The Changing Face of Environmental Legislation: New Policy Directions in the European Union

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Abstract

Environmental legislation has traditionally been reactive; governments would see a problem and then enact new legislation to target that specific problem. However, over the past few decades governments have started to take an increasingly holistic view by targeting the source of the problem rather than the waste at the end of the pipe. The European Union (EU) has been driving this change in recent years, regulating the automotive and the electronics industries through the enforcement of chemical restrictions, product take-back requirements and reuse/recycling quotas. But the EU has recognised that this will not be enough to achieve sustainability and is now looking forward to 2030 and beyond to help shape future policies. The Eco-design of Energy-Using Products (EuP) Directive, passed in 2005, is one example of how this vision is being translated into action. EuP will require manufacturers of targeted products to consider environmental impacts during product design and represents a fundamental shift in environmental policy. This paper will consider recent developments in environmental policy and illustrate some likely future developments. It is critical that New Zealand exporters and policy makers be proactive in this area so that New Zealand exports are not closed out of key markets.

Introduction

Environmental policy has been a key issue for the European Union (EU) since the launch of the First Environmental Action Programme (1st EAP) in 1973 (e.g. Bailey, 2003). Over three decades the focus of environmental policy has shifted from environmental protection to environmental integration to sustainable development. In the 1990s the polluter pays principle (otherwise known as extended producer responsibility) became an important part of the policy agenda. This led to the regulation of the packaging industry (through the Packaging Directive (EU, 1994)), the automobile industry (through the ELV Directive (EU, 2000)) and the electronics industry (through the WEEE (EU, 2003b) and RoHS (EU, 2003a) Directives). However, the EU has now moved beyond polluter pays and in 2005 passed the Eco-design of Energy-Using Products (EuP) Directive (EU, 2005a), which will require certain manufacturers to minimise the environmental impacts of their products over their whole life cycle. In addition to this the EU is expected to pass the Regulation on REACH (EU, 2003d) in late 2006, which will set up an EU-wide framework for regulating and restricting chemicals.

These policies illustrate some of the themes that are now driving the EU's environmental legislation, such as, a move toward framework legislation (e.g. REACH which replaces some 40 directives (EU, 2003d)), a life cycle perspective (e.g. EuP) and implementing policy using a range of different measures (e.g. EuP which will use formal regulation, voluntary agreements, etc.). There is also a tendency toward product-oriented policy.

The purpose of this paper is to analyse some of the drivers for change in environmental policy within the EU and to outline trends for the future. The next two sections will focus on the challenges posed by sustainability and how the concept of sustainable development is influencing environmental policy. This will be followed by a discussion of new policy initiatives and an example of how these initiatives are being applied. This will lead onto directions for future policy, some of the challenges that the EU must face and the effect that the EU's environmental policy is having on the rest of the world. The final section will discuss whether the EU's actions are enough to achieve sustainability. The focus of this paper will be on the product-oriented aspect of environmental policy.

