REGIONAL ACTIVITY CENTRE FOR CLEANER PRODUCTION

CP/RAC [9]

ANNUAL TECHNICAL PUBLICATION

SUSTAINABLE CONSUMPTION AND PRODUCTION IN THE MEDITERRANEAN | MAY 2010

Chemicals in the Mediterranean

The Stockholm and Basel Conventions and REACH

Regional Activity Centre for Cleaner Production

UNEP

GOBIERNO DE ESPAÑA | MINISTERIO DE MEDIO AMBIENTE Y MEDIO RURAL Y MARINO

Generalitat de Catalunya
Government of Catalonia
Department of the Environment and Housing

Regional Activity Centre for Cleaner Production

Director
Virginia Alzina

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Printed by ALTÉS arts gràfiques, s.l.
Cobalt, 160. 08907 L'Hospitalet de Llobregat
D.L.: B. 29.514-2001

Printed on 100% recycled paper

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SUMMARY

This is an annual technical publication of the Regional Activity Centre for Cleaner Production (CP/RAC). | *All articles are published in the original language of the author (English or French) and abstracts are also included in Spanish.* | Any institution dealing with industry and sustainability matters: CP Centers, professional associations, business federations, consultants, environment Authorities, etc. may collaborate in this publication by sending us an article in English or French. | *Possible publication feedback from readers is welcome and if you consider that this publication could be improved or that there is any lack of precision, we would appreciate if you could notify us.* | The contents of this publication do not necessarily reflect the views or the policies of the CP/RAC, nor are they an official record. | *This publication may be reproduced in whole or in part and in any form of educational and non-profit purposes without special permission of the CP/RAC, provided acknowledgement of the source is made. CP/RAC would appreciate receiving a copy of any publication that uses this material as a source.*

Chemical Substances in the Mediterranean: the Stockholm and Basel Conventions and the REACH Regulation

Virginia Alzina
Director

Regional Activity Centre
for Cleaner Production

In the ninth issue of the *CP/RAC Annual Technical Publication – Sustainable Consumption and Production in the Mediterranean,* we aim to highlight the importance of the rational management of chemical substances in the Mediterranean. For this reason, we have focused on the Stockholm, Basel and Rotterdam Conventions and the REACH Regulation (registration, evaluation, authorisation and restriction of chemical substances), which are initiatives to increase control and reduce the use of chemical substances that are noxious to the environment and harmful to human health. Since the beginning of 2010, the parties to the three conventions have been working together to take advantage of synergies and avoid duplicated efforts. This unification culminated in the ExCOPs held from 22 to 24 February in Bali, where the signatory parties of the three conventions first met to consolidate their joint effort and fight together for the environment. The Regional Activity Centre for Cleaner Production (CP/RAC) was present as a Regional Centre for the Stockholm Convention.

The CP/RAC has been working on the sustainable management of chemical substances since its foundation in 1996. However, in 2009 it became more significantly involved because of its ratification as a Regional Centre for the Stockholm Convention at the fourth meeting of the Conference of the Parties, held in May 2009.

In recent decades concern has been growing over the effects of persistent organic pollutants (POPs) on human health and the environment. These compounds have been identified by the international community as a group of substances that share four properties: high toxicity, persistence, volatility and the capacity to bioaccumulate in fatty tissue.

The Stockholm Convention is an initiative of the United Nations with the aim of moving towards a world free of POPs by first restricting and, finally, eliminating their production, use, emission and storage. It was ratified within the framework of the United Nations Environment Programme (UNEP) in May 2001 and came into force on 17 May 2004 as international law.

Initially, the Convention regulated 12 substances categorised in three annexes, by prohibiting the intentional use of the POPs in Annex A, restricting the use of the POPs in Annex B and establishing a set of measures with the objective of minimising the inadvertent emission of the substances in Annex C.

Since the Convention came into force, various countries have adopted it as members and they have been called to meet on four occasions to establish an action framework and perform a periodic review of the implementation of the Convention. One of the outstanding aspects of the Conference of the Parties held in Geneva in May 2009 was the modification of the Convention to include nine more POPs.

Given its involvement in the Stockholm Convention, the CP/RAC is establishing a network of collaborators including other regional centres for the Stockholm Convention, cleaner production centres, and regional centres for the Basel Convention. The aim of the network is to foster collaboration and avoid duplicated efforts, promoting synergies with the Rotterdam and Basel Conventions, in accordance with the resolution adopted by the three conventions.

The Barcelona Convention is also involved in questions related to the rational management of chemical substances through the Land-Based Sources Protocol (LBS

Protocol). This protocol was approved on 17 May 1980 and has been modified on various occasions. The latest version, registered as the 'Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources And Activities' came into force in May 2008.

Indeed the decision was made at the sixteenth meeting of the contracting parties to the Barcelona Convention, held in 2009, to promote the role of the CP/RAC in questions related to the application of the Land-Based Sources Protocol, with the aim that it should facilitate the necessary coordination of the regional centres of the Mediterranean related to the Stockholm and Basel Conventions, and the clean production centres in the Mediterranean region, with the aim of preparing joint programmes.

In line with the obligations established in both conventions (Barcelona and Stockholm), the CP/RAC is working with renewed energy for the rational management of chemical substances in the Mediterranean. This review is an example our desire to find new directions to continue our fight for the environment and to seek and disseminate information.

The ninth issue of the *CP/RAC Annual Technical Publication – Sustainable Production and Consumption in the Mediterranean,* titled 'Chemical Substances in the Mediterranean: the Stockholm and Basel Conventions and the REACH Regulation', begins with an in-depth article contributed by the Secretariat of the Stockholm Convention explaining the role of the regional centres for the Stockholm Convention. This article describes the steps and obligations that the CP/RAC fulfilled to achieve its recognition and that it continues to fulfil today.

The main body of the publication is divided into sections dedicated to the Stockholm Convention, the Basel Convention and the REACH Regulation, with articles reflecting the current situation of the management of chemical substances, describing experiences and contributing new ideas.

The publication is rounded off with an article about the phenomenon of sustainable agriculture, going into more depth about rice growing and explaining an example of this practice in Morocco.

We hope that this new issue will be of interest to you and that it will contribute to the expansion of the vision of the rational management of chemical substances in line with its increasing importance and the initiatives growing around it.

We would like to express our most sincere thanks to all the authors who have contributed articles to help create the content of the review. Their invaluable collaboration has made this publication possible.

We would also like to take advantage of this occasion to make a special mention of the CP/RAC National Focal Points in recognition of their valuable work and their contribution to the promotion of sustainable consumption and production and the rational management of chemical substances throughout the Mediterranean region.

The CP/RAC team wishes you a pleasant reading experience ■

Substances chimiques en Méditerranée : les Conventions de Stockholm, de Bâle et le règlement REACH

Virginia Alzina

Directrice
Centre d'Activités Régionales pour la Production Propre

Le neuvième numéro de la revue *CP/RAC Annual Technical Publication – Sustainable Consumption and Production in the Mediterranean* vise à mettre en évidence l'importance de la gestion rationnelle des substances chimiques en Méditerranée. Il souligne donc tout particulièrement les initiatives existantes, telles que les Conventions de Stockholm, de Bâle et de Rotterdam, ainsi que le règlement REACH (enregistrement, évaluation, autorisation et restriction des substances chimiques), qui visent à augmenter le contrôle et à diminuer l'utilisation de substances chimiques nocives pour l'environnement et la santé humaine. Dès le début de l'année 2010, les parties aux trois conventions ont rassemblé leurs synergies afin de collaborer entre elles et d'éviter la duplication des efforts. Cette initiative a pris tout son sens lors de la CdP-ex qui s'est tenue du 22 au 24 février à Bali et où s'est réuni pour la première fois l'ensemble des parties aux trois Conventions dans une lutte commune. Le Centre d'activités régionales pour la production propre (CAR/PP) y a participé en tant que Centre régional de la Convention de Stockholm.

Depuis sa création en 1996, le CAR/PP travaille sans relâche sur la gestion durable des substances chimiques. Néanmoins, c'est en 2009 que son implication a réellement pris de l'ampleur, grâce à sa reconnaissance officielle en tant que Centre régional de la Convention de Stockholm lors de la quatrième Conférence des Parties qui a eu lieu en mai 2009.

Au cours des dernières décennies, la préoccupation à propos des effets néfastes des polluants organiques persistants (POP) sur la santé des êtres humains et l'environnement n'a cessé de croître. La communauté internationale a défini ces composants comme étant un groupe de substances ayant quatre propriétés en commun : haute toxicité, persistance, volatilité et capacité à s'accumuler dans les tissus adipeux.

La Convention de Stockholm est le fruit de la volonté des Nations Unies d'éradiquer les POP par le biais de la restriction puis, à terme, de l'élimination de leur production, leur utilisation, leur émission et leur stockage. Elle a été ratifiée dans le cadre du Programme des Nations Unies pour l'Environnement (PNUE) en mai 2001, puis est entrée en vigueur le 17 mai 2004, devenant ainsi une réglementation internationale.

La Convention régulait tout d'abord l'utilisation de douze substances classées dans trois annexes, et ce en introduisant une interdiction internationale d'utiliser les POP répertoriés dans l'annexe A, en établissant des restrictions sur l'usage des POP figurant en annexe B et en instaurant un ensemble de mesures dont l'objectif est de minimiser les émissions non intentionnelles des substances incluses dans l'annexe C.

Depuis l'adoption de la Convention, plusieurs pays y ont adhéré en tant que membres. Ils ont été appelés à se réunir à quatre occasions afin d'établir un cadre d'actions et de réaliser un examen périodique de la mise en œuvre de la Convention. La modification de cette dernière, avec l'ajout de neuf autres POP, est l'un des aspects significatifs de la Conférence des Parties qui s'est tenue à Genève en mai 2009.

Sustancias químicas en el Mediterráneo: los convenios de Estocolmo y Basilea y el Reglamento REACH

Virginia Alzina

Directora
Centro de Actividad Regional para la Producción Limpia

El noveno número de la revista *CP/RAC Annual Technical Publication – Sustainable Consumption and Production in the Mediterranean* se destina a poner de relieve la importancia de la gestión racional de sustancias químicas en el Mediterráneo. Por ello, hace especial hincapié en las iniciativas existentes para aumentar el control y disminuir el uso de las sustancias químicas nocivas para el medio ambiente y la salud humana, como son los convenios de Estocolmo, Basilea y Róterdam y el Reglamento REACH (registro, evaluación, autorización y restricción de sustancias y preparados químicos). Desde principios de 2010, las partes participantes en los tres convenios unieron sus sinergias para colaborar entre ellas y evitar la duplicación de esfuerzos. Esta intención se vio culminada en la ExCOP celebrada del 22 al 24 de febrero en Bali, donde por primera vez todas las partes contratantes de los tres convenios se reunieron en una lucha común, y donde el Centro de Actividad Regional para la Producción Limpia (CAR/PL) estuvo presente como Centro Regional para el Convenio de Estocolmo.

El CAR/PL ha estado trabajando en la gestión sostenible de sustancias químicas desde su fundación, en 1996. Sin embargo, fue en el año 2009 cuando su implicación se hizo más relevante gracias al hecho de haber sido ratificado Centro Regional para el Convenio de Estocolmo, dentro de la cuarta Conferencia de las Partes celebrada en mayo de 2009.

A lo largo de las últimas décadas ha surgido una creciente preocupación por los efectos que los contaminantes orgánicos persistentes (COP) pueden causar en la salud de los seres humanos y del medio ambiente. Estos compuestos han sido identificados por la comunidad internacional como un grupo de sustancias que comparten cuatro propiedades: alta toxicidad, persistencia, volatilidad y capacidad de acumularse en tejidos grasos.

El Convenio de Estocolmo es fruto de la voluntad de las Naciones Unidas de tener un mundo libre de COP mediante la restricción y, finalmente, la eliminación de su producción, utilización, emisión y almacenamiento. Fue ratificado dentro del marco del Programa de las Naciones Unidas para el Medio Ambiente (PNUMA) en mayo de 2001 y entró en vigor el 17 de mayo de 2004, con lo que se convirtió en una ley internacional.

El Convenio empezó por regular 12 sustancias clasificadas en tres anexos, estableciendo la prohibición del uso intencional de los COP incluidos en el anexo A, restricciones sobre el uso de los COP incluidos en el anexo B y un conjunto de medidas cuyo objetivo es minimizar las emisiones no intencionadas de las sustancias incluidas en el anexo C.

Desde la adopción del Convenio, varios países se han adherido al mismo como miembros y han sido llamados a reunirse en cuatro ocasiones para establecer un marco de acción y realizar una revisión periódica de la implementación de Convenio. Uno de los aspectos destacados de la Conferencia de las Partes celebrada en Ginebra en mayo de 2009 fue la modificación del Convenio mediante la inclusión de otros 9 COP.

CAR/PP | présentation

Étant donnée l'implication du CAR/PP dans la Convention de Stockholm, le Centre met actuellement en place un réseau de collaborateurs, composé d'autres centres régionaux de la Convention de Stockholm, de centres pour la production propre et de centres régionaux de la Convention de Bâle, dans le but de collaborer et d'éviter ainsi la duplication des efforts, tout en favorisant les synergies avec les Conventions de Rotterdam et de Bâle, conformément à la résolution adoptée par les parties aux trois conventions.

La Convention de Barcelone traite également de thématiques liées à la gestion rationnelle des substances chimiques, grâce au Protocole « tellurique » (*LBS Protocol* en anglais). Ce protocole a été approuvé le 17 mai 1980 et modifié à diverses reprises. La dernière version, intitulée « Protocole relatif à la protection de la mer Méditerranée contre la pollution provenant de sources et activités situées à terre », est entrée en vigueur en mai 2008.

Plus précisément, lors de la seizième réunion des parties contractantes à la Convention de Barcelone qui s'est tenue en 2009, il a été décidé de promouvoir le rôle du CAR/PP, pour les questions liées à l'application du Protocole « tellurique ». Il a pour mission de faciliter l'indispensable coordination entre les centres régionaux méditerranéens en relation avec les Conventions de Stockholm et de Bâle ainsi que les centres œuvrant dans le domaine de la production propre dans la région méditerranéenne, afin d'élaborer des programmes conjoints.

Conformément aux obligations prévues par les deux Conventions (Barcelone et Stockholm), le CAR/PP travaille activement sur la gestion rationnelle des substances chimiques en Méditerranée. La présente revue illustre la volonté de trouver de nouvelles voies pour remporter cette bataille ainsi que pour la recherche et la transmission de l'information.

Le numéro 9 de la revue *CP/RAC Annual Technical Publication – Sustainable Production and Consumption in the Mediterranean,* intitulé « Substances chimiques en Méditerranée : les Conventions de Stockholm, de Bâle et le règlement REACH », débute par un article de fond émanant du secrétariat de la Convention de Stockholm, qui explique le rôle des centres régionaux de la Convention de Stockholm. Il détaille les démarches et les obligations que le CAR/PP a exécutées, et continue d'exécuter aujourd'hui, pour acquérir sa reconnaissance.

Le reste de la publication est composée de sections consacrées à la Convention de Stockholm, à celle de Bâle et au règlement REACH, avec des articles qui étudient la situation actuelle de la gestion des substances chimiques, qui relatent des expériences et qui apportent des idées neuves.

En guise de conclusion de cette publication, figure un article qui présente le thème de l'agriculture durable, en s'intéressant plus particulièrement à la culture du riz et en détaillant une expérience menée au Maroc.

Nous espérons que ce nouveau numéro vous intéressera et contribuera à élargir la perspective sur la gestion rationnelle des substances chimiques, compte tenu de son importance croissante et des initiatives qui voient le jour dans ce domaine.

Nous souhaitons adresser nos remerciements les plus sincères à tous les auteurs, qui, avec leurs articles, ont contribué à la création des contenus de la revue. Leur inestimable collaboration a rendu possible cette publication.

Nous profitons également de l'occasion pour décerner une mention spéciale aux points focaux nationaux du CAR/PP, en reconnaissance de leur précieux travail et de leur contribution à la promotion de la consommation et de la production durable, ainsi que de la gestion rationnelle des substances chimiques dans toute la région méditerranéenne.

L'équipe du CAR/PP vous souhaite une agréable lecture ■

CAR/PL | presentación

Dada la implicación del CAR/PL en el Convenio de Estocolmo, el Centro está estableciendo una red de colaboradores como otros centros regionales para el Convenio de Estocolmo, centros de producción más limpia, y centros regionales para el Convenio de Basilea, para conseguir colaboración y evitar así la duplicación de esfuerzos, promoviendo sinergias con los convenios de Róterdam y Basilea, según la resolución adoptada por los tres convenios.

El Convenio de Barcelona también está implicado en cuestiones relacionadas con la gestión racional de sustancias químicas mediante el Protocolo de fuentes terrestres (*LBS Protocol*, en inglés). Este protocolo fue aprobado el 17 de mayo de 1980 y modificado en diversas ocasiones. Su última versión, registrada como «Protocolo para la protección del mar Mediterráneo contra la contaminación causada por fuentes y actividades situadas en tierra», entró en vigor en mayo de 2008.

Precisamente el Convenio de Barcelona, en la decimosexta reunión de las partes contratantes, celebrada en 2009, decidió promover el papel del CAR/PL en cuestiones relacionadas con la aplicación del Protocolo de fuentes terrestres, con el fin de que facilite la necesaria coordinación de los centros regionales mediterráneos relacionados con los convenios de Estocolmo y Basilea y los centros que se ocupan de la producción limpia en la región mediterránea, con el fin de preparar programas conjuntos.

Siguiendo las obligaciones marcadas por ambos convenios (Barcelona y Estocolmo), el CAR/PL trabaja con energías renovadas para la gestión racional de las sustancias químicas en el Mediterráneo. Esta revista es un ejemplo de la voluntad de encontrar nuevas vías para seguir con esta lucha y para la búsqueda y transmisión de información.

El número 9 de la revista *CP/RAC Annual Technical Publication – Sustainable Production and Consumption in the Mediterranean,* que lleva por título «Sustancias químicas en el Mediterráneo: los convenios de Estocolmo y Basilea y el Reglamento REACH», comienza con un artículo de fondo aportado por el Secretariado del Convenio de Estocolmo que explica el rol de los centros regionales para el Convenio de Estocolmo. En él se pueden apreciar los pasos y obligaciones que el CAR/PL ha cumplido para lograr su reconocimiento y que sigue cumpliendo a día de hoy.

El grueso de la publicación se divide en secciones dedicadas al Convenio de Estocolmo, el Convenio de Basilea y el Reglamento REACH, con artículos que reflexionan sobre la situación actual de la gestión de sustancias químicas, que cuentan experiencias vividas y aportan nuevas ideas.

Como colofón a esta publicación se incluye un artículo que trata el fenómeno de la agricultura sostenible, entrando más específicamente en el cultivo del arroz y explicando una experiencia llevada a cabo en Marruecos.

Esperamos que este nuevo número sea de su interés y contribuya a ampliar la visión sobre la gestión racional de sustancias químicas respecto a su importancia creciente y las iniciativas que crecen a su alrededor.

Queremos expresar nuestro más sincero agradecimiento a todos aquellos autores que, con sus artículos, han contribuido a la creación de los contenidos de la revista. Su inestimable colaboración ha hecho posible esta publicación.

También aprovechamos la ocasión para dedicar una mención especial a los puntos focales nacionales del CAR/PL en reconocimiento a su valioso trabajo y su contribución en la promoción del consumo y la producción sostenibles y la gestión racional de sustancias químicas en toda la región mediterránea.

El equipo del CAR/PL les desea una agradable lectura ■

Role of Stockholm Convention regional centres in assisting Parties to implement the obligations under the Convention

Suman Sharma
Stockholm Convention Secretariat

Summary

A Convention signed by 151 governments in 2001 and ratified or acceded by169 Parties by 2010 is one of the fastest growing international agreement committed to protect human and environment from the adverse impact of dangerous group of chemicals called persistent organic pollutants. Besides the general objectives of the Convention, specific objectives, arrangements for the establishment and quality control mechanism of the regional centres under the Convention are discussed below.

Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants is an international treaty aimed at protecting human health and the environment from a group of chemicals known as persistent organic pollutants (POPs) by restricting and ultimately eliminating the production, use, trade, release and storage of such chemicals. Since these compounds possess toxic properties, resist degradation, bioaccumulation and are transported through air, water and migratory species, across international boundaries and deposited far from their place of release, where they accumulate in terrestrial and aquatic ecosystems rendering the whole world vulnerable to the contamination of these pollutants. Most of these chemicals were invented to serve mankind in wide range of areas; you name it, agriculture, public health, industry, power supply, fire retardant etc. A few of these are even generated unintentionally during combustion processes. With the widespread realization of their detrimental effects weighing very high over the benefit they provide, the world community decided to get rid of these compounds.

POPs under the Convention are essentially the chlorinated organic compounds. However not all chlorinated compounds are awfully bad many of them are still useful in wide range of human activities. The Convention therefore targeted to eliminate the first lot of twelve most toxic and persistent POPs, which are often referred as dirty dozen by establishing a dynamic mechanism of continued identification and enclosure of such chemicals under the Convention.

The chemicals of the first lot are Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene, Polychlorinated Biphenyls (PCBs), DDT, PCDD (Dioxin) and PCDF (Furans). Based on the provision of continued scrutiny of chemicals that are already in use but possessing the POPs characteristics, the Conference of the Parties in its fourth meeting, decided to add 9 more POPs into the existing list of POPs, which are: alpha hexachlorocyclohexane, beta hexachlorocyclohexane, chlordecone, hexabromobiphenyl, hexabromodiphenyl ether and heptabromodiphenyl ether, lindane, pentachlorobenzene, perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride, tetrabromodiphenyl ether and pentabromodiphenyl ether.

Most of these new POPs as that of the first lot are used in wide range of areas too! This is an ongoing process, so one can expect to see the list growing and the goal of which eventually will be to eliminate such chemicals from the world.

Stockholm Convention was adopted in Stockholm on May 23, 2001 and was signed by 151 governments. The Convention came into force from 17 May 2004. There are already 169 Parties to the Convention as of 23 March 2010. This is one of the most rapidly growing Conventions as well over 100 Parties ratified this Convention in less than 5 years.

Technical assistance and technology transfer a key programme

It is not at all easy to eliminate completely or stop abruptly the use of such a large number of chemicals, which were in use for decades virtually in every sphere of life. The developing countries find it very hard to cope with such a radical targets which have grave implications in their economy, technology, lifestyle etc. The Convention therefore made two prong approaches, identifying, regulating, controlling of the production and use of such chemicals in one hand coupled simultaneously with the provision of technical assistance and transferring the technologies to developing countries so that they can move side by side with developed countries to meet the challenging objectives of the Convention. In order to render the soundness to the technical assistance and technology transfer programme, the Convention has devised a financial mechanism of its own.

Thus complete elimination of the targeted chemicals apparently is an extremely tough task. This requires a good planning and sound resource base. The technical assistance and technology transfer programme in conjunction with the financial mechanism provide some assurance of meeting of the objectives of protecting human health and environment from the adverse effect of the POPs. The Convention envisions the institutional aspects of the technical assistance and technology transfer provision very clearly by stating, "the Parties shall establish, as appropriate, arrangements for the purpose of providing technical assistance and promoting the transfer of technology to developing country Parties and Parties with economies in transition relating to the implementation of this convention. These arrangements shall include regional and subregional centres for capacity-building and transfer of technology to assist developing country Parties and Parties with economies in transition to fulfill their obligations under this Convention. Further guidance in this regard shall be provided by the Conference of the Parties." This clearly shows that the responsibility of the centres is really enormous as they are the only institutions established by the Convention to assist Parties in implementing the Convention.

