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Working Group on Waste Prevention and Recycling

REPORT OF THE 2ND SURVEY ON SMM-RELATED ACTIVITIES IN OECD COUNTRIES

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FOREWORD

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REPORT ON THE 2ND SURVEY ON SMM-RELATED ACTIVITIES IN OECD COUNTRIES

EXECUTIVE SUMMARY

Introduction

This report provides a synthesis of responses to the second OECD survey on Sustainable Materials Management (SMM), which was sent to the 30 member countries, Israel and the European Commission (EC) in July 2007. By February 2008, 16 responses (from 15 countries and the EC) were received.

Objectives and Scope of the Survey

The previous survey (2005) revealed that most OECD countries were not familiar with the SMM approach. However, countries clearly perceived SMM as a promising approach for reducing environmental impacts associated with materials use.

For these reasons, participants to the 2005 SMM Workshop expressed a desire to carry out a more in-depth survey among member countries in 2007, to gain a clearer understanding of SMM activities in member countries and to get more detailed information on particular SMM initiatives, such as the materials or activities targeted and the instruments used to ensure sustainable management of materials. This second survey was also expected to reveal the trend in implementation of SMM-related policies in member countries.

Survey Results

Responses to this 2nd Survey on SMM initiatives suggested that the SMM concept continues to evolve rapidly in most OECD countries. Compared to the first Survey (2005), a much clearer understanding of what SMM means is emerging, including what types of activities/elements are covered by this concept. All responses (15 OECD countries and the European Commission) referred to general policies on waste, material/products, consumption, pollution prevention and energy. Several also incorporate a broader spectrum of policies into this concept, such as resource management, industry, transport and even specific areas of environmental policy (climate change, biodiversity, air, water and soil protection) on which materials use has an impact.

The responses also indicated that policies which address only “end-of-life materials” have their limitations. To make these particular policies more effective, they especially need to be supplemented by policies which target material flows upstream, involving a wide range of economic actors (producers, consumers and other stakeholders sharing responsibility in materials use), and use of a “mix of instruments”, including regulatory, economic, voluntary and information-based approaches. As Finland pointed out, “there is a need for innovative policies which focus on a life-cycle philosophy, implemented by all stakeholders”. The United Kingdom also considered the sustainability of materials as a key area of future growth and endeavours “to bring together the design and material technology communities to look at key issues linking product design and manufacture”.

Main Findings

It seems that a relatively small group of OECD countries is at the forefront of SMM policy development. These are the countries which have explored the SMM concept in greater depth, may have elaborated a definition and/or have begun to systematically assess the environmental impacts of SMM policies.

In general, these countries are trying to widen the scope of traditional waste management policies to include policies that simultaneously address the use of natural resources and production of materials in more sustainable ways. These countries are also thinking about consumption patterns, leading to the use of less quantity of materials and more sustainable materials (e.g. Japanese “sound material-cycle society”), To achieve this goal, they fund research and development programmes for new technologies. Conscious of problems associated with globalisation of the economy, reduction of environmental impacts of materials is also of concern to these countries, not only within national borders, but at the global level as well.

These countries also tend to highlight the necessity for all stakeholders or actors involved in the product chain (producers, retailers, consumers, recyclers and disposers) to closely co-operate toward developing a long-term vision and innovative solutions for a sound material society. Some governments are already sponsoring such partnership initiatives (e.g. for the construction and housing sector, as well as for particular products, such as electronics, carpets, paints, tyres and mercury-containing products).

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INTRODUCTION

This report provides a synthesis of responses to the second OECD survey on Sustainable Materials Management (SMM), which was sent to the 30 member countries, Israel and the European Commission (EC) in July 2007. By February 2008, 16 responses (from 15 countries and the EC) were received. A previous SMM survey was carried out among the OECD countries in 2005; 18 responses were received in that survey.

The previous survey revealed that most countries were not familiar with the SMM approach. However, countries clearly perceived SMM as a promising approach for reducing environmental impacts associated with materials use.

SMM is also not easy to delineate because it integrates numerous existing environmental policies, while taking into account the whole life-cycle of materials. It remains a relatively new approach and as such, the number of national or sub-national initiatives explicitly labelled “SMM” will likely remain very limited. However, other similar and overlapping activities continue to be developed and implemented. Two recent OECD projects (Inventory of International SMM Activities and Methodologies applicable to SMM, <http://www.oecd.org/env/waste>) have highlighted the wide variety of initiatives and tools that, while not explicitly labelled “SMM”, are “SMM-like” approaches or serve SMM purposes in that they fall within the scope of the OECD working definition on SMM.

For these reasons, participants to the 2005 SMM Workshop expressed a desire to carry out a more in-depth survey among member countries in 2007, to gain a clearer understanding of SMM activities in member countries and to get more detailed information on particular SMM initiatives, such as the materials or activities targeted and the instruments used to ensure sustainable management of materials. This second survey was also expected to reveal the trend in implementation of SMM in member countries.

This paper is structured to follow the order of the 12 questions as they were asked in the Survey. (The Questionnaire for the 2nd Survey on SMM is attached to this document as Annex 2).

SURVEY RESULTS

1. Does your country have a formal definition or a specific understanding of SMM in national legislation, regulation, programme, or policy other than the OECD working definition on SMM?

The OECD working definition of SMM is (explanatory notes to the working definition can be found in Annex 2):

“Sustainable Materials Management (SMM) is an approach to promote sustainable materials use, integrating actions targeted at reducing negative environmental impacts and preserving natural capital throughout the life-cycle of materials, taking into account economic efficiency and social equity”.

Table 1: SMM definition

Countries	Yes	No	Don't know
1 - Austria		1	
2 - Belgium		1	
3 - Canada		1	
4 - Finland	1		
5 - France		1	
6 - Greece		1	
7 - Japan	1		
8 - Netherlands	1		
9 - Poland		1	
10 - Spain		1	
11 - Switzerland	1		
12 - Turkey		1	
13- United Kingdom		1	
14 - United States		1	
15 - Israel		1	
16 - EC		1	
Total (16)	4	12	0

Most responding countries do not have a specific SMM definition. Only **Finland, Japan, the Netherlands and Switzerland** do have one:

Finland's SMM definition is less extensive than the OECD working definition. It also focuses on more specific concepts, such as eco-efficiency and material efficiency:

“Material efficiency means that competitive products and services are produced using less material inputs while harmful impacts are minimized during the life cycle”. (This definition has been developed by a Government agency whose specific mission is to promote eco-efficient use of energy and materials).

The **Japanese** definition is part of Article 3 of Fundamental Law for Establishing a Sound Material-Cycle Society:

“The establishment of a sound material-cycle society must be made, by encouraging actions on this to be taken autonomously and positively according to their economic and technological possibilities, with the purpose of realizing the society of sustainable development, by fostering sound economic development with reduced environmental load.

From **the Netherlands’** perspective, “resources” include biotic resources (like fish and wood), as well as fertile soils and fresh water. For that reason, biodiversity is also covered by their SMM policies/programmes:

“Reducing the environmental impacts of resource use (including the use of land) from cradle to grave independent of the country where impacts occur and with the overall aim of decoupling environmental impacts and economic growth”.

Switzerland’s understanding of SMM is very close to the OECD working definition:

“Sustainable use of resources means reducing environmental impacts of products (commodities, services and buildings) in Switzerland and abroad throughout their entire life-cycle including extraction/harvesting of raw materials, production, use and disposal (recovery and final disposal), taking into account ecologic, economic and social aspects”.

Among the 12 countries which have no formal SMM definition, only **Israel** intends to use the OECD working definition as it is similar to the current professional understanding of the term and aims to expand the concept to include efficient use of materials and energy. Respondents from a number of other countries indicated that they were not aware of plans to adopt the OECD working definition of SMM; others did not respond to this question.

2. Does your country have policies or programmes that explicitly address, or are relevant to, “sustainable materials management”?

Virtually all of the responses (15 of 16) indicated that OECD countries do put into practice the SMM concept, even if they have no formal definition or no specific policies that explicitly address SMM. These countries have policies or programmes in place that share similar goals and purposes as SMM or deal with one aspect of SMM or apply SMM principles to a particular sector. **Poland** responded that they have no SMM policies or programmes in place; however, their survey response to question 4 provided an explanation of the “Strategy for changing production and consumption patterns to favour the implementation of sustainable development principles” adopted by the Council of Ministers in October 2003.

This is a key finding of the survey: regardless of whether the countries have specifically defined sustainable materials management in legislation or regulation, all of the member countries responding have some policies or programmes on SMM in place. In many cases, the countries use different terminology but all relate to promoting sustainable materials use across the life-cycle of materials.

3. Are there other national policies/programmes/activities/initiatives which could be considered relevant to SMM, or that are achieving the same goals as SMM policies/programmes?

Because the OECD SMM working definition is very broad, it encompasses many basic elements of countries’ environmental policies and programmes which strive to prevent and reduce environmental impacts of materials across their life-cycle. The policies and programmes the responding countries

identified are closely related to one another and share a common purpose with SMM; some address a particular aspect of SMM or apply SMM principles to a targeted product or sector.

Country responses included the following examples of policies, programmes and actions that are relevant to SMM:

- Within waste policy: preventing and minimising waste generation and disposal through reuse, recycling and recovery, reducing hazardous waste, regulating the management of problematic waste streams (in particular, waste electrical and electronic appliances, packaging, used tyres, end-of-life vehicles, waste oils, batteries and accumulators);
- Within materials/product policy: minimising resource use and promoting efficient use of raw materials and renewable resources, promoting safe use of minerals, metals and chemicals, reducing or eliminating hazardous substance content (e.g. mercury), designing eco-products, supporting environmentally friendly and innovative technologies, promoting the use of best available technologies, increasing materials/products efficiency and promoting their reuse and recycling and closing material cycles;
- Within consumption policy: promoting material efficiency in consumption (e.g. prolonging materials life), striving to change consumption patterns and encouraging or requiring green procurement;
- Within pollution prevention policy: reducing or eliminating the generation of pollutants (including GHG emissions) from vehicles, industrial activities and government operations;
- Within energy policy: reducing energy use across the life-cycle of products and services.

It can therefore be concluded that all responding countries are applying sustainable materials management in one way or another, whether they have an official definition for SMM or not, and whether it is a specific SMM policy or not. SMM is in fact already put into practice through various environmental and product policies and programmes, which can each be considered as elements of an SMM “approach”.

4. If your country has developed (or is planning to develop) SMM or SMM-like policies/programmes, at which level(s) of government are (or will) these policies or programmes (be) implemented?

The survey responses suggest that SMM (or SMM-like) policies or programmes are designed to be implemented at the national or federal level. In fact, all respondents indicated that these SMM policies or programmes have been or will be implemented at the national/central government level. Approximately half (seven responses) of the countries pointed out that they would also be implemented at the regional or state level. SMM policies in **Japan, Spain and the US** are implemented or will be implemented at the local government level as well.

