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**ENVIRONMENTAL POLICY AND INTERNATIONAL COMPETITIVENESS:
CAN WE AFFORD A BETTER ENVIRONMENT IN A GLOBALIZING WORLD?***

Prepared by the secretariat in consultation with the Bureau

* This paper is mainly based on empirical evidence and research relating to developed market economies. The intention is to prepare a second paper for early 2007 focusing mainly on the situation in Eastern Europe, Caucasus and Central Asia (EECCA) and South-Eastern Europe (SEE).

For technical reasons, all statistical tables and references mentioned in this paper are available in an addendum (ECE/CEP/2006/4/Add.1).

EXECUTIVE SUMMARY

Against the background of intensifying competitive pressures associated with globalization and concerns about growth and jobs, the domestic economic impacts of more stringent environmental policies have come under closer scrutiny. More stringent environmental standards create additional cost burdens for domestic firms, which may harm their competitive position in international markets. Related to that, polluting domestic firms may decide to relocate activities to countries with laxer environmental standards (the “pollution haven effect”). There have also been fears that attempts to prevent such relocation may trigger a lowering of domestic environmental standards, with the risk of a “race to the bottom”.

The available empirical evidence, however, does not support the hypothesis that more stringent national environmental policies have had significant adverse consequences for foreign trade, FDI flows or a country’s international competitiveness in general. In fact, at the macroeconomic level, there is a clear positive correlation between the international competitiveness of countries and their environmental quality.

There is also little empirical evidence that increased economic openness and trade liberalization have entailed a “race to the bottom” of environmental standards in the global economy. There is, however, evidence, although mainly anecdotal, of “regulatory chill”, a process in which pressures from the business sector, motivated by competitiveness concerns, may lead to a lowering of environmental policy ambitions.

Among the main reasons for environmental regulation’s lack of significant impact on firms’ competitiveness are that compliance costs in general account only for a small share of production costs; that environmental standards among developed market economies are relatively similar; and that technological innovations have enabled firms to reduce the marginal costs of reducing or preventing pollution, thereby offsetting to a smaller or larger extent the additional cost burdens due to environmental policy.

In fact, technological innovations, which reduce energy and resource consumption, emissions and waste per unit of output, can play a strategic role in solving environmental problems while at the same time helping to maintain or improve the competitiveness of firms. The development of such environmental technologies has emerged as a new and rapidly growing industrial sector in many regions of the world economy.

Although there is no significant evidence that environmental policies have overall adversely affected international competitiveness in the past, this is no reason for complacency. It remains a persistent challenge for environmental policymakers to ensure that environmental protection measures are worth having from an overall societal point of view, and that these environmental policies and programmes are cost-effective – that they achieve a given target at the lowest possible cost.

Introduction

1. The process of globalization – the increasing international integration of markets for goods, services and financial capital, has led to intensified competitive pressures not only for the developed market economies but also for the emerging market economies in Central Europe, South-Eastern Europe (SEE) and Eastern Europe, Caucasus and Central Asia (EECCA). Globalization has triggered a debate not only about the environmental consequences of progressive trade liberalization but also about the impact that different levels of regulatory cost burdens across countries might have on the competitiveness of domestic industries or on the attractiveness of regions or countries for foreign investors. In this context, the economic impacts of environmental regulations and other environmental policies have also come under closer scrutiny.

2. Economic conditions and standards of living vary considerably across the UNECE region. But further increases in real income per capita is a major economic policy goal in all countries, and for this competitiveness in global markets for goods and services is a *conditio sine qua non*. This is clearly reflected, for example, in the EU's Lisbon Agenda for "jobs and growth, which also aims at closing the real income gap *vis-à-vis* the United States. In a similar vein, a key policy objective of the new EU member states as well as EECCA and SEE is to reduce the existing considerable gaps in real incomes *vis-à-vis* the developed market economies.

3. At the same time, the environmental problems and achievements of environmental policies vary significantly across countries in the UNECE region, reflecting the large diversity of economic, social and geographical conditions. In a more general way, environmental policies have helped to improve the state of the environment over the past decade or so, but progress varies – in some cases considerably – among subregions and countries (OECD, 1999; OECD 2001; OECD, 2005; ECE 2003).

4. In the more advanced economies, there has been progress towards decoupling economic growth from environmental pressures, but this needs to be sustained and amplified. In the new member states of the EU, the need to meet the requirements of the EU's *acquis communautaire* has been an important anchor for the design of economic and environmental policy reforms. But environmental pressures have remained high and significantly above the Western European average. The whole process of meeting EU environmental requirements may take more than two decades, and this would still not correspond to a sustainable development pattern (OECD, 1999). Environmental pressures continue to loom large in SEE and especially in the EECCA countries. For the latter, the challenge is to raise the level of environmental policy ambition in line with the strategy adopted at the fifth Ministerial Conference "Environment for Europe" held in Kiev in May 2003 (ECE, 2003a).

