Is There a Role for EU Integrated Product Policy (IPP) in Solving Global Environmental Problems? Investigating IPP's Capacity for Correction at Source in a Global Context

by Lydia Illge[*]*, Klaus Hubacek*[**]* and Stefan Giljum*[***]

In its 'Strategy for Sustainable Development', the European Commission (EC) refers to the fact that economic activities within the EU borders increase the pressure on the environment in other parts of the world, particularly in so-called developing countries, through imports of natural resources and exports of waste (European Commission 2001). In its statement, the EC points to another dimension of global environmental problems that have been typically associated with diffuse emissions into air and water. Now, environmental problems formerly labelled 'regional' are conceived to be globally related as well.

The phenomenon described by the EC is closely linked to that of economic globalisation—a historical process of increasing integration of economies around the world. Even though various differing opinions are held by economists on the actual extent and the consequences of globalisation today (both on the society and the natural environment), it seems to be generally acknowledged that production and consumption processes of products are increasingly intertwined on a global level.

At the same time, the OECD states "[...] a growing awareness that the traditional environmental policy focus on production processes may no longer bring about the needed changes to protect human health and the environment." (OECD 2001, p. 18). Based on these insights, the concept of Integrated Product Policy (IPP) was developed in the 1990s, primarily in Europe. IPP is an environmental policy approach aimed at reducing the environmental impacts of products along their entire life cycle.

The goal of this article is to analyse whether a European IPP can contribute to solving at their source the world-wide environmental problems associated with products consumed in the EU but produced in various parts of the world. The article is organised as follows: In referring to empirical data on the industrial metabolism of the EU, section 2 describes the notion of an increasing global division of labour between the EU and the rest of the world and points to its environmental effects. Starting from this problem outline, section 3 gives a brief overview of the IPP concept and its current state of development and presents four aspects of the environmental policy principle of 'correction at source'. This principle will be used in a more detailed analysis of IPP in section 4. In investigating conceptual ideas of IPP and general mechanisms of suggested instruments, section 4 pays special attention to their global effects. Section 5 draws conclusions for designing effective sets of policy instruments for tackling product-related global environmental problems at their roots.

The connection between global environmental problems and the industrial metabolism of the EU

Industrial metabolism is a model describing the material interrelations between the economy and the natural environment (Ayres 1989). The model points to the similarity between natural and economic metabolic processes, seeing the economy as an embedded subsystem of the environment which—similar to living beings—is dependent on a constant throughput of materials and energy. The following aspects of the EU industrial metabolism are of concern to this article: (1) raw materials, water and air are extracted from the natural environment both inside and outside the EU to be transformed into products at various locations around the world; (2) the products are consumed in the EU where they are finally returned to the natural system as diffuse emissions and waste.

In order to discuss the question of global environmental consequences of products in the EU, we first present current trends of the industrial metabolism of the EU, focusing on its trade relations and associated material flows. From this, general conclusions on the resulting world-wide environmental implications are drawn.

A physical input-output study on the external trade relations of the EU-15 region (Giljum and Hubacek 2001) shows that imports almost equal exports in monetary terms, but largely exceed them when measured in tons. In 1999, the European Union had an

[*] German Institute for Economic Research (DIW), Germany. Contact: lillge@diw.de.

[**] International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria. Contact: klaus_hubacek@yahoo.com.

[***] Sustainable Europe Research Institute (SERI), Wien, Austria. Contact: stefan.giljum@seri.at.

overall net import of almost 1 billion tons of abiotic and biotic materials from outside its territory (figure 1). Thus, the EU economy is highly interrelated with the rest of the world, both in monetary and physical terms. In particular, the EU is heavily dependent on material inputs provided by other world regions.