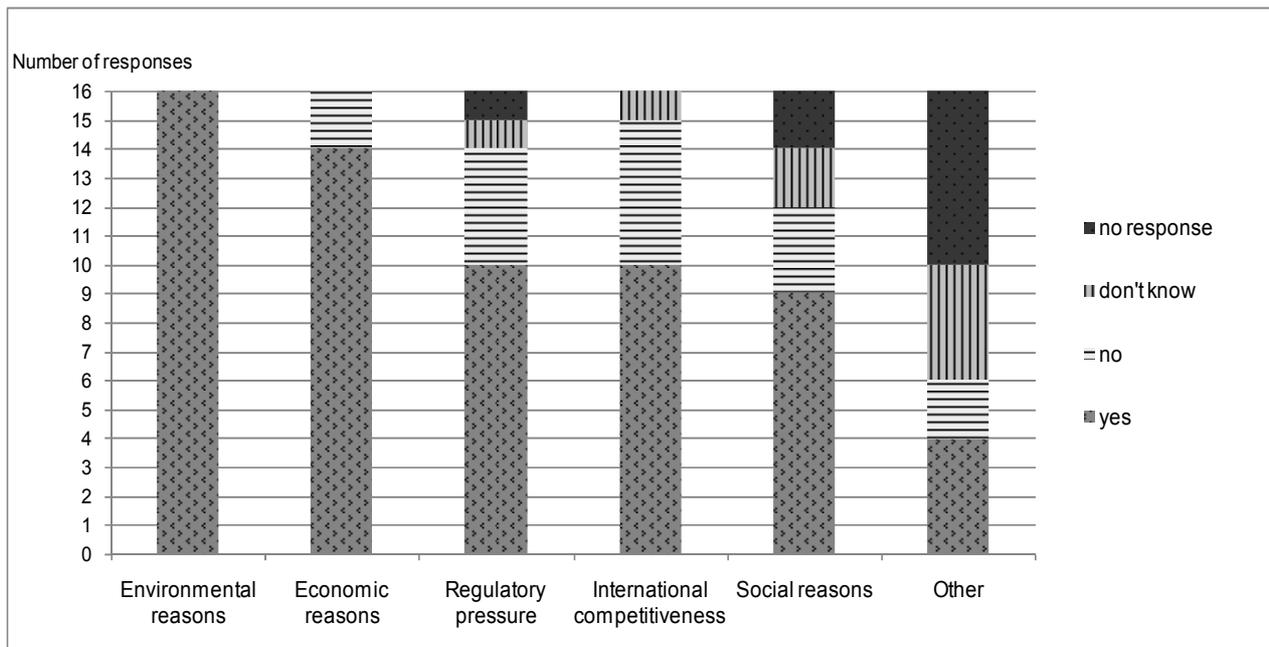
Several responding countries pointed out that, even if the SMM policy or programme is developed at national level, it would need the involvement of various stakeholders, such as manufacturers, retailers, and municipalities, to be implemented at the local level.

Table 2: Implementation level of SMM policies/programmes

Countries	National/central	Regional/state	Local
1 - Austria	1	1	
2 - Belgium	1	1	
3 - Canada	1	1	
4 - Finland	1	1	
5 - France	1		
6 - Greece	1		
7 - Japan	1		1
8 - Netherlands	1		
9 - Poland	1		
10 - Spain	1	1	1
11 - Switzerland	1	1	
12 - Turkey	1		
13 - United Kingdom	1		
14 - United States	1	1	1
15 - Israel	1		
16 - EC	1		
Total (16)	16	7	3

5. If your country has developed (or is planning to develop) SMM or SMM-like policies/programmes, please identify the factors that contributed (or will contribute) to their development

Figure 1: Reasons for developing SMM policies/programmes



As expected, protecting the **environment** is the only reason cited by all 16 responding countries for the development of SMM policies/programmes. As shown in Table 3 below, while every country named environmental reasons as a driver behind developing SMM policies/programmes, every respondent also noted that other factors, including economic or social reasons, regulatory pressure or international competitiveness, are contributing factors. Economic reasons were cited most frequently after environmental concerns

Table 3: Factors contributing to the development of SMM policies/programmes

Countries	Environmental reasons	Economic reasons	Social reasons	Regulatory pressure	International competitiveness	Other
1 - Austria	1	1	1	1	1	?
2 - Belgium	1	1	1	no	1	no
3 - Canada	1	1	1	1	1	1
4 - Finland	1	1	1	?	1	1
5 - France	1	1	no	1	no	1
6 - Greece	1	no	na	1	no	na
7 - Japan	1	1	1	1	1	na
8 - Netherlands	1	1	no	no	no	?
9 - Poland	1	1	1	no	no	?
10 - Spain	1	no	1	1	no	na
11 - Switzerland	1	1	1	no	1	1
12 - Turkey	1	1	na	na	na	na
13 - United Kingdom	1	1	1	1	1	na
14 - United States	1	1	?	1	1	no
15 - Israel	1	1	?	1	1	na
16 - EC	1	1	no	1	1	?
Total (16)	16	14	9	10	10	4

The main environmental reasons which countries have cited for implementing an SMM approach are the following:

- The increasing waste generation, despite the range of policy instruments in place intended to prevent and manage waste in an appropriate manner;
- The shortage of landfill sites which, combined with increasing waste generation, leads to illegal dumping;
- The need to divert certain materials from landfills, through recycling and energy recovery, to reduce greenhouse gas emissions;
- The need to reduce the use of hazardous substances in materials/products which may lead to hazardous waste generation and resulting in air, water and soil pollution;
- To avoid shifting environmental problems from one area or one country to another, and to reduce environmental impacts, irrespective of where they occur requires a life-cycle approach to material and natural resource use;
- **The Netherlands** further points out that an important policy gap is the lack of measures “addressing the upstream negative impacts of material use on nature and the environment beyond national and European borders”.

- The need to preserve/conserves natural resources (in particular non-renewable resources), due to the high per capita consumption of natural resources. One response explicitly mentioned water and groundwater, and another one explicitly mentioned soil fertility;
- The threats to biodiversity;
- The need to change production and consumption patterns, as significant environmental pressures result from society based on mass production, mass consumption and mass disposal.
- The need to manage materials more efficiently – especially to contribute to reducing greenhouse gases that lead to climate change;
- The need to reduce continually increasing energy consumption resulting from increased traffic, energy intensive industrial production, and changes in consumption patterns.

Economic reasons are almost as important as environmental reasons for implementing SMM policies, with 14 responses of the 16 mentioning the former. The major concern seems to be access to, and availability of, natural resources and raw materials (e.g. metals, energy sources, the price of which were increasing rapidly at the time the survey was conducted).

Other economic justifications mentioned by respondents are:

- Cost savings that accrue from using materials more efficiently. For example purchasing goods derived from recycled materials instead of primary raw materials, remanufacturing goods and reusing materials save disposal and energy costs.
- Internalising external environmental costs “into the overall prices” will enable promotion of additional economic alternatives for SMM”;
- SMM policies/programmes provide new alternatives for business, especially opportunities for increasing the productivity and competitiveness of SMEs and for marketing green products nationally and internationally;
- SMM policies/programmes may contribute to the fulfilment of the EU Lisbon Agenda, the purpose of which is to promote innovation, growth and jobs “in a manner that is fully consistent with the objectives of sustainable development”.

Regulatory pressure is another important factor contributing to the development of SMM policies/programmes (10 responses out of 16), but little detail was provided on how this pressure is being exerted. EU member states are mainly subject to this particular pressure, because they have to comply with European legislation. **The EC** has developed the 6th Environment Action Programme, which sets out the framework for environmental policy-making in **the European Union** for the period 2002-2012 and outlines potential actions to achieve them. One of the purposes of this Programme is to promote sustainable production and consumption patterns, while improving collaboration with enterprises and informing individual consumers, enterprises and public purchasers about the environmental impact of processes and products. Also, the EU Sustainable Development Strategy, which integrates environmental aspects into the Lisbon Agenda¹, proposes actions to enable the EU to meet the challenges of sustainable development. It

¹ European leaders at a summit in Lisbon in March 2000 set the European Union the goal of becoming the most dynamic and competitive knowledge-based economy in the world by 2010.

recognises, *inter alia*, “the need to gradually change our current unsustainable consumption and production patterns and move towards a better integrated approach to policy-making”. A key requirement of the Waste Framework Directive and its daughter Directives is to prevent waste in the first place, which leads to a product and material approach.

The enforcement of laws on waste management and waste recycling/recovery also plays a role in promoting development of SMM policies/programmes (**Japan**). In **Israel**, the ban of wood preservatives containing chromium, copper and arsenic, and of boron in washing detergents, so that waste water can be reused for irrigation, are both good examples of regulatory pressures that promote sustainable use of materials. Although **the US** considers that many SMM goals cannot be achieved by regulatory pressure alone (**Finland** expressed the same view), the US response mentioned two examples where regulatory pressure does play a role:

- Executive Orders, signed by the US President, which compel federal agencies to implement particular policy measures, including requiring procurement of products containing recovered materials, environmentally preferable electronic equipment, and energy efficient equipment; and
- An effort to avoid potential federal and state regulations can result in an increase in the participation and commitment of stakeholders in some voluntary/partnership programmes.

Ten responses out of the 16 received mentioned international competitiveness as a factor favouring the development of SMM policies/programmes:

- Globalisation of the economy and varying availability of natural resources are strong incentives for countries to develop innovative technologies ensuring eco-efficient use of natural resources and sustainable use of materials;
- Productivity gains through cleaner and more efficient production processes favour business competitiveness and access to global markets;
- Some responses pointed out that international competitiveness as a driver for SMM is very closely related and integral to the economic reasons.

Nine responses also mentioned social reasons as a factor for developing SMM policies/programmes:

- SMM policies/programmes result in economic benefits including job creation (e.g. in recycling activities), which then result in increased well-being (e.g. for long-term unemployed people and those living in remote or rural areas);
 - The health and safety of workers (through labour standards, e.g. reduced hazard of materials used) are strong reasons for enhancing sustainable materials use;
 - The standard of well-being is relative to the availability of natural resources, which in turn is relative to population growth and the increase in standard of living: creating an imbalance by misusing or over-using natural resources might endanger the standard of well-being;
 - The development of innovative environmental technologies can improve the quality of life;
-

- Growing public environmental awareness encourages governments to develop SMM policies/programmes.

Country responses cited a few additional reasons supporting SMM policies/programmes:

- The implementation of national sustainable development strategies;
- “Greening” initiatives taken by large companies and governments;
- Increased environmental awareness internationally of the consequences of globalisation, and the need for sustainable consumption and production patterns which lead to international commitments, such as the Ministerial Conference on the Protection of Forests in Europe and the World Summit on Sustainable Development; and
- The necessary “life-cycle philosophy” (**Finland**) to be implemented by all stakeholders from all sectors and the need to reverse the trend “from a throw-away to a cost-effective society by saving resources and avoiding wastes” (**Austria**).

6. What criteria were used in your country to target the specific areas or materials for which SMM or SMM-like policies/programmes are needed?

The survey results make clear that the primary purpose behind the development and implementation of SMM policies and programmes is to reduce environmental impacts. In response to the survey question regarding the criteria for targeting those SMM or SMM-like policies/programmes toward specific areas or materials, the respondents continue to reinforce that the primary criteria are environmental.

Virtually all of the responding countries (15 of 16 respondents) indicated that the reduction of potential environmental impacts from materials due to hazard or volume served as the main criterion used to justify the development and implementation of SMM policies/programmes. **Canada** noted that these reasons were “not directly” used to target SMM policies and programmes as Canadian decision-making is based on science and risk assessment.

After reducing potential environmental impacts from materials due to hazard or volume, the next most frequently cited criteria used to target SMM activities are an additional environmental criteria and an economic one of improving efficiency. 13 of 16 respondents indicated that the preservation of natural capital or natural resources (question 6.2) and the reduction of economic costs and/or increase of economic benefits derived from the production/use/disposal of materials (question 6.3) were used in targeted SMM policies/programmes.