Regional Centres

The terms of reference of the regional centres and the guidance to the financial mechanisms, which were adopted by the subsequent meetings of the Conference of the Parties, clearly spelled out the interrelationships between these two processes. The regional centres will provide technical assistance and take initiatives to transfer the environmentally sound technologies in developing countries. The issue of technology transfer has always received high importance in the international negotiations. Many developing countries Parties have not been able to phase out their old less efficient technologies, which have long been obsolete in developed countries, rendering barrier in achieving the objectives of the Convention. One of

The issue of technology transfer has always recived high importance in the international negotiations

the objectives for the arrangement of financial mechanism under the Convention is to facilitate this transfer. Financial mechanism in collaboration with the regional centres is looked as a solid framework to ensure this transfer happening.

Selection process enhances the effectiveness of the regional centres

Different process and methods have been put up to enhance the effectiveness and efficiency in their performance of the centres. One such method is the selection process itself. Learning from the experiences of other international organizations operating regional bodies of their own, the Stockholm Convention adopted a method of selecting institutions from all possible sectors for the role of regional centres from among the existing and competent institutions fulfilling the criteria set out for the regional centres. The concept is very similar with contracting out of the task or outsourcing of the institution to carry out of certain task based on clearly defined terms of reference. This process relieves the Convention from its engagement in helping the centres themselves than helping Parties. Thus the Secretariat has a clear shift of focus, i.e. to provide tools and guidance to the centres for technical assistance and monitor their performances.

Another beauty of the selection process is that the onus of selecting right institution is on the Parties of the region nominating the centres. The nomination of the centre however should take into account the ability of such institution to fulfill the technical assistance and technology transfer needs as identified in the guidance of technical assistance, the compliance with the terms of reference for the centres and the ability to promote of efficiency and effective use of resources among other criteria. The nominating Parties will have opportunity to assess the performance of the centres and take decision whether they intend to keep or get rid of the centre in question. There is neither any deadlines for submitting nominations nor any restrictions in number to be nominated at any given time, this process thus allows Parties to correct their mistakes even if they had made one by not endorsing such centre any further. As there is no host government agreement or commitment towards the selected institution in the entire selection process, this calls the centres to prove themselves through their performance.

Current list of regional centres

The current list of centres for the period of 2009 – 2013 located in different regions is as follows:

Asia:

Basel Convention Regional Centre located in Tsinghua University, Beijing, China
Kuwait Institute of Scientific Research (KISR), Kuwait

Central and Eastern Europe:

Research Centre for Environmental Chemistry and Ecotoxicology (RECETOX), Brno, Czech Republic

Latin America and the Caribbean

Companhia Ambiental do Estado de São Paulo (CETESB), Sao Paulo, Brazil
National centre for environmental research and training (CENICA), Mexico
Centro de Investigacio e Informacion de Medicamentos y Toxicos (CIIMET), Panama
Basel Convention Coordination Centre for Latin America and the Caribbean housed in Uruguayan Technological Laboratory, Montevideo, Uruguay

Western European and other region
Cleaner Production Regional Activity Centre (CP-RAC), Barcelona, Spain

As the procedure discussed above for establishing regional centres clearly indicates that the list of the regional centres under the Convention may not remain static, for example, four centres that were nominated by the regions could not garner endorsement. There is a wide diversity in the expertise among these centres.Of the centres listed above, some of them have expertise in dealing with POPs wastes while others have expertise in environmental monitoring while some others have expertise in carrying out technical research and designing and conducting need based trainings, preparing training tools etc.

Transparency and information sharing

Centres upon coming into existence require preparing their work plans based on the needs identified in the region. Among sources of information about the needs of the Parties, consultation of the national implementation plans prepared by the Parties of their constituencies are of particular importance. However these plans need also to be approved by the Parties they serve and then communicated to the Secretariat. The Secretariat in its turn publishes the work plans including the activities reports, the information on expertise and infrastructure submitted by them for wider consultation.

Criteria for performance evaluation

There are clear set of criteria already developed for the evaluation of the performance of the centres. The criteria were adopted even before the centres came into existence. The elements of evaluation include skill of the centre in project identification, formulation and implementation, the quality and quantity of results produced, effectiveness of their undertaking, efficiency and transparency of operation, etc. The performance of every centre is measured against the evaluation criteria and the result of such evaluation serves the basis for endorsement of the centre for next term.

Cooperation and coordination

The centres are not left to operate in isolation within their niche but are encouraged and to communicate, collaborate and exchange their experience among themselves. The centres are mandated to work closely with other institutions those having similar agenda particularly those working in the field of management of chemicals and hazardous substances and wastes. Further, centres of a particular geographical regions not only required to define how they cooperate and collaborate with each other but also need to define what areas of specific expertise they for each other the propose collectively. This process not only promotes cooperation among the centres but at the same time promotes the healthy competition for resources, establishing their expertise among other things.

Way forward the synergy decisions

Three Conventions on chemical and waste clusters, namely, Basel Convention on control of transboundary movement of hazardous wastes and their disposal,

Rotterdam Convention on prior inform consent procedure in international trade for certain chemicals and Stockholm Convention on persistent organic pollutants made separately by their respective COPs but an identical decision, popularly known as "synergy decision". The decision, inter alia, calls for the coordinated use of regional centres and offices to avoid duplication of efforts and maximizing the benefits to the Parties. Recently held extraordinary meetings of the conference of the Parties of the three Conventions held in February 2010 in Bali paves further the way for cooperation and coordination between the centres within all three Conventions.

For detailed information on the regional centres please visit to www.pops.int ■

Le rôle des centres régionaux de la Convention de Stockholm dans les initiatives visant à aider les parties à mettre en œuvre leurs obligations au titre de la Convention

Suman Sharma

Résumé

La Convention signée par 151 gouvernements en 2001 et ratifiée ou ayant reçu l'adhésion de 169 parties en 2010 est un des accords internationaux qui s'étend le plus rapidement. Elle a pour objet de protéger l'être humain et l'environnement de l'impact négatif d'un groupe de produits chimiques dangereux appelés polluants organiques persistants. Outre les objectifs généraux de la Convention, les paragraphes suivants analysent ses objectifs spécifiques, ses plans de mise en œuvre et un mécanisme de contrôle de qualité des centres régionaux en vertu de la Convention.

La Convention de Stockholm

La Convention de Stockholm sur les polluants organiques persistants est un traité international visant à protéger la santé humaine et l'environnement d'un groupe de produits chimiques connus comme les polluants organiques persistants (POP) en limitant et, en fin de compte, en éliminant la production, l'emploi, la libération et le stockage de ces produits chimiques. Ces composés possèdent en effet des propriétés toxiques, résistent à la dégradation, se bioaccumulent, et sont transportés au-delà des frontières internationales par l'air, l'eau et les espèces animales migratoires, pour être finalement déposés loin de leur lieux d'origine et s'accumuler dans des écosystèmes terrestres et aquatiques en rendant la totalité de l'environnement vulnérable à la pollution de ces produits. La plupart de ces produits chimiques ont été inventés pour être mis au service de l'espèce humaine dans un grand nombre d'applications, à savoir l'agriculture, la santé publique, l'industrie, l'énergie, les substances ignifuges, etc. Certains de ces produits sont même générés involontairement dans le cadre de processus de combustion. Les effets nuisibles généralisés qu'ils exercent étant beaucoup plus nombreux que les avantages qu'ils apportent, la communauté mondiale a décidé de se débarrasser de ces composés.

Selon la Convention, les POP sont pour l'essentiel des composés organiques chlorés. Néanmoins, tous les composés chlorés ne sont pas si mauvais, et bon nombre d'entre eux sont encore utiles dans le vaste spectre des activités humaines. C'est la raison pour laquelle la Convention s'est fixé comme objectif d'éliminer le premier lot des douze POP les plus toxiques et persistants, qu'on appelle souvent les « douze salopards », en établissant un mécanisme dynamique d'identification et de confinement permanent de ces produits chimiques au titre de la Convention.

Les produits chimiques du premier lot sont : aldrine, chlordane, DDT, dieldrine, Dioxines, endrine, furanes, heptachlore, hexachlorobenzène (HCB), mirex, Biphényles polychlorés (PCB) et toxaphène En se fondant sur la réalisation d'un examen minutieux et continu des produits chimiques qui sont déjà utilisés mais

Contribución de los centros regionales del Convenio de Estocolmo en apoyo de las Partes con el fin de implantar las obligaciones previstas en el Convenio

Suman Sharma

Resumen

El Convenio, firmado por 151 gobiernos en 2001 y ratificado o suscrito por 169 Partes en 2010, es el acuerdo internacional sobre compromisos de protección del ser humano y el medio ambiente frente a los efectos adversos de un peligroso grupo de productos químicos llamado contaminantes orgánicos persistentes que mayor expansión registra. A continuación se analizan, además de los objetivos generales del Convenio, otros objetivos concretos, planes de establecimiento y un mecanismo de control de calidad para los centros regionales en virtud del Convenio.

Convenio de Estocolmo

El Convenio de Estocolmo sobre contaminantes orgánicos persistentes es un tratado internacional cuyo objetivo es proteger la salud humana y el medio ambiente de un grupo de sustancias químicas conocidas como contaminantes orgánicos persistentes (COP) mediante la restricción y, en última instancia, eliminación de la producción, el empleo, el comercio, la liberación y el almacenamiento de dichos productos. Estos compuestos resultan tóxicos, resisten la degradación, se bioacumulan, son transportados por el aire, el agua y las especies migratorias más allá de las fronteras internacionales y se depositan lejos de su lugar de origen, donde se acumulan en ecosistemas terrestres y acuáticos, por lo que provocan que todo el mundo sea vulnerable a su contaminación. La mayoría de estas sustancias químicas se inventaron para ayudar al ser humano en distintos campos, a saber, la agricultura, la salud pública, la industria, el suministro energético, la protección frente a incendios, etc. Algunas de ellas incluso se generan de forma fortuita durante los procesos de combustión. Todo ello ha llevado a la comunidad mundial, ante el convencimiento generalizado de que sus efectos perniciosos superan con creces los beneficios, a decidir abandonar dichos compuestos.

Los COP que recoge el Convenio son, básicamente, compuestos organoclorados. Sin embargo, no todos los compuestos clorados resultan manifiestamente perniciosos; de hecho, muchos de ellos siguen teniendo aplicación en actividades humanas muy diversas. Por ello el Convenio se centró en eliminar en primer lugar un conjunto inicial formado por los doce COP más tóxicos y persistentes (a menudo llamados «la docena sucia») mediante el establecimiento de un mecanismo dinámico de identificación y aislamiento continuados de esos productos químicos presentes en el Convenio.

Los productos químicos que integran ese primer grupo son los siguientes: aldrina, clordano, dieldrina, endrina, heptacloro, hexaclorobenceno, Mirex, toxafeno, bifenilos policlorados (PCB), DDT, PCDD (dioxinas) y PCDF (furanos). Basándose en el requisito de vigilancia constante de los productos químicos en uso actualmente

possèdent des caractéristiques similaires à celles des POP, la quatrième réunion de la Conférence des parties a décidé d'ajouter 9 autres POP à la liste des POP existants : Alpha-hexachlorocyclohexane, Beta-hexachlorocyclohexane, chlordécone, hexabromobiphényle, hexabromodiphényléther et heptabromodiphényléther, lindane, pentachlorobenzène, acide perfluorooctane sulfonique, ses sels et fluorure de perfluorooctane sulfonique, tétrabromodiphényléther et pentabromodiphényléther.

Tout comme ceux du premier lot, la plupart de ces nouveaux POP sont également utilisés dans un grand nombre de domaines ! Il s'agit d'un processus qui est toujours en cours, de sorte que l'on peut s'attendre à voir la liste s'allonger et à ce que son objectif devienne éventuellement d'éliminer ces produits chimiques de la surface de la terre.

La Convention de Stockholm a été adoptée à Stockholm le 23 mai 2001 et signée par 151 gouvernements. La convention est entrée en vigueur le 17 mai 2004. En date du 23 mars 2010, il y avait déjà 169 parties à la Convention. Il s'agit d'une des Conventions qui s'étendent le plus rapidement, puisque plus de 100 parties ont ratifié cette dernière en moins de 5 ans.

L'assistance technique et le transfert de technologie comme programme clé

Il n'est pas du tout facile d'éliminer complètement ou d'interrompre brusquement l'utilisation d'un nombre aussi élevé de produits chimiques qui étaient utilisés depuis des décennies dans pratiquement tous les aspects de la vie. Les pays en développement ont beaucoup de mal à faire face à de tels objectifs radicaux qui ont de graves conséquences sur leur économie, leur technologie, le mode de vie, etc. C'est pourquoi la Convention a abordé deux approches frontales du problème, d'une part en identifiant, en réglementant et en contrôlant la production et l'utilisation de ces produits chimiques, et de l'autre en offrant son assistance technique et en assurant le transfert de technologie pour les pays en développement, de manière à ce que ces derniers puissent progresser aux côtés des pays développés et affronter les objectifs et les défis de la Convention. Afin de renforcer son programme d'assistance technique et de transfert de technologie, la Convention a conçu un mécanisme financier propre.

L'élimination complète des produits chimiques ciblés semble donc constituer une tâche extrêmement ardue. Elle exige une bonne planification et une base de ressources solide. Associé au mécanisme financier, le programme d'assistance technique et de transfert de technologie offre certaines garanties de pouvoir atteindre les objectifs de protection de la santé humaine et de l'environnement contre les effets néfastes des POP. La Convention envisage les aspects institutionnels de l'apport de l'assistance technique et du transfert de technologie d'une façon très claire en déclarant « Les Parties prennent, le cas échéant, des dispositions pour fournir une assistance technique et favoriser le transfert de technologie aux Parties qui sont des pays en développement ou à économie en transition, en vue de l'application de la présente Convention. Ces dispositions comprennent la création de centres régionaux et sous-régionaux pour le renforcement des capacités et le transfert de technologie afin d'aider les Parties qui sont des pays en développement ou à économie en transition à s'acquitter de leurs obligations au titre de la Convention. La Conférence des Parties donnera des directives supplémentaires en la matière ». Ceci démontre sans équivoque que la responsabilité des centres est réellement immense, puisque ces derniers sont les seules institutions mises en place par la Convention pour aider les Parties à appliquer celle-ci.

Les centres régionaux

Les termes de référence des centres régionaux et les directives concernant les mécanismes financiers, qui ont été adoptés lors de

que comparten características con los COP, la Conferencia de las Partes decidió, en su cuarto encuentro, añadir 9 COP más a la lista existente, en concreto: alfa-hexaclorociclohexano, beta-hexaclorociclohexano, clordecona, hexabromobifenilo, éter de hexabromodifenilo y éter de heptabromodifenilo, lindano, pentaclorobenceno, ácido perfluorooctano sulfónico, sus sales y fluoruro de perfluorooctano sulfonilo, éter de tetrabromodifenilo y éter de pentabromodifenilo.

La mayoría de estos nuevos COP, al igual que los pertenecientes al primer conjunto, también tienen numerosas aplicaciones. En cualquier caso, al tratarse de un proceso en marcha, cabe esperar que la lista siga creciendo hasta lograr el objetivo final de eliminar del mundo este tipo de productos químicos.

El Convenio de Estocolmo fue aprobado en Estocolmo el 23 de mayo de 2001 y firmado por 151 gobiernos. Entró en vigor el 17 de mayo de 2004. A día 23 de marzo de 2010 ya integraban el Convenio 169 Partes, lo que lo convierte en uno de los convenios que mayor crecimiento ha experimentado, puesto que ha sido ratificado por 100 Partes en menos de 5 años.

Asistencia técnica y transferencia de tecnología: un programa crucial

No resulta en absoluto sencillo eliminar por completo o detener drásticamente el empleo de tantos productos químicos que llevan décadas utilizándose en prácticamente todas las esferas. En los países en vías de desarrollo el cumplimiento de objetivos tan radicales es especialmente complicado, ya que tiene graves implicaciones para sus economías, tecnologías, estilos de vida, etc. Ello ha llevado al Convenio a preparar un doble enfoque basado, por un lado, en la identificación, la regulación, el control de la producción y el uso de dichos compuestos químicos y, por el otro, en facilitar al mismo tiempo asistencia técnica y transferencia de tecnologías a los países en vías de desarrollo para que puedan avanzar junto a los desarrollados en el cumplimiento de los ambiciosos objetivos del Convenio. A fin de materializar el programa de asistencia tecnológica plena y de transferencia de tecnología, el Convenio ha diseñado un mecanismo financiero propio.

Al parecer, la eliminación total de los productos químicos señalados es una tarea extremadamente difícil. Requiere una buena planificación y una sólida base de recursos. El programa de asistencia técnica y transferencia de tecnología, junto con el mecanismo financiero, suponen cierta garantía de cumplimiento de los objetivos de protección de la salud humana y el entorno de los efectos adversos de los COP. El Convenio prefigura los aspectos institucionales de la asistencia técnica y la transferencia de tecnología de forma clara señalando que «las Partes, cuando corresponda, concertarán arreglos con el fin de prestar asistencia técnica y promover la transferencia de tecnologías a las Partes que son países en desarrollo y a las Partes con economías en transición en relación con la aplicación del presente Convenio. Estos arreglos incluirán centros regionales y subregionales para la creación de capacidad y la transferencia de tecnología con miras a ayudar a las Partes que son países en desarrollo y a las Partes con economías en transición a cumplir sus obligaciones emanadas del presente Convenio. La Conferencia de las Partes proveerá más orientación a este respecto» Así pues, resulta evidente que la responsabilidad de los centros es en realidad enorme, ya que son las únicas instituciones establecidas por el Convenio para ayudar a las Partes a implantarlo.

Centros regionales

El mandato de los centros regionales y la orientación hacia los mecanismos financieros, adoptados en sucesivas reuniones de la Conferencia de las Partes, indicaron claramente la imbricación

réunions ultérieures de la Conférence des parties, expliquaient bien clairement l'interrelation entre ces deux processus. Les centres régionaux offrent leur assistance technique et prennent des initiatives pour transférer des technologies respectueuses de l'environnement aux pays en développement. Une grande importance a toujours été accordée à la question du transfert de technologie dans les négociations internationales. De nombreux pays en développement n'ont pas été capables d'éliminer progressivement leurs vieilles technologies moins efficaces, qui étaient depuis longtemps devenues obsolètes dans les pays développés, ce qui constituait un obstacle à la réalisation des objectifs de la Convention. Un des objectifs pour la mise en place de mécanismes financiers au titre de la Convention consiste à favoriser ce transfert. Le mécanisme financier mis en place en collaboration avec les centres régionaux est considéré comme un cadre solide pour garantir que ce transfert aura effectivement lieu.

Le processus de sélection accroît l'efficacité des centres régionaux

Différents processus et méthodes ont été mis au point pour renforcer l'efficacité des activités réalisées par les centres. Une de ces méthodes réside dans le processus de sélection lui-même. En apprenant des expériences d'autres organisations internationales dirigeant des corps régionaux propres, la Convention de Stockholm a adopté une méthode de sélection d'institutions appartenant à tous les secteurs possibles, pour faire assumer le rôle de centres régionaux par les institutions existantes et compétentes réunissant les critères définis pour les centres régionaux. Le concept est très similaire à celui de contracter la tâche ou de sous-traiter l'institution pour mener certaines tâches à bien sur la base de termes de référence parfaitement définis. Ce processus soulage la Convention de son engagement d'aider les centres eux-mêmes, puis d'aider les Parties. Le Secrétariat poursuit par conséquent un objectif bien défini, à savoir fournir des outils et des directives aux centres d'assistance technique, ainsi que superviser les résultats de ces derniers.

Un autre point fort du processus de sélection réside dans le fait que la responsabilité de la sélection de l'institution correcte incombe aux Parties de la région qui désigne les centres. La désignation du centre doit cependant tenir compte de la capacité de l'institution en question à satisfaire les besoins d'assistance technique et de transfert de technologie, tels qu'identifiés dans les directives d'assistance technique, de sa conformité aux termes de référence pour les centres, de même que de sa capacité à promouvoir l'efficacité et l'utilisation efficace des ressources, entre autres critères. La Partie qui désigne un centre a l'opportunité d'évaluer l'efficacité de ce dernier et de décider si elle doit tenter de conserver le centre concerné ou se débarrasser de celui-ci. Il n'y a ni dates butoirs pour soumettre des désignations ni restrictions d'aucune sorte quant au nombre de désignations, à aucun moment, ce processus permettant dès lors aux Parties de corriger leurs erreurs même si celles-ci ont été commises du fait de cesser de soutenir un centre. Puisqu'il n'existe aucun accord d'un gouvernement hôte ou engagement envers l'institution sélectionnée à aucun moment du processus de sélection, les centres sont ainsi appelés à faire leurs preuves par le biais de leurs performances.

Liste actuelle des centres régionaux

Voici la liste actuelle des centres situés dans différentes régions pour la période 2009 – 2013 :

Asie :

Centre régional de la Convention de Bâle à l'Université Tsinghua, Pékin, Chine

existente entre ambos procesos. Los centros regionales proporcionarán asistencia técnica y pondrán en marcha iniciativas para transferir tecnologías seguras y respetuosas con el medio ambiente a los países en desarrollo. La cuestión de la transferencia de tecnología siempre ha sido muy relevante en las negociaciones internacionales. Muchas Partes que son países en desarrollo no han sido capaces de retirar progresivamente las viejas tecnologías, menos eficientes y obsoletas desde hace mucho en los países desarrollados, lo que supone una barrera para el cumplimiento de los objetivos del Convenio. Uno de los objetivos previstos en la redacción del Convenio para los arreglos financieros es facilitar dicha transferencia. El mecanismo financiero, juntamente con los centros regionales, se consideran el marco estable desde el que garantizar la efectividad de la transferencia.

El proceso de selección potencia la efectividad de los centros regionales

Son varios los procesos y métodos instaurados para potenciar la efectividad y la eficacia de funcionamiento de los centros regionales. Uno de ellos es el propio proceso de selección. Gracias a experiencias anteriores de otros organismos internacionales basados en entidades regionales propias, el Convenio de Estocolmo adoptó un método de selección que incluía instituciones de todos los sectores posibles que cumpliesen los criterios establecidos para los centros regionales. Es un concepto muy parecido al de contratación externa o subcontratación de la institución para que lleve a cabo una serie de tareas de acuerdo con un mandato bien definido. Este proceso libera al Convenio de su compromiso al ayudar a los propios centros en vez de a las Partes. De este modo cambia claramente el enfoque de la secretaría, que pasa a proporcionar herramientas y a orientar a los centros en materia de asistencia técnica y a evaluar su rendimiento.

