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## OECD's Work on Sustainable Materials & Waste Management

The Organisation for Economic Co-operation and Development (OECD) has been working on waste management issues for many years. To encourage waste prevention and minimisation and to manage materials in a sustainable manner, the OECD is working in the following areas: sustainable materials management, environmentally sound management of waste, transboundary movements of waste, waste prevention and minimisation, and radioactive waste management.

### *Sustainable Materials Management*

Since 2004, OECD is exploring a new integrated approach, sustainable materials management (SMM), which addresses the management of materials throughout their life-cycle in a cost-effective manner. It also ensures that the negative impacts from material use and consumption are not relegated to the end of the material's chain. Currently the SMM work is focusing on policies and instruments that would be useful for promoting SMM, and for contributing to implementation of the OECD Council Recommendation on Resource Productivity adopted in 2008. While the OECD recommendations are not legally binding, there is an expectation that member countries will do their utmost to fully implement Recommendations.

A Global Forum on Environment focusing on SMM was held in October 2010 and brought together senior experts from governments, NGOs and the private sector. It proposed concrete steps and measures to put SMM into practice as well as drawing the linkages to other policy areas. Discussion at the Global Forum were supported by policy studies on target setting, policy principles and policy instruments for SMM, as well as case studies of selected materials: aluminium, critical metals, wood fibres and plastics. A publication "Sustainable Materials Management – Making Better Use of Resources" presents the main outcomes of this work (<http://www.oecd.org/env/waste/smm-makingbetteruseofresources.htm>). OECD is now following-up on the conclusions and recommendations of the Forum with further case-study work on important materials and analysis of economic policy instruments that can support sustainable materials management.

### *Environmentally Sound Management of Waste*

Over 4 billion tonnes of waste is generated each year in OECD countries. The environmentally sound and economically efficient management of this waste has to be ensured. The OECD has worked on this issue since the late 1990s and developed policy and technical guidelines: The OECD Council Recommendation on Environmentally Sound Management of Waste was adopted in 2004. This Recommendation applies to waste, whether imported or domestically generated, and to activities which collect, dispose, eventually store, and recover wastes. It provides not only a number of policy recommendations for governments, but also practical recommendations for facilities, such as the implementation of an environmental management system, auditing in terms of environment, health and safety measures, monitoring and recording of emissions and waste generation, ensuring of safe and healthy occupational environment, etc. In order to assist with the implementation of the Recommendation, a *Guidance Manual for Environmentally Sound Management of Waste* was published in 2007.

### ***Transboundary Movements of Waste***

Following indiscriminate and uncontrolled traffic in hazardous wastes which resulted in adverse effects on human health and the environment, OECD member countries decided in 1984 that exports and imports of hazardous waste should be controlled. For that purpose, the OECD developed eight legally binding instruments that were adopted by member countries. These form the basis of the Basel Convention and several European Community directives.

Furthermore, imports and exports of waste destined for recovery within the OECD area are subject to a control system which has been developed by the OECD on the basis of a legally binding instrument, the Decision of the Council concerning the Control of Transboundary Movements of Wastes Destined for Recovery Operations adopted in 2001. The control system allows trading of recyclable materials in an environmentally safe manner. An interactive OECD database provides the necessary information for authorities and exporters/importers to complete the notification and movement documents for transboundary movements of waste. A *Guidance Manual for the Control of Transboundary Movements of Recoverable Wastes* was published in 2009, which explains the functioning of the OECD control system in detail. The OECD has been working on the “harmonisation” of the OECD control system to the extent possible with the Basel Convention as it is updated, as requested by the member countries.

### ***Waste Prevention and Minimisation***

The OECD work programme on waste minimisation took place from 1994 to 2004. This involved compilation of existing policies and tools for waste minimisation in OECD countries, development of a common understanding of waste minimisation and its components (strict prevention, reduction at source, product re-use, recycling, and, when appropriate, energy recovery). It also looked at waste prevention policy design, target setting, implementation and evaluation. The work resulted in a *Reference Manual on Strategic Waste Prevention* published in 2000.