The fact that 12 responses mentioned the need for better management of materials at the end of their useful life may suggest that, despite the implementation of many waste-related policies and programmes already in place (e.g. Extended Producer Responsibility programmes), there may still be a need to complement these with policies targeting the management of materials upstream. This finding may also suggest that some countries have concerns with particular products at the end-of-life. **Canada** and **the US**, for example, noted electrical and electronic equipment as a particular focus and Greece mentioned end-of-life vehicles.

Regulatory pressure is a criterion used to target SMM policy/programme areas or materials by half of the responding countries. When asked about the reasons for developing (question 5), rather than targeting, an SMM approach, 63% of respondents indicated that regulatory pressure was a factor. This may

suggest that regulatory pressure is a somewhat more significant factor in justifying SMM policies/programmes than in targeting those activities toward a particular area or material. However, the respondents provided little detail to explain this difference. Several respondents mentioned EU and other directives when asked to explain their response that regulatory pressure is used to target SMM activities.

Table 4: Criteria used to target the specific areas or materials for SMM or SMM-like policies/programmes

Countries	1- Reduction of environmental impacts from materials due to hazard or volume	2- Preservation of natural capital, or resource conservation, involved in material production and/or use	3- Reduction of economic costs and/or increase of economic benefits derived from the production/use/disposal of materials (improved efficiency)	4- Mitigation of problems associated primarily with the management of end-of-life materials	5- Response to regulatory pressure	6- Other reasons
1 - Austria	1	1	1	1	1	?
2 - Belgium	1	1	1	1	no	no
3 - Canada	not directly	not directly	1	1	1	1
4 - Finland	1	1	no	1	?	no
5 - France	1	1	no	1	1	1
6 - Greece	1	1	1	1	1	no
7 - Japan	1	1	1	1	no	no
8 - Netherlands	1	1	1	?	?	?
9 - Poland	1	1	1	1	?	1
10 - Spain	1	1	1	no	no	1
11 - Switzerland	1	1	1	1	1	?
12 - Turkey	1	?	?	?	?	?
13 - United Kingdom	1	?	1	1	1	?
14 - United States	1	1	1	1	no	no
15 - Israel	1	1	1	?	1	1
16 - EC	1	1	1	1	?	?
Total (16)	15	13	13	12	7	5

6.1 *Reduction of potential environmental impacts from materials due to hazard or volume:*

On the basis of survey responses, the reduction of potential environmental impacts from materials due to hazard or volume is the most frequently cited criterion for targeting particular materials or areas with SMM policies. Survey responses provided detail on the way that this priority has played out in SMM activities. The responses made clear that countries use a wide variety of means, including regulation, economic instruments, education and voluntary partnerships, to reduce environmental impacts due to hazard or volume through targeted SMM activities. For example, the Green Chemistry Programme in the US supports the research, development and implementation of innovative chemical technologies that reduce or eliminate the use or generation of hazardous substances during the design, manufacture and use of chemical products. In **Israel** the use of boron in washing powders has been banned to facilitate the recycling of waste waters for irrigation.

Some responses, notably those of **Austria and Poland**, indicated that certain hazardous substances had been targeted in the development of SMM-like programmes including mercury, cadmium, chromium, lead, asbestos, PCBs/PCTs, and CFCs. Other countries specified that it was a priority to reduce hazardous substances in targeted product categories like batteries and electric/electronic equipment (France). Greece cited the example of separate collection of hazardous lead-acid batteries. Spain and the UK specifically referenced the need to reduce greenhouse gas emissions as a driver of SMM activities.

The main products which include such substances (and are therefore often targeted by SMM policies) are batteries, fluorescent mercury lamps and thermometers, lubricants, electric and electronic equipment (refrigerators in particular), cathode ray tubes, end-of-life vehicles, lead-acid batteries and paints.

Several bulky materials were identified as materials having significant environmental impacts at the end of their useful life because of their volume: residues from mining and quarrying, construction and demolition waste, organic waste from households and enterprises, excavated soil, packaging waste, and tyres. These materials are usually subject to waste management regulations, aimed at avoiding their landfilling and reducing their volume through reuse and recovery measures (e.g. composting).

Finally, some countries are still investigating which materials have the greatest environmental impacts through “multi criteria analysis” (**Belgium**) and “science and risk assessment” (**Canada**). In the **United Kingdom** “product roadmaps” are developed to identify the environmental impacts (in particular greenhouse gas emissions) that occur across each product’s life cycle and the opportunities for waste prevention and minimisation. This approach has targeted products such as milk, clothing, fish, lighting and televisions.

6.2 Preservation of natural capital, or resource conservation, involved in material production and/or use

To preserve natural capital and to lower the environmental pressures on primary resources, several countries reported encouraging use of renewable resources and energy (such as wood), improving materials efficiency in industrial production and extending the useful life of products. **Finland** and **Canada**, for example, strive to extend the lifespan of buildings. **Belgium** conducted a study to set priorities among materials streams according to their environmental impacts and used the depletion of natural resources as a selection criterion. Indirectly, actions and regulations protecting particular environmental media such as water, forests, and biodiversity (in **Spain**, **EC**, and **Israel**) also contribute to managing materials in a more sustainable way.

For most countries, preservation of natural capital and efficient use of primary resources are dependent on the use of innovative and clean technologies as well as on effective waste management policies, in particular those promoting the increase of materials recycling and recovery. In this respect, **Austria** shows particularly high rates of recovery for packaging waste (i.e. including material recycling and energy recovery): 88% for plastic, 95% for paper and cardboard, 52% for wood, and 85% as an overall average. **Austria** also facilitates reuse and recycling of construction and demolition waste through a website exchange. **Japan** has incorporated the objective of the *3R Initiative* into its national legislation: “building a sound material-cycle society through the effective use of resources and materials”. In **Canada**, the “*Enhanced Recycling Initiative*” has been designed to promote recycling and energy recovery, in light of the increased demand in materials and energy. In the **US**, particular programmes encourage the use of recovered materials and the purchase of products with high recovered material content. The Comprehensive Procurement Guidelines programme requires federal agencies to purchase designated products, such as paper and other office products, vehicle products, and carpets, with the highest recovered material content practicable. In addition, a procurement tool called the *Electronic Products Environmental Assessment Tool (EPEAT)* has been especially developed to inform institutional purchasers on the environmental attributes of computers/monitors and to help them identify specific environmentally preferable electronic products, thereby favouring sustainable consumption of materials, energy efficiency, and reduction of hazardous materials.

6.3 Reduction of economic costs and/or increase of economic benefits derived from the production/use/disposal of materials (improved efficiency)

In general, managing materials more efficiently and more sustainably does result in economic savings. This approach both saves resources used as inputs in the production chain and reduces the environmental impacts from raw material extraction and material production/use/disposal as well as the costs associated with these impacts.

Increasing resource productivity is key to reducing costs. **The EC**, in its Thematic Strategy on Natural Resources, endeavours to develop indicators to measure progress and performance in resource productivity. In **the UK**, a government-funded organisation, *ENVIROWISE*, provides businesses with free advice and support on resource productivity. As a result, it has helped UK industry save more than £1 billion.

Austria, Greece, Israel and Japan reported that disposal costs are a factor in promoting SMM. SMM policies/programmes in some countries are thus targeting those materials with the highest disposal costs. Economic instruments, such as landfill taxes, create an incentive to avoid or minimise the generation wastes and to encourage reuse and recycling. In the **UK**, the National Industrial Symbiosis Programme (NISP), funded by money raised from the landfill tax, matches one operator's waste with another's raw material needs. In the first two years of its operation, about 1.7 million tonnes of materials have been diverted from landfills with £70 million of costs savings.

Several **Austrian** policy measures, which aim at increasing material efficiency and "reversing the trend from a throw-away to a cost-effective society", have resulted in a significant diversion of waste from landfills, thereby saving disposal costs. The share of wastes being landfilled fell from 75% in 1989, to 24% in 2004. This is partly due to the development of "waste exchange platforms" by industrial sectors, facilitating the reuse and recycling of materials.

In **Canada**, a partnership between governmental organisations and the private sector (*Enviroclub*) is providing SME managers with the help of experts and financial support for in-plant projects to improve profitability and competitiveness through pollution prevention and improved environmental management. About 70 success stories carried out in different industrial sectors show financial gains through:

- Optimizing processes and improving use of resources (raw materials, energy, water);
- Substituting or reducing the use of toxic substances;
- Reusing or recycling materials on-site;
- Improving operating and maintenance practices;
- Implementing the key elements of an environmental management system (EMS), i.e. planning, monitoring and improving performance.

In the **US** as well, partnerships between government and industry have been organised to boost beneficial reuse and recycling of industrial materials, such as coal ash, foundry sands, and construction and demolition waste. The US also encourages industries to adopt "Lean Manufacturing," an approach practiced worldwide to reduce waste of all forms while increasing productivity.

6.4 Mitigation of problems associated primarily with the management of end-of-life materials

Because SMM policies/programmes are based on a life-cycle approach, they are considered to be necessary to minimise the environmental impacts of hazardous materials/products, or of specific products causing problems when they become waste. The application of product policies (e.g. to packaging, carpets,

vehicles, electrical/electronic equipment, paints, and batteries) and of the Design for Environment concept (e.g. to buildings, safer alternatives for hazardous chemicals) are elements of SMM policies designed to cope with the management of end-of-life materials in an environmentally sound manner.

As noted earlier, some respondents referenced particular products at the end-of-life. **Canada** and **the US**, for example, noted electric/electronic equipment as a particular focus and **Greece** mentioned end-of-life vehicles. **France** mentioned packaging, vehicles and batteries. One country highlighted that SMM policies/programmes should not only focus on impacts occurring at the waste stage but also on those occurring at other phases of the life-cycle. For example, in **the US** a business model called Chemicals Management Services (CMS) is structured so that the customer purchases chemical services such as procurement, delivery/distribution and disposal rather than just chemicals. The provider of chemical services is paid not on the volume of the chemical sold, but according to the quality and quantity of services provided, thereby reducing chemical life-cycle costs, risks and environmental impacts.

6.5 *Response to regulatory pressure*

National and international environmental regulations, most of which have both sustainable development and pollution prevention objectives, often require practical SMM-type actions to fulfil their objectives. This is the case of **EU** member states which have to implement the EU Directives and to take actions with regard to specific products and waste streams issued from various industries and agriculture. For example, the **EU** Directive on packaging wastes requires member states to introduce systems for the collection and recovery of certain materials. Challenging recycling targets have been set for glass, paper, metals, plastics and wood.