5. The question is how the objective of "going for growth" and the required strengthening of competitiveness can be reconciled with the need to ensure sustainable development. Economic, social and environmental problems cannot always be addressed by "win-win" situations. There are often trade-offs to be made between economic and environmental objectives. There is therefore always a risk that in the face of competing objectives, environmental problems are not being given

the attention they would merit. This risk may be more acute in countries with low levels of real incomes (as is the case in EECCA), but it is also omnipresent in the higher-income countries.

I. ECONOMIC GROWTH AND THE ENVIRONMENT

6. The conventional view of the relation between growth and the environment has been derived from empirical cross-country observations, which suggest that at low levels of per capita real income (i.e. at the beginning stage of industrialization), growth appears to be associated with increasing pollution. But after countries pass a certain development threshold, there is a tendency for pollution to decline (i.e. environmental quality to increase) with rising real incomes. This pattern has become known as the inverted-U Environmental Kuznets Curve (EKC).¹

7. While the EKC is intuitively straightforward, the relationship between economic growth and environmental quality is, in fact, quite complex.² It is true that at higher levels of income, societal preferences tend to shift in favour of more environmental quality; and higher incomes also provide more resources for accommodating this shift in preferences. Conversely, at lower levels of real income, as in many EECCA countries, environmental concerns are not featuring high among many the preferences of citizens and the resources for addressing environmental degradation tend to be very limited.

8. But there is nothing automatic about the effects of economic growth and higher levels of real incomes on the environment. In fact, the overall environmental effects of economic growth can be decomposed into three factors (Copeland/Taylor, 2004):

- A *scale effect* (i.e. the additional pollution due to a rise in production and consumption);
- A *composition effect* (i.e. the change in pollution due to the shift in demand for products with lower pollution intensity); and
- A *technology effect* (which reflects the favourable impact of technological progress on lowering pollution per unit of output).

9. This decomposition shows that economic growth can go along with declining pollution only if the scale effect is more than offset by the composition effect (e.g. a shift towards less polluting activities, such as services) and the technology effect. The interactions between these three effects are not easily disentangled, but it is clear that economic and environmental policy has a role to play in determining their relative importance. Institutional mechanisms, such as education, or the strengthening of democracy and citizens' rights for free expression of preferences are also essential because they help put pressure on policymakers to carefully balance the benefits of higher incomes with the likely costs of increased environmental degradation. The technology effect also points to the benefits that lower-income countries can reap from the cleaner and often more cost-effective technologies developed in the more advanced industrialized countries.

1 For a detailed discussion of the EKC see Panayotou (2003).

2 It should be noted that there is no evidence yet for the EKC to hold also for greenhouse gas emissions, which continue to increase with economic activity.

10. The EKC does not, of course, suggest that environmental problems can be conveniently ignored until higher income levels (i.e. those of middle-income countries) have been attained. This would indeed be a serious policy mistake, also in view of the irreversible processes that may be associated with environmental degradation. There is also little justification for not addressing early on those major sources of pollution that have significant adverse effects on health (e.g. due to poor-quality drinking water or air pollution). These are policies where benefits clearly outweigh the costs even in the poorest countries, and were, moreover, large increases in benefits can be reaped at relatively low cost (World Bank, 2003). In other words, there are very good economic reasons for stringent environmental policies even at low levels of real income. The increasing consciousness of environmental issues on the part of western consumers means, moreover, that high environmental standards have become an important component of international competitiveness. Stringent environmental policy should therefore not be regarded as a “luxury” which can be postponed until higher output levels and real incomes are achieved.

II. ENVIRONMENTAL PERFORMANCE AND COMPETITIVENESS

A. SOME BASIC CONSIDERATIONS

11. Although the term “competitiveness” is widely used in national and international policy debates, the concept has remained elusive. At the overall economy level, competitiveness has been mainly associated with the ability of countries to achieve sustained economic growth and higher real per capita incomes. The main issue at this aggregate level is the trade-off between improved environmental quality and overall economic growth in the longer run. But this also involves important issues of measurement of social welfare, which arguably should also include non-monetary measures of well-being such as the state of the environment (OECD, 2006)

12. But the relevant focus here is on the impact of more stringent environmental policies on firms’ international competitiveness. In fact, since the inception of environmental policy more than three decades ago, it has been a regular feature that competitiveness concerns and associated fears for profits and jobs have been mentioned as a reason for not moving to more stringent policies. It is argued in this context that more stringent policies create additional cost burdens for domestic firms, which put them at a disadvantage compared with major foreign competitors that do not face a similar increase in environmental standards. The upshot is a fall in domestic production and a decline in net exports as well as a loss of jobs. In case of pollution-intensive industries there may even be a relocation of production activities to countries with less stringent policies (the “pollution haven effect”). A related issue is that the threat of such relocations may trigger a lowering of domestic environmental standards to prevent these capital outflows (the “race to the bottom” hypothesis). These arguments gain proportionately more weight the larger the importance of the industrial sector (in terms of output and employment) that is affected by the environmental policy measure in the total economy.