Following this work, a multi-year project was launched to examine and to develop waste prevention performance indicators. Work was initiated on drivers for waste generation with the aim to develop pressure indicators for waste prevention. Work has also been undertaken on response indicators and on material flow accounts aiming towards the development of indirect pressure and response indicators for waste prevention. The outcome of this project, *Towards Waste Prevention Performance Indicators*, was published in 2004

Other aspects contributing to minimising and preventing waste generation which the OECD has studied are as follows:

### ***Economics of Waste***

The OECD has also looked at economic aspects of waste policies, in particular, barriers and failures of recycling markets. *Improving Recycling Markets* was published in 2007, which looked at the markets for waste oils, waste plastics, and used rubber tyres in particular. Factors such as information failures, technological externalities, and market power can affect the prices, quantity, and quality of materials traded. This report presents the case for the use of “industrial” policies which address such market failures and barriers and these policies are seen as complements to more traditional environmental policies. Indeed, encouraging ever-higher recycling rates in the absence of such complementary measures may impose very high social welfare costs. Other work in this area includes environmental effectiveness and economic efficiency of instrument mixes addressing household waste and the costs and benefits of waste collection systems.

### ***Extended Producer Responsibility***

Extended producer responsibility (EPR) is an environmental policy approach in which the producer’s responsibility for a product is extended to the post-consumer stage of a product’s life cycle. It is a concept where manufacturers and importers of products should bear a significant degree of responsibility for the environmental impacts of their products throughout the product life-cycle, including upstream impacts inherent in the selection of materials for the products, impacts from manufacturers’ production process

itself, and downstream impacts from the use and disposal of the products. While other policy instruments tend to target a single point in the chain, EPR seeks to integrate signals related to the environmental characteristics of products and production processes throughout the product chain. The OECD carried out work on EPR in the 1994-2006 period, and the major outputs are as follows:

- *Extended Producer Responsibility: A Guidance Manual for Governments* (2001) informs governments about the potential benefits and costs of EPR. It provides a set of principles to guide policy makers as they make decisions about EPR policy and programmes. The Guidance Manual also identifies several policy instruments for implementing EPR: take-back, economic instruments e.g. advanced disposal fees, deposit-refund, a combined upstream tax/downstream subsidy and standards.
- *Analytical Framework for Evaluating the Costs and Benefits of Extended Producer Responsibility Programmes* (2005) offers a framework for analysing the costs and benefits of EPR programmes.
- *EPR Policies and Product Design: Economic Theory and Selected Case Studies* (2005) discusses the potential Design for Environment impacts of EPR policies and provides practical examples of the extent to which some EPR programmes are contributing to "Design for the Environment".

Work to update the 2001 Guidance Manual for Governments is now starting and will be going on in 2013 and 14. This will allow to develop a number of case studies in OECD and partner countries so as to develop global guidance on EPR.

### **Wastes Containing Nanomaterials**

Since 2011, an effort to begin to understand the emerging issue of wastes containing nanomaterials has started. The use of various nanomaterials has been growing exponentially in recent years and an increasing number of products now use these materials, delivering a number of benefits to consumers. As a consequence more and more of these materials appear in different waste streams. However, very little is known about the way nanomaterials behave in different waste treatment operations. There is therefore a significant need for research and OECD has been mandated to explore this issue in order to facilitate governments' decision making in this area. OECD activities therefore focus on sharing information and coordinating research efforts between OECD member countries.

### **Greener Public Purchasing**

Buying "green" at the government level can help significantly to improve overall environmental conditions. Environmentally sound public procurement can also yield indirect benefits. OECD's work in this area began in 1996. The initial work focussed on policy reviews of greener public purchasing programmes and initiatives in OECD member countries, as well as the examination of institutional factors which facilitate or hinder their success. It was followed by work that focused on the links between the environmental characteristics of public procurement and other aspects of public policy such as general environmental policy, public expenditure management, trade law and competition policy. *The Environmental Performance of Public Procurement: Issues of Policy Coherence* (2003) reviews work at the OECD on these issues.