7. If your country has developed (or is planning to develop) SMM or SMM-like policies/programmes, do (or will) they address:

7.1 *Generic materials*

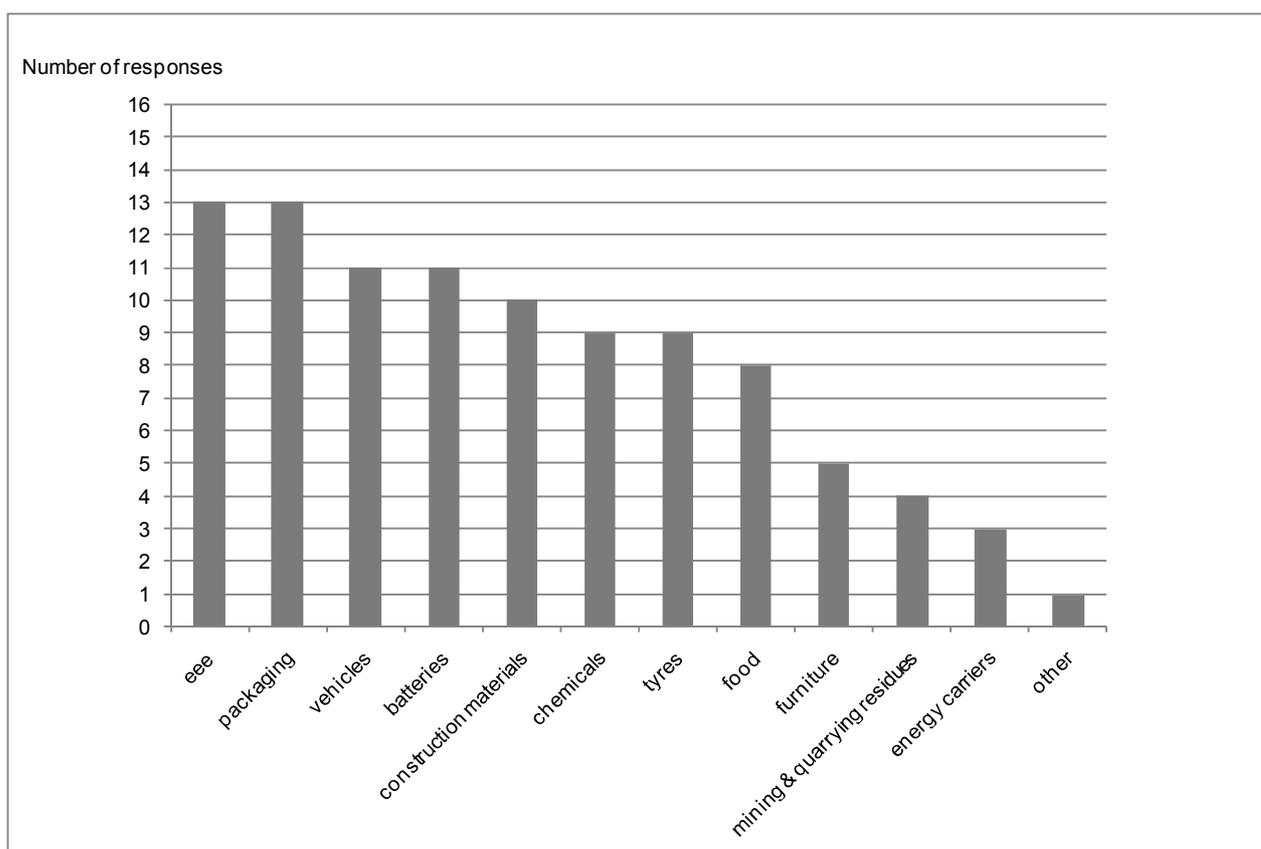
Table 5: SMM policies/programmes addressing generic materials

Countries	generic materials		Plastics		Metals		Glass		Wood		Textiles		Paper & cardboard	
	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no
1 - Austria	1		1		1		1		1		1		1	
2 - Belgium		1												
3 - Canada	1													
4 - Finland	1										1			
5 - France		1												
6 - Greece		1												
7 - Japan	1		1		1		1		1		1		1	
8 - Netherlands	1		1		1		1		1		1		1	
9 - Poland		1												
10 - Spain		1												
11 - Switzerland	1		1		1		1		1		1		1	
12 - Turkey	1				1									
13 - United Kingdom	1		1		1		1		1		1		1	
14 - United States	1		1		1		1		1		1		1	
15 - Israel														
16 - EC	1		1		1		1		1		1		1	
Total (16)	10	5	7	0	8	0	7	0	7	0	8	0	7	0

Among the 16 responses received, 6 countries (**Austria, Japan, the Netherlands, Switzerland, the UK and the US**) and **the EC** indicated that their SMM policies/programmes are addressing all the cited categories of materials (i.e. plastics, metals, glass, wood, textiles, paper and cardboard). On the other hand, 6 countries reported that they have no SMM policies/programmes addressing materials in general terms or any of those particular materials throughout their life-cycle. Finland responded that they have a SMM or SMM-like policy addressing materials in general over the whole life-cycle and a particular programme for textiles and furniture. The **United Kingdom** also has a SMM programme addressing food and kitchen waste and garden/plant waste.

7.2 Specific material flows

Figure 2: Specific Material Flows addressed by SMM policies/programmes



In addition, 13 respondents of 16 mentioned that countries are targeting specific products or waste streams. As shown in Figure 2, the products/wastes which are most frequently targeted are electric and electronic equipment and packaging, followed by vehicles and batteries (11 responses), and construction materials (10 responses).

It should also be noted that the four product/waste flows which are the most cited are often regulated under existing Extended Producer Responsibility schemes (note: **the US** employs Product Stewardship/Extended Product Responsibility which is a voluntary partnership programme with participants in the product value chain). In addition, **Austria, the Netherlands and the UK's** SMM policies/programmes are targeting almost all material flows cited in the survey. Despite its significant environmental impact (mainly greenhouse gases emissions), “energy carriers” (e.g. coal, petroleum, gas) is the material flow least often targeted by SMM policies/programmes.

7.3 *Specific activities addressed by SMM policies/programmes***Table 6: Specific activities addressed by SMM policies/programmes**

Countries	Specific activities	mining & quarrying	transport	energy production	manufacturing	food production	services	other activities
1 - Austria	1	1	1	1	1	1	1	
2 - Belgium	1							construction & housing
3 - Canada								
4 - Finland	1		1					
5 - France	1			1	1	1		green public purchasing
6 - Greece	1						1	
7 - Japan	1				1			
8 - Netherlands								
9 - Poland								
10 - Spain	1		1	1			1	construction & housing
11 - Switzerland	1		1				1	green public purchasing
12 - Turkey								
13 - United Kingdom	1	1			1	1	1	construction & housing
14 - United States	1	1	1	1	1		1	
15 - Israel	1	1	1		1	1	1	
16 - EC	1	1	1	1	1	1	1	
Total (16)	12	5	7	5	7	5	8	5

Among the 12 positive responses to this question, only **Austria, the US, Israel and the EC** focus their SMM policies/programmes on all or most of the activity sectors cited in the survey (i.e. mining and quarrying, transport, energy production, manufacturing industries, food production and services).

Other countries either did not respond to this question or mentioned only one activity sector. The activities most frequently targeted by SMM policies are services, transport (mainly road transport), manufacturing industries, and activities which governments can influence (e.g. public administration and services), whereas other activities (e.g. mining and quarrying, food production) are managed by the private sector.

France and Switzerland mentioned “green public purchasing” as a service activity addressed by SMM policies/programmes, and **Belgium and the UK** mentioned construction and housing under “other activity”. **The UK** has identified the construction and demolition activity as the largest source of waste generation, but also as a sector with high potential to increase resource efficiency. The British government is thus developing a “Sustainable Construction Strategy” in partnership with the construction industry, proposing to reduce by half the amount of construction and demolition waste landfilled by 2012 through waste reduction, re-use and recycling.

In summary, SMM policies/programmes are more often targeted toward specific material flows rather than generic materials. While the reasons for this are not stated in survey responses, it is possible that this may be because it is easier to identify and to address the different stages of materials’ life-cycle when the sectors/material flows are specifically identified or it may be due to the concerns of the environmental impacts associated with those sectors and their materials flows.

8. Are you aware of SMM or SMM-like initiatives being taken by the private sector on a voluntary basis in your country?

Table 7: Awareness of SMM or SMM-like initiatives being taken by the private sector

Countries	yes	no	don't know
1 - Austria	1		
2 - Belgium	1		
3 - Canada	1		
4 - Finland	1		
5 - France	1		
6 - Greece			1
7 - Japan	1		
8 - Netherlands	1		
9 - Poland			1
10 - Spain			1
11 - Switzerland	1		
12 - Turkey		1	
13 - United Kingdom	1		
14 - United States	1		
15 - Israel	1		
16 - EC	1		
Total (16)	12	1	3

A large majority of responses (12 out of 16 (75%)) showed that government officials responding to the survey are aware of initiatives undertaken on a voluntary basis by the private sector to manage materials sustainably. It was also reported that these initiatives are sometimes carried out in concert with NGOs or environmental agencies.

Industry associations and business federations contribute to SMM by organising roundtables, sharing information, providing guidance to enterprises on material efficiency and environmental performance of products (e.g. Responsible Care in the chemicals sector which leads to voluntary restriction on using certain hazardous chemicals in products).

The economic sectors where SMM initiatives have been cited to take place include:

- Mining and quarrying;
- Construction sector;
- Aviation;
- Electric and electronic goods;
- Food industry;
- Beverage industry;
- Retail sector;
- Wood industry;
- Textile industry;
- Chemicals industry.

Austria reported that the following systems contributing to SMM have been put in place by the waste management sector on a voluntary basis: refilling systems (e.g. bottles, toner and ink cartridges), leasing systems (chemicals, nappies and textiles), and waste recycling exchange platforms. Austria's response referenced also a number of other voluntary initiatives for particular industry sectors. These

include a sustainability agenda of the beverage industry, a variety of recycling and recovery efforts in waste management and an eco-audit programme of voluntary environmental management systems for the chemical sector.

Belgium has reported on some companies that take SMM-like approaches, such as a producer of radiators for heating houses, a producer of electrical switches and systems for automation and a plastic producer that applies the cradle-to-cradle concept.

In **Canada**, a number of enterprises and industry associations have carried out life-cycle inventories or impact studies to make their production processes and their products (e.g. plastics, resins, pesticides, aluminium, cement, paper) environmentally sustainable throughout their life-cycle.

As to the level of success with (and lessons learned from) such SMM initiatives, most respondents (11 of 16) indicated that they either had no information or did not know of information: **Israel** indicated they are collecting data to assess progress, and **Japan** cited the efforts of a business industrial federation to set numerical targets to reduce industrial waste destined for disposal. **Canada** mentioned that life-cycle inventories carried out by the plastics industry association have resulted in new product design and more sustainable waste management.

The Netherlands reported of several initiatives concerning corporate social responsibility, cradle-to-cradle and round tables for specific materials.

In **UK**, paper has been identified as a material where reduced waste and greater recycling can yield significant environmental benefits. The Government has already concluded voluntary producer responsibility agreements to promote, in particular, increased recycling of newspapers, magazines and direct mail with the Newspaper Publishers Association (NPA), the Periodical Publishers Association (PPA) and the Direct Marketing Association (DMA) respectively. These three waste streams are estimated to amount to about 3.6 million tonnes (which would equate to about 14% of total household waste). All three aim to increase recycling with targets for either recycled content or amount of waste recycled.

The **US** response provided detailed information on the SMM approach taken by the global retailer, Wal-Mart, which has committed to: i) using 100% renewable energy; ii) creating zero waste; and iii) selling sustainable products. This operates at two levels, not only through the management of its own activity and stores, but also at the level of the consumer. For example, Wal-Mart sells compact fluorescent light bulbs, reduces products' packaging as much as possible, and has energy efficient buildings and trucks, thereby contributing to the reduction of GHG emissions. It has also other environmentally sustainable initiatives, in particular concerning waste recovery and recycling, take-back systems, sustainable chemicals and electronic products. (For more details on Wal-Mart's sustainable approach and its results, see Annex 1).