The sustainability challenge

In 1992 a study by the Advisory Council for Research on Nature and the Environment in the Netherlands (the "Dutch RMNO") concluded that in order to reach truly sustainable development by the middle of the 21st century, all functions in society would need to be fulfilled using ten to fifty times less "eco-capacity" than is currently used by developed countries (i.e. Factor 10 to Factor 50 improvements in environmental performance) ((Weterings and Opschoor, 1992) as cited by (Weaver et al., 2000)). This study is now widely cited as it illustrates the magnitude of change that is required to sustain a global population of between 9.4 and 12.4 billion living at developed world standards. As incremental improvements to current systems and technologies are likely to yield no more than a four-fold improvement in environmental performance, it is clear that new approaches are necessary (Weaver et al., 2000).
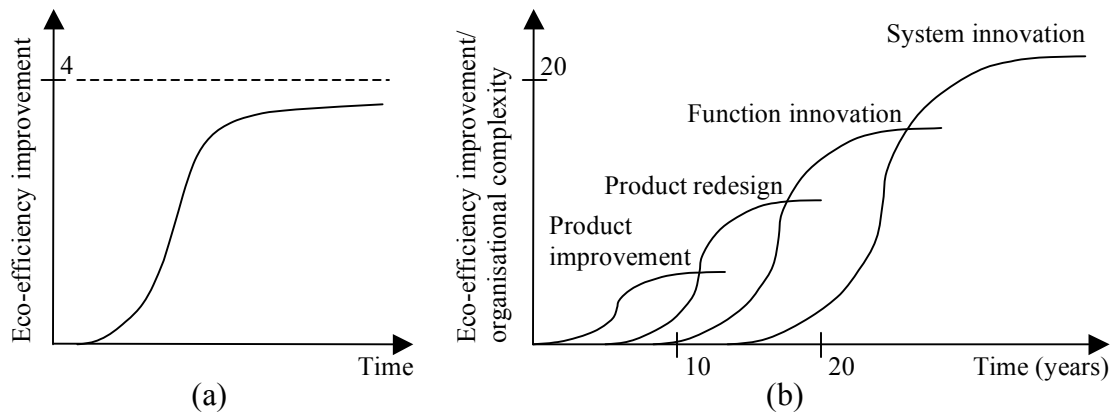

Figure 1: Eco-efficiency curves for a function implemented by (a) a single technology, or (b) different systems that are introduced over time as a result of eco-innovation (adapted from Brezet et al., 2000)

Eco-innovation is one approach that can be used to meet the challenge of sustainable development. The process, shown in Figure 1b, recognises that it is not possible to achieve ten- to fifty-fold improvements in eco-efficiency by "greening" existing

technologies; this level of improvement will require not only drastic changes in technology, but also new societal norms, organisational structures and market conditions (Rubik, 2001). This sort of change will take years (if not decades) to achieve, so the eco-innovation process assumes that new systems (technologies, services, etc.) are introduced over time in order to slowly shift a particular sector toward sustainability. As each system will have an upper limit of eco-efficiency (shown in Figure 1a), the new system(s) should be introduced when the incumbent system is approaching this upper limit.

The eco-innovation model is typically shown using three to four "phases". The first phase is product improvement (improving the eco-efficiency of existing products), the next is product redesign (applying eco-design techniques to a new generation of product), followed by function innovation (meeting a need in a different way) and finally system innovation (creating a new system, which may involve changes in technology, market conditions, business organisation and society itself) (Nuij, 2001; Rubik, 2001). Some authors prefer to combine the last two phases as "system renewal" (e.g. Jansen, 2000). As can be seen from the diagram, each new phase offers better eco-efficiency than the last, allowing Factor 10 to Factor 50 improvements to be realised over several decades.

The influence of sustainability on the EU's environmental policy

Sustainable development became a fundamental goal of the European Union when it was included in the Treaty of Amsterdam in 1997 (EU, 2006c). This goal has been translated into a set of guiding principles through the EU's 2001 Sustainable Development Strategy (EU, 2001) and more recently in the Renewed EU Sustainable Development Strategy (the "2006 SDS") (EU, 2006c). The 2006 SDS recognises two major challenges for the EU: unsustainable patterns of production and consumption and the lack of integration in policy-making. It aims to continuously improve the quality of life in the EU by tapping the "ecological and social innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion". It also recognises a need for long-term planning but short-term action and, as such, it requires the European Commission to "elaborate a concrete and realistic vision of the EU on its way to sustainable development over the next 50 years".

Both sustainable development strategies have a big picture focus and include societal, economic and environmental issues. While the 2006 SDS will provide significant input into environmental policy, it is the Sixth Environmental Action Programme (6th EAP) that has really been driving new policies. The 6th EAP runs from 2002 to 2012 under the banner "Environment 2010: Our Future, Our Choice" and has four key priorities: climate change; nature and biodiversity; environment, health and quality of life; and natural resources and waste (EU, 2006e). These priorities have been broken down into seven thematic strategies, each of which focuses on a certain theme (rather than a specific pollutant) over a 5 to 25 year time horizon.