Otra de las virtudes del proceso de selección es que la responsabilidad de seleccionar instituciones adecuadas recae en las Partes de la región que nombra a los centros. Con todo, el nombramiento del centro debería tener en cuenta la capacidad de la institución de satisfacer las necesidades de asistencia técnica y transferencia de tecnología previstas, el cumplimiento del mandato dirigido a los centros y la capacidad de fomentar la eficiencia y el uso efectivo de recursos, entre otros criterios. Las Partes encargadas del nombramiento tendrán la oportunidad de evaluar el rendimiento de los centros y decidir si desean mantener o prescindir de los centros en cuestión. No se establecen ni fechas límite para la presentación de nombramientos ni restricciones en el número de centros en ningún momento, por lo que el proceso permite a las Partes subsanar sus errores, incluso los que tengan que ver con haber prescindido de algún centro. Al no existir acuerdos con el país huésped ni compromisos hacia la institución elegida en todo el proceso de selección, son los mismos centros los que deben aseverar su buen rendimiento.

Lista de centros regionales actuales

La lista de centros de las distintas regiones para el período 2009-2013 es la siguiente:

Asia:

Centro Regional del Convenio de Basilea ubicado en la universidad Tsinghua, Pekín, China

Kuwait Institute of Scientific Research (KISR), Kuwait

Europa central y oriental:

Research Centre for Environmental Chemistry and Ecotoxicology (RECETOX), Brno, República Checa

América Latina y el Caribe:

Companhia Ambiental do Estado de São Paulo (CETESB), São Paulo, Brasil

Institut koweïtien de recherche scientifique (KISR), Koweït

Europe centrale et de l'Est :

Centre de recherche en chimie environnementale et écotoxicologie (RECETOX), Brno, République tchèque

Amérique latine et Caraïbes :

Agence environnementale de l'État de Sao Paulo (CETESB), Brésil

Centre national de recherche et de formation sur les questions environnementales (CENICA), Mexique

Centre de recherche et d'information sur les médicaments et les produits toxiques (CIIMET), Panama

Centre de coordination de la Convention de Bâle pour l'Amérique latine et les Caraïbes, Laboratoire technologique uruguayen, Montevideo, Uruguay

Europe occidentale et autres régions :

Centre d'activités régionales pour la production propre (CAR-PP), Barcelone, Espagne

Comme le révèle la procédure de détermination des centres régionaux exposée plus haut, la liste des centres régionaux au titre de la Convention peut ne pas rester statique : par exemple, quatre centres qui avaient été désignés par les régions n'ont pas pu bénéficier de soutien. L'expertise de ces centres est très variée. Parmi les centres énumérés ci-avant, certains sont spécialisés dans le traitement des déchets de POP, tandis que d'autres sont experts dans le contrôle environnemental et d'autres sont spécialistes de la recherche technique ou de la définition et de la réalisation de formations basées sur les besoins, de la préparation d'outils de formation, etc.

Transparence et partage d'informations

Les centres ci-dessus qui ont vu le jour doivent préparer leurs plans de travail en se fondant sur les besoins identifiés dans la région. Parmi les sources d'information relatives aux besoins des parties, la consultation des plans d'implantation nationaux préparés par les Parties de leur rayon d'action sont d'une importance toute particulière. Mais ces plans doivent également être approuvés par les Parties dont ils dépendent, puis communiqués au Secrétariat. Le Secrétariat publie à son tour les plans de travail en incluant les rapports d'activités, les informations concernant l'expertise et les infrastructures soumises par ceux-ci, pour une consultation plus étendue.

Critères d'évaluation des performances

Il existe un ensemble défini de critères déjà développés en vue de l'évaluation des performances des centres. Ces critères ont été adoptés avant même que les centres ne soient créés. Les éléments d'évaluation incluent l'aptitude du centre pour l'identification, la formulation et l'implantation du projet, la qualité et la quantité des résultats produits, l'effectivité de son engagement, l'efficacité et la transparence de la mise en œuvre, etc. Les performances de chacun des centres sont mesurées selon les critères d'évaluation et le soutien ultérieur du centre dépend du résultat de cette évaluation.

Coopération et coordination

Les centres ne sont pas livrés à eux-mêmes pour travailler dans leur propre niche, mais bien encouragés à communiquer, à collaborer et à échanger leur expérience entre eux. Les centres sont obligés de travailler en étroite collaboration avec d'autres institutions, dont celles possédant un objet similaire et, notamment, celles qui travaillent dans le domaine de la gestion des produits chimiques ainsi que des substances et déchets dangereux. Par ailleurs, les centres de régions géographiques particulières non

Centro Nacional de Investigación y Capacitación Ambiental (CENICA), México

Centro de Investigación e Información de Medicamentos y Tóxicos (CIIMET), Panamá

Centro Coordinador del Convenio de Basilea para América Latina y el Caribe, con sede en el Laboratorio Tecnológico del Uruguay de Montevideo

Estados de Europa occidental y otros Estados:

Centro de Actividad Regional para la Producción Limpia (CAR-PL), Barcelona, España

Dado que el proceso de establecimiento de centros regionales descrito más arriba indica claramente que la lista de centros emanada del Convenio no puede permanecer estática, por ejemplo, cuatro de los centros nombrados por las regiones no obtuvieron la aprobación. El nivel de experiencia y conocimientos de dichos centros es muy variable. Algunos tienen experiencia en hacer frente a los residuos de los COP, otros en el seguimiento ambiental, y otros en desarrollar investigaciones técnicas y diseñar e impartir formación basada en las necesidades, preparar herramientas de aprendizaje, etc.

Transparencia e información compartida

En el momento de instituir un centro es necesario preparar los planes de trabajo correspondientes, de acuerdo con las necesidades detectadas en la región. Entre las fuentes de información sobre las necesidades de las Partes reviste especial importancia la consulta de los planes de implantación nacional elaborados por las Partes de sus circunscripciones. Estos planes, sin embargo, también deben ser aprobados por las Partes afectadas y comunicarse posteriormente a la Secretaría. La Secretaría, por su parte, publica los planes de trabajo, incluidos los informes de actividad y la información sobre infraestructuras y experiencia y conocimientos presentados para que se sometan a mayor escrutinio.

Criterios de evaluación del rendimiento

Existen una serie de criterios definidos recopilados a fin de evaluar el rendimiento de los centros. Se trata de criterios adoptados antes incluso de que los centros iniciaran su andadura. Entre los elementos de evaluación destacan la capacidad del centro a la hora de identificar, formular e implementar proyectos, la cantidad y la calidad de los resultados obtenidos, la efectividad de las tareas realizadas, la eficiencia y transparencia del funcionamiento, etc. El rendimiento de cada centro se compara con los criterios de evaluación y el resultado sirve de base para la sucesiva aprobación.

Colaboración y coordinación

Los centros no operan en solitario dentro de su campo de acción, sino que se les alienta a entablar comunicación y a colaborar y compartir experiencias entre ellos. Los centros reciben el mandato de trabajar codo con codo con otras instituciones de agendas parecidas, en especial aquellas que se dedican a la gestión de productos químicos y a las sustancias y residuos peligrosos. Por otra parte, los centros de regiones geográficas concretas no sólo deben definir cómo colaboran y se coordinan entre ellos, sino también para qué áreas de conocimiento concretas se proponen unos a otros. Y es que el proceso no se limita a fomentar la cooperación entre centros, sino que al mismo tiempo promueve una sana competencia por los recursos basada, entre otras cosas, en el establecimiento del nivel de conocimientos y experiencia.

seulement sont obligés de définir leur manière de coopérer et de collaborer avec les autres, mais ils doivent également définir pour quels domaines d'expertise spécifique ils se proposent les uns aux autres. Ce processus favorise non seulement la coopération entre les centres, mais en même temps une compétition saine pour les ressources, en établissant entre autres leur expertise.

La voie vers la synergie décisionnelle

À travers leurs COP respectives, trois Conventions sur les groupes de produits chimiques et de déchets, à savoir la Convention de Bâle sur le contrôle des mouvements transfrontaliers de déchets dangereux et de leur élimination, la Convention de Rotterdam sur la procédure de consentement préalable en connaissance de cause applicable à certains produits chimiques et pesticides dangereux qui font l'objet d'un commerce International, et la Convention de Stockholm sur les polluants organiques persistants, ont séparément pris une décision identique populairement connue comme la « synergie décisionnelle ». Entre autres, la décision appelle à une utilisation coordonnée des centres et des bureaux régionaux afin d'éviter la duplication des efforts et de maximiser les avantages pour les Parties. Des réunions extraordinaires de la conférence des parties des trois Conventions, tenues récemment en février 2010 au Bali, ouvrent davantage la voie à la coopération et à la coordination entre les centres au sein des trois Conventions.

Pour en savoir plus concernant les centres régionaux, visitez le site *www.pops.int* ■

Las decisiones sinérgicas: un nuevo camino

Tres convenios sobre grupos de productos y residuos químicos, el Convenio de Basilea sobre el control de los movimientos transfronterizos de los desechos peligrosos y su eliminación, el Convenio de Rótterdam para la aplicación del procedimiento de consentimiento fundamentado previo a ciertos plaguicidas y productos químicos peligrosos objeto de comercio internacional y el Convenio de Estocolmo sobre contaminantes orgánicos persistentes, adoptaron en sus CP respectivas una decisión idéntica, lo que popularmente se llama «decisión sinérgica». Dicha decisión, entre otras cuestiones, exige el uso coordinado de los centros y oficinas regionales para evitar la duplicación de esfuerzos y maximizar las ventajas para las Partes. Las reuniones extraordinarias de la Conferencia de las Partes de los tres convenios celebradas recientemente en Bali (febrero de 2010) allanan aún más el camino a la cooperación y a la coordinación entre los centros de los tres convenios.

Si desea obtener información más detallada sobre los centros regionales visite la página web *www.pops.int* ■

The success to battling persistent organic pollutants starts with a strong foundation

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Persistent organic pollutants (POPs) are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms, and are toxic to humans and wildlife. In order to effectively manage POPs at the national level, through implementation of the Stockholm Convention, it is essential to have a strong chemicals management foundation in place. Ensuring adequate human resources, technical and legal infrastructure, project planning and implementation skills, and funds are just some of the basic components necessary to effective implementation of the Convention.

Keywords: Stockholm Convention, persistent organic pollutants, integrated chemicals management.

Le succès de la lutte contre les polluants organiques persistants commence par l'établissement de bases solides

Les polluants organiques persistants (POP) sont des substances chimiques qui persistent dans l'environnement. Ils se répandent largement du point de vue géographique et s'accumulent dans les tissus adipeux des organismes vivants. Ils sont toxiques pour l'homme, la faune et la flore. Pour gérer les POP d'une manière efficace à l'échelle nationale, via l'implantation de la Convention de Stockholm, il est essentiel de disposer de bases solides de gestion des produits chimiques. Des ressources humaines adéquates, des infrastructures techniques et juridiques appropriées, de bonnes aptitudes de planification et d'implantation de projets et des fonds ne sont que quelques-uns des composants nécessaires pour garantir une implantation efficace de la Convention.

Mots clés : Convention de Stockholm, polluants organiques persistants, gestion intégrée des produits chimiques.

Combatir con éxito los contaminantes orgánicos persistentes requiere una buena base

Los contaminantes orgánicos persistentes (COP) son compuestos químicos que permanecen inalterados en el ambiente durante largos períodos, muestran una gran distribución geográfica, se acumulan en los tejidos grasos de los seres vivos y resultan tóxicos para los humanos y la fauna. Para poderlos gestionar eficazmente a escala nacional a través de la implantación del Convenio de Estocolmo resulta esencial que exista una base de gestión de productos químicos sólida. Disponer de los recursos humanos, la infraestructura técnica y legal, la capacidad para planificar e implementar proyectos y la financiación adecuados son sólo algunos de los aspectos básicos necesarios para la implantación efectiva del Convenio.

Palabras clave: Convenio de Estocolmo, contaminantes orgánicos persistentes, gestión integral de productos químicos.

Introduction

The Stockholm Convention on Persistent Organic Pollutants (POPs) is a global treaty to protect human health and the environment from highly dangerous, long-lasting chemicals by restricting and ultimately eliminating their production, use, trade, release, and storage. The Convention initially targets 12 POPs, which include pesticides such as DDT and chlordane; industrial chemicals such as polychlorinated biphenyls (PCBs); and unintentional by-products of industrial processes such as dioxins and furans. In May 2009, the fourth meeting of the Conference of the Parties agreed to list nine new chemicals in the Convention. Entering into force in May of 2004, there are currently 169 Parties to the Convention.

National implementation of the Stockholm Convention or any chemicals-related multilateral environmental agreement is greatly assisted if a basic, but sound chemicals management infrastructure is in place. This is often a considerable challenge in many developing countries. An important aspect of strengthening national chemicals management is the need to develop an integrated programme which covers and links all aspects of the chemical life-cycle including production, import, export, storage, transport, distribution, use, and disposal of chemicals. This is also a key message of the Strategic Approach to International Chemicals Management (SAICM), a policy framework adopted by the International Conference on Chemicals Management (ICCM) in February 2006 in Dubai.

Current chemicals management efforts tend to be based on a sectoral approach, are media specific (e.g. addressing separately air, water, and land), and may focus on controlling individual stages of the chemical life-cycle without adequate consideration of possible linkages and opportunities for an integrated approach. This has often led to inadvertent substitution of one problem for another one. Other challenges include issues of misuse and diversion of chemicals from their intended use; as well as the potential for chemical accidents at all stages of the life-cycle.

National Chemicals Management Profiles

The preparation of a "National Profile" serves as a useful tool in providing a comprehensive picture of the national infrastructure and capacity for the sound management of chemicals and waste. It provides the basis for establishing national priorities for action, as well as the context in which chemicals-related international agreements, such as the Stockholm Convention, may be implemented. Through systematically documenting the national infrastructure for the management of chemicals, the National Profile facilitates the identification of existing gaps and weaknesses. It covers all stages of the chemical life-cycle; related priority concerns; chemicals-related legislation and non-regulatory mechanisms; responsibilities and activities of govern-

mental and non-governmental bodies; existing interministerial bodies and national coordinating mechanisms; available data sources; technical infrastructure; chemical emergency preparedness, response, and follow up; awareness, training, and education; and resources available and needed.

The process of preparing a National Profile is often as important as the document itself. Not only does it promote the integration of scattered information into one single national document; it also initiates a comprehensive and transparent process to define national priorities and enhance cooperation of all interested parties within and outside of government. Periodic updating of the National Profile helps to maintain its value and strengthen the network of the contributing parties. A *National Profile Guidance Document* (originally issued in 1996) has been prepared by the United Nations Institute for Training and Research (UNITAR) and the Inter-Organization Programme for the Sound Management of Chemicals (IOMC). (A revised Guidance Document is expected in 2010.) UNITAR in cooperation with the United Nations Environment Programme (UNEP) prepared companion guidance in 2003 on preparing/updating a National Profile as part of Stockholm Convention National Implementation Plan (NIP) development efforts.

During the last decade, over 100 countries have received technical and financial support to prepare National Profiles. Guidance material and intellectual support has been provided in Arabic, English, French, Russian, and Spanish. To-date, 139 countries, including several OECD Member States, have prepared or are preparing a National Profile following the UNITAR/IOMC Guidance. Many completed National Profiles Countries are hosted on the UNITAR/European Chemicals Bureau (ECB) "National Profile Homepage" *(www.unitar.org/cwm/nationalprofile-homepage)*.

With the financial support of the GEF and donor countries, UNITAR has assisted some 30 countries with National Profile development as a first step in the development of their NIP; 55 countries with action plan development to assist with NIP development; and 8 countries with in-depth NIP development. This included, for example, co-executing the Union of Comoros' NIP project; providing skills-building on many aspects of NIP development, inventory compilation, and capacity gap assessment in Pakistan; assisting Mozambique with national priorities and objectives, identification of POPs management options, training on cost benefit analysis, and evaluation of costs and benefits of management options; supporting Thailand regarding priority assessment, objectives setting, and NIP formulation; and providing pre-NIP training and assistance to Bhutan on National Profile development and priority setting. In the Mediterranean Region, UNITAR has been cooperating with the Barcelona Regional Activity Centre for Cleaner Production in supporting Malta with National Profile preparation and national priority setting, and there are plans for future cooperation in the Region.

Text Box 1. International cooperation

The Inter-Organization Programme for the Sound Management of Chemicals (IOMC) is the pre-eminent mechanism for initiating, facilitating, and coordinating international action to achieve the WSSD 2020 goal for sound management of chemicals. The seven Participating Organisations are the:

- Food and Agriculture Organization of the United Nations (FAO)
- International Labour Organization (ILO)
- United Nations Environment Programme (UNEP)
- United Nations Industrial Development Organization (UNIDO)
- United Nations Institute for Training and Research (UNITAR)
- World Health Organization (WHO)
- Organisation for Economic Co-operation and Development (OECD)

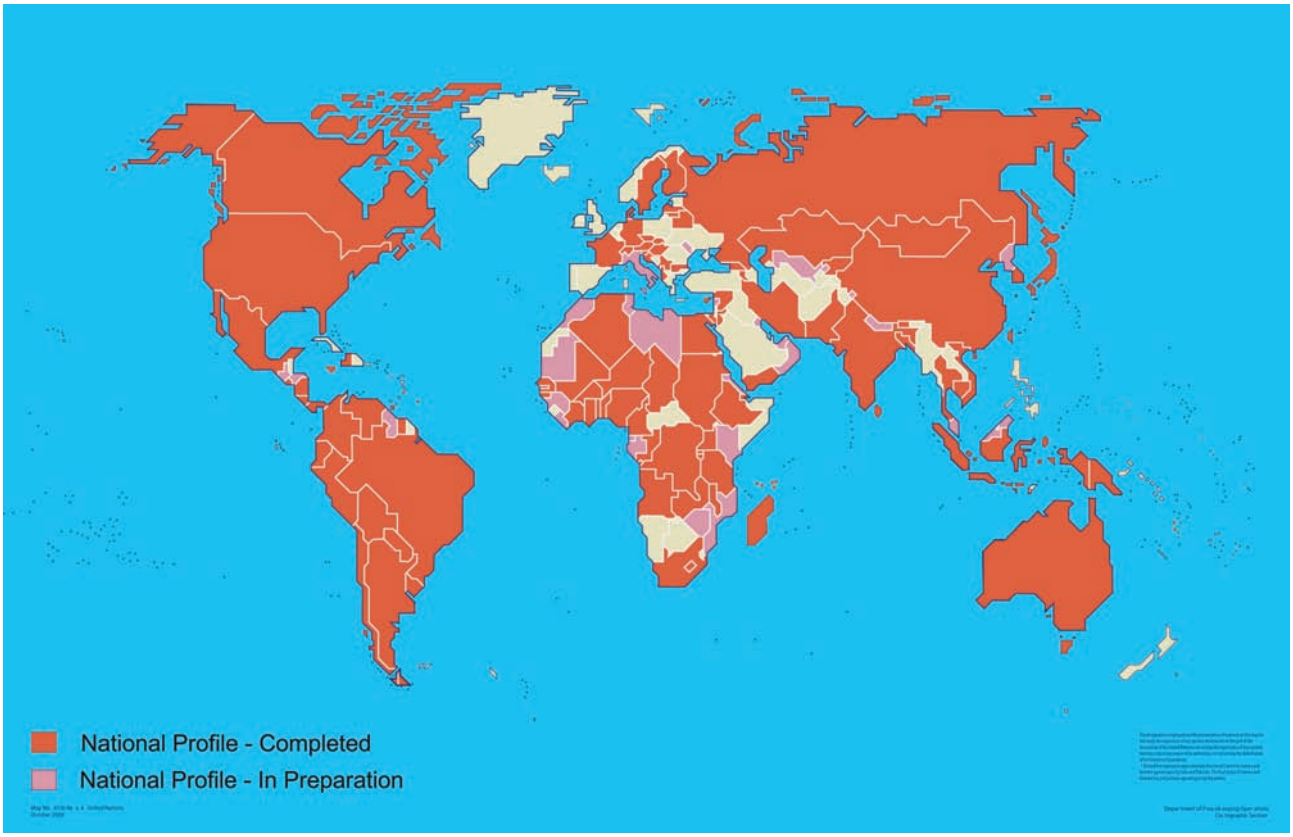
In addition, two observer organizations are also participating in the IOMC:

- United Nations Development Programme (UNDP)
- World Bank

Strengthening the Foundation and Building upon It

Following an assessment of a country's particular situation, a number of steps can be taken to build that critical chemicals management foundation and support Convention implementation, from planning activities—such as strengthening national coordination and information exchange; priority-setting; NIP preparation and action plan development for implementing specific requirements of the Convention; and risk management decision making—to more targeted implementation activities, such as PCB elimination; legislation and policy development, including enforcement; and other institutional strengthening such as implementing Pollutant Release and Transfer Registers (PRTRs) and the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

National Profile Preparation Worldwide



National coordination—including the participation of civil society in the implementation of the Convention—is crucial to minimizing the risks posed by industrial pollutants. In many countries, effective coordination even among key ministries within a government does not exist. For example, many ministries have overlapping responsibilities regarding certain POPs. In some countries DDT is used illegally for agricultural purposes, while it is legally used for combating malaria. Thus, customs officials, the agricultural ministry, and the health ministry may all have competing mandates regarding DDT. Effective coordination is therefore essential. It is hoped that the Convention will provide some incentive to build new relationships and strengthen existing ones—all with the goal of implementing the Convention for society as a whole.

At a more technical level, PRTRs—a catalogue or database of releases and transfers of potentially harmful chemicals, including information on the nature and quantity of such releases and transfers—will allow countries to comply with Stockholm Convention requirements on updating implementation plans (Article 7), exchanging information (Article 9), facilitating public information, awareness, and education (Article 10) and reporting to the Secretariat. UNITAR is currently executing a GEF-supported global pilot project which will demonstrate the value of using PRTRs as a monitoring and reporting system for POPs at the country level in the Latin America and Caribbean region (Chile, Ecuador, and Peru), Central and Eastern Europe region (Kazakhstan and Ukraine), and Asia Pacific (Cambodia and Thailand), and at the regional level in Central America, involving five countries: Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua. Additionally, UNITAR is assisting other countries including Georgia and Panama, under the SAICM Quick Start Programme Trust Fund, to develop PRTRs.

> **In some countries DDT is used illegally for agricultural purposes, while it is legally used for combation malaria**

Another tool that can assist with Stockholm Convention implementation is the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). The GHS is a new internationally-agreed tool for chemical hazard communication, incorporating harmonized chemical hazard classification criteria and provisions for standardised labels and safety data sheets. Implementation of the GHS and sound chemical hazard communication requires initiatives, activities and capacities for three distinct actors: government, business and industry, and public interest and labour organisations. In addition, the provisions of the GHS affect chemical hazard communication in four key sectors at the national level; they include: industrial workplace,

agriculture, transport, and consumer products.

The GHS provides countries with a key chemical's hazard communication mechanism to ensure that those using chemicals are informed of the potential hazards and have guidance concerning their safe use, including response following exposure or release, in a comprehensive manner. Countries are encouraged to implement the System using local languages and the use of pictograms and symbols helps non-literate users of chemicals to better understand the hazards. Global harmonization of the System also facilitates trade in chemicals and promotes their enhanced sound management. UNITAR is assisting the implementation of GHS in all regions of the world, including specific projects in ASEAN, China, Jamaica, and Uruguay.

The recent addition of nine new chemicals to the Stockholm Convention presents an important opportunity to enhance the capacity building efforts mentioned above. For example, NIPs will need to be updated, at which time National Profiles may also be updated, and countries will need to increase their capacities related to the management of these POPs. Increased efforts to strengthen coordination and information exchange may also be necessary. As some of these newly added POPs are more commercially relevant than the original 12—with production (intentionally or as by-products) and use still taking place—this creates a significant entry point for strengthening the engagement of business and industry. In addition, the implementation of the GHS (and related training for workers on labels and safety data sheets) is particularly relevant as a means to strengthen control measures before the new POPs are eliminated.