The reasons for the limited information provided in response to the question on the success of (or lessons learned from) SMM initiatives in the private sector may be that member governments do not necessarily have comprehensive knowledge of SMM initiatives that are taking place within the private sector - especially since they are undertaken on a voluntary basis and enterprises do not have to report to governments on them. It may also be that those SMM initiatives, as well as the tools to evaluate their effectiveness (such as indicators) have been put in place too recently to provide any feedback.

9. A number of initiatives have been identified as possible elements of policies/programmes relevant to SMM. Are the following initiatives in place or under consideration in your country?

Table 8: Current or future initiatives that are relevant to SMM

Countries	dematerialisation		detoxification		internalisation of externalities		other initiatives	
	in place	under consideration	in place	under consideration	in place	under consideration	in place	under consideration
1 - Austria	1		1		1		1	
2 - Belgium	1		1		1			
3 - Canada			1		no	no	no	no
4 - Finland	1		1	1	1			
5 - France	1		1		1		no	no
6 - Greece	1		1					
7 - Japan	1		1		1			
8 - Netherlands	1	1	1	1	1	1		
9 - Poland	1		1		1		no	no
10 - Spain	1		1		1			
11 - Switzerland	1		1		1		1	
12 - Turkey	1		1					
13 - United Kingdom	1		1		1			
14 - United States	1		1		1		?	?
15 - Israel	1		1		1			
16 - EC	1		1		no	1		
Total (16)	15	1	16	2	12	2	2	0

Nearly all responding countries pursue the 3 key policy types (see below) listed in the survey as contributing to SMM. No other particular initiatives were mentioned. Detoxification and dematerialisation are the most commonly used and cover a broad spectrum of environmental policies, including waste policies. Little detail was provided by the respondents on initiatives that are under consideration, so no conclusions can be drawn regarding how OECD member countries are moving forward with new SMM policies and programmes. **Finland** referenced the Finnish National Programme on Dangerous Chemicals and related recommendations as being under consideration. **The EU and the Netherlands** noted that they have under consideration activities or initiatives related to the internalisation of externalities.

A. **Dematerialisation** occurs at all stages of material life-cycle:

1. At the production phase by:
 - Enhancing product design for environment;
 - Developing cleaner production;
 - Increasing materials and energy efficiency;
 - Preventing waste generation.
2. At the consumption phase by:
 - Promoting green public procurement;
 - Developing leasing systems, repair systems.
3. Substituting services for products at the end-of-life phase of materials by:
 - Reducing the amount of waste destined for disposal (landfilling and incineration);
 - Increasing material reuse, recycling and recovery rates;
 - Creating waste exchange platforms, take-back systems.

The various tools that the respondents are using to support dematerialisation include:

- Regulatory instruments: laws and regulations on the management of specific waste streams (e.g. EU Directives on hazardous wastes, construction and demolition wastes, used tyres, waste oils, sewage sludges), on separate collection, provision of guidelines and standards, setting of recycling targets, use of criteria for products and end-of-life materials, landfill and incineration bans;
- Economic instruments: taxes on landfilling and incineration, taxes on energy consumption and transportation, unit-based pricing for household waste, subsidies for investments in innovative technologies for waste prevention or for energy use from renewable sources or, on the contrary, abolition of potentially harmful subsidies for the sustainable use of natural resources, free audits for SMEs on ways to lower the environmental impact of their production processes, EPR schemes which are not only used to enhance product design for environment but also to increase recycling (and with more success, according to **Belgium**);
- Information-based instruments: eco-labelling, awareness raising campaigns for efficient energy use, more sustainable consumption, household waste separation and recycling; online self-assessment tool for businesses to appraise their management of resources and improve their performance (in the **UK**); publication of reports on the state of environment based on the use of indicators for air, water, soil, nature and biodiversity, wastes, agriculture, energy, industry, transport, etc.;
- Partnership programmes and voluntary agreements between government and industry, such as EPR schemes, contractual instruments such as energy efficiency agreements with key sectors and future material efficiency agreements (in **Finland**). In the **UK**, to increase paper recycling, the government has concluded voluntary producer responsibility agreements with the three main producers of newspapers and magazines representing about 14% of total household waste tonnage.

B. Detoxification is a typical policy element, part of risk-based approaches used by all countries to ensure safe use and disposal of materials:

Detoxification takes place:

- At the production stage by restricting or banning the use of specific hazardous substances and chemicals in products and processes (cadmium, lead, mercury, chromium, halons, asbestos, PCB/PCT, etc.);
- At the end of life of materials by facilitating the removal of specific hazardous components such as batteries from waste electrical/electronic equipment (WEEE), requiring a pre-treatment for waste (hazardous as well as non-hazardous) prior to their disposal or their recovery (e.g. sorting out hazardous or other materials such as batteries, lubricants and tyres from cars before shredding).

The tools respondents are using to support detoxification include:

- Regulatory instruments, such as the use of criteria for products, requirements to choose the least hazardous substances and the best available techniques when technically and economically feasible [implementation of the IPPC Directive (Integrated Pollution Prevention and Control) and of the REACH Regulation (Registration, Evaluation, Authorisation and Restriction of Chemical substances) for EU member states]. In **Finland**, measures are foreseen to widen producers'

liability in the field of chemicals and maximum emission levels are envisaged for construction materials. Most waste legislations deal with materials toxicity, in particular when banning or fixing maximum concentrations of hazardous substances in products;

- Information-based instruments: eco-labelling of products and equipment, dissemination of information to consumers on chemical content of products, proper use and disposal of products, use of PRTR (Pollutant Release and Transfer Registers). For example, in **Belgium**, eco-design software “Ecolizer” has been developed which allows product designers to make a rough estimate of the life cycle environmental impact of a product. In the **UK**, the HazRed Initiative, an information and education/training-based effort designed for SMEs, demonstrates the benefits of setting targets and developing plans for hazardous waste reduction in partnership with key industry sectors. Project outcomes and methodologies are to be communicated across the EU to help other member states in developing effective sector-based hazardous waste reduction strategies.

C. Internalisation of externalities

Internalisation of externalities mainly occurs through EPR schemes, which can be considered as both a regulatory and an economic instrument to finance the treatment cost of materials at the end of their useful life. Material flows usually concerned are electrical and electronic equipments (EEE), vehicles, tyres, batteries, packaging, oils (used lubricants and cooking oils).

Several other economic instruments are used to internalise externalities, which are applied either to materials or to specific activities, in particular waste management. The most frequently cited are:

- Taxes and fees (e.g. tolls in many countries, fuel taxes, in **Austria** a disposal fee is paid by waste producers or operators of landfill sites and incinerators to cover the remediation of contaminated sites, recycling fees on products);
- Emission trading, permit trading scheme for packaging (in the **UK**);
- Tax reduction or exemption (e.g. in **Spain** for environmental investments of companies reducing their waste and pollutants’ emissions to air and water);
- Subsidies (e.g. in **Finland** and **France** for energy saving renovations in buildings);
- Unit-based pricing or pay-as-you-throw schemes (e.g. in **the US** and **Belgium** for municipal solid waste).

D. Other initiatives

No particular initiatives, other than the three mentioned above, were reported, except the five-year research Programme on Technologies for Sustainable Development which the **Austrian** Federal Ministry of Transport, Innovation and Technology has initiated. This programme aims at developing new technologies to ensure zero-waste, zero-emission and SMM in the building, energy and manufacturing sectors. **Switzerland** also reports the need to move towards sustainable consumption patterns, and to achieve this by using regulatory instruments (standards), information-based instruments (eco-labels), education and training and partnership instruments. The consumer goods affected by such initiative are food, clothes, toys, and goods consuming energy such as EEE, lighting products and cars.

10. Which policy instruments (or mixes of instruments) are the most commonly used within your country’s SMM policies/programmes or SMM-like initiatives?

All responses reported that SMM policies/programmes or SMM-like initiatives are using a mix of policy instruments (i.e. economic, regulatory, education and training, communication and information-

based instruments), as well as voluntary approaches such as eco-labelling and environmental management systems. These instruments have been described in more detail in previous sections.

11. In the case where your country has developed (or is planning to develop) SMM or SMM-like policies/programmes, are (or will) environmental impacts from material use be assessed or measured as part of these policies/programmes?

Responses to this question can be compared with responses to the questions on the assessment of economic efficiency (11.2) and environmental effectiveness (11.3) of SMM policies/programmes. It is indeed surprising to see that, although nearly all countries stated that they have SMM or SMM-like policies or programmes in place (see Section 2) to reduce environmental impacts of material use, only 69% of the countries are assessing these environmental impacts. Even fewer respondents (including the EC) measure or plan to measure the economic efficiency (25%) or environmental effectiveness (31%) of their SMM policies or programmes. In addition, half of the respondents did not know if any measurement of the economic efficiency and the environmental effectiveness of their SMM policies is taking (or will take) place.

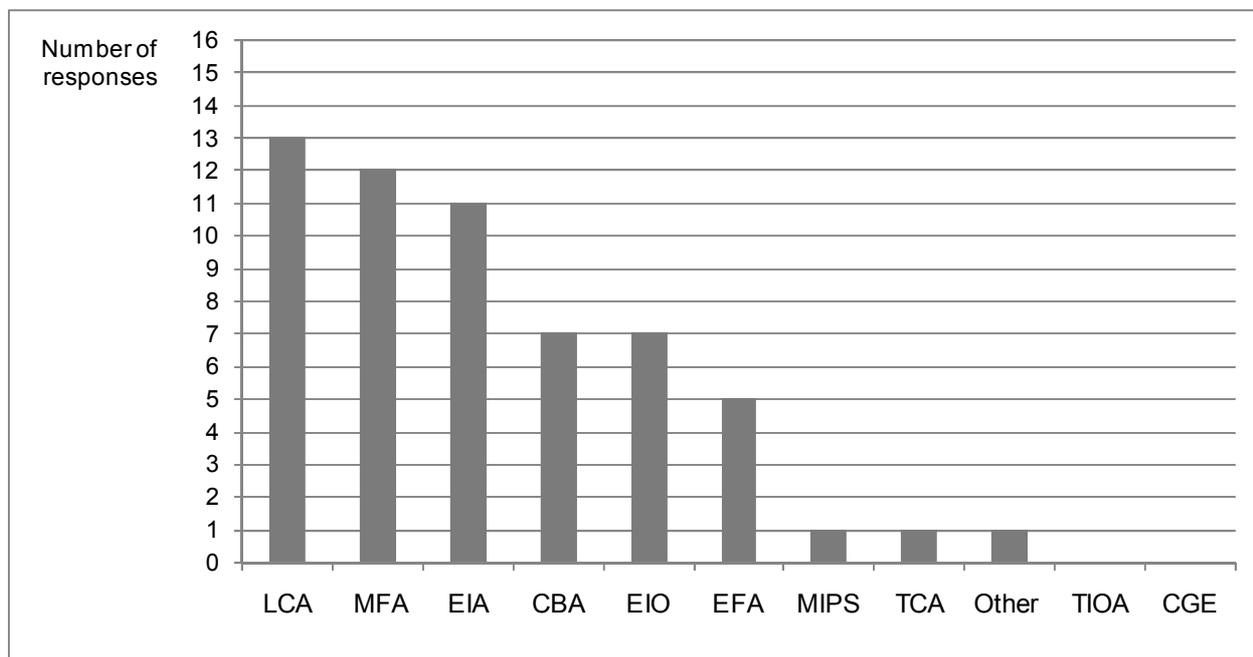
Table 9: Assessment of SMM policies/programmes