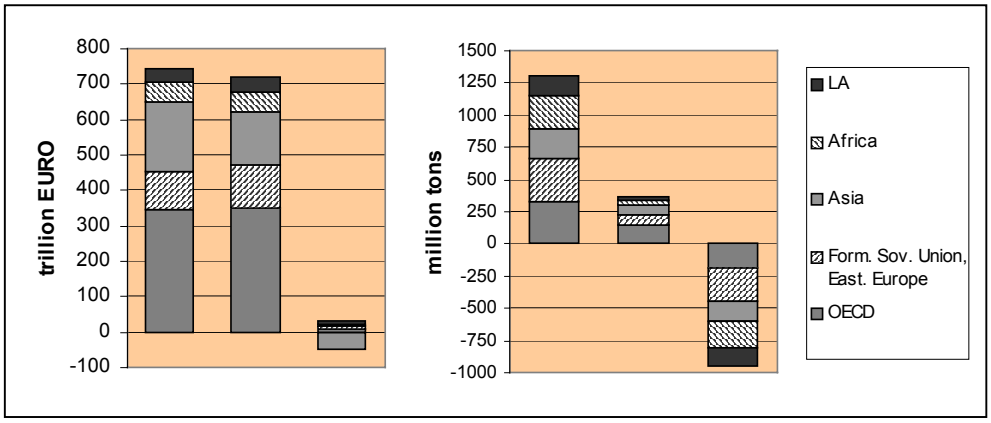

Figure 1: EU-15 imports, exports and trade balance in Euro (left) and tons (right) by world regions. Source: Giljum and Hubacek 2001

Figure 2 disaggregates EU imports and exports by world regions and product groups. According to the figure, the trade deficit of the EU in physical terms (tons) is mainly due to the import of large amounts of fossil fuels (around 60% of all imports) as well as abiotic raw materials and semi-manufactured products (together around 20% of all imports). EU exports (in tons) to all major world regions are dominated by abiotic manufactured products, followed by abiotic raw materials and semi-manufactured products.

A study on the total material requirement (TMR) of the EU over time shows that the contribution of domestic materials to TMR fell since 1986 and accounted for 61% in 1997, whereas from 1983 to 1997 foreign TMR per capita in EU-15 rose from 13 to 20 tons per capita (Bringezu and Schütz 2001). Thus, an overall trend of increasing material imports of the EU from other countries can be observed. The increasing shares of foreign materials were mainly caused by imported minerals, especially by resource demand for precious metals, which induce substantial flows of unused materials from mining due to low concentration levels of the original ores.

However, the environmental consequences of EU material imports have not been analysed in a detailed and comprehensive way. Yet, it can be assumed that large environmental impacts arise from resource extraction and production in regions outside of the EU resulting in land use change and with it deforestation, loss of bio-diversity and various types of emissions—causing environmental costs for these regions.

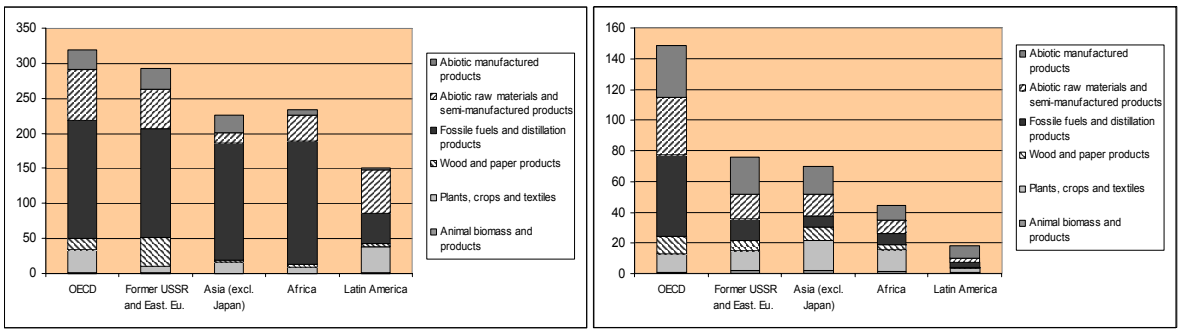

Figure 2: EU-15 imports (left) and exports (right) in 1999 by world regions and product/material groups (in millions of tons), Source: Giljum and Hubacek 2001.