13. While the theoretical argument cannot be refuted, the difficulty is to uncover statistically significant empirical evidence on these issues. The reason is that the performance of firms or

industrial sectors is determined by a host of factors, including non-environmental economic policy measures (e.g. corporate tax rates), capital and labour costs, exchange rate movements, product market structure, quality of infrastructure, profit taxes, etc. which operate jointly with environmental policy.

14. A good gauge to direct cost burdens created by environmental policy is pollution abatement and control (PAC) expenditures. The aggregate of public and private PAC expenditures varied within a range of 1 to 2 per cent of GDP in the OECD member countries during the 1990s, which is not a negligible magnitude (OECD, 2001). A similar feature prevails in the early 2000s (tables 1 and 2). As regards industrial environmental expenditures, the limited available data for the EU suggest that these corresponded on average to some 0.4 to 0.5 per cent of total output value (tables 2 and 3). In the United States, manufacturing expenditures on PAC amounted to 0.4 per cent of gross output in 1999 (table 5). But the importance of these expenditures varies across industrial sectors depending *inter alia* on the pollution intensity of production. They can rise to 1 per cent or more of gross output in sectors such as chemicals, refineries, paper and primary metals (tables 4 and 5). The upshot is that the industrial cost share of environmental protection expenditures is in general small, but also not of a negligible magnitude (see Addendum for more details).

15. The economic impact of more stringent policies will be influenced by the scope for technological or material input substitution processes that lead to less pollution-intensive processes and products. Another issue is how demand for a product will respond to an increase in prices. This will depend on the availability of close substitutes and the preference of consumers for “greener” products and production processes. Also, in case of environmental taxes, the recycling of tax revenues may at least partially offset any adverse economic impact (OECD, 2001a).

16. Of key importance is also whether major competitors abroad have to meet similarly stringent standards and the extent to which domestic markets are protected by tariff or non-tariff barriers. Thus, in the EU there exist harmonized (minimum) environmental standards for levelling the playing field in the Single Market. But even if there is an apparent similar degree of stringency in different countries, what also matters is the “quality” of the regulation, that is, its cost-effectiveness and the flexibility that it provides for meeting the more stringent standards.

17. In principle, nothing in economics suggests that there is a need for harmonized environmental standards across different countries.³ These standards rather reflect the prevailing ecological conditions and the varying societal preferences and, partly related to the latter, financial resources available for improving environmental quality. That is to say, this pertains only to local-cum-national pollution. In case of transboundary, wider international or global pollution problems (such as GHG emissions) there is a need for international coordination and cooperation in the design and implementation of environmental policy to avoid “free-rider” problems. The basic concern is that in the absence of such an international framework, countries would have little incentives to take

3 This is a controversial issue in international trade debates, but it will not be discussed in this paper. It should be noted, however, that Article 20 of the GATT allows countries to fix environmental product standards, provided that the measure is non-discriminatory and does not constitute a disguised protectionist measure. (Irwin (2002), chapter 6 discusses these issues in more detail.)

the international/global effects of pollution generated by domestic firms into account when determining the stringency of their environmental policy.

18. In any case, from an overall societal perspective, the costs of environmental policies have to be compared with their benefits. And these may be considerable in terms of health and other dimensions. It is, in fact, the intended outcome of environmental policy measures to reduce environmentally harmful activities by getting prices right, that is, by including the cost of that damage in the final sales price of the product. In other words, the general objective is to shift production towards less polluting activities under the constraint that the social benefits of reduced pollution offset the social costs of the policy measure.

B. EMPIRICAL EVIDENCE

19. Given that the performance of an industry is affected by many jointly operating factors, it is not straightforward to isolate the impact of a change in environmental policy. This requires an econometric model, that allows holding constant all the main non-environmental factors that also influence the performance of an industry (such as exchange rates, labour costs, etc.). But the shortage of good data (on pollution, compliance expenditures, policy stringency) narrowly circumscribes the effective implementation of this approach.

20. A recent study (EC, 2004) on the competitiveness effects of EU air pollution policies and legislation on competitiveness of European industry compared legislation, compliance costs and policy instruments with other countries (Japan, United States), and concluded that there is very limited evidence for air pollution legislation having had significant competitiveness effects. Evidently, this cannot be generalized to hold also for the effects of future policies, such as the European Emissions Trading Scheme (ETS). It has, however, been argued that the impacts of the EU ETS on competitiveness and employment are modest and the cheapest option compared with alternative regulation scenarios (Oberndorfer et al., 2006).

21. The most widely used approach for gauging the competitiveness effects of environmental policy is to inspect data on international trade and foreign direct investment. But as already noted data problems are looming large. It is also not straightforward to construct a convincing measure of environmental policy stringency for international comparisons. As a result, the international evidence concerning the impact of different levels of stringency of environmental regulations on firms' FDI location decisions is scant and based to a large extent on evidence related to United States industries. A comprehensive survey of most of this research work on the "pollution haven effect" can be found in Copeland/Taylor (2004) and Nordstrom/Vaughan (2003).

