DRESDEN

Risk-Based Management of Chemicals and Products in a Circular Economy at a Global Scale

8. – 9. May 2012, Dresden, Germany



Riskcycle and the EU-Legislation

Prof. Dr. habil. Uwe Lahl BZL Kommunikation und Projektsteuerung GmbH



Agenda

- 1. Introduction: Possible routes for implementation
- 2. Product legislation: Eco design
- 3. Waste legislation: RoHS
- 4. Chemicals legislation: REACH
- 4.1 Exposure scenario "recycling"
- 5. Recommendation

How can the outcome of the project RISKCYCLE influence European legislation?



Two questions to the project:

- Is there a problem "riskcycle" we have to solve with legislation?
- What are the source of the problem?

How can the outcome of the project RISKCYCLE influence European legislation?



In fact, there are different routes for implementing the idea of RISKCYCLE in regulations.

- First, the **Ecodesign Directive** is another possibility to implement more precaution against RISKCYCLE. So far, the idea of hazards and risks in the design of products was not well documented under this roof. Actually, there is a discussion on the European level to widen the scope of the Ecodesign Directive.
- And second, what about using **European waste legislation**?
- And last but not least, REACH the **European chemicals legislation** has interrelation to the waste sector and therefore to the project.

Ecodesign Directive





Currently, the Ecodesign Directive can include selected pollutants in life cycle assessment considerations (as resource efficiency). This does however not cover the topic RISKCYCLE.

At present it is unclear whether the scope of the Ecodesign Directive will be extended a second time and whether the problem of pollutants in products than would be involved. Since the focus of the policy will remain clearly on the energy aspect it is not expected that even with expansion of the scope, the Ecodesign Directive can make a relevant contribution to solving the problem of RISKCYCLE.



In the sector of electrical and electronic equipment, the RoHS Directive, has successfully fought an increase of RISKCYCLE and has reduced many problems. This raises the question whether the RoHS Directive can offer a further contribution for solving the remaining problems. This would require an extension of the scope of the Directive in two aspects:

- Expansion of product scope, so other products in addition to electrical and electronic equipment and
- Extension of the catalog of restricted substances (Annex II of the Directive).

European waste legislation



http://www.esskabel.de/upload/images/produktbilder/RoHS_Analyse_Kategorie.jpg

Article 6 of the RoHS Directive (recast 2011 [EC2011]) says: "1. With a view to achieving the objectives set out in Article 1 and taking account of the precautionary principle, a review, based on a thorough assessment, and amendment of the list of restricted substances in Annex II shall be considered by the Commission **before 22 July 2014**, and periodically thereafter on its own initiative or following the submission of a proposal by a Member State ...". Thus, the door would be open for this extension.

But I am skeptical! Reason: Without an extension of the instrumentation to a more sophisticated control system, the complex (chemical) process in products/waste cannot be reproduced with this directive.



REACH







REACH – the workplan





REACH – the safety check





http://echa.europa

AE





REACH – all applications should be covered





REACH – exposure scenarios



problems, etc.)

Wet

Deposition

Ingestion

Intake/Uptake

Evaporation/ Reentrainment

Absorption

Air

Inhalation



REACH – the relevent exposures











http://www.epa.gov/oppt/exposure/images/lake.jpg http://images.sciencedaily.com/2011/03/110316153123-large.jpg http://www.intarttiles.com/RK/RK-028-The%20Food%20Chain.jpg http://www.sciencecodex.com/aggregated-images/tech/e0kU63O9WI9E6Oxd.jpg http://www.reach-clp-helpdesk.de/de/Bilder/Exposition.jpg%3F__blob%3Dnormal%26v%3D2



REACH – how to performe exposure scenarios



Step	What	How
L Map by M	o substance applications and characterise I organisations with support from DU organ	exposures through the supply chain – action hisations
1	For a substance or group of substances with similar applications, Mi maps the supply chain to complie an inventory of Uses involving potential for worker or consumer exposure or environmental release. This is carried out for each defined area of application and forms the basis of the GES. Identify the relevant Sector of Use (Reach Use Desorption 1) for each the cycle stage, keeping the Sector as general as possible	Comple an inventory of applications for the substance(s) to be registered. For example: process chemicals, cleaning agents, coatings (e.g. paints/decorative coatings, inks, adhesives), lubricating agents (e.g. lubricants, greases). In addition general activities such as manufacture, storage and distribution, formulation and packing should be identified. For each application, opportunities for exposure are identified covering each lifecycle stage of the supply chain. Identify relevant Downstream User Associations to assist with verifying the mapping exercise.
2	For each area of application, determine the contributing scenarios and those Operating Conditions (OCs) and Risk Management Measures (RMMs) that are cuirently used to control workericonsumer exposures and environmental releases. Map each Use Involving potential for exposure to the relevant REACH Use Descriptor. Worker – Process Categories (PROC) Consumer – Product Categories (PC)(Article Categories (AC)) Environment – Environmental Release Categories (ERC) or equivalent	Use Table 1 of the standardized mapping Microsoft Excelle-based spreadsheet formal template. Separate templates are available for worker consumer and environment. Review the outcome of the mapping exercise with representative DU Organisations for accuracy and completeness and adjust as needed. This may be done at this point, or for efficiency, combined with the DU review carried out as par of later steps. See examples given in Section 5.1.