The thematic strategy on the sustainable use of resources (EU, 2005d) recognises that "[if] the world as a whole followed traditional patterns of consumption, it is estimated that global resource use would quadruple within 20 years". Clearly this would cause significant damage to the environment, so the EU is aiming to decouple economic growth

from resource consumption so that the economy can continue to grow even though fewer resources are used. This strategy is complimented by the thematic strategy on the prevention and recycling of waste (EU, 2005c) which focuses on preserving the EU's resource base by avoiding waste production and recycling the waste that is produced.

New policy initiatives

Stimulating innovation that leads to eco-efficiency improvements of Factor 10 and beyond will require future-oriented initiatives and strong leadership. Over the past few years the EU has adopted a number of new initiatives which are summarised below.

Better Regulation

Some critics suggest that the EU has opted for "quantity not quality when it comes to environmental law" (O'Neill, 2003), but this should change due to the recently adopted action plan for simplifying and improving the regulatory environment (EU, 2002). This plan calls for a number of actions, including: better coordination and simplification of policies; better use of non-legislative measures; tougher enforcement; and more effective transposition of policies into national law. Alongside the action plan, the European Commission has also adopted minimum standards for stakeholder consultation and a methodology for impact assessment that is to be applied to all new policies from 2004/05.

Integrated Product Policy (IPP)

IPP recognises that all products and services have an environmental impact in some (if not all) parts of their life-cycle and that these impacts should be addressed in an integrated way so that the overall life-cycle performance can be improved. The focus should first be on exploiting win-win scenarios, where gains in environmental performance can be achieved at little or no financial cost. The concept of IPP was first introduced at the European Union level in 1998, but it was formally adopted in 2003 (EU, 2003c). The IPP strategy is based on five guiding principles:
1. Life-cycle thinking (not full Life Cycle Assessment);
2. Working with the market (encouraging "green" supply and demand);
3. Stakeholder involvement;
4. Continuous improvement (rather than a fixed minimum level of performance);
5. A variety of policy instruments (formal regulation, voluntary agreements, etc.).

Environmental Technologies Action Plan (ETAP)

Environmental technologies include any technology that offers better eco-efficiency than comparable alternatives and technologies for better utilising natural resources or better managing pollution (EU, 2004). The objective of ETAP is to remove barriers that restrict the development of environmental technologies and to ensure that the EU takes a leading role in the global environmental technologies market. The aim is to reduce burdens on natural resources, stimulate economic growth and help to improve the quality of life of citizens in the EU.

EU environmental policy: a case study of the electronics industry

The electronics industry has been targeted by a range of environmental policies over the past few years due to growing concern over electronic waste (e-waste). This concern has