22. Among the recent studies, there is only one (Smarzynska and Wei, 2001) dealing with the relevance of the pollution haven effect for FDI flows to Central Europe and EECCA. The study finds only very weak statistical evidence, however, that laxer regulations have had an impact on FDI location decisions. In fact, the authors frankly admit that they have failed to discover any robust evidence supporting the pollution haven effect.

23. *Xing and Kolstad (2002)* examine FDI of several US industries with high pollution abatement costs (chemical and primary metals) and find a small (in fact, very marginal) impact of environmental stringency on location decisions.

24. *Eskeland and Harrison (2003)*, examine FDI flows to Cote d'Ivoire and Morocco (which originated mainly in France) as well as to Morocco and Venezuela (which came mainly from the United States). They find only very weak, if any, evidence that foreign investors are concentrated in sectors with high levels of air pollution. There is also no evidence that foreign investment in these countries was driven by high abatement costs in the home countries of the MNCs. Comparing foreign and domestic plants in the same sector, they find that foreign plants are significantly more energy-efficient and use cleaner types of energy. They also examine the overall pattern of US foreign investment between 1982 and 1993 and find that, when other determinants of FDI are controlled for, outbound FDI is highest in sectors with low abatement costs.

25. *Raspiller and Riedinger (2005)* examine the pollution intensity of imported goods to France from foreign subsidiaries of French enterprises. The aim was to detect whether there is a significant correlation between the pollution intensity of exports of these subsidiaries to France and the stringency of regulation of the host country where the foreign subsidiary is operating. The study found that the most pollution-intensive goods were imported from countries that had relatively more stringent environmental regulations. Thus, activities of French subsidiaries related to chemicals are located in Germany and for steel in Belgium. Conversely, imports of textiles, which are not very pollution intensive, were typically originating in subsidiaries operating in China and North Africa. This reflects the fact that textile manufacturing is, in general, a labour-intensive activity, and that labour cost are much lower than in France.

26. *Becker and Henderson (1997)* find an ambiguous impact of air pollution requirements on firms' location decisions *inside the United States*. They find evidence that changes in regulatory stringency have led to the relocation of pollution-intensive plants from more polluted to less polluted areas (i.e. counties). But this does not necessarily mean that the relocation was mainly driven by changes in environmental regulation, because below average polluting industries also left the high-pollution areas. The relocation may therefore also reflect the greater attractiveness of less polluted areas for conducting business (and for finding qualified staff).

C. RACE TO THE BOTTOM REGULATORY CHILL?

27. There are, in fact, some good economic reasons why multinational companies (MNCs) do not try to benefit from laxer environmental standards in foreign countries (see e.g. Bhagwati, 2005). First, for reasons of internal efficiency and related cost savings, MNCs prefer to apply the same production technologies independent of the location of the subsidiary. This technology will also in general tend to be more productive, while being at the same time less pollution intensive than equipment that would "fit" the lower environmental standards in the host country. MNCs likely base their technology decisions not only on current regulations but also on what they expect in the future, derived from emerging regulatory trends and pressures in their home country. This avoids the costs of retrofitting of equipment and expensive use of end-of-pipe solutions.

28. Moreover, environmental NGOs, shareholders, customers and the media tend to closely monitor the environmental performance of large companies. MNC therefore have an interest in applying clean technologies to ensure that there is no damage to their reputation, but also as a safeguard to legal liabilities in case of industrial accidents. Also, the international financial institutions and international banks are paying increasing attention to environmental issues.
29. The upshot is that there are strong incentives for MNCs to pay due attention to the environmental impacts of their activities. This is also indirectly supported by available evidence for Central European countries and EECCA, which suggests that existing environmental problems at industrial sites and uncertainty about the future implementation of environmental policies has likely discouraged some foreign investors (OECD, 1999, pp.162–163).
30. It also not very efficient for governments to use lax environmental standards for attracting international investors. There are better instruments for this, such as tax concessions, government contracts, and designated land at symbolic prices (Nordstrom/Vaughan, 2003).
31. All this helps to explain why there is only weak evidence, if any, for a “race to the bottom” for environmental standards in the global economy. It cannot be excluded that some firms locating abroad are indeed attracted by short-term profit maximization and the exploitation of lax environmental standards, but the available evidence suggests that this is more an exception (and mainly the case of some small- and medium-sized firms) than a general phenomenon.
32. In contrast, it appears to be a regular feature that the business sector is putting pressure on governments to delay planned environmental legislation or moderate its stringency arguing that otherwise its international competitiveness would be harmed. These pressures may then result in reduced environmental policy ambitions and the persistence of suboptimal environmental standards (Esty, 2001). This phenomenon has become known as “regulatory chill”.
33. This is a potentially serious, but difficult to detect problem, because it is based on counterfactual claims and related anecdotal evidence. Neumayer (2001) points to climate change policy as a possible example for regulatory chill, although this did not prevent progress in carbon abatement policies, as witnessed, for example, by the signing of the Kyoto protocol.
34. Another possible recent example is the controversy over the new EU chemicals legislation “REACH” (Registration, Evaluation And Registration of Chemicals) which according to the Institute for European Environmental Policy (IEEP), a non-governmental organization, “will present significant progress, but fall short of the chemical safety objective stipulated in the sixth EAP”.⁴ IEEP also believes that competitiveness concerns prevented a more ambitious Clean Air for Europe (CAFE) programme (IEEP, 2006) in spite of a very favourable overall benefit-cost ratio. Strictly speaking, however, the effective importance of regulatory chill requires having well-founded