Lessons Learned

UNITAR is currently reviewing the lessons learned from these various activities with developing countries and

those in economic transition, particularly the preparation of National Profiles. Through the National Profile and Stockholm NIP processes, countries have identified "gaps" at various stages of chemicals and waste management, prioritised concerns reflecting human health and environment impacts, and subsequently agreed on policies and practical and timely actions to address and resolve them. The lessons learned include the following:

• Importance of establishing an inclusive national coordination team at the policy-level to coordinate all relevant activities.

• Significance of widespread involvement of all relevant stakeholders inside and outside of government including industry, NGOs, and civil society in general to develop agreed policy initiatives.

• Requirements for a sound and effective legal framework covering all aspects of chemicals management are considered essential, as relevant laws are commonly outdated, fragmented, incomplete, and/or not adequately enforced.

• Gathering of data and information and its access by stakeholders has commonly revealed gaps, overlaps between ministries, and lack of systematic approaches by many stakeholder groups towards collecting and validating such data and information.

• Examination of data and information on chemicals throughout their life-cycle revealed gaps, and/or overlaps, in information while its accuracy and reliability was often questionable. Hazardous waste information is commonly lacking in many countries. Adequate local databases, chemical registers, and national inventories, as well as access to international data, have been acknowledged in many countries as basic unfulfilled needs.

• Technical infrastructure, including poison control centres, chemicals emergency response facilities, and adequate laboratory services are often weak or nonexistent and need strengthening.

• Awareness of chemicals and waste management issues both at the level of the public and decision-makers is severely lacking in most countries and there needs to be changes in behaviour of people to embrace a chemicals "safe use" society.

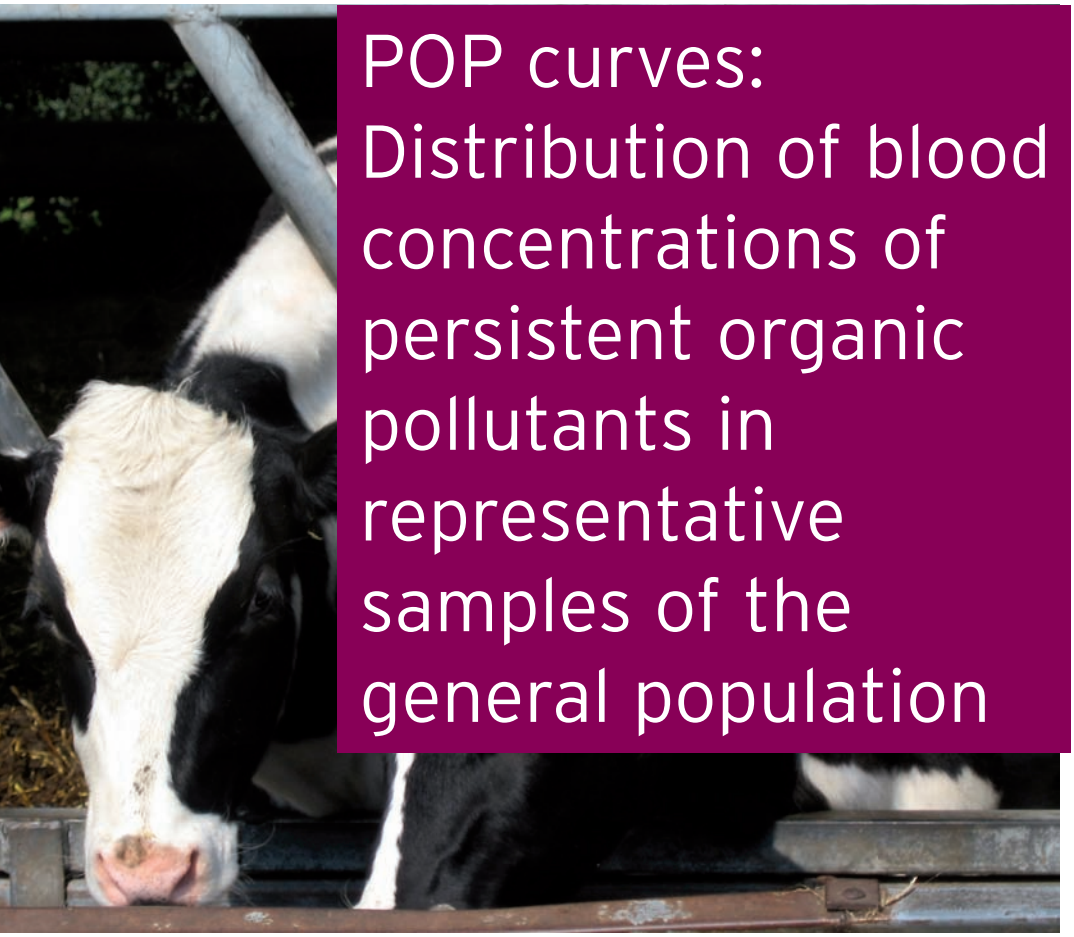
> "National Profiles will need to be regularly updated and new action plans and approaches developed for tackling the emerging issues and challenges"

Future Prospects

The implementation of the Stockholm Convention is an ongoing process and the requirements are being expanded as additional POPs are identified for inclusion. International efforts are also underway to ensure greater cooperation and coordination among the main chemicals-related international agreements, such as the simultaneous extraordinary meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions, held in Bali, Indonesia, from 22 to 24 February 2010.

At the national level, strengthening the foundation of chemicals management will be the key to meeting convention obligations and national priorities. For example, National Profiles will need to be regularly updated and new action plans and approaches developed for tackling the emerging issues and challenges. In countries where the infrastructure to protect human health and the environment from toxic chemicals is scarce to nonexistent, international agreements such as the Stockholm Convention provide an unprecedented opportunity for action.

The views expressed are those of the authors and do not necessarily reflect the views of UNITAR and the United Nations ■



POP curves: Distribution of blood concentrations of persistent organic pollutants in representative samples of the general population

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There is little as individuals we can do to decrease our personal accumulation of persistent organic pollutants (POPs). Prevention of human POP contamination cannot be treated as an individual problem; rather, population strategies are required. It is hence surprising that systems that monitor human contamination by POPs in a representative sample of the general population are so scarce worldwide, and that few efforts have been devoted to the representation and analysis of the full population distribution of POP concentrations in humans. "POP Geoffrey Rose curves" help visualize that such distributions stem from and belong to a population, and emphasize the importance of shifting the whole distribution of POP concentrations through public and private policies (e.g., policies to decrease contamination of animal feed and human food, industrial emissions and residues).

Keywords: human biomonitoring; global health; health survey; persistent organic pollutants; pesticide residues; environmental pollutants / toxicity / prevention and control; environmental exposure / adverse effects; human samples; general population.

Distribution des concentrations de polluants organiques persistants dans le sang dans des échantillons représentatifs de la population générale

À titre individuel, il y a peu à faire pour réduire notre accumulation personnelle de polluants organiques persistants (POP). La prévention de la contamination humaine par les POP ne peut pas être abordée comme un problème individuel ; au contraire, des stratégies sont nécessaires au niveau de la population. Il est dès lors surprenant que les systèmes qui contrôlent la contamination humaine par les POP dans un échantillon représentatif de la population générale soient tellement rares dans le monde, et qu'aussi peu d'efforts aient été consacrés à la représentation et à l'analyse de la distribution des concentrations de POP chez les humains dans l'ensemble de la population. « Les courbes de POP de Geoffrey Rose » contribuent à faire comprendre que ces distributions proviennent et appartiennent à la population, et mettent l'accent sur l'importance du fait de changer la distribution totale des concentrations de POP par le biais de politiques publiques et privées (par exemple des politiques visant à réduire la contamination de l'alimentation humaine et animale, les émissions industrielles et les déchets).

Distribución de la concentración en sangre de contaminantes orgánicos persistentes en muestras representativas de la población general

Poco podemos hacer las personas para reducir la acumulación de contaminantes orgánicos persistentes (COP) en nuestro organismo. La prevención de la contaminación causada por estos compuestos en las personas no puede tratarse como un problema aislado, sino que se necesitan estrategias dirigidas a la población. Por eso resulta tan sorprendente que los sistemas de seguimiento de la contaminación por COP en humanos a partir de muestras representativas de la población general sean tan escasos en el mundo y que se hayan dedicado tan pocos esfuerzos a la representación y el análisis de la distribución total entre la población humana de las concentraciones de COP. Las «curvas de Geoffrey Rose» ayudan a constatar que las distribuciones se originan en una población y son propias de ésta; además, enfatizan la importancia de modificar por completo la distribución de las concentraciones de COP a través de políticas públicas y privadas (por ejemplo, dirigidas a reducir la contaminación en los alimentos destinados a las personas y los animales, emisiones industriales o residuos).

Persistent organic pollutants (POPs) as dioxins, dichlorodiphenyltrichloroethane (DDT), hexachlorobenzene (HCB), hexachlorocyclohexanes (HCHs), and polychlorinated biphenyls (PCBs) are highly lipophilic and resistant to degradation; they thus bioaccumulate in the environment, food chains and living organisms, and are known or reasonably suspected to harm human health [1-8]. Their potential adverse effects include neurotoxicity [6,9], endocrine disruption and reproductive disorders [10-12], cardiovascular effects [4,6,13], and carcinogenicity (through a variety of mechanisms, including indirect, non-genotoxic mechanisms) [14-18]. As a consequence, many of these global and local (glocal) contaminants have been targeted for elimination or reduction by governments, and treaties as the Stockholm convention encourage countries to integrate population-based surveillance of POP levels in humans within their health monitoring schemes [3,8,19]. It is hence surprising that systems that monitor human contamination by POPs in a representative sample of the general population are so scarce worldwide [1].

In the general population, lifelong accumulation of POPs is largely the result of low-dose contamination of fatty foods [4-7,13,20-23]. There is little individuals can do to decrease personal exposure over the long term, and prevention of human POP contamination cannot be treated simply as an individual problem; rather, population strategies are required [1,24,25]. Therefore, it is also surprising that few efforts have been devoted to a rigorous representation and analysis of the full population distribution of POP concentrations in humans. It is also remarkable how little is known on the properties of such distributions.

Since the end of World War II, vast changes have occurred in human exposure to POPs in most populations worldwide: while the body burden of many compounds (e.g., some organochlorines) first increased and then decreased, levels of other POPs seem stagnant, and new synthetic chemicals as flame retardants have in recent years contaminated humans [1-7]. Surveillance of such patterns has seldom been undertaken on a nationwide, continued basis, and the generalizability of many studies is often limited [1,4,26-28]. Certainly, concentrations have been assessed in etiological studies and in some programs based on volunteers and convenience samples [1]. Surprisingly, however, only the USA and Germany regularly monitor POP concentrations in representative samples of the general population [4,7,29-36].

> **Human contamination by persistent organic pollutants (POPs) cannot be treated just as an individual problem**

Monitoring programs are useful to quantify trends and patterns of human exposure to human POPs and other environmental chemical agents, to identify highly exposed minorities [8,26,27,37], and as a framework to evaluate health impacts and the effectiveness of policies aimed at decreasing exposure to POPs [7,37,38].

Plotting the curves

Density plots can be used to chart the distributions of POP body concentrations in the different age and sex population groups. We name these graphs "POP Geoffrey Rose curves" to emphasize the analogy with the 'popula-

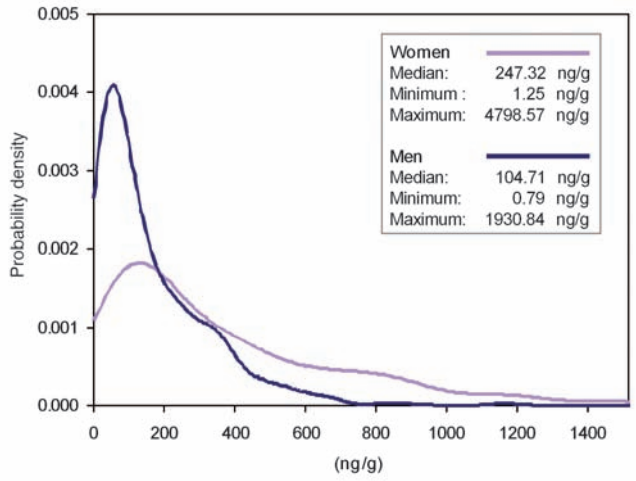
tion strategy' of the British epidemiologist (1926-1993) [1,24,25]. Several properties of the curves are interesting; e.g., kurtosis, skewness, and coefficient of variation. Kurtosis is a measure of the peakedness or sharpness of the peak of a distribution curve, i.e., of the extent to which the curve is flatter or more peaked. Skewness is a measure of asymmetry in frequency distributions, i.e., the degree to which frequencies trail towards extreme scores in one direction away from the majority of cases. The normal distribution is symmetric and thus has zero skewness.

In many populations wolrdwide there are huge interindividual differences in POP concentrations. In the general population of Catalonia, for instance, the highest individual concentration of p,p'-DDE (9036.01 ng/g) is over 7700 times higher than the lowest (1.17 ng/g); for HCB the corresponding values are 4798.57 and 0.79 ng/g (a 6000-fold difference), and for, β-HCH, 2716.16 and 1.35 ng/g (2000-fold). Figure 1 shows the population distribution of HCB concentrations by sex. They were significantly higher in women than men even after adjusting by age and BMI.

Figure 2 shows the distribution of p,p'-DDE by age group; with respect to older groups, the distribution of youngest individuals leans towards the left (lower DDE levels). There is a progressive flattening of the curves with increasing age. The kurtosis of each of the two younger groups is higher than that of the two older groups; i.e., in the younger groups DDE concentrations cluster more around a few values than in the older groups. Furthermore, the skewness of the distribution of the two younger groups is about twice as large than that of the two older groups. In addition, the coefficient of variation of the distribution of DDE decreases from the younger to the older groups. This phenomenon can be summarised as: curve flattening, decreasing kurtosis, decreasing skewness, and decreasing coefficient of variation in increasingly older groups.

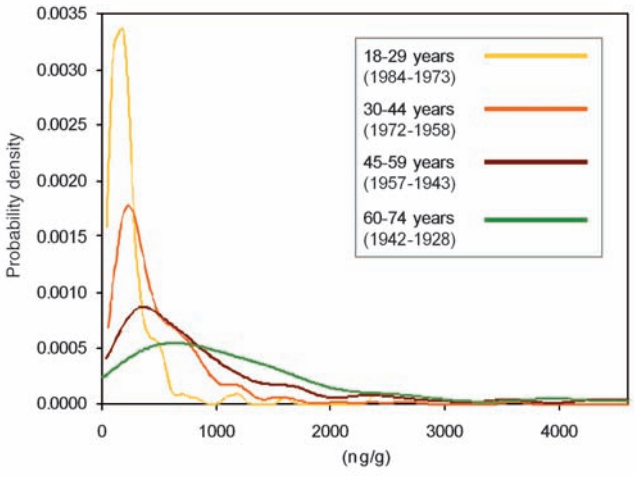
In many studies worldwide, the median, mean, geometric mean, standard deviation, maximum value, 25th percentile and 75th percentile of commonly detected POPs usually in-

Figure 1. Distribution of serum concentrations of hexachlorobenzene in Catalonia by sex



The curves include 99% of the population with lower concentrations

Figure 2. Distribution of concentrations of dichlorodiphenyldichloroethene (p,p'-DDE) in Catalonia



Figures in brackets are the corresponding birth years of each age group (number of subjects: 919)

crease with increasing age group. Sometimes, a remarkable exception is the minimum value (the lower individual concentration of a POP), which may be quite similar in all age groups; i.e., among middle-aged and older subjects, a minority fails to accumulate the higher amounts of each POP that a majority accrues. This facet of the problem coexists with the fact that a vast majority of the population has much lower concentrations of POPs than a certain minority.

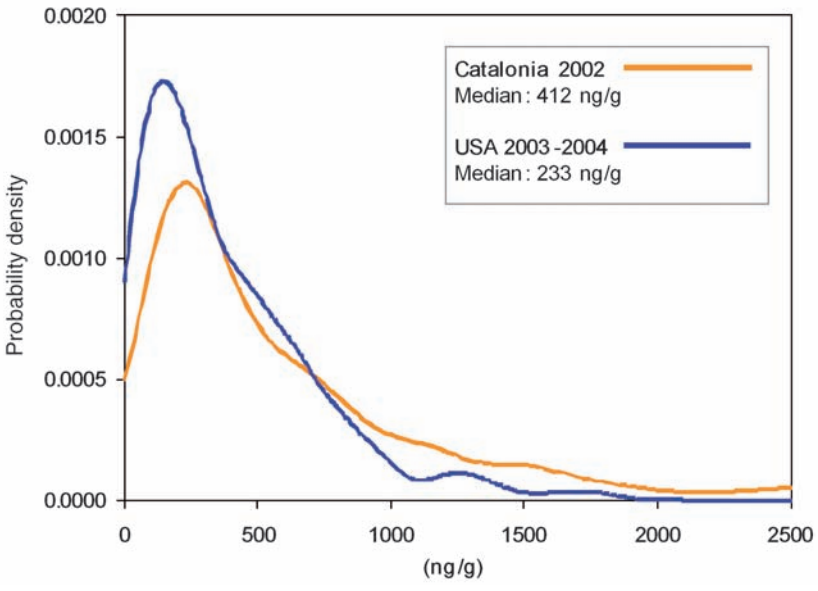
POP Geoffrey Rose curves

While several programs have yielded relevant information, there are very few reports worldwide based on a representative sample of the general population [1-8,28,32-36,41]. We suggest there is a need to focus on the whole population distributions of POP concentrations and their properties. A distribution may seem a simple representation if viewed only from a technical angle. However, as conceived, drawn and interpreted in this article, distributions of POP concentrations clearly stem from and belong to a population, they reflect the inherently population nature of the issues at stake, and thus convey pedagogically a core message: individual concentrations of POPs result from societal processes, there is little an individual can do to decrease personal exposure, and POP contamination cannot be viewed just as an individual problem. Our "POP Geoffrey Rose curves" emphasize the importance of shifting the whole population distribution of POP concentrations through public and private policies (e.g., policies to decrease contamination of animal feed and human food, industrial emissions and residues) [24,25].

When we compare POP curves of different regions it is important to remember that differences may partly be explained by subtle differences in laboratory and epidemiologic methods (e.g., the age range of participants), as well as by the ethnic composition of each country [1,7]. Although the US reports and the Germany surveys do not present the full distribution of POP concentrations, they do offer selected percentiles; from such data the distribution in the US and German populations can be estimated. Figure 3 shows the distributions of serum concentrations of p,p'-DDE in the USA and Catalonia. The shapes are remarkably similar, although the US curve trails further towards the left than the curve for Catalonia: there is a higher proportion of Americans in the zone of lower p,p'-DDE values and a higher proportion of Catalans with higher concen-

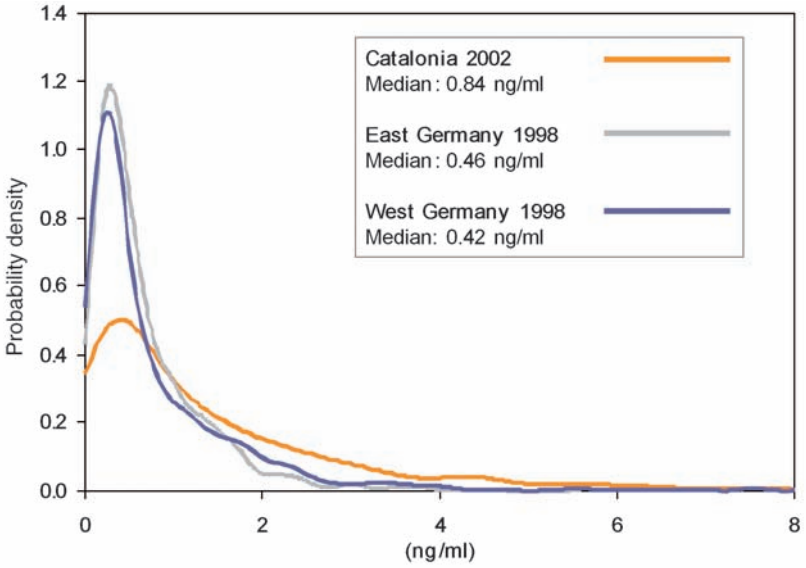
> **"Shifting the population distribution of POP concentrations requires more energetic public and private policies"**

Figure 3. Distribution of concentrations of dichlorodiphenyldichloroethene (p,p'-DDE) in the populations of USA and Catalonia



Catalonia: population from 20 to 74 years of age;
USA: population ≥ 20 years

Figure 4. Distribution of concentrations of hexachlorobenzene in the populations of Germany and Catalonia



All three curves refer to the population from 18 to 69 years of age

trations. As compared with the raw means or medians the curves convey much better the exposure of the whole population.

Levels of HCB and, β-HCH in Catalonia are higher than in USA and Germany. Figure 4 shows the distribution of serum concentrations of HCB in the Catalan and German (East and West) populations: the shape of the two German distributions is similar, and so is the long right tail of the three curves; with respect to the German curves, the curve for Catalonia is shifted towards higher concentrations.

Shifting the population distribution of a POP towards the left decreases the percent of the population under the right end of the tail, it lowers the mean and median values, and it may substantially decrease the percent of the population under the area of intermediate concentrations. Certainly, for many POPs the risk function is incompletely known. While the minority of the population with higher concentrations is of concern, the long-term health effects of lifelong low concentrations are not negligible [16-18].

Virtually all populations worldwide bear a body burden of environmental chemicals –with large interindividual and inter-population differences [1-6]. Programs that monitor such distributions in a representative sample of the general population are essential to establish reference levels, to analyze predictors of exposure, to increase public awareness, to stimulate prevention policies and, hence, to diminish the burden of disease that these chemicals contribute to cause.

Acknowledgements

The authors gratefully acknowledge scientific and technical assistance from Elisa Puigdomènech, Magda Bosch de Basea, Montserrat Guillén, Mercè Garí, Joan Grimalt, Esther Bigas and Ricard Tresserras.

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Acknowledgements

The authors gratefully acknowledge technical assistance from Elisa Puigdomènech, Magda Bosch de Basea, Montserrat Guillén, Mercè Garí, Joan Grimalt, Esther Bigas and Ricard Treserras ■

This article includes excerpts from an original paper published by the authors in the journal Environment International (doi:10.1016/j.envint.2010.04.013).

The Green Screen for Safer Chemicals: charting the path to safer chemicals in products

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Mark Rossi,
Beverley Thorpe
Clean Production Action

Chemical pollution is a pervasive and global concern and is linked to human health illnesses and environmental degradation. As public concern grows many companies and governments are working to phase out known hazardous chemicals. But the main question remains: how can safer chemicals be clearly defined and selected? The Green Screen for Safer Chemicals provides a path to inherently safer chemical choices by benchmarking and ranking chemicals based on their inherent hazards. The Green Screen has now been adopted by Hewlett Packard as their primary tool to enable informed substitution for substances eliminated from HP products. The Green Screen approach has also been integrated into Wal-Mart's chemical screening tool for suppliers and some governments have now endorsed the Green Screen as a robust chemicals assessment tool. Clean Production Action is committed to keeping the Green Screen open, transparent and publicly available to increase the availability of safer, healthier products.