To summarise the above, the empirical data presented in this section underline the fact that the EU economy is closely linked in various ways to other parts of the world, one of them being the import of large amounts of resources and semi-manufactured goods. Even though the EU again exports a lot of final goods that were produced from the imported materials and product components, EU consumption still has a strong impact on the environmental quality of those non-EU countries involved in resource extrac-

tion and production processes. Thus, if it is the goal of IPP to reduce the environmental impacts of products along their entire life cycle, its policy measures have to affect not only production and consumption activities inside the EU but also production in non-EU countries.

Integrated Product Policy and 'correction at source'—an overview

Concept and state of development of Integrated Product Policy

Integrated Product Policy (IPP) puts an emphasis on the product as a source of pollution and resource overuse and has the goal of reducing the life-cycle environmental impacts of products (European Commission 2001a). Rather than representing completely a new policy approach, IPP is a new umbrella concept for a variety of product-related policy instruments, of which a number are already in existence (for example, the EU Directives on Packaging and Packaging Waste [1994] and on End-of-Life-Vehicles [2000]). However, comprehensive product-oriented policy concepts have been developed only in a few European countries, the first being the Netherlands and Denmark, followed by Sweden, Finland, Austria and Germany (Ernst and Young 1998).

The development of an EU-wide IPP started in the late 1990s with support of the EC. In 2001, the EC adopted a Green Paper proposing a strategy to strengthen product-related environmental policies on the EU level, and providing a framework regarding policy concepts of EU member states (European Commission 2001a). On this basis, the EC is now creating a White Paper on IPP to propose in more detail specific measures to be taken (European Commission 2001b).

IPP is generally described as being integrated, product life cycle oriented, and market based; these characteristics are explained briefly in the following. IPP is integrated in two ways: first, in considering entire product life cycles as well as all environmental categories (water, air, soil) at a particular product life cycle stage in policy design; and second, in attempting to integrate aspects of environmental quality in economic policy making (European Commission 2001a). Regarding the second aspect, IPP is closely related to industrial policy and is expected to lead towards producing environmental-economic win-win solutions. Thus, it harmonises with the 'ecological modernisation' and 'green industrial restructuring' discourses (e.g. Dryzek 1997, Binder et al. 2001)—both representing aspects of a desired overall industrial development driven by innovation towards more environmentally sound production and consumption patterns. Against this background, strategies to promote green innovation are explicitly pursued in order to establish leader positions for EU businesses in green products markets (European Commission 2001a).

With its product life cycle orientation, IPP is different from earlier approaches of environmental policy that have a focus on individual production processes and environmental categories (for example air, water). Thus, IPP may prevent the problem of 'shifting' environmental problems from one environmental category or stakeholder to another. Market forces provide the basis for developing incentive-based policy instruments (e.g. product taxation) that will affect both supply and demand—directing them towards greener products. However, the major focus of IPP is on improving the existing market conditions towards, for example, a more competitive market structure (thus, fostering innovation); better access for all market participants to widely available information; clearly assigned property rights and responsibility; and unified EU-wide regulations.

Four approaches to the environmental policy principle of 'correction at source'

The principle of correction at source is expressed in the Treaty establishing the European Community (Article 174 (2) TEC), stating that "environmental damage should as a priority be rectified at source." However, no specific explanation is given for what should be understood as 'source.' For the purpose of investigating IPP in a global context, interpretations from four perspectives seem to be beneficial. We label them the *industrial metabolism, monetary incentive, policy integration* and *spatial approaches,* explaining them in the following.

