "Alternative Scenario," which was subsequently also run for its *World Energy Outlook 2005*. The scenario, which is compared to the baseline reference case, assumes the undertaking of a broad suite of currently contemplated policies and measures to address energy security and environmental concerns in developed and developing countries, such as the G-8 commitments from the Gleneagles Summit of 2005, China's Tenth Five-Year Plan for Energy Conservation and Resources, and so on.

While it is not intended to be a simulation of Kyoto compliance, and while it includes both developed and developing countries, the alternative scenario in fact comes remarkably close to looking like compliance with Kyoto obligations. It has OECD CO₂ emissions leveling off at around 13,750 Mt by 2020 (IEA 2004:378).

To find whether this indeed looks like a Kyoto-compliant future, we first need to translate Annex I commitments under Kyoto to Annex I commitments *plus* likely non-Annex I OECD member emissions (to get a comparable OECD figure). And we need to derive CO₂-only figures, which the IEA uses. Table 4 shows the results; OECD emissions of CO₂ are estimated to average 12,400 Mt/year in the first commitment period.

Table 4 uses Annex I data from UNFCCC (2005) to derive CO₂ emissions figures for 2010, assuming the mix of emitted gases remains unchanged from 2003 levels. Korea's 2010 figure is derived from its GHG inventory for 2001 as per its national communication (Korea 2003), which is then grown at an annual rate of 5.2% (projected GDP growth) until 2011 to give an estimated average annual emission during the first commitment period. Mexico's figure is taken from the medium-term forecast in its second national communication (Mexico 2001). Turkey did not submit a national communication, and is estimated by taking emissions figures from Greece (an economy of roughly similar size) and inflating them by the GDP difference to arrive at an estimated current emissions rate, then growing it up to 2011 by 1.4% annually – Turkey's average annual GDP growth between 2000 – 2004. These are all simplifying assumptions, but arguably yield an illustrative and useful final result.

Table 4. CO2 Emissions (without LULUCF) of OECD Countries under Kyoto Compliance

Party	1990 CO2 emissions	2003 CO2 emissions	Kyoto % target	2010 emisisions
Australia	281	372	8	303.4
Austria	61	76	-8	56.4
Belgium	119	126	-8	109.5
Canada	460	586	-6	432.2
Czech Republic	164	127	-8	150.9
Denmark	54	61	-8	49.9
Finland	56	73	-8	51.8
France	397	408	-8	365.2
Germany	1,015	865	-8	933.8
Greece	84	110	-8	77.3
Hungary	85	60	-6	79.7
Iceland	2	2	10	2.3
Ireland	32	44	-8	29.3
Italy	431	487	-8	396.2
Japan	1,122	1,259	-6	1,054.9
Korea	-	446	n/a	741.0
Latvia	19	7	-8	17.2
Luxembourg	13	11	-8	11.7
Mexico	-	-	n/a	878.9
Netherlands	158	177	-8	145.4
New Zealand	25	35	0	25.3
Norway	34	43	1	34.8
Poland	477	302	-6	448.0
Portugal	44	64	-8	40.1
Spain	228	332	-8	210.1
Sweden	56	56	-8	51.8
Switzerland	44	45	-8	40.8
Turkey	-	154	n/a	436.6
UK & N. Ireland	589	557	-8	541.7
USA	5,010	5,842	-7	4,658.9
Total				12,375

Sources: UNFCCC (2005), table II.9; Republic of Korea (2003); Mexico (2001); World Bank Development Indicators Database.

The 12,400 Mt figure is obviously comparable to the IEA result of 13,750. But the former assumes that all “compliance” will be the result of domestic actions only. In fact there is likely to be a sizable market for CERs, ERUs and AAUs, meaning increased CO₂ emissions in OECD countries. Rosenzweig and Youngman (2005) of Natsource predict a market of 3,750 Mt over the first commitment period, which is middle ground in the current field of estimates. While OECD emissions would be higher, however, CO₂ emissions would not make up the entire increase. If we assume a percentage of CO₂ increase equal to the 2003 Annex I CO₂ portion of emissions (82.7%), the appropriate increment is some 620 Mt CO₂, giving total predicted annual OECD emissions of 13,020 Mt. This is just under the leveling off point reached by OECD countries in the IEA’s alternative scenario: 13,750 Mt.

Granted, the “Kyoto compliant” estimate is valid only through the first commitment period, ending 2012, while the IEA scenario forecasts figures for 2020 (the only figures publicly available). But the difference may not be a significant problem, as the IEA scenario predicts asymptotic approach to the leveling-off point. Another problem is the use of CO₂ as a proxy for compliance behaviour over the spectrum of six gases covered by the Kyoto Protocol. Finally, announced and intended policies may result in national levels of “compliance” that do not precisely mirror the targets to which individual Annex I Parties are committed.

In the end, however, none of these problems is so significant as to render the IEA alternative scenario useless as a rough indicator of a plausible future under Kyoto compliance. Its bottom-up policy-based character allows a number of valuable insights into possible future energy-environment dynamics.

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