arisen for a number of reasons, including the growing number of electronic products on the market, the comparatively short lifespan of these products, the hazardous materials that are used and the difficultly in recycling printed circuit boards. As can be seen in Figure 2 below, there is now quite a range of policies that apply to electronic products in the EU. It should be pointed out that the Regulation on REACH is expected to be passed by the end of 2006 but has currently not been promulgated. Many of these policies are out of scope of this paper, but WEEE, RoHS, EuP and REACH will be discussed in more detail below.
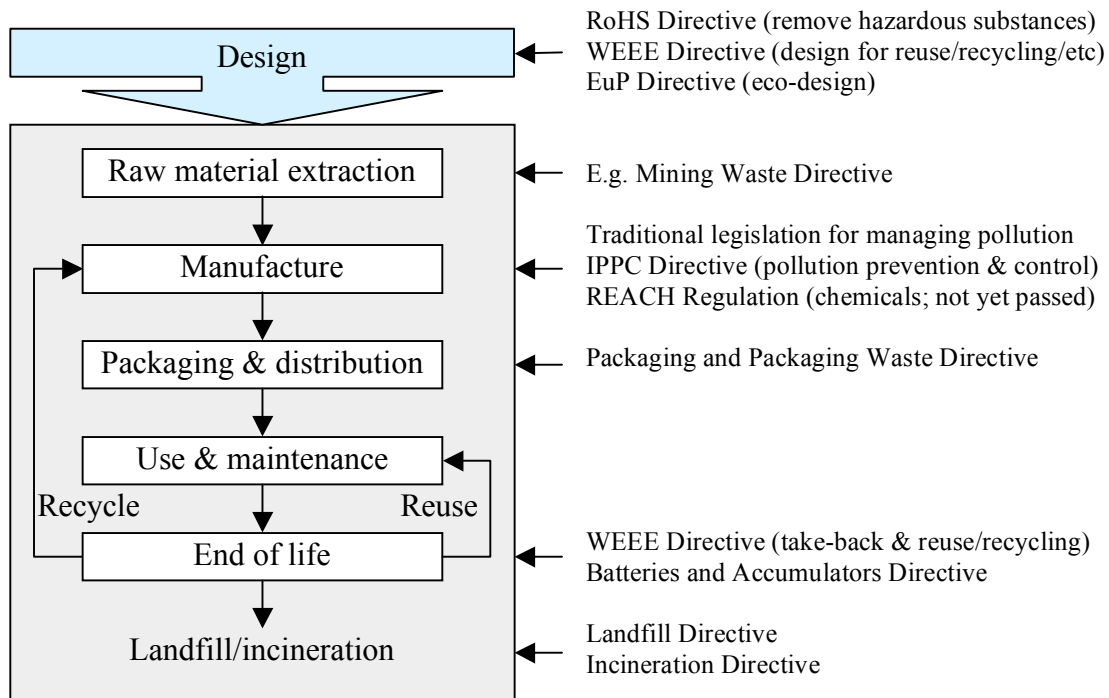

Figure 2: EU environmental legislation governing electronic products over their life cycle

WEEE and RoHS

The Waste Electrical and Electronic Equipment (WEEE) Directive is a polluter pays policy that requires manufacturers of most kinds of electronic products to take back their products at "end of life" for reuse or recycling (EU, 2003b). The Restriction of Hazardous Substances (RoHS) Directive compliments WEEE by banning six hazardous substances, thereby making products safer to reuse, recycle or dispose of (EU, 2003a). While there are currently only six substances restricted, the RoHS Directive allows more substances to be added based upon sound scientific evidence (EU, 2003a).

Eco-design of Energy-using Products (EuP) Directive

EuP is a framework directive that will require manufacturers of targeted products which use energy (from electricity, fossil fuels, or renewable energy sources) to improve the eco-efficiency of their products by applying eco-design techniques (EU, 2005a). EuP is almost the polar opposite of end-of-pipe pollution control, as it seeks to address issues with environmental performance during product design. It is generally agreed that most of the environmental impacts caused by a product are decided at the design stage and,

therefore, changing product design is one of the most cost-effective ways of reducing these impacts throughout the life-cycle of the product (EU, 2005a). Rather than setting performance standards based upon the best performing product in a given category, EuP targets will be based upon technical (and economic) feasibility (EU, 2005a), thereby allowing for continuous improvement rather than an acceptable level of mediocrity

The EuP Directive provides a framework for setting minimum levels of eco-design for particular groups of products, but it will require implementing measures before any action needs to be taken by manufacturers. The first set of target products could theoretically include any energy-using product (except vehicles which are excluded from the scope), but it is likely that the first group will be a subset of the products already being studied by the EU (for a full list see Defra). A working plan will be published no later than 6 July 2007 and this will clarify which products are a priority (EU, 2005a). The implementing measures used to enforce compliance may be directives, but the EU is making it clear that it prefers self-regulation by industry (EU, 2005a).