(a) Industrial metabolism approach

Analysing the material flows which constitute the industrial metabolism of the EU shows that the sources of environmental damage include a variety of economic sectors located both inside and outside the EU (see section 2). Thus, in solving the related worldwide environmental problems at their source, economic agents at all these locations are to be affected by policy measures.

The industrial metabolism model illustrates the prevention-based interpretations of the principle of correction at source by von Seht and Ott (2000) and the Council of the European Union (2001). Von Seht and Ott state that negative environmental effects

should be prevented at the earliest possible stage. They argue that it is generally more efficient (from a society's point of view and in the long run) to invest, for example, in cleaner production technologies and greener product design than to take an 'end-of-pipe' approach and clean up environmental damage resulting from inadequate production technologies and product characteristics after the fact. Similarly, from an ecological perspective, it seems logical that less environmental harm will be generated if—partly irreversible—damage can be avoided rather than cleaned up. The same approach seems to be taken by the EU Council in claiming that preventive measures should be stimulated at an early stage of the product chain and that a transfer of environmental impacts from one life-cycle phase or stakeholder to another should be avoided (EU Council 2001).

However, since the sources of environmental problems are typically spread over all stages of the product life cycle (and industrial metabolism), the focus should be not only on the early but on all stages to achieve most effective solutions. Perhaps, the proposed emphasis on early stages may be explained by the fact that past and present environmental policy and economic decision making has been overwhelmingly focused on end stages and outputs (solid and diffuse emissions); in the eyes of von Seht and Ott and the EU council, this may have to be 'balanced out' now by a stronger input orientation.

(B) MONETARY INCENTIVE APPROACH

A way to implement the principle of correction at source can be seen in the polluter-pays-principle of environmental policy. If a polluter has to pay for environmental pollution (for example through a tax) there is a direct incentive for him/her to either avoid or reduce the polluting activities. On the contrary, if the society as a whole pays for the environmental damage, the individual polluter has no such incentive.

Economists typically favour the polluter-pays-principle because it is market-based by using the market forces through price incentives and, in this way, is expected to lead to efficient methods of environmental protection. In other words, it is expected that the polluter will choose the most efficient way of reducing the pollution. However, this presupposes well-working market mechanisms (for example, no monopoly power) and readily available information for all economic agents. For instance, it should be possible that the polluter can be identified and reached by the incentive-based instruments that it can be calculated how much (for example, of a tax) the polluter has to pay, and that the polluter is able to decide on the most efficient way to reduce pollution. Since some of these circumstances are hard to find in reality, decisions of economic agents will not be 'optimal' both from an economic and environmental perspective.

(C) POLICY INTEGRATION APPROACH

Searching for the sources of environmental damage not only leads to different views on economic activities (such as the industrial metabolism and monetary incentive approaches) but also to the political domain, that is, to the non-environmental policy areas with large environmental impacts (for example, on transportation, industrial development, agriculture, regional development). Here, the policy principle of integration is of particular importance for tackling environmental problems at their source. 'Integration' refers to the non-environmental policy areas in which environmental aspects should be considered right from the beginning and not discriminated against other policy concerns (Article 6 TEC, von Seht and Ott 2000).

The process of political integration in the EU—also known as the 'Cardiff-process'—is also a key principle of sustainable development in that the mutual interdependency of environmental and economic aspects is considered. This aspect is acknowledged by the EC as well in its attempts to develop an EU-wide strategy for sustainable development (European Commission 2001).

(D) SPATIAL APPROACH

Considering that the EU economy is highly interrelated with other regions of the world through material flows (see section 2), the location of economic agents along the stages of a product life cycle becomes particularly important. For our purpose of investigating an EU policy concept, it matters especially whether the economic agents are located inside or outside the EU. The spatial aspect adds a number of difficulties to the practical implementation of the above (industrial metabolism, monetary, and policy integration) approaches. For instance, information may be missing on where the pollution occurs and who the polluters are. Consequently, policy instruments aimed at promoting co-operation among producers (and other agents such as the government) and instruments based on the polluter-pays principle may require large efforts, e.g. in monitoring and assessment.