-	Commenter and and and and an an an and an an an an an an an	Contracts in the dist is set of the second
-	Carry out exposite estimates for womens, consumers and/or the environment for each identified Use included within the mapping exercise. Opposite elevant notices of human environmental emission (air, water, land/sediment).	Estimate predict exposures using available then modelling tools, e.g. ECETOC TRA. Identity OCSIR/Mits applied to mostly the Tier I estimates bandwind the subtuisting Table 2 of the subtuisting table 2 of the subtuististing table 2 of the
4	Continm adequacy of the existing typical RNMIs taking account of appropriate RNMI efficiencies through comparison with actual or representiative DNELs and PNECs. Iterate where necessary to define adequate risk control and demonstrate take use. List the RNMIs for each Use as standard phrases to support compliation of the required risk control measures for communication to Downstream Users using meaningful language. These may include required risk control measures in support of product stewardship in addition to those required to demonstration of cafe use allowing with iteration of the use allowing the demonstration of cafe use allowing the control MNLs are appropriate and recommended RNMIs are appropriate and practical. Where identified RNMIs we opprovide and practical.	Compare the exposure estimates for the relevant volatility or dustiness ranges with netwart DNELs and/or PNECs. For the development of the GES it is only necessary to have available a DNEL or PNEC representative of a substanceFootnote. Prior to final registration a verification step with the actua DNEL_PNEC is required. Safe use is demonstrated if the result is below unity. If adfe use cannot be demonstrated cany out Tier 2 iteration to verify actual rak reduction is greater than the Tier 1 default for a particular RMM or identify additional RMM status and the Dray being Openics Safety Assessment Openics Safety Assessment Openics Barley Assessment Draw on the RMM standeds process to comple the relevant list of RMM standers in needed.

Footnote to point 4: For certain groups of substances having similar hazardous properties may be possible to use a DNEL/PNEC for the whole group. This requires expert judgment.











http://www.downtoearth.org.in/sites/default/files/images/i.jpg http://redroselady.edublogs.org/files/2012/02/Water-pollution-solid-waste-szrtcx-1vtorn7.jpg



REACH – waste is included !



REACH – guidance documents how to include *"***recycling**"





Types of waste generated along the life cycle of a substance (ECHA 2010)

LoW = List of Waste (established by Commission Decision 2000/532/EC), DU = downstream user, SDS = Safety Data Sheet

REACH – guidance documents how to include *"***recycling**"





Determinants and results of regional release estimation for the waste stage (ECHA 2010)

REACH – guidance documents how to include *"***recycling**"





Workflow for generic approach (ECHA 2010)

DRESDEN

REACH – Riskcycle



Summary:

"The recycling process is part of the life cycle of a substance and as such it must be included in the exposure scenarios under REACH and in particular in the chemical safety report (> 10 Mg)." German Government 2012



DRESDEN

REACH – Riskcycle





- The dossier evaluation is on the way.
- Data are not yet available!
- Significant deficits are predicted.
- REACH amendment is to be decided in 2012 after 5 years experiance with the regulation. The discussion will start after the summer break.





REACH – Riskcycle – REACH-Amendment

- The RISKCYCLE issue should be explicitly noted in the regulatory text to raise awareness among the registrants of this topic.
- The ongoing analysis of registration dossiers should be considered and performed with sensitivity to the waste stage. This should also be done for the selection of substances of very high concern (SVHC, candidate list). For this purpose this task should be designated to the ECHA.
- A previous proposal given in the process of designing REACH should be "revitalized": the introduction of quality assurance mechanisms in REACH regulation. This proposal could not be implemented due to the lack of majority during the political decision process on structuring REACH. But today's situation shows that such a mechanism is needed. Quality assurance mechanisms could be arranged privately. Before a registration is submitted the file could be checked by an independent expert for completeness and defined content requirements. One requirement must be "riskcycle". Without such an examination a registration would be incomplete.



Backup



Structure of the Guidance Documents (ECHA 2012)



Backup

Antwort der Bundesregierung auf die Kleine Anfrage der Abgeordneten Dorothea Steiner, u.a.