Keywords: Green Screen, substitution, chemical assessment, green chemistry, chemical hazards, safer products, HP, Wal-Mart.

The Green Screen for Safer Chemicals : planifier l'évolution vers des produits chimiques plus sûrs dans les produits

La pollution chimique est une inquiétude omniprésente et globale qui est liée aux maladies humaines et à la dégradation de l'environnement. Puisque la préoccupation du public grandit, de nombreuses entreprises et gouvernements travaillent pour éliminer progressivement les produits chimiques dangereux connus. Mais la question principale continue à être la suivante : comment définir clairement et sélectionner des produits chimiques plus sûrs ? The Green Screen for Safer Chemicals ouvre une voie vers des choix de produits chimiques plus sûrs par nature en comparant et en classant les produits chimiques en fonction de leurs dangers inhérents. Le Green Screen a maintenant été adopté par Hewlett Packard comme son outil principal pour permettre de remplacer en connaissance de cause les substances éliminées des produits de HP. L'approche du Green Screen a également été intégrée dans l'outil de screening chimique de Wal-Mart pour les fournisseurs, et certains gouvernements ont même appuyé le Green Screen en tant qu'outil robuste d'évaluation des produits chimiques. L'action pour la production plus propre s'est engagée à laisser le Green Screen ouvert, transparent et accessible au public pour augmenter la disponibilité de produits plus sûrs et plus sains.

The Green Screen for Safer Chemicals: una iniciativa que abre la puerta al uso de productos químicos más seguros

La contaminación química es motivo de gran preocupación a escala mundial y guarda relación con enfermedades del ser humano y la degradación del medio ambiente. A medida que la preocupación pública crece son muchas las empresas y gobiernos que tratan de suprimir paulatinamente los compuestos químicos peligrosos conocidos. Sin embargo, la gran cuestión sigue siendo cómo definir y elegir con claridad los productos químicos más seguros. The Green Screen for Safer Chemicals es una iniciativa que permite elegir con mayor seguridad los productos químicos al definirlos de acuerdo con categorías y clasificaciones en función de su peligrosidad. Ha sido adoptada recientemente por Hewlett Packard, que la utiliza como herramienta principal para sustituir de forma fundamentada las sustancias eliminadas de los productos HP. La estrategia Green Screen también se ha integrado en el sistema de cribado químico que Wal-Mart utiliza con sus proveedores; también algunos gobiernos han adoptado Green Screen por ser una herramienta segura para la evaluación de productos químicos. Clean Production Action se ha comprometido a que Green Screen sea una iniciativa abierta, transparente y disponible para el público con el fin de lograr una mayor disponibilidad de productos más seguros y saludables.

The chemical experiment on living systems

Diseases of our modern age are increasingly linked to toxic chemicals in the environment. As this awareness increases, the public want products and the chemistry behind them to be safe and healthy for their children, communities, and themselves. Manufactured chemicals are essential ingredients in the products of the twenty first century economy. Today global production of chemicals totals over 300 million tons per year[1] and global chemical sales approach two trillion dollars per year[2]. Carpets, cars, trains, buses, televisions, computers, fabrics, lights, and even food are among the many products made with manufactured chemicals. But some chemicals are known bad actors: they pose serious risks to human health and the environment. Lead, cadmium, DDT, CFCs, and PCBs are examples of hazardous chemicals that should not be in products. Chemicals that persist, bioaccumulate, and are toxic are dusted across the globe. The vast majority, if not all, humans and mammals, are contaminated with human-made chemicals. Literally every person on the planet carries industrial chemicals that were not present 100 years ago. Some of these chemicals have the potential to cause cancer or adverse effects to the brain, normal development, or the endocrine, reproductive, and immune system. The result is a vast chemical experiment with unknown consequences. How can industry and society move to safer chemical production and use and how do we define 'safer'?

Defining Safer Chemicals

Paul Anastas and John Warner sketched the terrain for defining safer chemicals in 1999 with the publication of their concise and influential book, *Green Chemistry: Theory and Practice*[3]. Their 12 principles of green chemistry include the need to design chemicals with little or no inherent toxicity and to design chemical products to break down to innocuous substances after use so that they do not accumulate in the environment. Green chemistry does not follow the traditional approach of attempting to reduce exposure to hazardous chemicals; rather it attempts to design chemicals with inherently safer properties. The success of green chemistry will hinge on changing the intrinsic nature of chemicals so that they are inherently safer for human health and the environment. This reinforces the definition of pollution prevention as defined in the US Pollution Prevention Act of 1990, which defines pollution prevention (also known as source reduction) as any practice that "reduces the hazards to public health and the environment.[4]"

Choosing Safer Chemicals

For companies, however, the real issue is how to select safer chemicals? These companies are chemical and material "choosers" who depend on suppliers for providing raw material options. Their challenge is to identify greener chemicals and materials for use in their products and processes and a significant challenge for them is how to determine if a chemical is in fact "greener". The Green Screen for Safer Chemicals provides such an an-

[1] S. Davis and J. Lacson. 2005. "Petrochemical Industry Overview" in the Chemicals Economic Handbook. Palo Alto: SRI Consulting.

[2] US Department of Energy. 2004. Chemicals Industry Analysis Brief (http://www.eia.doe.gov/ emeu/mecs/iab98/chemicals/index.html—accessed April 2010).

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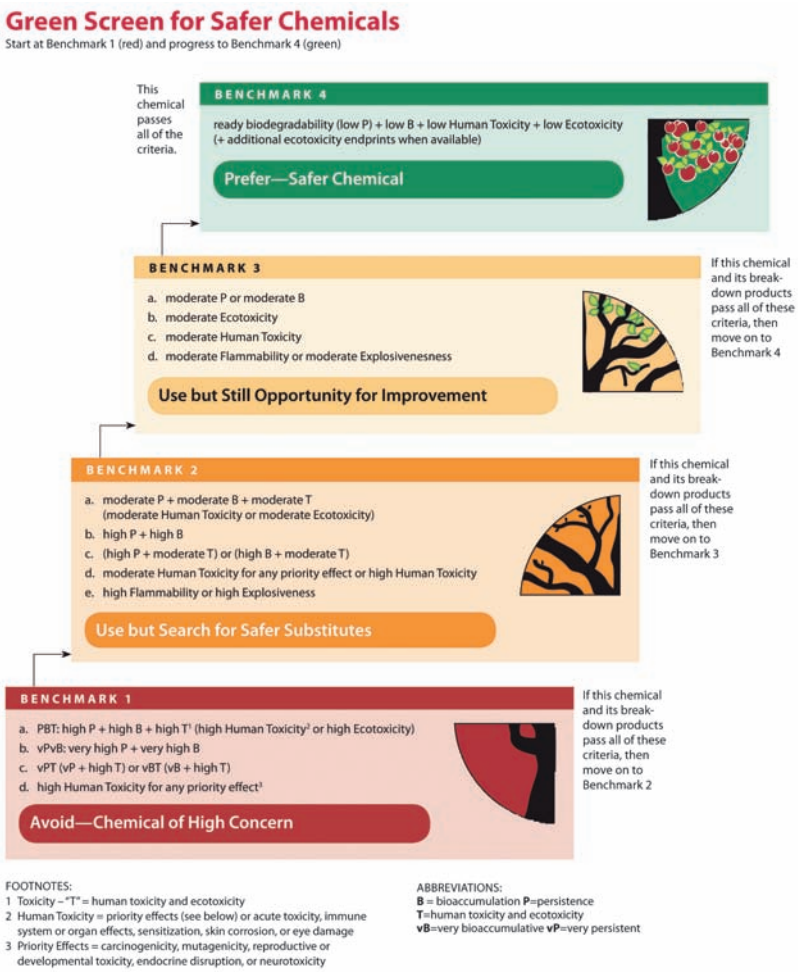
[4] Public Law 101-508, November 5, 1990, Omnibus Budget Reconciliation Act of 1990 (Pollution Prevention Act of 1990).

swer. It is the first free, open source and transparent tool to identify substances that are inherently less hazardous for humans and the environment. It charts a path to green chemistry by ranking chemicals based on their inherent toxicity into four benchmarks with each benchmark defining progressively safer chemicals:

- Benchmark 1
  "Avoid—Chemical of High Concern"
- Benchmark 2
  "Use but Search for Safer Substitutes"
- Benchmark 3
  "Use but Still Opportunity for Improvement"
- Benchmark 4
  "Prefer—Safer Chemical"



By using the Green Screen assessment method, companies can now rank chemicals based on their inherent hazards and understand why some alternatives are more or less environmentally preferable

Each benchmark depicted in the figure below includes a set of hazard criteria that a chemical, along with its known and predicted breakdown products must pass.

The structure of the Green Screen method builds from the chemical assessment approach developed by the US Environmental Protection Agency's Design for Environment Program and takes into account the available data on a chemical's inherent characteristics—including human health effects, environmental fate and toxicity, and safety. Each chemical is ranked as high, moderate or low for each endpoint. From there, the hazard evaluations of each chemical are further consolidated into a single benchmark based on the lowest result. The Green Screen also addresses the hazards posed by a chemical when it breaks down in the environment or in an organism into more toxic chemical byproducts. This life cycle consideration of each chemical is an important factor in the Green Screen method. If a chemical degrades to a more toxic form, that low ranking will define its final benchmark score. The most significant challenge to using the Green Screen is the availability of hazard data for a chemical. Because chemical manufacturers have not been required to generate comprehensive test data the vast majority of the more than 80,000 chemicals on the market have limited to no publicly available test data. Although REACH and other initiatives will slowly rectify this problem we will continue to live in a world of in-

complete chemical information. To address this problem the Green Screen supplements available test data with modeling and other practices.

Clean Production Action initially tested the Green Screen method in 2007 on three chemicals used as flame retardants in TV enclosures – the plastic external housing of a TV. One of the chemicals, decaBDE, had come under intense scrutiny in the European Union and the availability of safer substitutes became a primary concern for regulators and companies. A detailed and transparent Green Screen investigation found that one of the three chemicals scored higher thereby demonstrating the comparative benefit of using this alternative although its placement in benchmark 2 advises the product designer to: "use but search for safer substitutes[5].'

The Green Screen helps companies reduce business risk.

Businesses are increasingly using the Green Screen to assess whether any of the chemicals they manufacture, purchase or use, contain chemicals of high concern. Once identified, these chemicals can be prioritized for substitution using the Green Screen benchmarking system so that companies are not replacing a chemical of high concern with another problematic chemical.

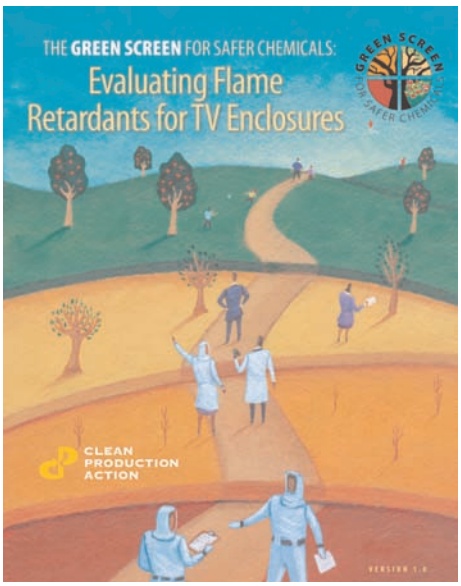
Removing toxic chemicals from products is challenging; most companies do not even know all the chemicals that are in their products and are unaware of the possible alternatives. Replacing chemicals and materials multiple times due to new regulations or consumer concern is extremely expensive for companies. To avoid future financial costs, companies are searching for a chemical screening tool that is scientifically robust, easy for their suppliers to understand, and transparent in its decision logic. Leading edge companies are now finding hazard reduction to be a better approach to reduce their business risk, anticipate future regulations and lower the cost of managing chemical use in their products.

HP is now the world's leading practitioner of the Green Screen tool

- 2009 HP Global Citizenship Report[6]

Hewlett-Packard (HP) began using the Green Screen to assess alternatives to chemicals being restricted in their products and has assessed more than 50 replacement materials for brominated and chlorinated flame retardants, phthalates, PVC and other substances of concern. HP is now the world's leading practitioner of the Green Screen tool, and the results of assessments have begun to inform decision making on key replacement materials. HP has adopted the Green Screen as the primary tool for alternatives assessment to enable informed substitution for substances eliminated from HP products.

HP is also championing wider acceptance of the Green Screen within industry, the environmental NGO com-



[5] Mark Rossi and Lauren Heine. The Green Screen for Safer Chemicals: Evaluating Flame Retardants for TV Enclosures. Clean Production Action. March 2007.

[6] http://www.hp.com/hpinfo/globalcitizenship/enviro/design/materials.html

munity and regulatory bodies. And to share information on common chemistries and help the entire electronics supply chain be able to select better replacement materials, HP is working with Clean Production Action, the Lowell Center for Sustainable Production, and other partners to create an external repository for assessments.

Screening Chemicals at Wal-Mart

Wal-Mart is now integrating chemical screening based on the Green screen approach to move out of highly hazardous chemicals to support their sustainability initiative. In the autumn of 2007, Clean Production Action (CPA) introduced the Green Screen to Wal-Mart as a way to guide their movement toward an inventory of safer chemical products. We subsequently worked with Wal-Mart and a group of stakeholders to finalize a comprehensive list of chemicals of concern with a weighted scoring system and this has been integrated into a new software screening tool, GreenWercs. This 'Green Screen approach' of scoring chemicals for high hazard characteristics has already created more scrutiny by Wal-Mart suppliers to better understand the characteristics of chemicals used in their products. We are continuing our work with Wal-Mart and its stakeholders to now determine how to reward companies that choose demonstrably safer chemicals for their products. We believe this will have a major ripple effect of promoting safer chemicals use within global supply chains.

Regulators are endorsing the Green Screen as a robust substitution tool

The State of Maine in the US unanimously adopted proposed regulations in 2010 to protect the health of children by ensuring that chemicals of high concern in consumer products are replaced with safer alternatives. The state has endorsed the Green Screen as a good substitution assessment tool[7].

Washington State used the Green Screen to support legislation restricting the use of deca-BDE, a hazardous flame retardant chemical, by showing the existence of demonstrably safer alternatives[8]. The state is now training its pollution prevention officers with the Green Screen methodology.

> "It is our goal that companies, government agencies, academia and non-profits will use the Green Screen to select inherently safer chemicals"

Next Steps

The Green Screen for Safer Chemicals represents a needed building block on the path to sustainable material flows in our economic and ecological systems. It is our goal that companies, government agencies, academia, and non-profits will use the Green Screen to select inherently safer chemicals, thereby increasing the availability of safer, healthier products.

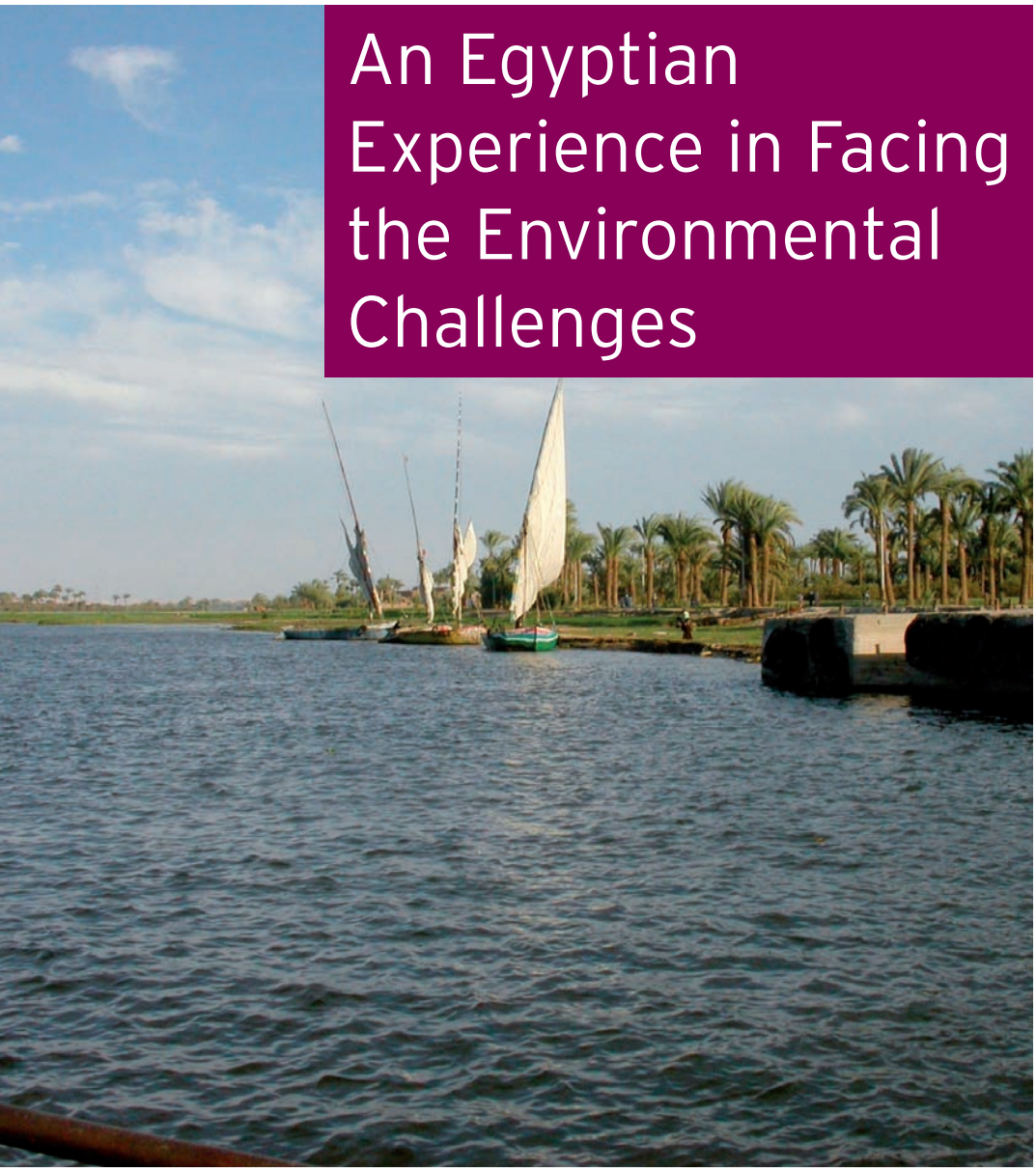
Clean Production Action is busy finalizing version 2.0 of the Green Screen methodology and building a designated website to house online assessments of chemicals and new case studies. We will release the prototype website by November 2010 and this will give users guidance on how to screen chemicals and publicly share chemicals assessments. We are committed to maintaining the Green Screen as a transparent and open methodology that will help companies adopt safer chemicals and help society move to a healthier economy.

For more information please contact Beverley Thorpe at *Bev@cleanproduction.org* and visit the Clean Production Action website: http://cleanproduction.org/Green.php ■

[7] Maine Department of Environmental Protection. Safer Chemicals in Consumer Products and Services. http://www.maine.gov/dep/oc/safechem/ (accessed April 2010).

[8] State of Washington. Department of Ecology. Alternatives to Deca-BDE in Televisions and Computers and Residential Upholstered Furniture. Final Report. December 2008. http://www.ecy.wa.gov/biblio/0907041.html (accessed April 2010).

An Egyptian Experience in Facing the Environmental Challenges



Ahmed Kamal Abdel Moneim

Environmental Compliance office and Sustainable Development office Manager

In an era of globalization and technological advancement in every field, environmental problems are no longer confined to the boundaries of a specific country. Rather, we are all affected by the surroundings. The relation between environment and development needs balance so that neither overcomes the other. On top of industry-related environmental problems comes the transfer and handling of (chemical) hazardous materials.

Keywords: chemicals handling, sustainable development, industry, international and regional conventions, cleaner production (CP), information availability, environment protection, environmental problems, challenges, legislations, health.

Une expérience égyptienne relevant les défis de l'environnement

À l'ère de la globalisation et du progrès technologique dans tous les domaines, les problèmes liés à l'environnement ne sont plus confinés à l'intérieur des frontières d'un pays donné. Au contraire, nous sommes tous affectés par notre voisinage. La relation entre l'environnement et le développement doit être équilibrée de manière à ce que personne ne domine personne. Le transfert et la manipulation de matières (chimiques) dangereuses est le principal problème environnemental de l'industrie.

Mots clés : manipulation de produits chimiques, développement durable, industrie, conventions internationales et régionales, production plus propre (PP), disponibilité d'information, protection de l'environnement, les problèmes environnementaux, défis, législations, santé.

Una experiencia egipcia frente a los retos ambientales

En esta era de globalización y avances tecnológicos generalizados los problemas ambientales traspasan las fronteras de los países y nos acaban afectando a todos. La relación existente entre medio ambiente y desarrollo debe equilibrarse para que ninguno sucumba ante el otro. Uno de los principales problemas ambientales relacionados con la industria se debe a la transferencia y manipulación de materiales (químicos) peligrosos.

Palabras clave: productos químicos, desarrollo sostenible, industria, convenios internacionales y regionales, producción más limpia (PL), disponibilidad de la información, protección del medio ambiente, problemas ambientales, retos, legislaciones, salud.

In the light of the State's public policy prioritizing the protection of citizens and environment, and the role undertaken by the Federation of Egyptian Industries (FEI), and in compliance with the global system and international conventions to which Egypt is a signatory, the implementation of environmental and multilateral conventions on the management of chemical materials has become an imperative. Such conventions must be promoted, while gaps existing in international policy frameworks concerning chemical materials must be bridged. Chemistry – green chemistry in particular – is expected to bear fruit in order to upgrade living standards, public health and environmental protection. Ongoing efforts to promote the safety of chemical material production and use should be sustained. Providing stakeholders with data and information about the impacts of chemicals on health and the environment is the responsibility of the industry to ensure the safe use of chemical substances and products. Citizens are as well entitled to have access to information and knowledge with respect to the life cycle of chemicals including the hazards they pose to the environment and human health. In order to attain sustainable development, international illegitimate trading of chemical materials, products and restricted, prohibited, dangerous and toxic wastes must be addressed. In addition, sound management of chemicals and hazardous waste should be promoted, being a priority in international, regional, and national policy frameworks including sustainable development, development assistance and poverty reduction strategies.

Introduction

Global and local concern with environmental issues grew, along with the realization of the significance of sustainable development that meets current needs and strikes a balance with the present and the future in order to enable future generations to satisfy their needs as well. In view of the cruciality of sound environmental management of hazardous wastes, the main objective of monitoring the handling process is to reduce the pollution hazards caused by such wastes. Given the increasing amounts and types of hazardous wastes generated by activities of all facilities which pose an obvious threat to public health and the environment, safe handling and processing – with regard to the environment and human health – must be managed. This matter should be addressed by setting up strategies, plans and legislations to safely manage and monitor the whole cycle, and reduce such materials and their hazards in accordance with the restrictions provided by Law 4/1994 on Environment Protection and its Executive Regulations.

In this regard, developed communities need different types of chemicals since chemical industry is central to European market economy. Chemical production in Europe is the third largest industry in the EU. However, the unchecked use of chemicals poses a major hazard to human health, resulting in disease infections despite many procedures and legislation adopted by the European market in respect of chemical management, production, use and handling.

Handling of Chemical Materials

World production of chemical materials has jumped from 1M tons/year to over 400M tons/year. Such materials are the most significant inputs to many modern industries. However; the risk lies in the potential impacts of unsafe handling of these materials including environmental disasters in the short as

well as long terms due to the lack of relevant information and data.