Detailed analysis of IPP with respect to correction at source in a global context

ANALYSIS OF IPP USING THE INDUSTRIAL METABOLISM APPROACH

IPP is based on an integrated view on all stages of the product life cycle. A product life cycle may be understood as an aspect of the industrial metabolism: whereas the industrial metabolism model is concerned with material flows of an entire economic system, a product life cycle refers to only one individual product. However, the product life cycle model exceeds a representation of material flows in being two-dimensional: whereas the material (or 'ecological') life cycle contains all stages from resource extraction to waste disposal/recycling, the 'economic' life cycle refers to all stages from product idea to market decline (Rubik et al. 2000). Thus, a wide range of economic agents representing the various product life cycle stages need to co-operate in order to develop integrated solutions for 'greener' products.

However, given the high complexity of a product life cycle oriented policy approach, large amounts of information are needed, and the government may have only a limited ability to successfully 'steer' economic activities. Therefore, IPP considers the government as only one of the stakeholders related to environmental protection (including, for instance, businesses, research institutes, and environmental and consumer protection organisations). The stakeholders are invited to participate in designing IPP policy measures and developing ways to implement them, whereas the role of the government is to mediate stakeholder co-operation and create a business environment that promotes environmentally-sound economic development and allows room for innovations in various directions. In this way, IPP follows a general trend of environmental policy that favours voluntary/co-operative and informational policy instruments. Some of these instruments are investigated further in the following discussion.

A major challenge for governments implementing IPP is to promote 'life cycle thinking' (i.e. thinking about the effects of one's productive/consumptive activities at other stages of the product life cycle) and co-operation of stakeholders. One way of establishing co-operation is the Danish approach of 'product panels,' that is, groups of stakeholders along the life cycle of a product or product group co-operating in the development of 'greener' products (European Commission 2001a).

Considering a large number of product life cycles exceeding national boundaries, the question is first whether and how to include foreign stakeholders in the panels. Although discussions are still going on, there seems to be no intention to create product panels on the EU level. Instead, the panels are promoted on the national level (Ernst and Young 2000). In this case, important stakeholders (for example, producers) located outside of the EU may be missing in the panels, thus making it impossible to include all sources of environmental damage in the development of solutions. But does it seem possible at all to establish global product panels? Although modern information technologies make such a 'global co-operation' easier then ever before, there is a lack of knowledge on how to use the communication means and of foreign language skills amongst small businesses. Also, information technologies cannot completely replace face-to-face communication. Therefore, without governmental support, the approach may be limited to big businesses having the capacities for international business co-operation.

To sum up, in principle, the instrument product panels provides an approach to tackling product-related environmental problems at their sources. In practice, even though it may be easier to implement the panels on the regional and national level, they may in this way leave out important sources of environmental damage. Thus, global product panels may provide an option to be pursued and developed further, particularly due to missing alternative means for establishing co-operation along global product life cycles.

Two types of product-related voluntary agreements may be distinguished. The first type is one negotiated between government and industry on, for instance, take-back of end-of-life products, recycling or reuse quota, or the banning of environmentally-harmful substance in products. The second type represents agreements on product standardisation, typically concluded by business associations and governmental standardisation agencies.

At the present, a number of voluntary agreements exist on the national level. Thus, their direct effects are restricted to the individual country as well. However, their indirect effects exceed national boundaries if, for instance, businesses no longer import environmentally-harmful raw materials and semi-manufactured products as a result of wanting to ban a certain substance in products. Yet, voluntary agreements are of particular importance (and partly existing) also on the international level—both within and beyond the EU. Major issues to be agreed on internationally (ideally: globally) are product and production standardisation to be negotiated between national governments and agencies of the various countries of the world. In this way, efforts in developing greener

products, e.g. through product recycling or reuse, will be both more economically efficient and environmentally effective.