The OECD's work on greener public purchasing resulted in the OECD Council Recommendation on Improving the Environmental Performance of Public Procurement adopted in 2002, which urges governments to provide appropriate policy frameworks and support. Among other things, it recommends establishing appropriate procedures for the identification of greener products; government-wide information, training and technical assistance to facilitate implementation; and the development of indicators to monitor and evaluate programmes and policies. A Report on the implementation of the Recommendation, *Improving the Environmental Performance of Public Procurement: Report on Implementation of the Council Recommendation* was published in 2006.

## **Radioactive Waste Management**

The Nuclear Energy Agency (NEA), a specialised agency of the OECD, assists member countries to find and implement sustainable solutions for the management of radioactive waste, covering policy and governance issues, safety evaluation and regulation, and scientific and technical developments.

*Nuclear Energy Outlook* (first edition published in 2008), reviewed the status of radioactive waste management world-wide and noted that the technology for disposal of low- and intermediate-level radioactive waste is well developed and all countries with major nuclear programmes operate corresponding waste disposal facilities or are in an advanced stage of developing them. However, there is currently no repository operating for the disposal of spent nuclear fuel or of high-level waste from reprocessing. Analysing the status of current projects, the *Nuclear Energy Outlook* estimates that by 2050 three quarters of all such waste generated by then would have an operating disposal route. The NEA maintains an information base of countries profiles and full reports regarding their approaches and plans in dealing with radioactive waste.

In 2008, the NEA published a new Collective Statement urging countries to move forward with geologic disposal for high-level and long-lived radioactive waste. The experts recognised the important progress made in countries like Finland, France, Sweden, Switzerland and the United States and expressed their collective view that sufficient information exists today to take the first steps and put a plan in place commensurate with the current generation's responsibility. The Statement also notes that national strategies for geological disposal should address not only the technical means to construct a facility, but also provide a framework and roadmap allowing decision makers and the concerned public the time and means to understand and evaluate the basis for various proposed decisions.

The NEA also organises international peer reviews, on the request of its member countries, specialising on important technical milestones and studies of national waste programmes. These peer reviews support countries in their decision making. The latest such review took place in France. The next review (2011) will take place in Sweden. It will deal with the world's first-ever authorisation of a spent fuel repository in a geologic formation.

Today, there is a clear understanding that the implementation of radioactive waste repositories is as much a socio-political challenge as a technical one. While the safety of a repository remains the first priority, local acceptance of the site, and national agreement of the programme, are the overarching issues that need to be secured and maintained over the long term. Reversibility of decisions and retrievability of waste, under specified conditions, are typically two important requests from the local public that need to be taken into account when designing a disposal programme. The NEA has analysed the role of the various institutional actors and the cultural and organisational changes needed for a successful stakeholder dialogue and decision making processes. In addition, various NEA reports explore how a durable relationship between a waste management facility and its host community may be built.

## **Disposal Safety and Regulation**

The NEA is promoting a new concept for the safety evaluation for geologic disposal, focussing on an integrated view on long-term safety. As such, the concept goes beyond demonstrating compliance with numerical safety indicators and highlights the range of underlying evidence and methods that give confidence in the quality of the scientific and institutional processes. This "safety case" concept has become the basis for international safety standards in this area and various NEA workshops and studies have developed the state of the art in this field and support the implementation of the concept in all aspects of repository development and implementation. The concept is now well understood and used in radioactive waste management programmes worldwide to evaluate long-term safety, but also to refine research programmes, site characterization plans, engineering designs and modelling tools at subsequent stages of repository development. The NEA also reviews the regulatory framework for the disposal of radioactive waste, especially long-lived waste. The review shows that comprehensive regulatory systems are in place in countries with advanced programmes. It also observes that there is a broad range of national long-term safety criteria and practices. While not issuing international safety standards itself, the NEA has undertaken to make the variety of these approaches more transparent, as well as their settings in different regulatory and safety/technical environments. In workshops and reports, the NEA reviewed the

definitions used as a basis for setting these criteria, and in particular the ethical argumentation providing the basis for defining safety over extended timescales.