4 In a similar vein, in Germany, the Rat von Sachverständigen für Umweltfragen (2004) noted that the extent and ecological effectiveness of REACH is being adversely affected by the fact that it is largely discussed from an economic perspective in the EU Competitiveness Council.

information on the *marginal* net benefits foregone by not moving to more stringent standards compared to those adopted.

35. This points to the importance of economic analysis for gauging the economic and environmental impacts of existing or planned environmental policies (Pearce et al. 2006). Such impact assessments have become a regular feature in the United States, but they also have gained more prominence in Europe. A cornerstone of the EU's renewed Lisbon Agenda for raising "growth and jobs" (EC, 2005) is the stronger drive for "better regulation" for promoting competitiveness both at the EU level and in the member states. This involves not only simplifying existing legislation but also strengthening the assessment of economic impacts when gauging the overall economic, environmental and social effects of new regulations (EC, 2005a).

36. While streamlining of legislation and impact assessments are essential for an efficient and effective conduct of environmental policy, there have been fears, notably among environmental groups, that the overriding concern for growth and jobs may lead to a *de facto* downgrading of environmental objectives and ambitions. Possible risk factors are a stronger weighting of short-term costs to industry than of longer-term environmental benefits due to uneven involvement and weight of stakeholders in pre-legislative processes, notably the absence of a level playing field for environmental stakeholders. Such problems and risks are, of course, not limited to the EU. They constitute in fact a constant challenge faced by environmental policy makers all over the world.

D. GOOD ENVIRONMENTAL PERFORMANCE DOES NOT STAND IN THE WAY OF GOOD ECONOMIC PERFORMANCE

37. The findings of recent empirical research suggest that more stringent national environmental policies and the related increase in environmental expenditures have not had tangible adverse consequences for foreign trade, FDI flows and countries' international competitiveness in general. In a similar vein, in the recent OECD environmental performance report on the United States, it is emphasized that overall "there is no conclusive evidence that environmental expenditure has had a net effect of reducing jobs or the international competitiveness of the US economy." (OECD, 2005a). This is in line with the findings of a previous survey of empirical studies dealing with the impact of environmental regulations on the competitiveness of the U.S. manufacturing industry (Jaffe et al.1995).

38. Environmental regulation appears to have an impact on firms' FDI decisions (especially for pollution-intensive sectors) only at the margin. Environmental policy is clearly not a primary determinant of plant foreign location choices, which are, rather factors such as labour costs, geographical proximity of major markets and market access.

39. Looking at a large sample of low-income, middle-income and high-income countries, a study by Esty and Porter (2002)⁵ found evidence of a significant positive correlation between a strong

5 Daniel C. Esty, Michael E. Porter, Ranking National Environmental Regulation and Performance: A Leading Indicator of Future Competitiveness? World Economic Forum, Global Competitiveness Report 2001-2002, chapter 2.1, pp. 78-100.

environmental performance, measured by levels of air pollution (particulates and SO₂) and energy efficiency, and an aggregate index of country economic competitiveness (with levels of GDP per capita and growth performance as components) “Many of the nations with top-tier competitiveness rankings also have strong environmental performance scores.”⁶ Correlations do not prove causation, but the analysis, nevertheless, suggests that there appears to be no significant trade-off between progress in improving environmental conditions in a country and maintaining a good growth performance over the longer run.

40. A main reason for the lack of significant impact of environmental regulation on firms’ competitiveness is the fact that compliance costs account in general only for a relatively small share of total production costs. The stringency of pertinent environmental regulations is, moreover, relatively similar across the developed market economies, especially for air and water pollution control. There has been, moreover, a general upward tendency in the stringency of environmental policies also in developing countries. It should be recalled in this context that some 75 per cent of all global FDI flows are among the developed market economies themselves. The fact that at the end of 1980s over 90 per cent of the production of pollution-intensive goods was in OECD countries is indicative that weak environmental regulation does not play a major role in their location across the globe (Copeland/Taylor, 2004).