In promoting information generation, processing and availability, informational instruments help identify the sources of product-related environmental damage. Instruments supportive of generating environmental information include promoting the development of assessment methods such as Material Flow Analysis (MFA), Physical Input-Output Analysis, and Life Cycle Analysis (LCA). In order to express product-related information in an easily interpretable form (in order to support decisions of various economic actors), widely accepted eco-labels may be created and promoted. To make information broadly accessible, information agencies, public Internet-based databases and other forms of publications can make large contributions. All of these measures are taken—and needed—both on the EU level and in member countries. However, against the background of global production and consumption, these instruments are also needed on the global level to involve all stakeholders.

ANALYSIS OF IPP USING THE MONETARY APPROACH

The concepts of 'product' (or 'producer') 'responsibility', also named 'extended producer responsibility',[108] provide the basis for a group of incentive-based instruments that are to be part of IPP. The monetary rationale of the concepts is that in extending the producers' responsibility, e.g. to the post consumer stage of a product life cycle, formerly external costs (e.g. for disposal or recycling) are internalised into the private costs of producers. In having to consider these—partially environmental—costs, producers have an incentive to developing efficient solutions to reducing the costs.

Thus, the main idea of product responsibility is to make producers financially responsible for the environmental effects originating from their products all along their life cycle. One option for establishing product responsibility is to introduce tack-back obligations for end-of-life products; another option is to raise a product tax, thus, internalising the external environmental costs of production and (partly) consumption into the private costs of the producer. Both these instruments are investigated in more detail below.

The instrument requires producers to take back the products (or packaging) they produced after consumption. They can, however, chose between doing this either individually or by joining a 'producer responsibility organisation (PRO)' that will organise the take-back and prepare the end-of-life products for reuse, recycling, and disposal. Since an individual take-back over long distances will be neither economically nor environmentally favourable, particularly for product life cycles with global dimensions, making membership to a PRO allows these take-back regulations to be manageable. Thus, foreign producers will typically participate in a domestic producer responsibility organisation just like most domestic producers. In this way, a take-back obligation includes both domestic and foreign producers equally. This presupposes, however, that producers can be identified and 'free rider' behaviour (that is, using the take-back infrastructure without paying for it) can be avoided.

Take-back obligations may refer to various kinds of end-of-life products and packaging. They have been introduced in the EU, for instance, for end-of-life vehicles and are planned for electrical and electronics equipment. A general shortcoming of take-back regulations is that they can rarely be installed for all products, primarily due to the required infrastructure and large efforts for selecting and recovering the end-of-life products.

There are a number of (interrelated) options for businesses on how to react to a take-back obligation, including recycling, waste incineration and the development of better recyclable materials and reusable products and less waste generating service and product concepts. Thus, take-back obligations have the potential of influencing various stages of the product life cycle. Which of these options will be used by businesses, however, depends on a number of aspects, including (private and environmental) costs associated with the options, technological innovations, and the information available on the effects of the options on the market and the environment. Therefore, the aspects of internalising environmental costs and fostering eco-innovation appear to be largely influential on the success of take-back regulation—presuming the goal of solving environmental problems at their source. Consequently, other instruments are needed to complement take-back obligations (for example environmental product taxation, see later in this section; informational instruments, see section 4.1).

All consequences along the product life cycle considered, these above mentioned options of reacting to a

[108] All three names appear throughout the literature representing similar approaches differing in their scope (e.g. whereas some approaches only refer to take-back obligations, others also include taxation) and major focus (e.g. the product focus also refers to consumers whereas the producer focus does not).

take-back obligation will have varying environmental impacts with regard to resource use, pollution and waste generation—not at least depending on available technologies. Thus, governmental promotion of 'green product' research and development can make take-back obligations more environmentally effective. Moreover, each of the options above faces a number of difficulties—even more so considering the global division of labour. The problems of joint product development were already indicated for product panels (see above in this section). Considering the option of recycling, economic and environmental problems result, for example, from the various kinds of materials that have to be either collected separately or divided after collection for the recycling processes. These processes are typically associated with high costs and an unsatisfactorily low degree of separation. If materials, product components or packaging are imported, additional difficulties may arise, for example, from problems with recycling materials and missing information on the materials (risk of toxic components in secondary materials). Thus, the seemingly paradox situation may occur in some cases that incineration turns out to be the less costly and less environmentally harmful alternative to recycling.