### ***Future Developments***

On the long-term perspective the NEA analysed the impact future advanced nuclear fuel cycles could have on the volume and management options for high-level radioactive waste. The NEA undertook studies to assess their impact on radioactive waste management and on disposal options. It became clear that, even for fuel cycles with limited recycling (*i.e.* that reprocess spent fuel and where plutonium is reused only once) there is a substantial reduction possible in the volume of high-level waste generated. Were a fully-closed fuel cycle to be employed in future, based on the exclusive use of fast neutrons reactor systems and advanced facilities for separation and transmutation, a further large reduction of high-level waste would occur, together with significant reductions in heat generation. This would not eliminate the need of geological repositories, but it would greatly reduce their dimensions.

## FOR FURTHER READING

### Sustainable Materials Management

Sustainable Materials Management – Making Better Use of Resources (OECD, 2012, <http://www.oecd.org/env/waste/smm-makingbetteruseofresources.htm>)

Global Forum on Environment focusing on SMM, Mechelen, Belgium, 2010  
[www.oecd.org/environment/gfenv](http://www.oecd.org/environment/gfenv)

Recommendation of the Council on Resource Productivity [C(2008)40] (OECD, 2008, [www.oecd.org/dataoecd/1/56/40564462.pdf](http://www.oecd.org/dataoecd/1/56/40564462.pdf)).

### Environmentally Sound Management of Waste

Recommendation of the Council on the Environmentally Sound Management of Waste [C(2004)100] (OECD, 2004, [acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=51&InstrumentPID=48&Lang=en&Book=False](http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=51&InstrumentPID=48&Lang=en&Book=False)).

*Guidance Manual on Environmentally Sound Management of Waste* (OECD, 2007, [www.oecd.org/dataoecd/23/31/39559085.pdf](http://www.oecd.org/dataoecd/23/31/39559085.pdf)).

### Transboundary Movements of Waste

Decision of the Council concerning the Control of Transboundary Movements of Wastes Destined for Recovery Operations [C(2001)107/FINAL] (OECD, 2001, [acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=221&InstrumentPID=217&Lang=en&Book=False](http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=221&InstrumentPID=217&Lang=en&Book=False)).

Database on Transboundary Movement of Wastes destined for Recovery Operations, [www2.oecd.org/waste](http://www2.oecd.org/waste)).

*Guidance Manual for the Control of Transboundary Movements of Recoverable Wastes* (OECD, 2009, [www.oecd.org/dataoecd/57/1/42262259.pdf](http://www.oecd.org/dataoecd/57/1/42262259.pdf)).

### Waste Prevision and Minimisation

“Reference Manual on Strategic Waste Prevention” (OECD, 2000, [www.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/epoc/ppc\(2000\)5/final&doclanguage=en](http://www.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/epoc/ppc(2000)5/final&doclanguage=en)).

“Towards Waste Prevention Performance Indicators” (OECD, 2004, [www.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/epoc/wgwpr/se\(2004\)1/final&doclanguage=en](http://www.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/epoc/wgwpr/se(2004)1/final&doclanguage=en)).

### Economics of Waste

*Improving Recycling Markets* (OECD, 2006, [www.oecd-ilibrary.org/environment/improving-recycling-markets\\_9789264029583-en](http://www.oecd-ilibrary.org/environment/improving-recycling-markets_9789264029583-en)).

### Extended Producer Responsibility

*Extended Producer Responsibility: A Guidance Manual for Governments* (OECD, 2001, [http://www.oecd-ilibrary.org/environment/extended-producer-responsibility\\_9789264189867-en](http://www.oecd-ilibrary.org/environment/extended-producer-responsibility_9789264189867-en)).