World countries, therefore, seek to draw up locally and internationally environmental legislations to control the handling of these products and ban any violation which may bring about local or international environmental problems. The 2002 World Summit on Sustainable Development held in Johannesburg paid special attention to this matter, where the concluding statement urged countries to set up systems for safe production and use of chemicals to be operational by 2020.

Sustainable Development and Sound Management of Chemicals

Sound management (SM) of chemicals is central to sustainable development including eradication of poverty and disease, promotion of the environment and human health, sustenance, and upgrading of living standards in countries undergoing development. SM means proper management, sustenance and ultimate investment of all environmental resources including chemicals without causing any harm. This means that such process covers current needs without causing future imbalance, pollution or degradation of natural resources and elements. Should there be any development in chemical industries, it should promote the environment, the community and the country to a better and more advanced position with regard to socio-economic and cultural status. This is often reflected in the improved service quality and the abundance of high-quality production.

Industrial Challenges

Egypt's ability of environmental management is on the rise. However, some major challenges lie in the way particularly in the field of industry since there is still lack of consistency between development plans and environmental orientation. To address these challenges, the government recognized the importance of drafting national policies and extensively implementing them in social, economic and cultural fields. This can be done by the adoption and preparation of a national strategy of sustainable development to harmonize policies, economic plans, and the various environmental components in order to achieve environmentally rational and compatible development that comes to the interest of future generations.

> **The risk lies in the potential impacts of unsafe handling of these materials due to the lack of rellevant information data**

An important step to prepare and implement this strategy is to define high-priority challenges that should be addressed by the strategy. Challenges contained in industry, particularly the management of chemicals, include the following:

- Reduction of material-, energy-, and water-intensive industrial production.
- Industrial pollution abatement or prevention by upgrading older technologies.
- Failure in the data and information systems precludes decision-making and implementation follow-up.
- Use of heavy oil, coal, and rubber along with wastes as fuels in industrial SMEs increases emissions of air pollutants.
- Limited training opportunities for staff skill development.
- Lack of awareness of the significance of quality services offered for the industry sector.

• Lack of finance for Cleaner Production (CP).

In order to sustain a high industrial growth rate along with environment and natural resource conservation, there is a need to:

• Expand CP technology

• Enhance consistency between the Environment Law and health and safety regulations enforced in industrial facilities, and promote CSR.

• Further collaboration between governmental authorities concerned with the enforcement of environment regulations and those responsible for realizing development requirements.

• Set up an all-inclusive database for all information about industrial activity sites in governorates and industrial zones.

• Create investor incentives in industrial zones.

• Introduce policies encouraging research and development (R&D) and their applications in industry.

• Create industrial zones dedicated to industrial activities such as foundries, dye houses, spinning and weaving factories, as well as whatever would go in line with physical development plans.

• Use credits (revolving funds) to address negative industrial impacts on the environment.

Chemical Management Conventions

1. Huge progress – though insufficient – has been made with regard to international management of chemicals through the enforcement of Chapter 19 of Agenda 21; ILO Chemicals Convention No. 170, and the Prevention of Major Industrial Accidents Convention No. 174; Basel Convention on the Control of Transboundary Movements OF Hazardous Wastes and their Disposal; the beginning of enforcing Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade; and Stockholm Convention on Persistent Organic Pollutants (POPs). POPs are organic compounds consisting mainly of carbon, which may be of a natural or artificial origin and combine both natural and chemical characteristics which have a detrimental impact on human health and the environment. International concern has been expressed, since 1995, about POPs until the POPs convention was concluded in May 2001, entitled Stockholm Convention on Persistent Organic Pollutants. On account of Egypt's concern for the protection of public health and environment, a ban on the importation or usage of chemicals listed in the Convention has been imposed since 1996. This culminated in Egypt being a party to the Convention by signing it on 17/5/2002, ratifying it on 2/5/2003 and enforcing it on 17/5/2004.

Stockholm Convention on POPs starts with targeting 12 toxic substances in order to restrict and then eliminate them. It, more importantly, sets up a system for thwarting additional chemicals identified as hazardous, which requires a special effort to phase out certain chemicals for certain uses, as well as channels resources into cleaning up currently existing POPs stockpiles and depositories. Ultimately, the Convention points to the way for a POPs-free future.

The Private sector has made tremendous efforts to upgrade the safety of chemicals, notably through programs and voluntary initiatives such as product care, and chemical industries responsible care program.

World processes undertaken to produce, use and trade in chemicals are on the rise, while growth patterns impose increasing requirements on developing countries and countries undergoing transition for chemical

management. They, in addition, place certain obstacles in meeting this challenge; therefore fundamental changes of chemical management have to be introduced to the methods adopted by communities.

> "Compliance with REACH and GHS is a requirement for exportation to an EU country"

MSEA-FEI Productive Cooperation

Cooperation and coordination is in effect among MSEA, MOFTI, FEI and all relevant State entities on safe chemical management. According to multilateral environmental conventions on chemicals, MSEA has coordinated strict controls on chemical handling with all concerned entities through checking customs release applications of imported hazardous chemicals to ensure they are not included on the list of banned chemicals decreed by competent administrative entities, or those banned by virtue of international multilateral environmental conventions. MSEA has also initiated similar coordination and cooperation with line ministries and authorities concerned with issuing guidelines on the safe handling of hazardous materials (approx. 300 chemicals) to identify rules governing such handling. Furthermore, MSEA has created an electronic system for hazardous chemicals information and management in Egypt in coordination with all ministries and the Customs Authority, as well as set up the National Chemical Profile in collaboration with UNEP Chemicals Unit. The Profile comprised some information about pesticide importation and exportation in Egypt.

ECO Imminent Role in Sound Chemical Management

FEI/ECO has played an imminent role in the achievement of sound chemical management, most notably seminars and hearings held for producers on the new system for handling chemicals known as REACH (registration, evaluation, authorization and restriction of chemical substances) which mandates full availability of information about chemicals to avoid any adverse effects during their production and handling. The new system also places restrictions and controls required for registration, evaluation and authorization of chemicals in order to assign the responsibility of safe management to producers; thus ensuring safe handling within and among states. Compliance with REACH and GHS is a requirement for exportation to an EU country.

Label is a first indicator, that it may be hazardous!

ECO seeks to enable industrial SMEs to adopt CP technologies and regulations and to adhere to the requirements of sound environmental management, to

enhance production lines not only to guarantee cost-effectiveness, upgrade productivity, and boost exports, but also to reduce negative impacts on the environment and achieve industrial sustainable development.

ECO is supporting industrial facilities by providing consultation, upgrading human capacities by holding training courses for factory workers as well as workshops to promote environmental awareness of the industrial community and identify most recent CP technologies and applications in industrial SMEs.

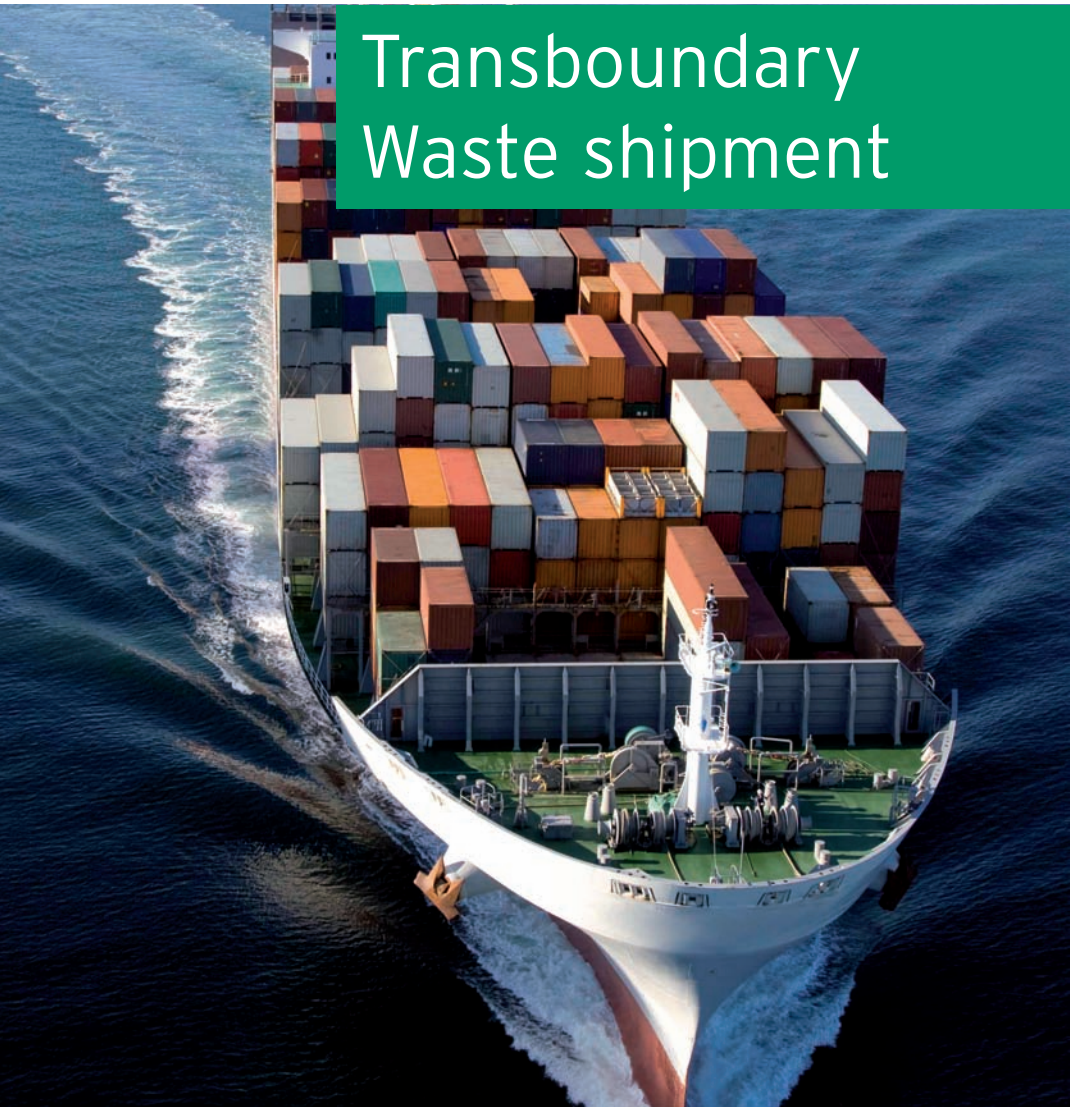
Sound Chemical Management training session

ECO also provides soft loans to support industrial SMEs and facilitations to CP switching.

Sources

• MSEA Annual Reports
• MSEA Press reports
• Chemicals World, 13th issue
• Reference of Environmental Education – Environmental Training and Awareness project, DANIDA
• Bulletin of Basel Convention Regional Center – 3rd issue
• National Action Plan on Stockholm Convention Directives Development Project ■

Transboundary Waste shipment



Pep Tarifa
Fundació Fòrum Ambiental

Better waste management has been on the agenda in the EU for at least the last 20 to 30 years. New waste strategies and legislation on how to handle waste have been introduced at whole EU countries. In general, the requirements for waste management have been harmonised in the EU during this period and especially in the last 10 to 15 years.

Therefore, but also due to the introduction of the single market in the EU in 1993 stimulating transboundary shipment of goods – and waste is a good - it is not surprising that certain waste types are shipped from one Member State to another for treatment, and even for non EU countries. In this case there are good practices and non good practices.

Keywords: shipment of waste, Basel Convention, EU countries.

Le transport transfrontalier de déchets

Une meilleure gestion des déchets a été à l'ordre du jour de l'UE depuis au moins les 20, 30 dernières années. De nouvelles stratégies et législations en matière de gestion des déchets ont été introduites dans tous les pays de l'UE. En général, les exigences de la gestion des déchets ont été harmonisées dans l'UE pendant cette période et en particulier au cours des 10, 15 dernières années.

Par conséquent, mais aussi en raison de la création du marché unique au sein de l'UE en 1993 pour stimuler le transport transfrontalier de marchandises (les déchets étant des marchandises), il n'est pas surprenant que certains types de déchets soient transportés d'un État membre à un autre en vue de leur traitement, et même dans des pays n'appartenant pas à l'UE. Il existe dans ce contexte de bonnes pratiques et d'autres qui ne le sont pas.

Mots clés : transport de déchets, Convention de Bâle, pays de l'UE.

Transporte transfronterizo de bienes

La mejora de la gestión de los residuos lleva en la agenda de la UE desde hace 20 o 30 años. Todos los países de la UE disponen ya de nuevas estrategias y legislaciones en materia de manipulación de residuos. Durante este período, en general, los requisitos de gestión de residuos en el seno de la UE se han armonizado, en especial en los últimos 10 a 15 años.

Por todo ello, pero también a causa de la introducción del mercado único en 1993 con la intención de estimular el transporte transfronterizo de bienes (y los residuos son bienes), no sorprende que ciertos tipos de residuos se envíen de un Estado miembro a otro para su tratamiento. Se trata, en este caso, de buenas prácticas, y no al contrario.

Palabras clave: transporte de residuos, Convenio de Basilea, países de la UE.

Waste has become a business for rich countries, including EU countries, and in development countries is a source of revenue based on that garbage recycling or to access materials they contain and that otherwise they could not have access. These facts are intrinsically good, but some recent reports note that there is a small problem, the illegal transport of waste. It's generally estimated that about 15% of European transport of waste (within the EU and also outside it) does not meet EU shipment standards.

> It is estimated that about 15% of European transport of waste does not meed EU shipment standards

Some inspections in containers in the port of Rotterdam (note that approximately 15% of cargo transported in the EU are waste of all kinds) revealed that fridges with final purpose to be dismantled, and destination India were still inside the cooling gas (the "famous" CFC's) An appliance in such circumstances cannot be exported to a developing country without the means to manage a harmful product to ozone layer.

This is determined by European legislation and the Basel Convention on hazardous waste transport. According to Article 41 in the Waste Shipment Regulation 259/93 the EU Member States have to submit reports comprising information on the annual amounts of waste generated, imported and exported to the Secretariat of the Basel Convention and supply the EU Commission with a copy of these reports. This system has a problem that appears often when to fulfil documents is needed: the quality of data.

Data availability and quality

The Basel Convention covers both hazardous waste and other wastes requiring special consideration. The specific shipments of waste are reported both by the country of origin (as export) and by the country of destination (as import) if these members have signed the Basel Convention. They appears in many cases the called "double shipments".

In general, those differences can be explained by the fact that Member States have different approaches to calculate the figures for the report to the Basel Secretariat. Further, there is a difference between the notified figures (planned quantity stated on the notification document) and the real quantity of waste shipped. There is also a difference in the amount of waste reported by the notifier prior to the shipment and the amount of waste reported by the facility at the moment of receiving the waste.

Some important errors in the provided data:

- double counting – for example, counting the tonnage mentioned on the original notification, as well the tonnage for each actual shipment.
- including shipments from other calendar years – for example, if a report for calendar year 2007 is being prepared in March 2008, shipments up to March 2008 might be included in the report.
- poor use of IT solutions.
- poor staff training and competence – especially in the small local authority areas. Therefore the lack of experience of staff often shows through in poor data submitted, for example: inconsistent units (litres, tonnes, kg, number of items), too many zeroes resulting in order of magnitude, poor descriptions, lack of key fields being completed (Y code, European Waste List code, country of import etc.).

About the poor use of IT solutions:

In Spain a collaborative work is being done in this moment with the participation of the administrations with competences to monitor the management of hazardous waste. The basic idea is to implement the IT solutions general use by private companies and administrations (with the creation of a new electronic language that allows all the administrations to be connected) This will help administrations to obtain real and on time data on the production and management of this type of waste and private companies to be more efficient in the generation of documentation, now with less paper involved, going to zero use in the near future.

To know more about this project: www.eterproject.org

e-waste case

As European citizens acquire more and more electrical and electronic goods the e-waste (WEEE, Waste Electrical and Electronic Equipment) is rapidly growing as waste stream. It requires the attention of Public Administration because it contains hazardous substances and at the same time valuable materials such as precious metals, which make it attractive as a resource in some parts of the world. The EU Directive on waste electrical and electronic equipment (2002/96/EC) requires e-waste to be collected and imposes strict requirements on the treatment of this waste in the EU. But where does this waste actually end up? Is it actually recycled in the EU or shipped to other countries?

It is very difficult to follow transboundary shipments of e-waste within and out of the EU. These waste fractions are assigned ambiguous codes when reported to the Basel Convention and the European Commission. Furthermore, it can be difficult to discern when a used electrical or electronic item is waste or just second-hand. In general, export of e-waste to non-OECD countries is prohibited, whereas for example, the export of a used but fully functional television set to a non-OECD country is permitted. There have been well-documented cases in the European media highlighting infringements of this ban. It has been found, for example, that significant numbers of the exported used television sets, computers, monitors and telephones to non-OECD countries are non-functioning and they should, therefore, be classified as e-waste.

A waste shipment case

Boats are exported from Europe to third countries. Consider this case. The boats are sold to Indians or Chinese scrappers that put it on the beach and where they are dismantled by hand. This trade is controlled by the Basel Convention, although some gaps exists and is not clear the Convention affects the boats. The Government held in the Spanish port of Almeria *Beni Ansar* ferry that had been sold to an Indian company for scrapping. Upon inspecting the boat, the Ministry of Environment, Rural and Marine ruled that the boat contained a number of pollutants and could not be exported as waste under the Basel Convention. At the end sales, after successive ones, ship left for Romania so within the EU itself. Halfway down the ship deviated from its route and ended up in India, according to Greenpeace denounced when it happens. The paradox is that Spain's total deficit (or was before the construction collapse) for casting metals... so part of the ships dismantled in India and China have been returning to be recycled into new metal.

Good practices in waste shipment, how to

The process for the export of waste to third countries within the EU is the following:

Needed documents

- Documents on service of documents completed
- Listing of producers with their identification data
- Authorization Export Manager
- Certificate of Insurance
- Export-import contract
- Authorization Import Manager
- Description of the treatment process
- List of approved transporters and their records with country of origin and destination
- Details of the route
- Calculation of bond and guarantee
- List of authorities to notify

Obtaining authorization procedure

- GV Request to original documents of service which
- Sending the GV of 3 sets of documentation
- Reception GV document shipping to supply the documentation to the countries of transit and destination
- Receipt of document from the country of destination, transit indicating receipt of the documentation
- Will open within 30 days for each country to authorize or request more information
- Receipt of document for each country to authorize or not objecting to the export.

Sending trucks and closing procedure

- Advance notice 3 days before shipment of the truck at all affected countries
- Sending the documentation truck enclosing all approvals including the carrier
- Reception of the movement document submitted by the importer to the receipt of the waste
- Will open within 6 months to meet the appropriate importer for recovery / recycling of waste
- Reception of the movement document submitted by the importer to the recovery / recycling
- Sending this document to the GV.

Private companies users in these processes identified as difficulties of this system the following:

- Obtaining the extensive documentation and completion of complex documents
- That all the participants have all authorizations, registrations, etc.
- Different interpretations as to the consideration or not as dangerous waste
- Major administrative work and paper generation, location numbers and faxes, etc. records.
- In XXI Century all the waste management documentation are still in paper format. Do the administrations really need this paper volume? What happens with statistics generation when data comes in paper format?
- Very long (since it begins to assemble the documentation until they can make the first shipment may have discoursed fully two months).

And also some commentaries about the availability of data collected in official EU documents (see information sources):

Waste information is poor, is poorly harmonized, is based on different definitions and methodologies that are characterized by overlaps in the reporting process, data errors, and therefore results in a poor quality of that information which is used as the basis for the generation of statistics. This is enhanced; inter alia, a partial and incorrect use of RSI by some authorities, which leads to an inefficient control in this area.

There is much concern within the EC with the lack of traceability turned-largely supported by the current model of data control in paper format.

"The Waste Shipment Regulation is one the key priorities of EC in order to contribute to capacity building, cross-border cooperation, joint enforcement activities, improving inspection meth-

ods, training of inspectors, exchange of information and awareness-raising. Also will it support a more equal and uniform implementation of the Waste Shipment Regulation in the Member States."

"To ensure that waste is shipped to licensed facilities and treated in an environmentally sound manner without damaging the environment and human health, it is necessary to follow waste from its origin to its final destination. In case of waste shipments and treatment within the EU, the network of contacts exists and can be used for requests. This is not yet the case in countries of destination outside Europe."

Information sources

http://www.pbs.org/frontlineworld/stories/ghana804/video/video_index.html

REGULATION (EC) No 2150/2002 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2002 on waste statistics. European Parliament. 2002

Transboundary shipments of waste in the EU. Developments 1995-2005 and possible drivers. European Topic Centre on Resource and Waste Management. 2008

Waste without borders in the EU? Transboundary shipments of waste. European Environmental Agency. 2009

Chemical Management Services and REACH "It's all about information"

Yasser Askar, M.Sc
Head of Technical and Institution support Department Egyptian Environmental Affairs Agency

United Nations World Summit on Sustainable Development promotes Sustainable Consumption and Production (SCP) through promotion of social and economic development within the carrying capacity of ecosystems by addressing and, where appropriate, de-linking economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and production processes and reducing resource degradation, pollution and waste[1].

SCP calls for safer and sustainable usage of chemicals during the life cycle of the products, adding more challenges on chemical supply sector from the producers (service providers) to consumers (service receivers).

Product Service System as a tool to use the life cycle thinking is an approach to sustainable consumption and production adopted by the United Nation Environmental Program (UNEP). As a new business concept, PSS may increase the performance of a business and decrease environmental and social impacts.

Keywords: Chemical Management Services (CMS), Registration, Evaluation, and Authorization of Chemicals (REACH), Sustainable Consumption and Production (SCP), information transparency.

Service de gestion des produits chimique et REACH : « Tout porte sur l'information »

Le Sommet mondial des Nations Unies sur le développement durable encourage la via la promotion du développement social et économique dans les limites de la capacité d'absorption des écosystèmes, en abordant et, le cas échéant, en dissociant la croissance économique et la dégradation de l'environnement, à travers l'amélioration de l'efficacité et de la durabilité de l'emploi des ressources et des procédés de production, ainsi que via la réduction de la dégradation des ressources, de la pollution et des déchets.

La CPD appelle à une utilisation plus sûre et durable des produits chimiques pendant le cycle de vie des produits, en augmentant de cette manière les défis du secteur de distribution de produits chimiques des producteurs (fournisseurs de services) aux consommateurs (destinataires des services).

Le système produit-service (SPS) est un outil visant à employer le cycle de vie en pensant à une approche tenant compte de la production et consommation durable adoptée par le Programme des Nations Unies pour l'environnement (PNUE). En tant que nouveau concept commercial, le SPS peut augmenter les performances d'une affaire et réduire ses impacts environnementaux et sociaux.

Servicios de gestión de productos químicos y REACH «la información lo es todo»

La cumbre mundial de Naciones Unidas sobre desarrollo sostenible promueve la producción y el consumo sostenibles (PCS) mediante el fomento del desarrollo social y económico dentro de los límites de capacidad de los ecosistemas analizando y, en caso necesario, desvinculando crecimiento económico y degradación ambiental a través de la mejora de la eficiencia y la sostenibilidad en el uso de recursos y procesos de producción, así como la reducción de la degradación de los recursos, la contaminación y los residuos.