The problems described thus far point toward the importance of global co-operation of stakeholders along the product life cycle and of global standardisation agreements (for example, on the use of materials and their declaration). Without the supportive framework of these global measures, effects of take-back obligations in the EU will be limited in affecting the sources of environmental damage along product life cycles.

The rationale of environmental product taxation is based on the assumption that the environmental performance of products can best be optimised by the market forces once all prices reflect the 'true environmental costs' of products during their life cycle (polluter-pays principle). Consequently, the external costs should be included in the private costs of producers and consumers by, for example, establishing environmental taxes. Environmental product taxes are, however, rare in reality—one of the few examples being a component of the German 'eco-tax' raised on gasoline). A major reason for this is the fact that taxes typically lack acceptance by all producers and consumers since they seemingly generate an additional financial burden.

The following rationale for taxation in the IPP Green Book may be seen against the background of a possible cost disadvantage for the taxed producers and the resulting low acceptability. It is argued that since initiatives by economic actors to reduce environmental harm will lower the financial burden on the society, they should be rewarded, for example, by lowering (already existing) taxes. In particular, the EU IPP concept suggests to differentiate the value added taxation throughout the EU according to whether a product meets the criteria of an 'eco-label' or not (European Commission 2001a).

The approach raises a number of questions regarding its practical implementation. However, since an eco-label typically combines various environmental aspects in an aggregated form, it may be concluded that this approach abandons the idea of basing the tax on the external environmental costs that had to be estimated. Rather, the emphasis is on putting a differentiated tax burden on more or less environmentally sound products.

This approach will very likely increase the recognition of eco-labels. In particular, it may be expected that the labeling criteria will be a core object of concern. This would also intensify the need to further developing eco-label concepts and, in particular, methods to analyse and compare the environmental impacts resulting from various products. In addition, since the value added tax sets a clearly noticeable price signal to the consumer, the role of consumer decisions is highlighted by this instrument.

ANALYSIS OF IPP USING THE POLICY INTEGRATION APPROACH

The focus of IPP on the economic category 'product' leads to an important aspect of environmental policy design: in aiming at improving the environmental performance of products, aspects of industrial and other forms of economic policy become the central political categories. From this insight, the need for integrating environmental and economic policy issues is derived in the European IPP concept (Ernst and Young 2000, European Commission 2001a). If the goal of this development is defined as implementing economic policy instruments in the most environmentally effective way, policy integration should be particularly welcomed from the following point of view: it embodies the chance of tackling environmental problems at a political source—through correcting economic policy that is supporting environmentally-harmful activities. There is a major challenge for governments lying in policy integration since co-operation has to be created across established fields of policy responsibility, e.g. various ministries).

However, if environmental and economic problems are solved jointly in the attempt to develop mutually beneficial solutions there is the risk of achieving second-best results if win-win solutions are primarily

pursued from a short-term economic perspective. This is a likely development in practice since short-term solutions (e.g. to promote recycling without changing product design) will be easily agreed upon. Yet, more sustainable solutions may be achieved from a long-term perspective, e.g. in pursuing innovation leading to improved recycling processes and better recyclable products. In addition, in orienting toward potential market advantages for EU businesses, IPP puts an emphasis on economically favourable instruments such as on voluntary/co-operative (e.g. EU-wide standardisation of product components). The expectation of business advantages may lead to a preferred application of these instruments only on the EU level. However, global product-related standardisation agreements will be more sustainable from a global perspective than EU agreements. Thus, the economic goals from an EU perspective may be opposed to global environmental goals. However, long-term and global approaches may also require large efforts and sometimes even be not achievable in a reasonable time scale.