“Analytical Framework for Evaluating the Costs and Benefits of Extended Producer Responsibility Programmes” (OECD, 2005, [www.oecd.org/dataoecd/31/34/34529905.pdf](http://www.oecd.org/dataoecd/31/34/34529905.pdf)).

“EPR Policies and Product Design: Economic Theory and Selected Case Studies” (OECD, 2005, [www.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/epoc/wgwpr\(2005\)9/final&doclanguage=en](http://www.oecd.org/officialdocuments/displaydocumentpdf/?cote=env/epoc/wgwpr(2005)9/final&doclanguage=en)).

### **Greener Public Purchasing**

*The Environmental Performance of Public Procurement: Issues of Policy Coherence* (OECD, 2003, [http://www.oecd-ilibrary.org/environment/the-environmental-performance-of-public-procurement\\_9789264101562-en](http://www.oecd-ilibrary.org/environment/the-environmental-performance-of-public-procurement_9789264101562-en)).

Recommendation of the Council on Improving the Environmental Performance of Public Procurement [C(2002)3] (OECD, 2002, [acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=46&InstrumentPID=43&Lang=en&Book=False](http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=46&InstrumentPID=43&Lang=en&Book=False)).

“Improving the Environmental Performance of Public Procurement: Report on Implementation of the Council Recommendation” (OECD, 2006, [www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPNEP\(2006\)6/FINAL&docLanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPNEP(2006)6/FINAL&docLanguage=en)).

### **Radioactive Waste Management**

*Nuclear Energy Outlook 2008* (NEA, 2008, [www.oecd-ilibrary.org/nuclear-energy/nuclear-energy-outlook-2008\\_9789264054110-en](http://www.oecd-ilibrary.org/nuclear-energy/nuclear-energy-outlook-2008_9789264054110-en)).

Radioactive Waste Management Programmes in OECD/NEA Member Countries (NEA, [www.nea.fr/rwm/profiles](http://www.nea.fr/rwm/profiles)).

*Moving Forward with Geological Disposal of High-Activity Radioactive Waste: A Collective Statement of the NEA Radioactive Waste Management Committee* (NEA, 2008, [www.nea.fr/html/rwm/reports/2008/nea6433-statement.pdf](http://www.nea.fr/html/rwm/reports/2008/nea6433-statement.pdf)).

*International Peer Reviews for Radioactive Waste Management* (NEA, 2005, [www.nea.fr/html/rwm/reports/2005/nea6082-peer-review.pdf](http://www.nea.fr/html/rwm/reports/2005/nea6082-peer-review.pdf)).

*Safety of Geological Disposal of High-level and Long-lived Radioactive Waste in France - An International Peer Review of the “Dossier 2005 Argile” Concerning Disposal in the Callovo-Oxfordian Formation* (NEA, 2006, [www.nea.fr/html/rwm/reports/2006/nea6178-argile.pdf](http://www.nea.fr/html/rwm/reports/2006/nea6178-argile.pdf)).

Forum on Stakeholder Confidence (NEA, [www.nea.fr/rwm/fsc](http://www.nea.fr/rwm/fsc)).

The Retrievability and Reversibility (R&R) Project (NEA, [www.nea.fr/rwm/rr](http://www.nea.fr/rwm/rr)).

### **Disposal Safety and Regulation**

Regulator’s Forum (NEA, [www.nea.fr/rwm/regulator-forum.html](http://www.nea.fr/rwm/regulator-forum.html)).

### **Future Developments**

*Advanced Nuclear Fuel Cycles and Radioactive Waste Management* (NEA, 2006, [www.oecd-ilibrary.org/nuclear-energy/advanced-nuclear-fuel-cycles-and-radioactive-waste-management\\_9789264024861-en](http://www.oecd-ilibrary.org/nuclear-energy/advanced-nuclear-fuel-cycles-and-radioactive-waste-management_9789264024861-en)).