Registration, Evaluation and Authorisation of Chemicals (REACH)
As the name suggests, the proposed Regulation on REACH (EU, 2003d) will establish an integrated system for registration, evaluation and authorisation of chemicals. This system aims to manage the potential risks (to humans and the environment) of the tens of thousands of chemicals that are used on the EU market. It would require most chemicals that are manufactured or imported in quantities greater than one tonne to be registered (by submitting a technical dossier). For many chemicals this will be the end of the story, however, if some of the properties are identified as a potential risk then the chemical will need to be further evaluated. Based upon this evaluation, the chemical can be allowed onto the market without restriction, can be granted an authorisation (subject to certain conditions) or completely restricted (i.e. a ban on certain uses or the chemical itself). A newly established European Chemicals Agency would administer the REACH process and a chemicals database. The regulation would replace some 40 directives and as a regulation it would automatically apply to all EU Member States without having to first be translated into national law. Political agreement on the proposal was reached on 27 June 2006 and the regulation is expected to be adopted in late 2006 (EU, 2006b).

While REACH will have obvious impacts on the manufacturing sector, it will also impact companies which import products into the EU because it can apply to chemicals in finished products (known as "articles" in the regulation) where these chemicals are hazardous and can be released from the product. And even in cases where REACH does not apply directly, it is likely that the European Chemicals Agency will provide guidance on new chemical restrictions that should be made through existing legislation like RoHS.

Directions for future policy

While each new environmental policy has its own focus, many of the themes are shared. The themes that have been driving recent policies (particularly the 2006 SDS, ETAP and IPP) can be grouped into seven key areas:

Sustainable development – long-term planning but short-term action; better integration of social, environmental and economic needs and a focus on win-win and win-win-win scenarios (e.g. improved environmental performance through eco-design reduces cost of manufacture and creates a marketing advantage); taking a life cycle perspective; and continuously improving the quality of life of all citizens while using fewer resources;

Shared responsibility – wide stakeholder consultation in new initiatives; encouraging integrated supply chains; educating stakeholders; encouraging responsible citizenship; and making polluters pay;

Acting globally as well as locally – recognition that the EU's actions have global implications; encouraging uptake of "sustainable" technologies in developing countries; and standardising the EU's policies against world standards;

Reforming the market – creating a "green" market by getting prices right (removing subsidies that have a negative effect on the environment or society, shifting taxes from the labour force to resource use, etc.) and stimulating "green" supply and demand (e.g. green public procurement); making policies consistent between Member States to minimise barriers to trade; and labelling products (e.g. eco-labels) so that citizens can make choices based not only upon the price tag;

Better information – making information more accessible (e.g. European Platform on Life Cycle Assessment (EU, 2005b)) so that better decisions can be made (by citizens, governments and companies) while taking account of the precautionary principle;

Better policy – improving accessibility (e.g. simplified language, framework legislation, etc.), flexibility (e.g. mixing compulsory and voluntary measures, adding revision clauses to policies so they can be updated quickly, etc.) and quality (e.g. impact assessment, wide consultation, better follow-up on infringements, etc.) of policies;

Implementation – improve integration of policies within Members States and companies through better policy (as above), performance review (e.g. through indicators), better demonstration and dissemination, smart tools (e.g. streamlined LCA, supply chain tools, environmental management systems, etc.) and education programmes.

New policies such as the 2006 SDS (EU, 2006c) recognise that although the concept of sustainability has received significant attention over the past two decades, there is still a long way to go if we want to achieve truly sustainable development, consequently these new policies are very action oriented. The action plan for IPP is a good example of this. The first phase of implementation (named EIPRO: Environmental Impact of PROducts) aimed to evaluate the areas of private consumption that caused the greatest life cycle impact (EU, 2006a). This phase completed in May 2006 and found that, out of the 300 categories considered, 70-80% of impacts came from only three categories (food and drink, private transportation and housing). The second phase (known as IMPRO: environmental IMProvement of PROducts) is underway and will consider the scope for improvement in three specialist areas (meat products, passenger cars and housing) and is

due to be completed by the end of 2007. The final phase (implementation) will determine the policy measures that can be used to improve the aspects of each system which yield the greatest improvement in eco-efficiency with the least socio-economic cost.