Favourable economic effects of IPP are also used as a major argument to convince businesses in the EU to engage in IPP development and implementation (EU Commission 2001a). Since eco-innovations of EU businesses may generate market advantages for them, an economic incentive is seen for businesses to participate in IPP initiatives. However, this 'mix' of environmental and economic motives held by both the government and businesses is hard to always assign clearly. Thus, IPP may be viewed by outside-EU countries as an attempt to protect the EU domestic market against the rest of the world rather than to solve environmental problems. Since this problem is a major source of disagreement between industrialised and developing countries within WTO negotiations, IPP may add another point of controversy to this discussion.

Conclusions

Considering the fact that the EU economy is closely linked to the rest of the world in various ways, environmental problems formerly labelled 'regional' are now conceived to be global as well. In particular, the EU's heavy dependence on foreign material imports is the reason why products consumed in the EU can be assigned environmental damage related to resource extraction and production in other parts of the world. Thus, economic globalisation changes the context of product-based environmental policy.

Particularly in view of achieving sustainable development, the implication for EU Integrated Product Policy is that life cycle thinking of policy makers, producers and consumers in the EU cannot stop at the borders of member countries or the EU domestic market. Otherwise, environmental problems may be tackled at their sources only in so far as they are located within the EU domestic market. It is even possible that environmental problems may be shifted towards the non-EU countries by decisions of policy makers and economic agents who do not take into consideration the global effects of EU consumption.

The IPP concept and the instruments under investigation in this article confirm that IPP, as proposed by the EU, embodies the potential for improving the environmental performance of products along their global life cycles. However, this potential can only be realised if the following two aspects are taken into consideration by policy makers. First, sets of instruments should be developed rather then focusing on individual instruments in order to improve their effectiveness. For example, take-back obligations will only result in most environmentally-sound solutions if they are complemented by other instruments such as environmental product taxation, promotion of information agencies, and product panels.

Second, whereas some incentive-based instruments implemented on the EU level, such as take-back obligations and differentiated value added taxation, can affect producers world-wide—voluntary/co-operative and informational instruments need a global approach in order not to limit their effects to the EU territory. Taking the above example of take-back obligations again: implemented on the EU-level, the instrument can establish product responsibility amongst producers world-wide. However, global agreements on standardised labeling of product components and final products will support the identification of producers. In addition, globally linked information agencies and product panels will be supportive of an environmentally efficient take-back obligation and include the foreign sources of environmental damage. In this respect, an essential precondition for successful co-operation, particularly on the global level, is that a new understanding is created for all stakeholders of what is economically desirable—based on a long-term perspective. To implement this basic principle of sustainable development may require an extensive process of learning by all stakeholders.

The strong orientation on the business advantages arising from IPP instruments may lead to a reduced view on IPP instruments favouring their application only within the European domestic market. Particularly with respect to sustainable development, these

potentially problematic issues should be addressed in the process of further developing IPP by the EU. Overall, both short- and long-term as well as EU-wide and global policy approaches will have to be valued against each other and, ideally, combined in order to develop most effective and sustainable IPP sets.

To implement IPP, large amounts of information are needed by governments as well as businesses, consumers and other stakeholders (for example, environmental organisations) to support their decisions—be it on policy measures, production methods or purchase of goods. This information includes data on the environmental and economic effects resulting from products and product groups, from economic strategies (such as recycling, dematerialisation, reduction of toxic components), and from the IPP instruments. Indeed, in order to enhance the success of IPP, it will be a major task to promote not only EU but also world-wide data generation, to support the development of analytical methods, and to make the information available world-wide.

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