Countries	policies/programmes			policies/programmes			Assessment of environmental effectiveness of SMM policies/programmes		
	yes	no	don't know	yes	no	don't know	yes	no	don't know
1 - Austria	1	0	0	1	0	0	1	0	0
2 - Belgium	1	0	0	0	1	0	1	0	0
3 - Canada	0	0	1	0	0	1	0	0	1
4 - Finland	1	0	0	0	0	1	0	0	1
5 - France	0	0	1	0	0	1	0	0	1
6 - Greece	1	0	0	0	0	1	0	0	1
7 - Japan	1	0	0	1	0	0	1	0	0
8 - Netherlands	1	0	0	1	0	0	1	0	0
9 - Poland	0	0	1	0	1	0	0	1	0
10 - Spain	0	0	1	0	0	1	0	0	1
11 - Switzerland	1	0	0	0	0	1	0	0	1
12 - Turkey	1	0	0	0	1	0	0	1	0
13 - United Kingdom	1	0	0	0	0	1	0	0	1
14 - United States	1	0	0	0	1	0	0	1	0
15 - Israel	0	0	1	0	0	1	0	0	1
16 - EC	1	0	0	1	0	0	1	0	0
Total (16)	11	0	5	4	4	8	5	3	8

On the other hand, nearly all respondents mentioned that they are using some of the methodologies that are listed in the questionnaire to assess environmental impacts. Indeed some of these methodologies have been used for a long time in the context of other environmental policies and policy objectives that are quite compatible with the objectives of SMM. Environmental Impact Assessments, for example, is a methodology which has already been in practice for a long time and is even part of environmental legislation in most countries to assess potential impacts of planned major development projects, related to agriculture, energy, mining, industry, transport, waste management, water management, tourism, urban planning etc.

The most frequently named methodology used to assess environmental impacts of materials is Life-Cycle Assessment (13 responses out of 16). This is not unexpected since the underlying principle of SMM is the reduction of negative environmental impacts across the life-cycle of materials. This is followed by Material Flow Analysis (12 responses), and Environmental Impact Assessment (11 responses).

Figure 3: Methodologies used to assess environmental impacts of material use



- LCA: Life-Cycle Analysis
- MFA: Material Flow Analysis
- EIA: Environmental Impact Assessment
- CBA: Cost-Benefit Analysis
- EIO: Economic Input/Output Analysis
- EFA: Ecological Footprint Analysis
- MIPS: Material Input per Service Unit
- TCA: Total Cost Assessment
- TIOA: Thermodynamic Input/Output Analysis
- CGE: Computable General Equilibrium Modelling

Two methodologies were not mentioned by any of the responding countries: Thermodynamic Input-Output Analysis and Computer Generalized Equilibrium Modelling. **Greece** is the only responding country to use the Total Cost Assessment (TCA) methodology and for a specific purpose: assessing costs of collection, treatment and recycling of selected waste streams. **Finland** is the only responding country to use the Material Input per Service Unit.

The assessment of economic efficiency is practiced by three responding countries and recommended by the **EC**. **Japan** and **the EC** are using resource productivity and resource efficiency indicators. **Austria** is using Cost-Benefit Analysis. Concerning the assessment of environmental effectiveness of SMM policies/programmes (practiced by four countries and recommended by **the EC**), **Japan** is using “Final Disposal Amount” indicators. **The Netherlands** has developed a special indicator, *Environmentally Weighted Material Consumption (EMC)*, which is based on life-cycle analysis, and has been used to identify 21 materials covering over 90 percent of the environmental impacts of material use.

Table 10: Methodologies used to assess environmental impacts of material use

Countries	Material Input per Service Unit (MIPS)	Life-cycle Assessment (LCA)	Material Flow Analysis (MFA)	Economic Input/Output Analysis, EIO	Total Cost Assessment (TCA)	Cost-Benefit Analysis (CBA)	Ecological Footprint Analysis (EFA)	Thermodynamic Input-Output Analysis (TIOA)	Environmental Impact Assessment (EIA)	Computer Generalized Equilibrium Modelling (CGE)	Other methodologies
1 - Austria	0	1	1	0	0	1	1	0	1	0	0
2 - Belgium	0	1	1	1	0	0	0	0	0	0	1
3 - Canada	0	1	1	1	0	1	0	0	1	0	0
4 - Finland	1	1	1	0	0	1	1	0	1	0	0
5 - France	0	1	0	0	0	0	0	0	0	0	0
6 - Greece	0	0	0	0	1	0	0	0	1	0	0
7 - Japan	0	1	1	1	0	1	0	0	0	0	0
8 - Netherlands	0	1	1	1	0	1	0	0	1	0	0
9 - Poland	0	1	0	0	0	0	0	0	1	0	0
10 - Spain	0	0	1	0	0	0	1	0	1	0	0
11 - Switzerland	?	1	1	?	0	0	?	0	0	0	0
12 - Turkey	0	1	0	0	0	0	0	0	1	0	0
13 - United Kingdom	0	0	1	1	0	0	0	0	1	0	0
14 - United States	0	1	1	1	0	1	0	0	0	0	0
15 - Israel	0	1	1	0	0	1	1	0	1	0	0
16 - EC	0	1	1	1	0	0	1	0	1	0	0
Total (16)	1	13	12	7	1	7	5	0	11	0	1

12. Another part of the SMM project is an inventory of initiatives by international organisations² to promote SMM. If possible, please list the top 3 initiatives developed by three international organisations, which your country is implementing or intends to implement:

For OECD countries which are also EU Member States, the most cited international initiatives to promote SMM are those developed within the EU, whether they are policy guidance of a voluntary nature or more stringent regulations (*e.g.* Directives):

- EU Sustainable Development Strategy;
- EU Thematic Strategy on Sustainable Use of Natural Resources;
- EU Thematic Strategy on Prevention and Recycling of Waste;
- EU Action Plan for Sustainable Consumption and Production;
- EU WEEE Directive;
- EU Directive on Eco-Design of Energy-Using Products;
- Forthcoming EU Sustainable Industrial Policy.

Otherwise, the initiatives most frequently cited by respondents are:

- OECD Council Recommendation on Material Flows and Resource Productivity [C(2004)79];
- 3R Initiative;
- UN Marrakech Process;
- UNEP/SETAC Life-Cycle Initiative;
- UNIDO/UNEP Cleaner Production Programme.

Two countries commented on the need for effective coordination of international initiatives related to SMM to avoid duplicating work.

² For further detail on these initiatives, refer to the OECD document ENV/EPOC/WGWPR(2007)4/FINAL: “Inventory of International Initiatives Related to Sustainable Materials Management”.

MAIN FINDINGS

Responses to the 2nd Survey on SMM initiatives suggested that the SMM concept continues to evolve rapidly in most OECD countries. Compared to the first Survey (2005), a much clearer understanding of what SMM means is emerging, including what types of activities/elements are covered by this concept. All responses (14 OECD countries, Israel and the European Commission) referred to general policies on waste, material/products, consumption, pollution prevention and energy. Several also incorporate a broader spectrum of policies into this concept, such as resource management, industry, transport and even specific areas of environmental policy (climate change, biodiversity, air, water and soil protection) on which materials use has an impact.

The responses also indicated that policies which address only “end-of-life materials” have their limitations. To make these particular policies more effective, they especially need to be supplemented by policies which target material flows upstream, involving a wide range of economic actors (producers, consumers and other stakeholders sharing responsibility in materials use), and use of a “mix of instruments”, including regulatory, economic, voluntary and information-based approaches. As Finland pointed out, “there is a need for innovative policies which focus on a life-cycle philosophy, implemented by all stakeholders”. The United Kingdom also considered the sustainability of materials as a key area of future growth and endeavours “to bring together the design and material technology communities to look at key issues linking product design and manufacture”.

Expanding the policy approach to cover the whole life-cycle of materials will clearly complicate the development of a single SMM policy and it may well be the reason why most countries still have no specific definition of, or policy related to, SMM. In fact, many of the policies or initiatives cited by respondents in this survey as being relevant to SMM (as well as the policy instruments currently being used to reduce the environmental impacts of materials use) have already been in place for several years and have roughly the same scope and orientation in most OECD countries. It is also apparent that the co-existence of many “scattered” policies/initiatives related to SMM is placing increasing emphasis on the need for better co-ordination of these policies.

Ten out of 15 responding countries indicated that they measure environmental impacts which result from SMM or SMM-like policies/programmes. However, similar to the evolution of other environmental policies that have been in place over the years, the evaluation of SMM policies is still at an early stage and will likely develop over time. Only 20% of responding countries indicated that they measure the *economic efficiency* of SMM or SMM-like policies/programmes, while 26% indicated that they measure the *environmental effectiveness* of these policies. The EC has undertaken a number of studies to assess both the environmental effectiveness and economic efficiency of their SMM or SMM-like policies. For the future, it might be interesting to explore why some countries indicate that they strive to reduce environmental impacts of material use through SMM initiatives, but have not yet measured the efficiency and effectiveness of these policies. It might also be interesting to have more detailed information about the use of particular methodologies to assess environmental impacts.

It seems that a relatively small group of OECD countries is at the forefront of SMM policy development. These are the countries which have explored the SMM concept in greater depth, may have elaborated a definition and/or have begun to systematically assess the environmental impacts of SMM policies. In general, these countries are trying to widen the scope of traditional waste management policies

to include policies that simultaneously address the use of natural resources and production of materials in more sustainable ways. These countries are also thinking about consumption patterns, leading to the use of less quantity of materials and more sustainable materials (e.g. Japanese “sound material-cycle society”). To achieve this goal, they fund research and development programmes for new technologies. Conscious of problems associated with globalisation of the economy, reduction of environmental impacts of materials is also of concern to these countries, not only within national borders, but at the global level as well.

In general, these countries are trying to widen the scope of traditional waste management policies, often to include new policies that simultaneously address the use of natural resources and production of materials in more sustainable ways. These countries are also thinking about new consumption patterns, leading to the use of reduced quantities of materials and more sustainable materials (e.g. the “sound material-cycle society”). To achieve this goal, they fund research and development programmes for new technologies. Conscious of the globalisation of the economy, the reduction of environmental impacts of materials is also of concern to these countries, not only within national borders, but also at a global level.

These countries also tend to highlight the necessity for all stakeholders or actors involved in the product chain (producers, retailers, consumers, recyclers and disposers) to closely co-operate toward developing a long-term vision and innovative solutions for a sound material society. Some governments are already sponsoring such partnership initiatives (e.g. for the construction and housing sector, as well as for particular products, such as electronics, carpets, paints, tyres and mercury-containing products).

The Survey responses also revealed that many individual SMM initiatives are taking place within the private sector, in large enterprises as well as in SMEs. Since the respondents to this survey were national/central government representatives, they may not be fully aware of all SMM work implemented by private companies, which suggests that private sector initiatives are probably much more numerous than is suggested in the responses that were received. It would therefore be useful to further explore the potential of enterprises with respect to SMM implementation (as Belgium is already doing for SMEs, for example) and whether current SMM experiences are succeeding. In this way, the appropriate role of governments in promoting private sector-based SMM could be further elaborated. Governments could also learn from private enterprises regarding the assessment of economic and environmental benefits derived from SMM initiatives.