41. Governments have, moreover, the possibility to apply “mitigation tools” for cushioning the economic impact of new policy measures.⁷ There is evidence that “generally those industries that in principle would be expected to pay the largest share of environmentally related taxes imposed on business have been very successful in obtaining rebates and exemptions from these levies on account of competitiveness concerns.”⁸

42. Another important factor for the absence of significant competitiveness effects of environmental policy are technological innovations, which have enabled firms to reduce the marginal costs of pollution abatement per unit of output.

III. ENVIRONMENTAL POLICY AND ENVIRONMENTAL TECHNOLOGIES

A. REGULATIONS AND INDUCED TECHNOLOGICAL INNOVATIONS

43. It would, of course, be fortunate if companies could always and swiftly offset the increase in production costs on account of stricter environmental regulations by cost-savings due to changes in production processes and product characteristics undertaken in response to more stringent policies. In this context, the Porter hypothesis (Porter, 1991; Porter and van der Linde, 1995) claims that strict and well-designed environmental regulation in a competitive environment will stimulate firms’ R&D activities towards the development of technologies that allow to offset, at least partially, the increased costs of complying with the stringent standards. In the most optimistic case, these

6 Loc. cit., p. 95.

7 In case of fixed international emission targets such preferential treatment will raise the marginal pollution abatement costs for other sectors, and this may adversely affect their competitiveness.

8 OECD, 2001a, p. 77.

“innovation offset” could even lead to a situation where the improved environmental performance goes along with an improved competitiveness, thus creating a “win-win” situation.

44. Although intuitively appealing, the empirical evidence for such complete “innovation offsets” is so far relatively limited and based mainly on anecdotal evidence and a number of company case studies from various industrial sectors in the United States (Porter and van der Linde, 1995; Berman and Bui, 2001). There has been scepticism that the Porter hypothesis holds as a matter of generality (Frankel, 2003).⁹

45. But the Porter hypothesis draws attention to the important fact that regulatory and other government policies, which increase the intensity of competition in product markets, have an impact on business technological innovation efforts.¹⁰ And these technological innovations can help improving the trade-off between marginal cost of pollution control and the associated marginal social benefits from reduced pollution.

46. A major mechanism that leads firms to pursue these innovation activities is likely the creation of first-mover advantages in markets for environmental technologies, which may stimulate exports and profits when other countries adopt similar stringent standards in the future. Two examples for this are the development of fuel-efficient engines for passenger cars and wind energy (Beise and Rennings, 2003).

47. While this argues in favour of pro-competitive regulatory and competition policies, it is important to strike the right balance with the need to protect intellectual property rights (IPR) because firms also demand adequate rewards for their innovative activities. There is, however, evidence that regulation (other than IPR) that is restraining competition has a significant dampening impact on business R&D intensity.¹¹

48. Given that the social benefits from innovations will often exceed those for the private firms, there is an important role for government policy to encourage innovation. In the present context, one channel for stimulating the development and diffusion of environmental technology is the proper design of environmental policy instruments (regulations and economic instruments). The latter are, in general, believed to have larger, positive impacts on innovation than command-and-control measures. Another channel is to directly support R&D policies that aim at the development and diffusion of environmentally friendly technologies (Jaffe et al., 2004). A case in point is the EU’s Environmental Technology Action Plan that was launched recently.

49. A stronger focus on new technologies in environmental policies could well be of primordial importance, because it may be surmised that technical change is in the long run one of the main

9 The Porter hypothesis has also been criticized (Palmer, et al., 1995) for suggesting that there is no trade-off between the costs of environmental regulations and the social benefits of environmental improvements, such as reductions in morbidity and premature mortality that can result from cleaner air. Even if these “innovation offsets” from the corresponding investments in pollution abatement and control were to materialize, there are still opportunity costs, measured by the forgone returns from alternative investments in productive capital.

10 See OECD (2006), chapter 3.

11 *op. cit.*, p. 67

determinants of success or failure of environmental protection efforts (Jaffe et al. 2002). A case in point is the policy challenge posed by the threat of global climate change.

50. The attention that a firm's management pays to the potential benefits of environmental innovations may also be raised by adherence to strict standards for environmental management, such as the voluntary EU Environmental Management and Audit Scheme (EMAS) or ISO 14001, which also require environmental reports related to the firm's activity. A recent study based on German EMAS-validated facilities found that most of them report a positive influence of EMAS on environmental process innovations and, related to that, economic performance (Rennings et al. 2006).