Some further examples of measures that are already planned by the European Union and will influence environmental product policy over the next fifteen years are:
- 2007: IMPRO study complete (as above) (EU, 2006a);
- 2007: Priority products for EuP implementing measures published (EU, 2005a);
- 2007: Sustainable production and consumption action plan complete (EU, 2006c);
- 2007: Research complete for shifting away from taxes on labour and toward taxes on resource consumption, energy consumption and/or pollution (EU, 2006c);
- 2008: Review of subsidies incompatible with sustainability complete (EU, 2006c);
- 2008: Life cycle data readily available (EU, 2005b);
- 2008: Progress indicators developed for tracking the decoupling of economic growth from resource use and environmental degradation (EU, 2005d);
- 2010: Each Member State to have a level of Green Public Procurement that is at least equal to the level of the best performing member states in 2006 (EU, 2006c);
- 2020: REACH would have phased out all chemicals that pose significant threat to the environment or human health (EU, 2003d).

The 6th EAP calls for economic growth to be decoupled from environmental degradation and resource use and it is clear from many of the actions above that the EU is seeking to reform the market. This is no simple task and the EU will need to cross many hurdles, not least of which are:
- Pressure from within the EU (lack of policy implementation in Member States, lack of enforcement and problems trying to harmonise law across a growing number of Member States) (Krämer, 2003);
- External pressure from non-EU countries such as the US (Krämer, 2003) and lobby groups;
- Companies which do not want to change because they are locked into current technologies through investment (EU, 2004);
- Transforming new initiatives (eco-design, eco-innovation, etc.) into everyday business practice (e.g. Tukker et al., 2001); and
- Getting companies to change their planning horizon from years to decades.

The impact of the EU's policies on businesses and other countries

The EU is one of the world's biggest markets and, consequently, any action taken by the EU has a global impact. The RoHS Directive, which came into force on 1 July 2006, is a good example of this. By imposing substance restrictions, particularly on lead (Pb) which is widely used as a joining material, the EU has caused a reform of the entire electronics industry. Large multinationals, which export the same product to many countries, have pressured manufacturers (of solders, electronic components and printed circuit boards) to supply them with RoHS-compliant components. Even now, only a few months after RoHS came into effect, it is already difficult to get non-compliant parts.

Furthermore, the introduction of RoHS has caused other countries (e.g. China) to adopt similar legislation as they do not wish to become a dumping ground for e-waste.

Given the global nature of the EU's policies and the difficulties that electronics industry has had with RoHS and WEEE, it is important that businesses are more proactive and respond quickly and effectively to this new breed of environmental policy. Some of the important qualities for success are:

A highly integrated supply chain – many producers now integrate their suppliers' parts so practices like eco-design become a "network activity" (Tukker et al., 2001), for this reason it is important that information is passed both up and down the supply chain and that organisations focus on quality not quantity when it comes to suppliers;

A long term focus – substance restrictions and eco-design standards can come at almost no cost if included as part of the specification for a new product (Defra), but the cost of making existing products comply can be substantial, therefore businesses should specify increasing levels of eco-efficiency for each new product generation and also phase out harmful chemicals (e.g. JIG Level A and B substances (EIA et al., 2005));

A life cycle perspective – businesses must consider products over their whole life cycle and this may involve redesigning products for disassembly/reuse/recycling, partnering with local recycling organisations and possibly even distributed manufacturing to produce products closer to their point of use; concepts such as environmental benchmarking, streamlined LCA and Design for X (DfX) should be well integrated.

Is it enough for sustainability?

To reach truly sustainable development by the middle of the 21st century, we will need to achieve ten- to fifty-fold improvements in eco-efficiency for all functions in society, so the question is: Are the EU's new policy initiatives enough? The short answer is no. Even measures like EuP, which can be seen as a revolution in environmental policy, are still focused on product improvement and redesign and it is very unlikely that this sort of innovation will achieve anything more than four-fold improvements in eco-efficiency (Weaver et al., 2000). In fact, it has been shown by Tukker et al. (2001) that even in countries where eco-design tools and education are quite advanced, the application of eco-design is still limited and it is not achieving anywhere near Factor 4 improvement. A further problem for eco-design is that while a very high percentage of the environmental impact of a product is determined at the design stage (often quoted at 85%), much of this impact is "locked in" when an implementing technology is chosen (Stevels, 2003).