ANNEX 1

AN EXAMPLE OF SMM APPROACH OF THE PRIVATE SECTOR: WAL-MART

(Provided by the US EPA)

Wal-Mart, Inc. is the world's largest retailer. It has relationships with 61,000 US suppliers, and is the largest importer in the US, bringing in over 250 million cubic yards of shipping container space, filled with products and packaging from around the world.

In 2005, Wal-Mart's CEO committed Wal-Mart to three environmental goals: 1) be supplied 100 percent by renewable energy, 2) create zero waste, and 3) sell products that sustain our resources and environment. Wal-Mart formed 13 teams Sustainable Value Networks, (SVNs) to support those goals, and later added a 14th SVN. Four SVNs are focused on the *Renewable Energy* goal, 2 SVNs are focused on the *Zero Waste* goal, and 8 SVNs are focused on the *Sustainable Products* goal. The approaches taken by the SVNs vary, as do the degree to which they have engaged Wal-Mart's supply chain, NGOs and government agencies. EPA staff is working with many of these SVNs. Examples of some of work being done are described below.

Climate/Energy

Global Greenhouse Gas Strategy

Wal-Mart planned to sell 100 million compact fluorescent light bulbs (CFLs) at its locations by the end of 2007. The CFLs may seem like a minute change from the incandescent light bulbs that have been a mainstay of residence and industry for many decades. The big picture, however, reveals quite a drastic change: If every one of 110 million American households bought just one [CFL], took it home, and screwed it in the place of an ordinary 60-watt bulb, the energy saved would be enough to power a city of 1.5 million people. Wal-Mart plan could save customers as much as \$3 billion in electrical costs over the life of the CFLs, as well as conserving up to 75 percent of the energy used by traditional light bulbs and resulting in fewer greenhouse gas emissions.

Energy: Design, Construction & Maintenance

Wal-Mart has been operating 2 experimental stores (in Texas and Colorado) for over a year, and is beginning to apply the successes from those experiments to other retail locations. These two stores operate with innovative green technologies designed to reduce operational and construction waste, use recycled and renewable materials, and conserve water and electricity.

The stores are being evaluated over a three-year period by two US government-sponsored laboratories. On January 19, 2007, Wal-Mart opened a store in Kansas City that uses 20 percent less energy than other Wal-Mart Supercenters. The store is the first in a series of 'High-Efficiency' stores that integrate heating,

cooling and refrigeration systems to save energy. In early 2006, Wal-Mart changed its exterior concrete specifications to include 25% fly ash, a by-production of coal combustion.

Global Logistics

Wal-Mart is one of the two companies to make commitments to EPA as both a SmartWay Carrier and a SmartWay Shipper Partner. This is a notable endeavor because Wal-Mart controls the second largest truck fleet in the nation, with over 7,200 trucks. By investing heavily in efficiency improvements to its current truck Fleet, Wal-Mart is reducing about 670,000 tons of CO₂, 58 tons of PM and 2,400 tons of NO_x, saving over 60 million gallons of diesel fuel in the process. Wal-Mart is on the leading edge of the Nation's private carriers in terms of overall efficiency, making significant use of idle reduction technologies, advanced aerodynamics, speed controls and tire improvements. To further its commitment to sustainable transportation goals, Wal-Mart has made a profound and public commitment to increase its truck fleet efficiency 25% by 2008 and 100% by 2015, with projected savings of 13 million tons of CO₂ by 2020.

Waste

Packaging

EPA has been involved with Wal-Mart on packaging issues since mid-2005, through another industry-based group focused on reducing the environmental footprint of packaging (the Recyclable Transport Packaging Roundtable).

- EPA is helping Wal-Mart and a portion of Wal-Mart's supply chain in the design of a Scorecard, intended to measure the relative environmental footprint of packaging. Scorecard metrics include GHG emissions, product / package ratio (source reduction), cube utilization (transportation efficiency), transportation (balance of price vs. distance to fill the package), recycled content (high value place on increased recycled content, recovery (recyclability), and bonus points for production with Renewable Energy and design innovation. Beginning Feb 1, 2008, Scorecard results will be considered in the financial compensation of Wal-Mart buyers (along with price and sales volume), providing a significant incentive for suppliers to fine-tune their packaging.
- By Wal-Mart's estimates, packaging changes in 277 products resulted in savings of \$3.5 million on transportation costs, energy savings equivalent to 1,300 barrels of oil. Reformulation (concentration) of one product allowed a significantly smaller package – together, the changes resulted in annual savings of over 478 million gallons of gallons of water, 128 million pounds of plastic, and 20 million gallons of diesel fuel.
- At the 2006 Clinton Global Initiative, Wal-Mart made a public commitment to reduce packaging in products sold in its stores by 5% in 2008. EPA helped Wal-Mart estimate the climate impact of that change - 667,000 metric tons of CO₂, the equivalent of 213,000 trucks off the road annually, 323,800 tons of coal not burned, or 66.7 million gallons of diesel fuel not consumed, using WARM (Waste Reduction Model) and other tools.
- Impacts of the Scorecard are causing Wal-Mart's supply chain to have conversations about material selection and package design that they have previously not been motivated to engage in.

Operations & Internal Procurement

Wal-Mart's Operations and Internal Procurement SVN is responsible for eliminating municipal solid waste leaving the stores, distribution centers, and offices, either through source reduction or recycling. (Unlike many other SVNs, this network is almost entirely composed of Wal-Mart employees.) After contracting for a statistically significant survey of the waste stream, the company identified the largest categories of waste, and conducted a 6-week, 21 store pilot study to collect and recycle the material (plastics, office paper, beverage containers – they are currently testing strategies for recovery of compostable materials, they were already recovering corrugated containers). The results of the study were so successful that they have taken the process nationwide to all stores.

FY 2007 recovery of LLDPE (bags and thin films) - 57 million pounds.

Goal for FY 2008 – 70 million pounds.

EPA worked with Wal-Mart and their recycler (Rocky Mountain Recycling) in evaluating/refining these recycling practices, as well as in communicating the energy & climate impacts of recovering the material. The commodity costs of the recovered materials, as well as the avoided costs of disposal, have added tens of millions of dollars to the Wal-Mart bottom line, as well as contributed significant energy and climate benefits (e.g., recycling rather than landfilling 57 million pounds of low density polyethylene provides an energy benefit equivalent to approximately 1.6 trillion BTUs.)

Sustainable Products

Chemical Products

The chemical intensive products (CIP) network is focused on the human and environmental health impacts of the chemical ingredients in both the products Wal-Mart uses and in the products Wal-Mart offers to its customers. Network participants engage in discussions, and provide technical, logistical, and other advice. The CIP network has set the goals of identifying chemicals of concern and encouraging innovation toward preferred chemicals. These goals are not yet reflected in the broad structure above.

Wal-Mart has asked their suppliers to move away from two pesticides (propoxur and permethrin) and a family of detergent surfactants (nonylphenol ethoxylates). Wal-Mart plans to identify a further 17 chemicals over the next two years for substitution. The CIP network is also developing a Product Sustainability Scorecard to help provide feedback to suppliers regarding product achievement in this area.

Electronics

The Electronics SVN is seeking to both “green” Wal-Mart's electronics purchases (both those made for Wal-Mart's internal use and those offered to its consumers) and to assist its customers in finding convenient and environmentally sound solutions for their used electronics.

Electronics Products Scorecard: A draft products scorecard for the Electronics products sector was recently shared with Wal-Mart's electronics suppliers. This scorecard calls for products that meet Energy Star, EPEAT (EPA-sponsored multi-attribute green improvements purchasing certification), packaging reduction and product take-back criteria.

In-Store Take-back Pilots: Wal-Mart and Hewlett-Packard have collaborated on in-store electronics take-back pilot initiatives. OSW staff has provided extensive guidance to Wal-Mart on how to conduct take-back pilots and assistance on how to identify environmentally responsible recyclers, as well as advice on crafting customer outreach on recycling electronics.

ANNEX 2

QUESTIONNAIRE FOR THE 2ND SURVEY ON SMM-RELATED ACTIVITIES WITHIN OECD COUNTRIES

OECD work on “Sustainable Materials Management” (SMM) started with a workshop on 28-30 November 2005 in Seoul, Korea. Among other topics, this Workshop explored the present understanding and status of activities towards sustainable materials management in OECD member countries through a survey [see ENV/EPOC/WGWPR/RD(2005)5/FINAL on the Outcome of the Workshop on Sustainable Materials Management].

Progress was made at the 1st SMM Workshop with regard to a common understanding of SMM, and an agreement was reached on the following OECD working definition:

“Sustainable Materials Management (SMM) is an approach to promote sustainable materials use, integrating actions targeted at reducing negative environmental impacts and preserving natural capital throughout the life-cycle of materials, taking into account economic efficiency and social equity.”

Participants also agreed to the following *explanatory notes* to this working definition:

- “**Materials**” include all those extracted or derived from natural resources³, which may be either inorganic or organic substances, at all points throughout their life-cycles;
- “**Life-cycle of materials**” includes all activities related to materials such as extraction, transportation, production, consumption, material/product reuse, recovery and disposal;
- An **economically efficient** outcome is achieved when net benefits to society as a whole are maximized;
- A variety of policy tools can support SMM, such as economic, regulatory and information instruments and partnerships;
- SMM may take place at different levels, including firm/sector and different government levels;
- SMM may cover different geographical areas and time horizons.

³ The term “*Natural resources*” designates renewable and non-renewable resources that are found in nature (e.g. trees, fish, ore, petroleum).

The first survey revealed that most countries were not familiar with this new approach. However, countries clearly perceived SMM as a promising approach for reducing environmental impacts associated with materials use.

SMM is also not easy to delineate because it integrates numerous existing environmental policies, while taking into account the whole life-cycle of materials. It remains a relatively new approach and as such, the number of national or sub-national initiatives explicitly labelled “SMM” likely remains very limited. However, other similar and overlapping activities continue to be developed and implemented. Two recent projects⁴ under the WGWPR of the OECD have highlighted the wide variety of types of initiatives and activities that, while not explicitly labelled “SMM”, are “SMM-like” in that they fall within OECD working definition of SMM or contribute to SMM as per this definition.

Therefore, Delegates at the 2005 Workshop expressed a desire to carry out a more in-depth survey among member countries in 2007 in order to have a clearer understanding of what countries are doing in relevance to SMM and to get more detailed information on particular issues, such as the materials or activities targeted and the instruments used to ensure sustainable management of materials. This second survey would also reveal if whether other member countries have endorsed or are moving towards such an approach.

Please respond to this questionnaire by 31 October 2007.

⁴ ENV/EPOC/WGWPR(2007)4/FINAL (Inventory of SMM-related activities within international organisations) and ENV/EPOC/WGWPR(2007)5/FINAL (Methodologies relevant for the OECD approach on SMM)

QUESTIONNAIRE ON SUSTAINABLE MATERIALS MANAGEMENT (SMM)

Country

Respondent's name

Respondent's position

Respondent's affiliation

Respondent's phone number

Respondent's email address

1. Does your country have a formal **definition or a specific understanding of SMM** in national legislation, regulation, programme, or policy other than the OECD working definition on SMM?
 Yes No Don't know

1.1 If yes, please provide your country's definition or understanding of SMM (with reference to national documents if possible):

- 1.2 If no, is your country planning to use the OECD working definition on SMM?
 Yes No Don't know

2. Does your country have **policies or programmes** which explicitly address, or are relevant to "sustainable materials management"?
 Yes No Don't know

If no, is your country planning to have SMM policies or programmes?