La PCS pretende lograr un uso más seguro y sostenible de los productos químicos durante su ciclo de vida, lo que plantea más retos por parte de los productores (proveedores de servicio) del sector productor de productos químicos hacia los consumidores (receptores de los servicios).

El sistema producto-servicio (PSS) es una herramienta que se basa en el ciclo de vida para enfocar la producción y el consumo sostenibles adoptada por el Programa de las Naciones Unidas para el Medio Ambiente (PNUMA). Este nuevo concepto empresarial puede aumentar el rendimiento de una empresa y reducir su impacto ambiental y social.

Chemical management services (CMS) is an application of the Product Service System in the chemical sector. Thomas Votta, deputy director of Chemical Strategies Partnership (CMP) association, considers CMS to be a strong strategic and long-term relationship between the customers (industrial enterprises that receive services) and providers (that supply services), in which the service provider manages the chemical and related services associated with it instead of the customer. CMS helps to optimize processes and to continuously reduce chemical lifecycle costs, risk, and environmental impact, because often chemical service providers are more efficient and can achieve lower production costs than the customers[2].

REACH (Registration, Evaluation, and Authorization of Chemicals) is a relatively new European Community Regulation on chemicals and their safe use (EC 1907/2006). It deals with the Registration, Evaluation, Authorisation and Restriction of Chemical substances. The new law entered into force on 1 June 2007[3]. REACH track the chemicals used in production to assure safer usage and consumption as a tool toward better environmental impacts. All information shall be evaluated and registered within the European Chemical Agency (ECA).

It is clear the REACH and CMS are matching together, since CMS can provide better tracking of chemical through the tight relation between service providers and service receivers, which is a cornerstone to REACH.

1. Introduction

PSS is considered a step beyond such concepts as pollution prevention, cleaner production and re-designing of products. The new approach directs the producers to shift from the traditional "business as usual", based on selling the product, to a new horizon of selling utility. The result of selling a mixture of products and services reinforces the financial status of the producers and provides more benefits to the consumers. In sum, better financial, environmental and social results can be expected.

Chemical management services (CMS) is an application of the Product Service System in the chemical sector. Thomas Votta, deputy director of Chemical Strategies Partnership (CMP) association, considers CMS to be a strong strategic and long-term relationship between the customers (industrial enterprises that receive services) and providers (that supply services), in which the service provider manages the chemical and related services associated with it instead of the customer. CMS helps to optimize processes and to continuously reduce chemical lifecycle costs, risk, and environmental impact, because often chemical service providers are more efficient and can achieve lower production costs than the customers.

"REACH track the chemicals used in production to assure safer usage as a tool toward better environmental impacts"

2. Chemical Management Services

Chemicals have a high importance for many industries, but during their life cycle the amount of chemicals released to the environment poses a serious threat to both human health and the environment. The main objective behind CMS is to reduce the adverse effects of these chemicals by reducing the amount of chemicals used.

[1] Chapter 3, Johannesburg Plan of Implementation, UN World Summit on Sustainable Development, 2002. www.un.org/esa/sustdev/ documents/WSSD_POI_PD/English/POIChapter3.htm

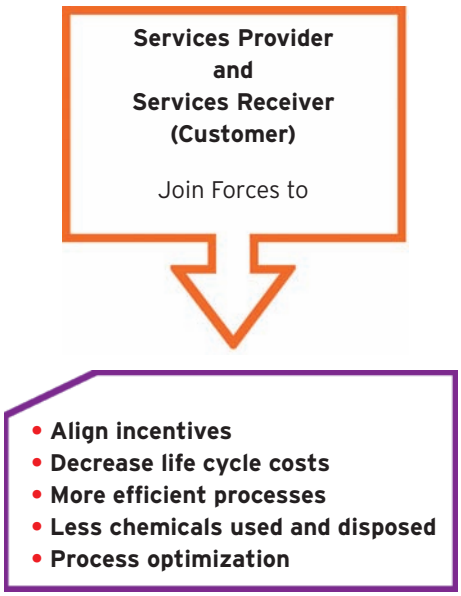
[2] Votta, Thomas. (2005). CMS presentation on the Privatization Industry Day, Defense Logistics Agency, Defense Supply Center, Richmond VA. December 2005.

[3] http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm

The reduction of the amount and volume of chemicals used has negative consequence for chemical- producing industries, because their basic business model is based on the volume of chemicals sold. CMS provides a solution that allows the negative consequences for industries from the reduction of chemical volume sold to be avoided by shifting from a product-based market to a service-based market economy, which allows both interested sides to use chemicals with a maximum efficiency during the entire life cycle and boost their businesses[4].

The CMS model creates a win-win business situation between supplier (service provider) and buyer (service receiver -customer), by giving financial incentives to reduce the volume of chemicals used and to increase the process efficiency. Supplier compensation is based on a service fee for managing chemicals, which is in turn based on a long-term relationship with customers, high level of trust and new business opportunities, in for example waste recycling and treatment. The following figure shows the relationship between supplier and buyer in the CMS concept:

Figure 1-1. CMS model relationship



Adopting CMS has many benefits to service suppliers and service customers. Examples of benefits to service providers are[5]:

• Enhanced relation with service receiver and increased mutual trust.

• Financial benefits and prevention of price underbidding.

• Ensured growth in business through introduction of adding value products and especially services and increased competitive position.

• Encouragement of research and development (R&D) and continuous improvement of products and services.

• Winning the loyalty and trust of the service receivers.

For service customers, benefits may include[6]:

• Enhanced relation with services provider and increased mutual trust.

• Better control and management of chemicals and processes.

• Realized real cost of chemicals and chemical management.

• Reduced chemical consumption and therefore cost of chemicals.

• Decreased liability for chemicals management and final disposal.

• Decreased emissions and amount of waste and reduced health and safety risks.

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[4] Bernard Siegele. (2005). Presentation of Chemical leasing program in Egypt, National Cleaner Production Center- April 2005.

[5] Csilla Magyar. (2006). Dow Europe GmbH "Dow Shares Experiences at UNIDO Chemical Leasing Event: First pilot results show significant potential for emissions reductions". Düsseldorf, Germany – Feb. 8, 2006. Can be found online: http://www.news.dow.com/dow_news/prodbus/2006/20060208a.htm

[6] Business Editors. (2000). BUSINESS WIRE "Chemical Management Services Provide Bright Light in Stagnant Chemical Industry; Industry Report Finds Customers Reducing Costs and Chemical Use". SAN FRANCISCO, US -Nov. 9, 2000. Can be found online: http://www.findarticles.com/p/articles/mi_m0EIN/is_2000_Nov_9/ai_66758797

• Better internal logistics for products and chemicals.

• Reduced number of suppliers, leading to reduction of management costs.

• Provision of updated data that can be used in voluntary environmental certificates.

• Continued improvement of processes, products and services.

Figure 1-2. Traditional model relationship

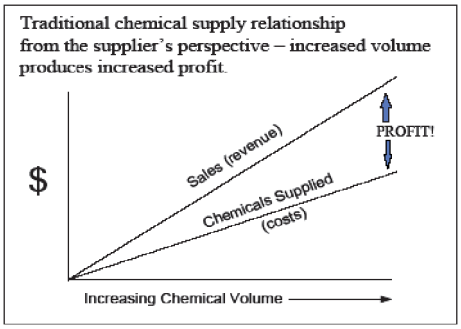
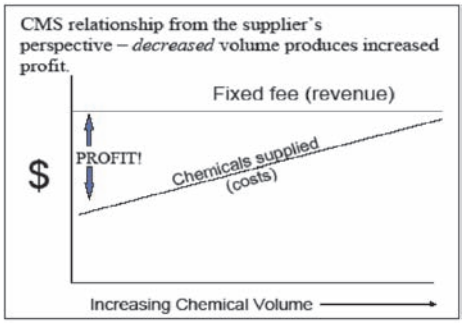


Figure 1-3. CMS model relationship



Source: Chemical Management Services – Focused Studies (Thomas J. Bierma Frank L. Waterstraat 2004).

3. CMS grouth worldwide

Chemical Management Services are growing worldwide. According to the Chemical Management Partnership industry report 2009, the highest growth in CMS is in the US, while other parts of the world are lagging behind. About half of the international CMS programs are run by multinational companies based in the U.S. Different programs can be found in Canada, China, Europe and Mexico.

The 2009 market revenue of the CMS industry, as of June-July 2009, is estimated at $900 million-$1 billion in the U.S., $1-1.2 billion in the North American Free Trade Agreement (NAFTA) region and $1.3-1.6 billion globally. The CMS industry realized revenue growth of more than 30% per year from 2006-2008. The market size projected during the next 5-10 years is estimated to be $2 billion for the U.S., $2.3 billion for the NAFTA-region and $6 billion globally[7].

4. Chemical Management Services and REACH

REACH was adopted in December 2006 and came into force in June 2007 calling for tight chemical track and control. It imposes on industries to register chemicals (substances) produced more than one ton when produced or imported. It is clear that this regulation started to affect not only Europe, but worldwide.

REACH regulation considered "complex and difficult for companies to implement, since they now have to rethink their organization, processes and information systems to be able to gather, manage and declare large sets of information about the chemical substances they use and produce"[8].

CMS provides new relation between chemical producer and chemical con-

[7] Chemical Management Services (CMS) Industry Report 2009 Key Facts. Found online at: http://www.chemicalstrategies.org/pdf/industry_reports/Press09/CMSIndustryReport2009_Key_Facts.pdf

[8] The corporate social responsibility news wire press release Dec. 2006. Found on-line at: http://www.csrwire.com/press/press_release/16575-With-the-Final-Approval-of-the-REACH-Regulation-Enablon-Announces-the-Launch-of-a-New-Chemical-Substances-Management-Solution-to-Help-Companies-Meet-their-New-Compliance-Requirements.

sumers within industry. Meanwhile, REACH calls for better and transparent information exchange of chemicals within the industries. In REACH, both producers and consumers of chemicals within the industrial boundary shall know more details about the chemicals properties and characteristics and mainly risks on environment during and after usage.

5. Conclusions and further research

Under CMS, service providers are the "Know how" owners. Their "know how" includes many issues like:

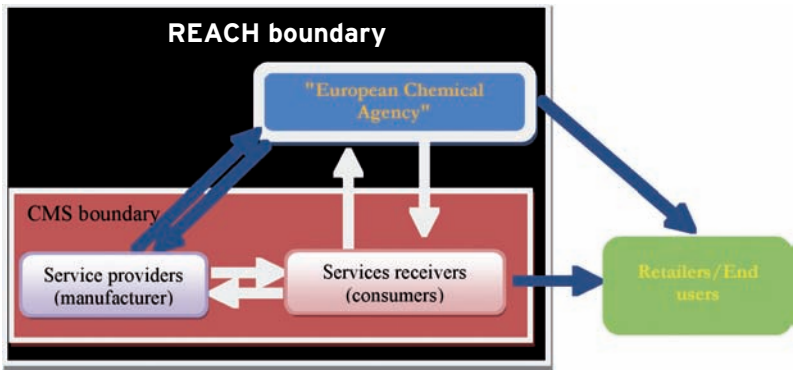
- *The exact composition of each chemical they produce,*
- How to use this chemicals,
- Under which conditions, and
- The best reaction media, providing the best yield and results.

Meanwhile under REACH, users (service receivers), shall know more details about the chemical they are using and its supply chain. Part of the supply chain is the chemicals main source (from service providers). Consequently, Under CMS, service providers play main role in information clearance to users (service receivers).

Chemical information exchange in CMS boundary and REACH boundary, expand the information clarity even for producers of less than one ton/year, giving more transparency and accuracy.

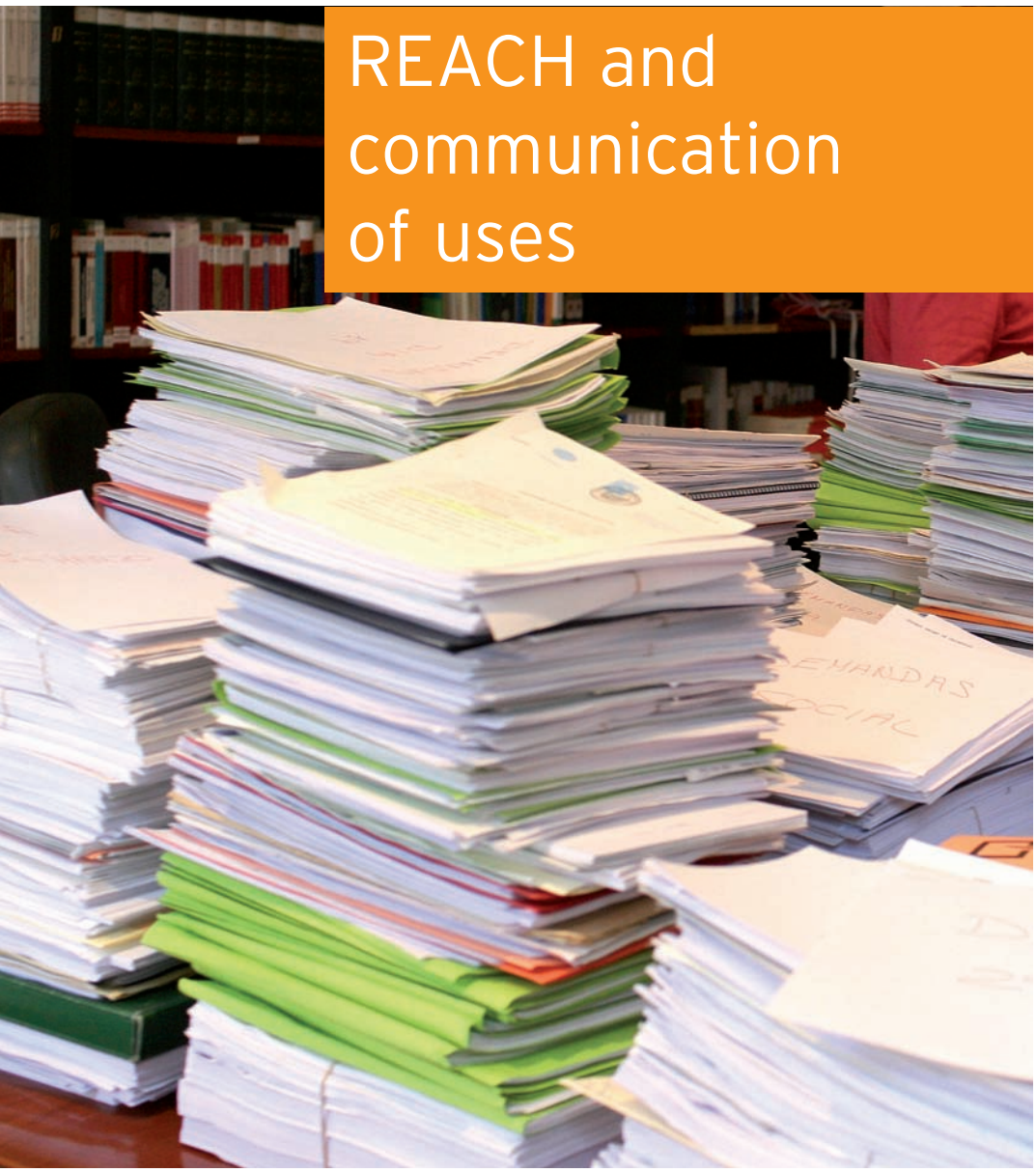
It is clear that synergy between the CMS & REACH would ease implantation and widen information transparency. *This kind of synergy between such a business model (CMS) and emerging regulation (REACH) is supported by many indicators and facts.* As mentioned in CMS report 2009 "nearly 60% of service providers indicated that the top priority for investment in the future was information management, followed by improved process technologies" ■

Figure 1-4. CMS_REACH synergy



> Both producers and consumers of chemicals within the industrial boundary shall know more about the chemicals properties, characteristics and mainly risks

REACH and communication of uses



Rosana Marín

After the enforcement of the REACH Regulation on December 18th 2006 for the Registration, Evaluation and Authorisation of chemicals, the industry continues to confront challanges. At the moment, the upstream and downstream communication in the channels of supply and only at a few days before the deadline, the bureaucratic "stress" invades our daily routine.

Keywords: REACH, regulation 1907/2006, registration, evaluation, authorization, communication, uses, identified, scenarios, exposure, descriptors, users, intermediates, manufacturer, importer, pre-registration, dossier, security, chemistry, assessment, report.

REACH et communication des utilisations

Après la mise en application le 18 décembre 2006 du règlement REACH pour l'enregistrement, l'évaluation et l'autorisation des substances chimiques, l'industrie continue à faire face à des défis. Actuellement, avec la communication en amont et en aval dans les canaux de distribution et quelques jours seulement avant la date butoir, le « stress » bureaucratique envahit notre quotidien.

Mots clés : portée, réglementation 1907/2006, enregistrement, évaluation, autorisation, communication, utilisations, identifié, scénarios, exposition, descripteurs, utilisateurs, intermédiaires, fabricant, importateur, pré-enregistrement, dossier, sécurité, chimie, évaluation, rapport.

REACH e información sobre el uso

Desde la entrada en vigor del Reglamento REACH (18 de diciembre de 2006) sobre registro, evaluación y autorización de productos químicos, la industria sigue enfrentándose a nuevos retos. Actualmente, la comunicación de arriba abajo y de abajo arriba en los canales de suministro sólo unos días antes de la fecha límite supone un «estrés» burocrático que invade nuestra rutina diaria.

Palabras clave: REACH, reglamento 1907/2006, registro, evaluación, autorización, comunicación, usos, identificados, escenarios, exposición, descriptores, usuarios, intermediarios, fabricante, importador, prerregistro, dossier, seguridad, química, evaluación, informe.

Almost 3 years after the approval of the REACH Regulation 1907/2006 on December 18th 2006, only a few have heard of it and the many consequences it has on the society and especially in the industry sector.

> ECHA has developed orientation documents on the requirements of information and assessment of chemical security

This Rule, commonly known as **"REACH"**, establishes the process of Registration, Evaluation and Authorisation of chemicals produced and/or imported in the European Union, thus putting the responsibilities of manufacturers and importers at the same level.

After having finished almost a year ago the first pre-registration phase, users, manufacturers and importers will have to face in a few days a second challenge, the communication of uses so that these are recorded in the registration dossier as "identified uses" that will be the only ones for which one specific substance will be able to be used, so it is important to ensure that these have been properly communicated.

These uses will appear in the Chemical Security Report, where the assessment of the substance's security is documented regarding to the dangers for human health, physical-chemical dangers, and the dangers for the Environment as well as its persistent, bioaccumulative and toxic properties. Moreover, all the possible scenarios of exposure for the identified uses will need to be evaluated.

According to article 37 (2) on *Chemical Security Assessment:*

"Every intermediate user will have the right to inform by writing (paper or e-mail) about a use, or at least the brief general description of the use, the manufacturer, the importer, the intermediate user or the distributor that provided him with a substance, as such or in the form of preparation, with the aim to turn such use into identified use. When presenting a use, sufficient information will be provided to allow the manufacturer, the importer or the intermediate user who has provided with the substance in order to ellaborate an exposure scenario, or if applicable a category of use and exposure for a specific use with in the assessment of the chemical security of the manufacturer, importer or intermediate user".

For the communication of uses, ECHA (European Chemical Agency) has developed orientation documents on the requirements of information and assessment of chemical security, where in chapter R12 the system of descriptors of use is established. These descriptors can be divided in 4 categories:

Decriptors for Sector of Use **(SU)** such as agriculture, food industries, textile, stationary, formulation of preparations or plastic, Chemical Products Category **(PC)** (adhesives, sealing, fertilizers, inks, phytosanitary products, medicine, cosmetics and personal care products...), Process category **(PROC)** based on the exposure of workers as for instance the use in closed processes with unlikely exposure or on the contrary the mixing in processes by batches for the formulation of preparations and articles with significant contact, and finally the category of the final Item to which such distance will be assigned **(AC)** such as electrical items, toys, furniture, handkerchiefs, sanitary towels, textiles, surface flooring, etc...

Normalizing this way the possible scenarios of exhibition and helping thus suppliers and clients to maintain reciprocal communication.

Even though such communication is only necessary at the moment for those substances manufactured in more than 1000 yearly tons, carcinogenic, mutagenic and toxic agents for reproduction (CMR) categories 1 and 2, and for very toxic substances with negative effects for the environment in the long term in more than 100 tons, since the lack of knowledge of the real tonnage is usual, everyone proceeds to the mentioned communication contributing once again, since **REACH** came into effect, to the bureaucratic chaos of upstream and downstream communications.

Fortunately there are many European associations that, foreseeing what would be a new challenge for the companies, started working on a project of synthetisation collecting all the exposure uses and scenarios that affect the activity of their associate companies, in associations such as:

§ **AISE** (detergent)
§ **ATIEL/ATC** (Lubricants and additives)
§ **CEPE** (Paints and inks)
§ **ERMA** (Resins)
§ **ETAD** (Pigments)
§ **FEICA** (Adhesives and sealing)
§ **ISOPA** (Diisocyanates and polioles)
§ **PEST** (Plastic Sector)
§ **COLIPA** (European Cosmetics Association)

Among others, they have defined what is known as *"mapping use"* or "maps of uses" which will be considered by all manufacturers as a starting point for the production of the exposure scenarios and the assessment of the risk for each one of them.

This is greatly simplifying both the work that needs to be done by manufacturers and importers as well as that of users of substances, known in the "Reach slang" as intermidiate users or "Down Stream Users (DU)".

From another side, another deadline that expires together with the foreseen for the communication of uses is the *"late pre-registration"*, which is nothing more than the pre-registration procedure for all substances manufactured or imported for the first time after December 1st 2008.

The late pre-registration must be made within the first 6 months of its manufacture or importation and 12 months before the deadline for the registration, which would be on November 31st 2009, and after that it will also no longer be possible to pre-register a substance of more than 1000 tons, categories CMR 1& 2 in more than 1 ton, and very toxic substances for the environment in more than 100 tons.

Any legal entity that decides to start with a substance within the aforementioned suppositions, beyond this date, will have to present directly a request of Registration of the substance to ECHA.

However, we can start the manufacture or importation of substances in less than 1000Tn and have the option to formalize its pre-registration until May 31st 2012 or until May 31st 2017 for those between 1 and 100 tons.

Meanwhile we will continue to cover phases and facing new challenges in the application of the Regulations which not in vain have been catalogued as the most complicated and ambitious ever developed by the European Union ■

Development of new solvents – safer to use and less contaminating – and their application to the paints and varnishes sector (SOLVSAFE PROJECT)

Pedro Guerra
Representative for AFAQUIM/SOLVSAFE B&B Assessors

Most of the European demand for industrial solvents comes from the paints and surface-coating industry, which uses almost two million tons of solvents each year. Some solvents used in the sector will have to be replaced by safer ones because of European regulations governing the risk to humans and the environment in relation to the use of solvents. In this article we discuss the problems and possibilities for the replacement of solvents in the paints and varnishes sector, and the European SOLVSAFE project.

Keywords: solvents, SOLVSAFE, VOC, REACH.