These policies alone will not lead the EU to sustainable development because they are too focused on individual companies and individual products. Factor 10-50 improvements can only be achieved through fundamental changes to our current system and this sort of change will require widespread cooperation, shared visions and strong leadership.

That being said, there is one promising initiative that has come from the Environmental Technologies Action Plan and that is technology platforms. These platforms, now

incorporated under the banner European Technology Platforms (ETPs), bring together as many stakeholders as possible and focus on a single area of technology (e.g. hydrogen fuel cells, water sanitation, etc.). Each ETP follows a common process: firstly, agree on a shared vision for the technology; secondly, form a Strategic Research Agenda (SRA) which outlines medium- and long-term goals; and finally, implement the SRA by drawing on private and public funding (EU, 2006d). While the main objective of the ETPs is to boost European competitiveness, these platforms could also develop new eco-efficient technologies which could then be used to raise the bar in policies like EuP (as the eco-efficiency criteria in EuP will be based upon what is technically possible) and overcome limitations of current technologies.

Conclusions

A number of shared themes are appearing in the EU's environmental policies, namely: sustainable development; shared responsibility; action on both the local and global levels; reforming the market so that it better facilitates sustainable technologies; making better information available; creating better quality policy; and finally, making sure that new initiatives are properly implemented. These themes can be seen in new initiatives such as Integrated Product Policy and the Environmental Technologies Action Plan and they are also driving new legislation like the EuP Directive and the Regulation on REACH.

Sustainable development is one of the core themes and it is enabling the European Union to take a longer term focus (sometimes up to 50 years). This long-term perspective can be seen in the Renewed Sustainable Development Strategy (2006) and the Sixth Environmental Action Programme and it is critical if the EU wants to realise ambitious goals such as the decoupling of resource use from economic growth.

However, while many of these initiatives represent a revolution in environmental policy, they are unlikely to inspire the function and system innovations that will be necessary for the EU to achieve truly sustainable development. This is largely because they are too focused on individual companies and individual products and do not adequately address societal and environmental problems at a system level. That being said, the creation of technology platforms, which bring together a wide range of stakeholders from a given sector, is certainly a step in the right direction. But if these platforms are to become a tool for sustainable development, they must focus on more than just European competitiveness.

As a final point, while this paper has focused on developments in environmental policy within the EU, there have also been substantial developments in Japanese policy. A comparison between recent European and Japanese policies would be an interesting topic for further research.

Acknowledgements

References

Bailey, I. (2003). *New Environmental Policy Instruments in the European Union*. Burlington, VT: Ashgate.

Brezet, J. C., Bijma, A., & Silvester, S. (2000). *Innovative Electronics as an Opportunity for Eco-efficient Services [September 11-13, 2000].* Paper presented at the Electronics Goes Green conference, Berlin, Germany.

Defra. Regulatory Impact Assessment (Partial): The Ecodesign For Energy-Using Products Regulations 2007 [UK]. Retrieved 2006, October 20, from http://www.defra.gov.uk/corporate/consult/ecodesign-energy/annexd-ria.pdf

EIA, JGPSSI, & JEDEC. (2005). JIG-101: Material Composition Declaration for Electronic Products. April 2005. Retrieved 2006, May 11, from http://www.jedec.org/download/search/ACF276.pdf

EU. (1994). Directive 94/62/EC of 20 December 1994 on packaging and packaging waste. *Official Journal of the European Union, L365*(31.12.1994), 10-23.

EU. (2000). Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles. *Official Journal of the European Union, L269*(21.10.2000), 34-43.

EU. (2001). A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development, *COM(2001)264 final*.

EU. (2002). Action plan "Simplifying and improving the regulatory environment", *COM(2002) 278 final*.