- Yes provide the approximate timing: _____
 No Don't know

3. If your country does not have or is not planning to have any policies or programmes explicitly addressing SMM, are there other national policies/programmes/activities/initiatives which could be considered relevant to SMM, or that are achieving the same goals as SMM policies/programmes (i.e. dealing, with the environmental impacts of materials across their life-cycle)?

4. If your country has developed (or is planning to develop) SMM or SMM-like policies/programmes, at which level(s) of government are (or will) these policies or programmes (be) implemented?

National/central Regional/state Local

Please provide more details with relevant national documents:

5. If your country has developed (or is planning to develop) SMM or SMM-like policies/programmes, please identify the factors that contributed (or will contribute) to their development:

- Environmental reasons Yes No Don't know
if yes, in particular:
- Economic reasons Yes No Don't know
if yes, in particular:
- Social reasons Yes No Don't know
if yes, in particular:
- Regulatory pressure Yes No Don't know
if yes, in particular:
- International competitiveness Yes No Don't know
if yes, in particular:
- Other: Yes No Don't know
if yes, in particular:

6. What criteria were used in your country to target the specific areas or materials for which SMM or SMM-like policies/programmes are needed?

- 6.1** Reduction of potential environmental impacts from materials due to hazard or volume:
 Yes No Don't know

Provide examples:

- 6.2** Preservation of natural capital⁵, or resource conservation, involved in material production and/or use:
 Yes No Don't know

Provide examples:

⁵In environmental accounting, "natural capital" is used to designate all natural assets, also called environmental assets, whether they are economic assets or not. Natural capital is generally considered to comprise three principal categories: natural resource stocks, land and ecosystems. All are considered essential to the long-term sustainability of development for their provision of "functions" to the economy, as well as to mankind outside the economy and other living beings. (Source: SEEA 1.23).

6.3 Reduction of economic costs and/or increase of economic benefits derived from the production/use/disposal of materials (improved efficiency):

Yes No Don't know

Provide examples:

6.4 Mitigation of problems associated primarily with the management of end-of-life materials:

Yes No Don't know

Provide examples:

6.5 Response to regulatory pressure:

Yes No Don't know

Provide examples:

6.6 Other reasons:

Yes No Don't know

Provide examples:

7. If your country has developed (or is planning to develop) SMM or SMM-like policies/programmes, do (or will) they address:
(please mention only those which cover the whole life-cycle of materials, in accordance with the SMM working definition)

7.1. - generic materials: Yes No

More specifically:

Plastics Yes No

Metals Yes No

Glass Yes No

Wood Yes No

Textiles Yes No

Paper & cardboard Yes No

other:

7.2 - specific material flows: Yes No

More specifically:

Construction materials Yes No

Mining and quarrying residues Yes No

Energy carriers (e.g. coal, petroleum, gas) Yes No

Chemicals Yes No

Vehicles Yes No

Tyres Yes No

Electric and electronic equipment Yes No

Batteries Yes No

Packaging Yes No

Furniture Yes No

Food (i.e. products from crops and meat) Yes No
 other:

7.3 - specific activities: Yes No

More specifically:

- Mining and quarrying: Yes No

- transport: Yes No

which ones in particular (road, railway, aviation, navigation):

- energy production: Yes No

- manufacturing industries: Yes No

which ones in particular:

- food production: Yes No

- services (e.g. waste management services, water distribution and sanitation, telecommunications, energy distribution, etc.): Yes No

which ones in particular:

- other

8. Are you aware of SMM or SMM-like initiatives being taken by the private sector on a voluntary basis in your country?

Yes No Don't know

8.1 If yes, provide examples (for which materials, in which economic sectors, what kind of enterprises: multinational, SMEs, etc):

8.2 If yes, do you have any information on their level of success, lessons learned, and/or challenges encountered?

Yes No Don't know

Provide details, if possible:

9. A number of initiatives have been identified as possible elements of policies/programmes relevant to SMM. Are the following initiatives in place or under consideration in your country?

9.1 - dematerialisation⁶, which includes, for example, increasing material efficiency⁷ in the supply chain, increasing energy efficiency, eco-design of products, limitation of transport in the

⁶ "Dematerialisation" means an absolute or relative reduction in the use of material and energy per unit of value added or output. (Source: *Economy-wide material flow accounts and derived indicators – A methodological guide*, Eurostat, 2001)

⁷ "Material efficiency" represents the efficiency with which material resources are used in the economy or in a production process. It is often used as a synonym for material productivity. It also designates an indicator that reflects the output or value added generated per unit of materials used. (Source: *Economy-wide material flow accounts and derived indicators – A methodological guide*, Eurostat, 2001)

supply chain, increasing material reuse, waste recovery and recycling, closing material cycles, substitution of services for products:

<u>In place</u>	<u>Under consideration</u>
<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

Which instruments are used (e.g. economic/markets instruments, regulatory instruments, information-based instruments, education and training instruments, partnership/contractual instruments, other)?

Addressing in particular:

9.2 - detoxification⁸, which includes, for example, toxic or hazardous materials substitution; cleaner technologies; material regulation (ban), waste pre-treatment, etc.:

<u>In place</u>	<u>Under consideration</u>
<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

Which instruments are used (e.g. economic/markets instruments, regulatory instruments, information-based instruments, education and training instruments, partnership/contractual instruments, other)?

Addressing in particular:

9.3 - internalisation of externalities⁹:

<u>In place</u>	<u>Under consideration</u>
<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

In which area or for which material flows in particular:

Which instruments are used (e.g. economic/markets instruments, regulatory instruments, other)?

Addressing in particular:

9.4 – other initiatives:

<u>In place</u>	<u>Under consideration</u>
<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

⁸ "Detoxification" means reduction of the toxic characteristics of materials used in products and processes. This can be accomplished by reducing the volume of toxic materials used in a process or production, by substituting more benign substances for toxic materials, or by changing the toxicity of materials through chemical changes that reduce or eliminate their toxic properties. (Source: Geiser, K. (2001), *Materials Matter. Towards a Sustainable Materials Policy*. The MIT Press, Cambridge, Massachusetts)

⁹ "Internalisation of externalities" means the incorporation of the economic value of any external costs into the market decision making process through pricing or regulatory interventions.

Please provide details on such initiatives:

Which instruments are used (e.g. economic/markets instruments, regulatory instruments, information-based instruments, education and training instruments, partnership/contractual instruments, other)?

Addressing in particular:

10. Which policy instruments (or mixes of instruments) are the most commonly used within your country's SMM policies/programmes or SMM-like initiatives,?

(Economic, regulatory, education and training, communication and information-based instruments, voluntary approaches such as eco-labelling and environmental management systems, or others)? For each identified initiative, please provide references to relevant documents and mention the instruments used:

11. In the case where your country has developed (or is planning to develop) SMM or SMM-like policies/programmes are, or will environmental impacts from material use be assessed or measured as part of these policies/programmes?

Yes No Don't know

11.1 - As part of the SMM project, a number of methodologies assessing environmental impacts from materials use have been identified. Could you please indicate which of these methodologies (definitions are provided in the Annex to this questionnaire¹⁰) your country is using, or planning to use, to advance the goal of sustainable materials management?

- | | | |
|---|------------------------------|-----------------------------|
| 1. Material Input per Service Unit, MIPS | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2. Life-cycle Assessment, LCA | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3. Material Flow Analysis, MFA | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4. Economic Input/Output Analysis, EIO | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5. Total Cost Assessment, TCA | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 6. Cost-Benefit Analysis, CBA | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 7. Ecological Footprint Analysis, EFA | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 8. Thermodynamic Input/Output Analysis, TIOA | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 9. Environmental Impact Assessment, EIA | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 10. Computable General Equilibrium Modelling, CGE | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 11. Other methodologies | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

¹⁰ For more explanations on these methodologies, refer to the OECD document: ENV/EPOC/WGWPR(2007)5/FINAL.

if yes, please provide details:

11.2.- Is, or will the economic efficiency of your country's SMM or SMM-like policies or programmes being (be) assessed?

Yes No Don't know

If yes, how?

11.3.- Is (or will) the environmental effectiveness of your country's SMM or SMM-like policies or programmes being (be) assessed?

Yes No Don't know

If yes, how?

12. Another part of the SMM project is an inventory of initiatives by international organisations¹¹ to promote SMM. If possible, please list the top 3 initiatives developed by three international organisations, which your country is implementing or intends to implement:

(Examples of international SMM initiatives include for example the EU Thematic Strategy on the Sustainable Use of Natural Resources, the OECD Council Recommendation on Material Flow Accounting, the 3-R Initiative (Japan, G8), the WBSCD Mining, Minerals and Sustainable Development, etc.):

***THANK YOU FOR TAKING THE TIME TO ANSWER
THIS QUESTIONNAIRE***

¹¹ For further detail on these initiatives, refer to the OECD document ENV/EPOC/WGWPR(2007)4/FINAL: "Draft Inventory of International Initiatives related to Sustainable Materials Management".

ANNEX¹²

	Methodology investigated	Overview
1	Material Input per Service Unit, MIPS	Measures amount of materials used (inputs) to generate a unit of service, such as a car or a pair of shoes, and results can be used to assess the potential for improving this ratio (i.e., for deriving more service or value from all inputs) but it does not calculate associated harm to the environment (kg per unit of service).
2	Life-cycle Assessment, LCA	Measures the environmental and health impacts resulting from materials used, energy consumed, emissions generated to produce a product or carryout a process or activity. Measured for example as CO ₂ equivalents, potential to cause eutrophication in water or other potential impact per functional unit.
3	Material Flow Analysis, MFA	Measures amount (kg) of selected materials flowing through the economy, and through different industry sectors.
4	Economic Input/Output Analysis, EIO	Measures monetary value of the materials that industries buy and sell organised by industrial sector or by commodity.
5	Total Cost Assessment, TCA	Identifies and quantifies costs associated with activities across the life-cycle of a product, process or activity, aiming to include costs in addition to conventional, direct costs to the decision maker.
6	Cost-Benefit Analysis, CBA	For a given decision or problem, assigns economic value to social and environmental impacts, so all costs can be evaluated against benefits. Results intended to support decisions to allocate limited resources (i.e. willingness to pay)
7	Ecological Footprint Analysis, EFA	Measures land area (or equivalent) that is needed to support a certain level of consumption in a particular population, or to support production of a particular product.
8	Thermodynamic Input-Output Analysis, TIOA	Measures exergy associated with the materials and goods that industries buy and sell (organised by industrial sector or by commodity), essentially adding an energy dimension to the monetary values in Economic Input-Output Analysis.
9	Environmental Impact Assessment, EIA	Very different from the other 9 methodologies, it is a requirement (e.g. government legislation) to assess and report potential environmental impacts of planned large scale development projects.
10	Computable General Equilibrium Modelling, CGE	Predicts structural changes that may occur throughout an economy, as a result of a change in consumption in one industry sector (e.g. shift from one material to another in production of roads), or a change in technology used, efficiencies, prices, etc.

¹²For more explanations on these methodologies, refer to the OECD document: ENV/EPOC/WGWPR(2007)5/FINAL.