B. THE MARKET FOR ENVIRONMENTAL TECHNOLOGIES AS A SOURCE OF COMPETITIVE ADVANTAGE

51. The development of environmental technologies, which reduce energy and resource consumption, emissions and waste per unit of output, has emerged as a new and rapidly growing industrial sector in many countries of the world economy.¹² Trade in environmental goods rose at an average annual rate of 14 per cent over the period 1990–2002, more than twice the rate of expansion (6 per cent) of world trade. Total exports of these goods amounted to some \$240 billion or 3.5 per cent of world merchandise exports in 2002. The major regions of origin (but also destination) of these environmental goods are Western Europe, Asia and North America. Western Europe accounted for about half of world exports in 2002.¹³ Major environmental goods traded are wastewater management, environmental monitoring and analysis, solid waste management, air pollution control, noise and vibration abatement (WTO, 2004). Environmental goods have always been on the trade liberalization agenda, but they were explicitly mentioned in the DOHA Development Agenda (DDA), which calls for the “reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services” (paragraph 31 (iii) of the DDA).

52. The surge in demand for environmental goods reflects to a large extent the greater global preferences for environmental quality and the more pervasive adoption of measures to reduce pollution in the face of more stringent environmental policies.

53. The market for environmental technologies has increased significantly since the onset of economic reforms in the former centrally planned economies. The 10 new EU Member States are modernizing their productive capital stock and adapting to EU environmental, health and safety

12 The OECD (1999a) defines the environmental goods and services industry as consisting of “activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise, and eco-systems. This includes cleaner technologies, products and services that reduce environmental risk and minimise pollution and resource use” (page 3)].

13 It is noteworthy that the EU has become the leading producer and exporter of some key environmental technologies and services such as photovoltaic, wind energy and water supply and services.

standards, which creates a big market for environmental technologies. Complying with EU environmental standards is estimated to cost €50 billion to €80 billion (Eurostat 2002).

54. But the demand for environmental technologies can also be expected to grow considerably in regions such as EECCA and other emerging market economies in Asia (especially China and India) and Latin America. The dynamic growth performance of these countries has been placing more pressures on their environments and, as regards air pollution, also the global environment. Policy makers in these countries are increasingly realizing the enormous costs of environmental pollution and inefficient use of raw materials, which leads to a squandering of natural resources.

55. Tightening of regulatory framework conditions, including stricter exhaust standards in the transport sector for cutting emissions,¹⁴ is part of the overall strategy for arresting and reversing the degradation of the environment. At the same time, there is an increasing awareness of the important role to be played by environmental technologies in the energy, industry, transport and agriculture sector. Friedman (2006) argues that in the face of expectations for permanently high energy prices and increasing concerns that continued strong dependence on fossil fuels risks bringing on climate change much faster, global demand for renewable fuels and energy-efficient cars, buildings and appliances may well be the “biggest growth industry of the twenty-first century.”

56. In a more general way this points to the enormous growth potential of the global market for environmental technologies in the decades ahead. Gaining so-called *first mover advantages* in the development of environmental technologies that other countries will eventually need to adopt can therefore be of strategic importance. In view of the expected global surge in demand for energy-efficient technologies, Friedman even calls for “regulatory forcing” in the United States, because the “tougher the energy-efficiency standards we impose on our own companies, the more likely it is that they will dominate this new industry” (loc. cit.).

57. Not surprisingly, policies to promote the development and diffusion of environmental technologies in domestic markets and abroad occupy an important place on the economic and environmental agenda of governments in many countries.¹⁵ Supportive measures include improving market conditions for the use of these technologies and attracting more private and public funds for the development and demonstration of these technologies.

58. It is only logical (both from an economic and environmental perspective) that efforts are also being made to promote the role of environmental technologies in low-income countries, including EECCA, for promoting sustainable development. This should help these countries, within an adequate framework for technology transfer, to significantly accelerate the process of shifting away from their current resource- and pollution-intensive patterns of production and switch to more eco-efficient patterns of production and consumption. But this will also require developing mechanisms

14 It is noteworthy that the Chinese government aims to catch-up with European vehicle emission standards by 2010. For a discussion of environmental policies in China see Deutsche Bank Research (2006)

15 In the EU this is reflected in the Environment Technology Action Plan (ETAP), which was launched in 2004. See European Commission (2004). For the United States see the Environmental Technology Opportunities Portal maintained by the Environmental Protection Agency (EPA) (www.epa.gov.etop).

to promote knowledge accumulation, technological learning and innovation in these countries in order to increase their technological absorption capacity.

IV. MAKING THE BEST USE OF ENVIRONMENTAL POLICY INSTRUMENTS¹⁶

59. Although there is no significant evidence that environmental policies have overall adversely affected the international competitiveness of countries in the past, this is no reason for complacency. There are always opportunity costs of private and public environmental expenditures, measured by foregone returns from alternative investments in private productive capital or public infrastructure (Palmer et al. 1995).

60. It is therefore important to make sure that individual environmental policies are worth having that they pass an impact assessment (cost-benefit analysis) concerning their economic, social and environmental consequences.¹⁷ The conduct of such an assessment should involve a balanced participation of all major stakeholders. And those policies that are worth having should be cost-effective, that is, achieve their objectives at least cost.

61. Main emphasis should be put on curbing pollutants that have major adverse effects on the quality of the environment in a medium and longer-term perspective, both nationally and globally. (This does not mean ignoring less important pollutants, but rather getting the priorities right.) This holds especially in a context of very scarce resources for policy design, implementation, monitoring and enforcement, as is the case in SEE and EECCA.