EU. (2003a). Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. *Official Journal of the European Union, L037*(13.2.2003), 19-23.

EU. (2003b). Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE). *Official Journal of the European Union, L037*(13.2.2003), 24-38.

EU. (2003c). Integrated Product Policy: Building on Environmental Life-Cycle Thinking, *COM(2003) 302 final*.

EU. (2003d). Proposal for a Regulation of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (Reach), *COM(2003) 0644 final*.

EU. (2004). Stimulating Technologies for Sustainable Development: An Environmental Technologies Action Plan for the European Union, *COM(2004) 38 final*.

EU. (2005a). Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products. *Official Journal of the European Union, L191*(22.7.2005), 29-58.

EU. (2005b). European Platform on Life Cycle Assessment. Retrieved October 20, 2006, from http://ec.europa.eu/environment/ipp/pdf/flyer_lca_0511.pdf

EU. (2005c). Thematic Strategy on the prevention and recycling of waste, *COM(2005) 666 final*. Brussels.

EU. (2005d). Thematic Strategy on the sustainable use of natural resources, *COM(2005) 670 final*. Brussels.

EU. (2006a, October 19). Integrated Product Policy: Identifying products with the greatest potential for environmental improvement. Retrieved October 20, 2006, from http://ec.europa.eu/environment/ipp/identifying.htm

EU. (2006b, April 7). REACH. Retrieved 2006, October 20, from http://europa.eu.int/comm/environment/chemicals/reach/reach_intro.htm

EU. (2006c). Renewed EU Sustainable Development Strategy (EU SDS) (10117/06).

EU. (2006d). Second Status Report on European Technology Platforms: Moving to Implementation. Retrieved 2006, October 22, from ftp://ftp.cordis.europa.eu/pub/technology-platforms/docs/ki7305429ecd.pdf

EU. (2006e, June 16). The Sixth Environment Action Programme of the European Community 2002-2012. Retrieved October 20, 2006, from http://ec.europa.eu/environment/newprg/index.htm

Jansen, L. (2000, October 26). Technology in Sustainable Development: The Challenge of evolutionary change! Retrieved 2006, October 20, from www.indecol.ntnu.no/indecolwebnew/events/conferences/061000/061000_jansen.doc

Krämer, L. (2003). The Future Role of the ECJ in the Development of European Environmental Law [Chapter 6]. In J. H. Jans (Ed.), *The European Convention and the Future of European Environmental Law*. Groningen, The Netherlands: Europa Law.

Nuij, R. (2001). Eco-innovation: Helped or hindered by Integrated Product Policy. *The Journal of Sustainable Product Design, 1*, 49-51.

O'Neill, M. (2003). *WEEE&RoHS and Trends in the Environmental Legislation in European Union.* Paper presented at the Third International Symposium on Environmentally Conscious Design and Inverse Manufacturing [December 8-11, 2003], Toyko, Japan.

Rubik, F. (2001). Environmental sound product innovation and Integrated Product Policy (IPP). *The Journal of Sustainable Product Design, 1*, 219-232.

Stevels, A. (2003). *Towards an operationalization of the proposed European Directive on EcoDesign (Design for Environment) of electronic end use products (EuP).* Paper presented at the Third International Symposium on Environmentally Conscious Deisign and Inverse Manufacturing [December 8-11, 2003], Tokyo, Japan.

Tukker, A., Eder, P., Charter, M., Haag, E., Vercalsteren, A., & Wiedmann, T. (2001). Eco-design: The State of Implementation in Europe Conclusions of a State of the Art Study for IPTS. *The Journal of Sustainable Product Design, 1*, 147-161.

Weaver, P., Jansen, L., Grootveld, G. V., Spiegel, E. V., & Vergragt, P. (2000). *Sustainable Technology Development*. Sheffield, UK: Greenleaf.

Weterings, R., & Opschoor, J. (1992). *The Ecocapacity as a Challenge to Technological Development*. Rijswijk, The Netherlands: Advisory Council for Research on Nature and the Environment [RMNO].