Le développement de nouveaux solvants (plus sûrs à utiliser et moins polluants) et leur application dans le secteur des peintures et des vernis (Project SOLVSAFE)

La plus grande partie de la demande européenne de solvants industriels provient de l'industrie de la peinture et des revêtements de surfaces, qui consomme près de deux millions de tonnes de solvants par an. Certains des solvants utilisés dans le secteur devront être remplacés par d'autres plus sûrs en vertu des réglementations européennes portant sur les risques pour les humains et l'environnement en ce qui concerne l'utilisation de solvants. Cet article aborde les problèmes et les possibilités de remplacement de solvants dans le secteur des peintures et des vernis, de même que le projet européen SOLVSAFE.

Mots clés : solvants, SOLVSAFE, COV. REACH.

Desarrollo de nuevos disolventes (más seguros y menos contaminantes) y su aplicación en el sector de la pintura y el barniz (Proyecto SOLVSAFE)

La mayor parte de la demanda europea de disolventes industriales se genera desde el sector de la pintura y el revestimiento de superficies, que utiliza casi dos millones de toneladas de disolventes al año. Algunos disolventes empleados en el sector deberán sustituirse por otros más seguros a consecuencia de los reglamentos europeos en materia de riesgo a los seres humanos y el medio ambiente por el uso de disolventes. En este artículo se debaten los problemas y las posibilidades que plantea la sustitución de disolventes en el sector de la pintura y el barniz en el marco del proyecto europeo SOLVSAFE.

Palabras clave: disolventes, SOLVSAFE, COV. REACH.

Introduction

The European SOLVSAFE project (*www.solvsafe.org*) – now concluded – was integrated by a consortium of firms, universities and European technological centres, and third party countries, to develop products and chemical processes through the use of solvents which are safer for humans, as well as being friendlier to the environment.

SOLVSAFE dealt with one of the fundamental problems of European industry – it is very probable that in forthcoming years a large percentage of European industrial processes will be affected by EU policies, like for example, the REACH Regulations for chemical substances, which could restrict the use of very hazardous substances, such as some of the existing solvents normally used in the industry. As a result of these regulations, it is highly likely that some industrial processes may lose competitiveness – especially the chemical industry, which is the third highest contributor to GDP in the EU.

The Solvsafe Project was created by a Spanish initiative, answering the need to establish a series of methodologies for the development of products and chemical processes through the use of safer solvents. The fundamental objectives of the project were: to reduce the quantity and diversity of those solvents which could have adverse effects on human heath and the environment, to reduce the emissions of volatile organic compounds (VOCs), to reduce CO_2 emissions into the atmosphere, and the use of renewable raw materials as alternatives to petroleum in manufacturing solvents.

The SOLVSAFE Project was set in motion in the year 2005 and brought to a conclusion in 2009, and counted 22 members from 9 different countries. Its executive committee was made up of SMEs, with the participation of 120 industrial researchers and investigation centres in Germany, Austria, Spain, France, Italy, Romania, Switzerland, Uruguay and Russia.

The Spanish Association of Fine Chemical Manufacturers (AFAQUIM) and members of the Spanish Network for Sustainable Chemistry, who provided many of their scientists, were among the members of the consortium. With a total investment of 12 million Euros (5.7 million of which was provided by the EU through the 6º Marco programme), SOLVSAFE developed its I+D activities during a period of 4 years.

SOLVSAFE was applied to a wide variety of industrial processes, resulting in revolutionary innovations in 6 different industrial sectors:

1. Manufacture of active pharmaceutical ingredients (API)
2. Biodiesel production and the use of its by-products.
3. Production of phytosanitary products.
4. Paints and varnishes.
5. Manufacture of solvents.
6. Metal-degreasing products.

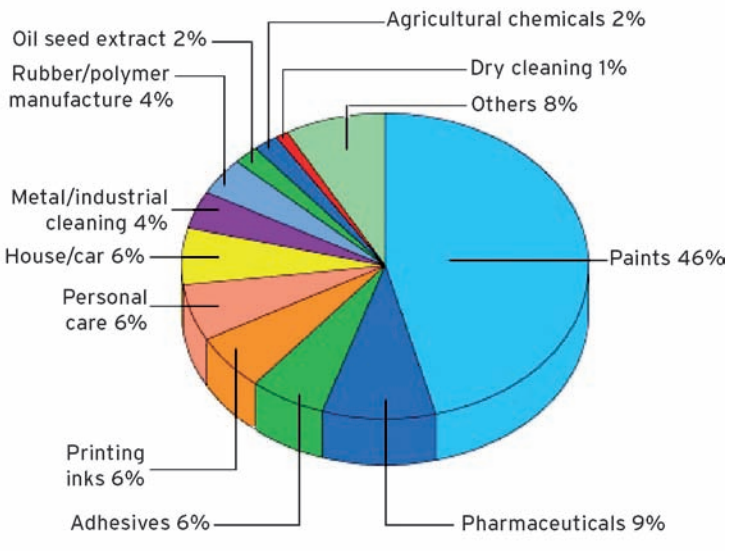
> SOLVSAFE dealt with one of the fundamental problems of European chemical industry, which is the third highest contributor to GDP in the EU

The present article will present the main contributions of the SOLVSAFE Project to the paints and varnishes sector, which is the highest consumer of solvents in Europe.

Paints and varnishes sector: problems in the use of solvents

The greatest European demand for solvents comes from the paints and sur-

Figure 1. European consumption of solvents in different industrial sectors



face-coating industry, which uses almost two million tons every year, representing approximately 46% of the European market for solvents (see figure 1).

Solvents are used in the manufacture of paints to dissolve the various compounds used in the formulation of paint, such as colour, resins and other constituents, so that the paint acquires the right consistency for its application. Once the paint has been applied, the solvent evaporates, allowing the resin and pigment to form a film of paint and dry quickly. Without solvents it would be impossible to produce long-lasting decorative effects, and – especially – glossy paints for indoor or outdoor use, capable of withstanding all kinds of weather conditions.

Many solvents used in the sector are considered to be dangerous because they have a relatively low boiling point. A low boiling point is a desirable characteristic in many applications in which solvents are used, as the solvent must evaporate and leave behind – for example – the film of coating applied. But the fact that the solvents have a low boiling point may mean that they produce vapour at room temperature, with a high volatile level, if the storage process and the conditions are not properly controlled.

Any typical paint contains 60-80% in weight of solvent. As has already been stated, after applying paint to a surface, the solvent evaporates, either freely or stimulated by a heat source, with the consequent emission of Volatile Organic Compounds (VOCs) into the atmosphere. These emissions of organic solvents may create health and safety problems for the handlers, and be damaging to the environment.

The European Union, with the 2004/42/CE Directive, has initiated a harmonization process to reduce emissions of volatile organic compounds, through limiting the content of these types of compounds in paints and varnishes, as far as is technically possible and economically viable, bearing in mind climatic conditions. There are various alternatives for reducing the generation of residue-discharge from solvents. The most efficient use of paints and varnishes allows the reduction of VOC emission and implies an economic saving.

The introduction of water-based paints, which use smaller amounts of solvents, has implied the transfer of part of the environmental problem to the water sector, as it has multiplied the impact on residual water. Cleaning processes, spillage, and inefficiency in the application process, among other causes, could be sources of generating contaminated residual water, which should receive correct treatment.

Solvents used in the paints and varnishes sector

Within the SOLVSAFE Project a survey was carried out to identify the main solvents used in the paints and varnishes sector. The questionnaire was sent to those responsible for the environment or production in companies in Spain, France, Italy, Portugal and com-

panies in Eastern Europe. Judging from the replies obtained in the survey, it can be concluded that the sector uses a wide range of solvents. The most used solvents in the sector, arranged by order of frequency of use, are: Toluene; Acetone; Ethyl acetate; Methylisobutylketone; Butanol; Butyl acetate; 2-Propanol; Xylene, Dichloromethane; Cyclohexanone; Methyl acetate; n-Hexane; Butanone, Dichloroethylene; N,N-Dimethylformamide; Ethanol; 2-Ethoxyethanol; Ethylbenzene; n-Heptane; Methanol; 2-Methoxyethanol and Cyclohexane. Each one of these solvents presents some sort of associated risk, according to present legislation.

Possibilities for substitution: new solvents

Taking into consideration that the paints and varnishes sector is the main European consumer of solvents, and the environmental problems – together with the burden of regulations associated with the use of solvents in paints and varnishes – it is a challenge to the sector to seek new solvents which are less hazardous to the environment and to humans, but which, at the same time, provide the same functional characteristics and quality as those of traditionally used solvents.

In the SOLVSAFE project, taking the characteristics of the sector into account and its high consumption of solvents, a range of new solvents have been developed and applied to existing products, which have achieved the established objectives.

To summarize, 97 new solvents were synthesized from renewable sources, and more than 15,000 properties of the solvents were calculated. Some of these new solvents have been successfully tested, in various applications within the paints and varnishes sector, as well as for their reduced environmental impact, danger, and toxicity.

As a means of orientation, Table 1 lists some of the new solvents for the paints and varnishes sector:

Conclusion

The paints and varnishes sector – as well as other industrial sectors which use solvents – should use alternative solvents which do not pose a threat to the environment, and which are not hazardous or toxic.

Table 1. Solvents developed by SOLVSAFE for the paints and varnishes sector

Sector	Solvsafe Code	Manufacturer of Solvent	Application developed by	Properties of Solvents	Application and Uses
Paints and Varnishes	00031 00035	COGNIS	COGNIS	Medium Polarity, Non- VOC, Derived from fatty acids	Coalescent agents for the manufacture of lacquers and paints with base of natural raw materials.
	00064	COGNIS	COGNIS	Medium Polarity, Derived from fatty acids	Reagent solvents for reducing the VOC content in alkyd-based paints.
	PV-01 PV-02 PV-03	INCA	LECHLER	Medium Polarity	Solvents for systems of water-based paint in substitution of butyl glycol.

The tendency of European legislative pressure increasingly requires the use of processes with the least possible impact on the environment, and the highest possible safety factor to humans, and, as solvents are the chemical substance that are of greatest use in paints and varnishes, they should therefore be used safely, and those of highest risk should be substituted.

The European SOLVSAFE Project has contributed a collection of alternative solvents capable of successfully substituting solvents with known risks or with serious limitations in their use.

List of abreviations

EU/EC = European Union

REACH = Registration, Evaluation, Authorisation and Restriction of Chemical Substances

COV/VOC = Volatile Organic Compounds

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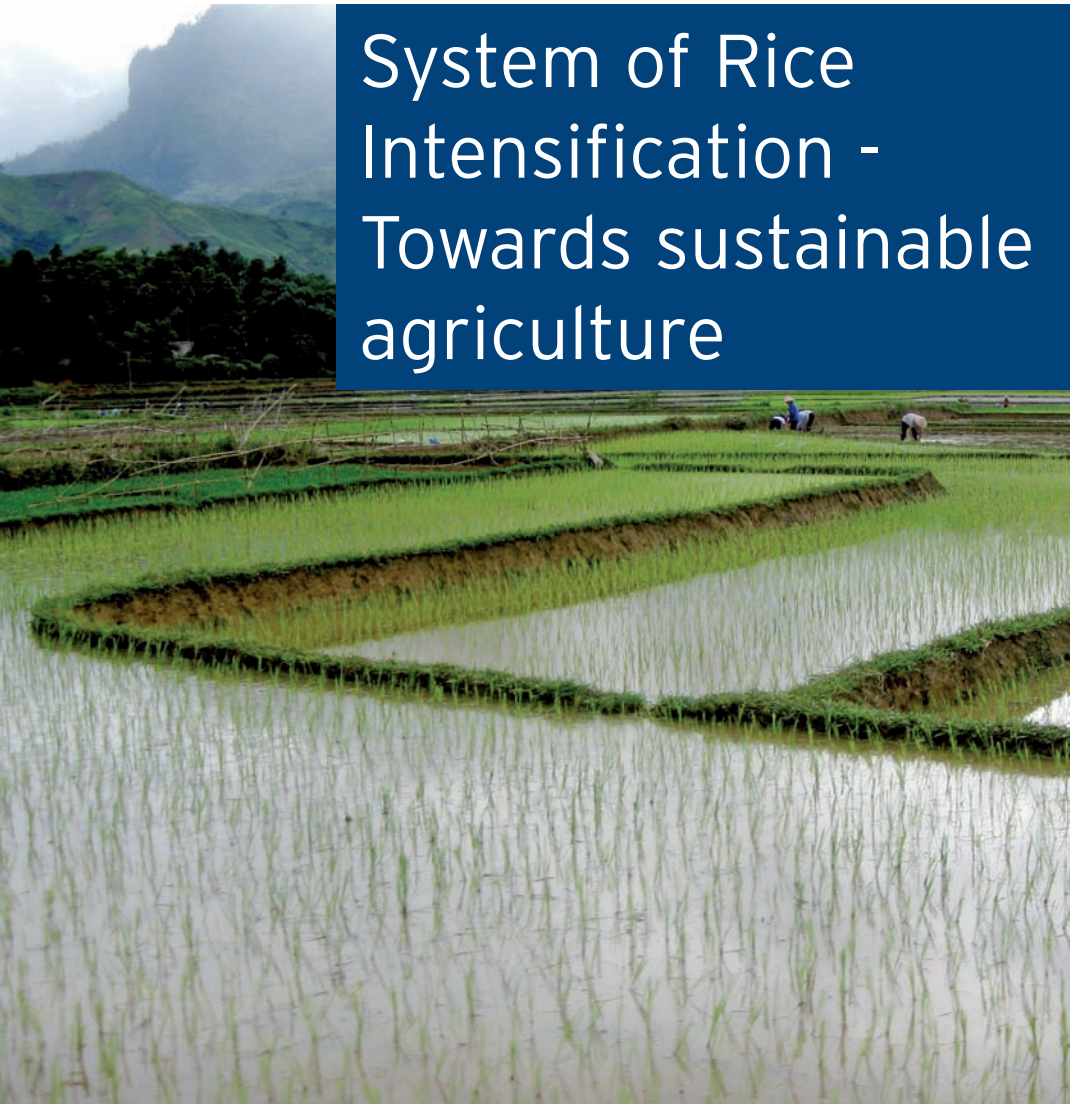
System of Rice Intensification - Towards sustainable agriculture



Raffaele Mancini, Biksham Gujja, Francesca Antonelli, Imad Cherkaoui

Rice is currently among the most water consuming crops, but also the food and/or source of income of half of the world population. System of rice intensification, popularly know as SRI is changing the paddy cultivation allowing farmers to produce more with less-seed, water, chemical fertilisers. SRI, introduced in India around 2003, is now practising in all the states of the country and has become a national phenomenon. Nowadays, SRI is being practiced in more than 35 rice producing countries, though the area cultivated may be small, and is spreading fast from farmer to farmer, country to country. WWF has tried to capitalize on this successful experience by introducing SRI in the Sebou river basin (Morocco) through a pilot project.

Keywords: SRI, System of Rice Intensification, water, chemical, fertilisers, soil, agriculture.

« Système de riziculture intensive - Vers une agriculture durable »

Le riz compte actuellement parmi les produits agricoles qui consomment les plus grands volumes d'eau, mais il constitue par ailleurs l'aliment et/ou la source de revenus de la moitié de la population mondiale. Le système de riziculture intensive, populairement connu comme SRI, est en train de changer la riziculture en permettant aux cultivateurs de produire davantage tout en utilisant moins de grains, d'eau et d'engrais chimiques. Introduit en Inde vers 2003, le SRI est maintenant mis en pratique dans tous les États du pays et est devenu un véritable phénomène national. De nos jours, le SRI est pratiqué dans plus de 35 pays producteurs de riz, même si les surfaces cultivées peuvent être réduites, et se répand rapidement de cultivateur en cultivateur et de pays en pays. Le WWF a tenté de capitaliser cette expérience réussie en introduisant le SRI dans le bassin du fleuve Sebou (Maroc) via un projet pilote.

«Sistema de intensificación del cultivo de arroz. Hacia una agricultura sostenible»

El arroz se encuentra en la actualidad entre los cultivos que mayor exigencia de agua presentan, pero también es el alimento/fuente de ingresos de la mitad de la población mundial. El sistema de intensificación del cultivo del arroz, llamado normalmente SRI por sus siglas en inglés, está modificando el cultivo en los arrozales al permitir a los agricultores producir más con menos semilla, agua y fertilizantes químicos. El SRI se introdujo en la India hacia 2003, aunque ya se practica en todos los estados del país y se ha convertido en un fenómeno nacional. Hasta la fecha, el SRI se ha implantado en más de 35 países productores de arroz; aunque inicialmente las áreas cultivadas sean pequeñas, este sistema se está extendiendo rápidamente entre los agricultores y los países. El Fondo Mundial para la naturaleza (WWF) ha intentado sacar provecho de la exitosa iniciativa introduciendo el SRI en la cuenca del río Sebou (Marruecos) a través de un proyecto piloto.

Introduction

Agriculture uses over 80% of world' water resources[1] and wastes up to 60% of the 2,500 trillion liters of water it uses each year, something like 70% of the world's accessible water[2]. Many big food producing countries like India are close to reaching their renewable water resource limits and, due to the abuse of agro-chemicals, are destroying rivers' water quality and in turn the ecosystems downstream. By 2035, India's population is projected to have half a million people more than now. In order to meet food demand, India needs to increase productivity in the available area of paddy cultivation with less water and less input than today; the adoption of SRI can help achieve that. SRI is still a work in progress, and improvements can be brought especially to further reduce labour requirements.

1.1 System of Rice Intensification (SRI)

Agriculture in India is in big crisis due to many reasons: declining yields, non-availability of agricultural labour, water scarcity, seed quality, lack of proper extension, declining soil fertility for excessive application of fertilizers, inadequate market intelligence, escalating cost of cultivation, low profitability, urbanization, migration to urban areas, etc. In this very bleak picture, SRI appears as a promising success story of partnership between farmers and civil society. The SRI method was synthesized in the early 1980s by the French Jesuit Fr. Henri de Laulanié, S.J., who lived 34 years in Madagascar working with local farmers on agricultural systems, particularly rice production with the objective to consistently raise rice production while abating production costs. Nowadays it is proved that SRI *i)* requires less seed, up to 1/10th of what is used in conventional method *ii)* reduces at least 30% consumption of water because paddy fields are not kept continuously flooded, *iii)* produces at least 25-30% more than what is produced through conventional method *iv)* requires less pesticides and fertilisers as organic materials (compost, manure or any decomposed vegetation) gives good or even better results at lower cost *v)* requires more labour – mainly for weeding or careful transplanting – but, since yields may increase up to 100%, the return of this extra labour is really worth in terms of reducing costs and increasing net profit *vi)* perfectly fits farmers who have small landholdings and need to get the highest yields out of their available land; in this view, SRI is one of the few agricultural innovations having a bias in favour of equity. Having said all this, it is important to stress that SRI has significant environmental benefits since *i)* water demand is reduced and then made available for other uses *ii)* soil that is not kept saturated has greater biodiversity *iii)* unflooded paddies do not produce methane contributing to global warming: it is true that there can be more nitrous oxide from unflooded paddies, which offsets to some extent the gains from reducing methane emissions, but when nitrogen fertilizer is not used, this effect is small.

1.2 SRI method implementation

SRI increases rice production by following a simple but the following step-by-step process:

Rice plants - seedlings are transplanted: i) *very young* usually just 8-12 days old, with just two small leaves ii) *carefully and quickly* to have mini-

[1] World Bank, 2002. "The 2nd UN World Water Development Report".

[2] Clay J. 2004. "World Agriculture and the Environment: a commodity-by-commodity guide to impacts and practices", Island press.

mum trauma to the roots iii) *singly*, only one per hill instead of 3-4 together to avoid root competition iv) *widely spaced* to encourage greater root and canopy growth v) *in a square grid pattern*, 25x25 cm up to 50x50 cm with the best quality soil.

Soil – it is kept moist but well-drained and aerated, with good structure and enough organic matter to support increased biological activity; the quality and health of the soil is the key to best production.

Water - only a minimum of water is applied during the vegetative growth period, and then only a thin layer of water is maintained on the field during the flowering and grain filling stage.

Alternatively, to save labour time, some farmers flood and drain (dry) their fields in 3-5 day cycles with good results.

Nutrients - soil nutrient supplies should be augmented, preferably with compost, made from any available biomass; better quality compost such as with manure can give additional yield advantages.

Weeds - Since weeds become a problem in fields that are not kept flooded, weeding is necessary at least once or twice, starting 10-12 days after transplanting, and preferably 3 or 4 times before the close of the canopy. Using a rotary hoe - a simple, inexpensive, mechanical push-weedier - has the advantage of aerating the soil at the same time that weeds are eliminated.

1.3 Introducing SRI in Morocco

Morocco undergoes water crisis due to the high variation of rainfall patterns over the last two years that has increased the effect of droughts and desertification. The unsustainable water management and the promotion of industrial agriculture for high water consuming crops aggravate the situation: water quantity is threatened by excessive pumping and illegal boreholes while water quality by the drainage of water full of fertilizers and pesticides used in agriculture. The Gharb plain, a huge and fertile flooded area in the Sebou river basin (central north of Morocco), is the first agricultural zone in Morocco where rice cultivation is an example of the permanent conflict between water availability and agriculture development. Indeed, despite high water prices, low profitability, high production costs and recent trade liberalisation, productivity of rice in the area is relatively high (from t/ha up to 8 t ha-1). On this basis, WWF Mediterranean Programme (WWF MedPO) and WWF International decided to join forces with ORMVAG (Regional Agency for the Agricultural Development in the Gharb plain) responsible for the irrigation infrastructure in the region in order to develop agricultural approaches able to protect local freshwater ecosystems and, at the same time, support rice cultivation. To this end, it was decided to test SRI method in the area with the objectives of *i)* reduce water consumption in paddy field in the Gharb area *ii)* reduce chemicals inputs.

> **Water quantity is threatened by excessive pumping and illegal boreholes**

1.4 SRI demonstration in Morocco

The demonstration of SRI in the Gharb area was funded by AECI Programme AZAHAR and ICRISAT. WWF International made a first visit to Morocco (October 2007) to understand the scenario and the problems related to the production of rice as well as the feasibility of introducing SRI in the country.

Subsequently (March 2008) a team consisting of two ORMVAG officials and a representative of WWF MedPO visited India to learn more about SRI through specific training and field visits. As a result, it was decided to test SRI adoptability in the Gharb region with the following specific objectives: *i)* 30% less of water consumption *ii)* 25% less of fertilisers and other inputs *iii)* the same or 10% more production with respect to the average of last five years. Technical field assistance was carried out locally by the displacement of two SRI Indian experts to Morocco for two months. The demonstration was implemented in 11 ha of rice plots belonging to 4 farmers and a research farm managed by a private society. All farmers involved were offered compensation in case of harvests lower than 10 tons of raw rice per hectare; the compensation amount was set at 3.1 MDH (Moroccan Dirham) per kilogram of raw rice, set on the basis of the average market price

1.5 SRI demonstration in Morocco: conclusion

Farmers in Morocco received with great interest SRI though nursery and transplanting of seedlings were entirely new for them. They proved to be quite receptive in understanding the method and the logic behind it, but took quite some time for farmers to actually believe that the method would lead to any improvement. Weed management was a major challenge since from one side the young seedlings gave raise to major growth of weeds and, to the other, SRI do not promote the use of herbicides. When the single seedling started producing tillers, however, the farmers started believing the merit of the SRI. It can be said that, overall, the test did prove that it is possible to introduce the SRI in Morocco though it is still a long way off as it requires major and continuous training, confidence of local farmers used to applying different traditional cultivation methods and further commitment from the authorities ■

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