62. Improving cost-effectiveness requires understanding the advantages and disadvantages of the range of available environmental policy instruments under given specific circumstances and objectives. In a more general way, the challenge is to find the appropriate mix of tools for environmental policy management.

63. A greater reliance on economic instruments (such as tradable emission permits, emission taxes, deposit-refund schemes) is one way of improving cost-effectiveness. Depending on the circumstances, an economic instrument may be able to fully replace a regulation or fulfil a complementary function when used in combination with it. It should be noted, however, that some economic instruments such as taxes or charges also have a built-in rigidity, given the inherent difficulties to change them and they also involve administrative costs (as do regulations).

64. Cost-effectiveness requires that regulations be kept as simple as possible to reduce monitoring and reporting costs. It should also be explored to what extent stringency of emission standards (or prescribed BAT, if any) can be allowed to deviate from a national standard in case of significant variations in the assimilative capacity of the local and regional environment within a country.

16 This section draws heavily on OECD 1997; OECD 2001; OECD 2001a; EC 2004b.

17 Freeman (2002) provides some examples of environmental policies in the United States where *ex post* estimates of social costs exceed the estimated benefits by a significant margin.

65. Regulations should focus on environmental outcomes and not prescribe a particular technology or process. Regulations should be designed so as to stimulate innovations of more environmentally friendly processes and products. The approach to innovation should be left to companies and not the regulating agency. Government innovation policies should support the development of more performing environmental technologies. But technology policy is only a complement to environmental policy and not a substitute.

66. There may also be cost savings to be achieved by a better integration of environmental issues in sectoral economic policies and efforts to improve (i.e. render more efficient) environmental management at the firm level. Voluntary agreements between governments and industry may help promoting innovative environmental practices (such as EMAS), possibly as complementary measures to existing command-and-control measures. In the face of increased consumer preference for “green products”, eco-labelling programs have become an integral part of strategies to promote international competitiveness in countries all over the world.

67. Firms want to operate in a stable and predictable regulatory policy framework. This means that unanticipated large policy shifts should be avoided to reduce adjustment costs associated with increased regulatory stringency. This points to the importance of gradual and predictable (as announced) implementation of policies. This holds also for the removal of environmental harmful subsidies. It is important to provide firms with sufficient advance notice and adaptation time that often allow them to render the measures initially designed for checking pollution more cost-effective.

68. It is important for the effectiveness of environmental policy that targets fixed can be realistically achieved taking into account the current pollution standards and available technologies. A participatory approach, involving industry, may be helpful for setting realistic targets. Strong autonomous technological change may require a corresponding increase in stringency of regulations to prevent them from becoming obsolete.¹⁸

18 It was noted e.g. that the air pollution abatement rules for the Netherlands “which were recently determined at the European level, cannot be achieved by even the most drastic national policy efforts.” On the other hand, technological developments have led to such reductions in noise emissions that “national noise abatement rules with respect to Amsterdam Airport ...have been ineffective in recent years” (van Hoek, 2006).

Conclusions

69. The paper has reviewed some issues related to the potential impact of environmental policies on international competitiveness of domestic industries. The upshot is that the relationship between these two areas is complex and that there is only very limited evidence that increased stringency of regulations and other environmental policy instruments have adversely affected the international competitiveness of domestic polluting firms.

70. The development and diffusion of environmental technologies, either as part of the autonomous process of technological change or in response to the increased stringency of environmental policy and associated increased competitive pressures on industries, has played an important role in improving the trade-offs between competing economic and environmental objectives. This points to the importance of creating a policy environment that is conducive to innovative activity. But it also points to the potentially high environmental benefits from policies designed to facilitate technology imports by lower income countries and increase their technological absorption capacity.

71. In a more general way, concerns about competitiveness appear not to justify a lowering of environmental policy ambitions. The predominant use of generally rigid command-and-control measures suggests, however, that there may be relatively ample scope for increasing the cost-effectiveness of environmental policy measures. This could be achieved by stronger reliance on incentives from economic instruments but also by a review of the existing and planned regulations from a cost-benefit and cost-effectiveness perspective.

72. “If we cannot achieve our professional environmental objectives in a reasonably efficient way, it is likely that it will be these objectives, and not industrial performance, that will have to give in. Thus, the standards of environmental quality that society is willing to accept may themselves depend upon the efficiency of the policy instruments we adopt to achieve these standards” (Baumol and Oates, 1988, p. 189).

Issues for discussion

73. The Committee on Environmental Policy may wish to consider the following issues for discussion:

(a) What are areas of possible friction between environmental policy and international competitiveness in your country?

(b) What are the main institutional mechanisms in place for gauging the competitiveness effects of environmental policy and for mitigating the potentially adverse economic effects of regulations and other environmental policy measures?