Der Recyclingprozess ist Teil des Lebenszyklus des Stoffes und als solcher im Rahmen der Expositionsbewertung unter REACH und damit insbesondere auch in dem Stoffsicherheitsbericht zu betrachten, der bei Herstellungsmengen über 10 Jahrestonnen den Registrierungsunterlagen beizufügen ist. Genauere Kenntnisse z. B. der bei Primärkunststoffen eingesetzten Additive sind für die Recyclingwirtschaft nützlich, um so einen besseren Überblick dazu zu erhalten, mit welchen Zusätzen im jeweiligen Abfallstrom grundsätzlich gerechnet werden muss bzw. welche Zusätze sich in den erzeugten Sekundärmaterialien potentiell wiederfinden können. Inwieweit sich die Situation in der Praxis durch REACH verbessert, bleibt abzuwarten. Informationen zu den bei Primärkunststoffen jeweils eingesetzten Additiven sind gegenwärtig kaum öffentlich zugänglich. Unmittelbare Rückschlüsse auf Eigenschaften eines konkreten Abfallstroms dürften zumindest im Bereich Produktabfälle aber selbst bei Vorliegen dieser Informationen regelmäßig kaum möglich sein, da sich z. B. die Fraktion Kunststoffabfälle aus einer Vielzahl nicht konkret bekannter Produkte zusammensetzt.



Faculty of Business and Economics, Chair of Economics, esp. Allocation Theory

An Integrated Policy to Control Environmental and Health Risks from Chemicals and Additives in WEEE and Textiles

Prof. Dr. Hans Wiesmeth Dr. Dennis Häckl



May 9th, 2012



- The implementation of the "Globally Harmonized System of Classification and Labeling of Chemicals" (GHS) was encouraged by COP 8 in Johannesburg in 2002. It helped to adjust the safety assessment of chemicals and products in many countries all over the world.
- The **concept of the circular economy** imposes additional risks with commodities produced with recycled material contaminated with additives or other potentially hazardous chemicals.
- The goals of any environmental policy should be to
 - provide incentives to reduce the application of these chemicals wherever and whenever possible ("Design for Environment" (DfE)),
 - recover used products and recycle chemicals and additives in an environmentally friendly way, and
 - control trade of products containing hazardous substances to countries without proper recycling capabilities.
- These goals point to a "life cycle approach" as targeted by "integrated environmental policies".
- BUT: How can a **closed chain of incentives** be established?



- Introductory remarks
- Challenges with WEEE policies
 - Holistic approaches to WEEE policy
 - Guideline for WEEE policies
 - WEEE policy for industrialized countries
- Holistic approach to additives in the textile industry
- Final remarks



• Extended Producer Responsibility (EPR) is defined (cf. OECD (2001)) as:

"an **environmental policy approach** in which producer's responsibility for a product is extended to the **post-consumer stage** of a product's life cycle"

- An EPR policy is in particular characterized by the shifting of responsibility upstream toward the producer, and the provision of incentives to producers to take into account environmental considerations when designing their products
- The **holistic approach** with an EPR policy is meant to provide incentives for producers for Design for Environment (DfE)
- One aim could be that **products can be easier disassembled and recycled** after the product's life time.

The **European Directive on WEEE** contains major critical steps of an integrated approach to WEEE:

- According to Article 1, its purpose is, "as a first priority, the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste."
- It seeks to **improve the environmental performance of all operators** involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment.
- Article 4 provides the relationship to EPR and to DfE: "Member States shall **encourage the design** and **production** of electrical and electronic equipment which take into account and facilitate dismantling and recovery, in particular the reuse and recycling of WEEE, their components and materials."
- Article 7 discusses the take-back requirement for producers.



Thus, the essential components of a WEEE policy are:

- "product design",
- "separate collection" of WEEE,
- "take back requirement" and treatment including a test regarding reusability

The **signals** associated with these components **have to be linked**, but for many countries, this "chain of incentives" has weak points:

- The separate collection of WEEE is costly (time for transport)
- The **"Tragedy of the Commons"** may misguide consumers to put small WEEE into the garbage/ "donate" WEEE to private collectors for export.
- WEEE can be valuable enough to be reusable and reused in some developing country. Manufacturers may export WEEE, when cheaper.
- Producers will change the design, if the new design is less costly to handle over its life-time including recycling. If part of WEEE can be exported, aggregate disassembling and recycling costs will decrease, providing even less incentive for DfE.

Critical issue of a holistic approach to WEEE policy: Linking the signals from the various parts of the product chain



A holistic policy approach for WEEE in a country with major producers or distributors of EEE should pay attention to the following points:

- Owners of WEEE should be "motivated" to return their used or end-oflife equipment to official collection points.
- Link consumers' decisions to buy certain EEE, to return WEEE, and an incentive of the producers for Design for Environment





- A holistic approach to handling chemicals and additives in the textile industry has to take into account that producers and consumers are regionally separated (environmentally sensitive production sites mainly in developing countries).
- Current environmental policies regarding textiles are limited to command-and-control policies proscribing, for example, the application of certain chemicals in the production processes at least to the extent that remainders of these chemicals cannot be detected in the finished products.
- This part of the policy should be retained, if not extended to include new substances which prove to be hazardous during the production process or while using the textiles, or which can become dangerous if they accumulate in the soil or wherever discarded textiles tend to end up.
- But how can manufacturers be motivated to "Design for Environment", to reducing or substituting potentially hazardous chemicals in finished textiles?



One potential approach that is orientated towards consumers:

- Basic assumption and observation: Manufacturers usually react quite sensitive on potential changes in the demand for their products.
- Manufacturers with DfE should be encouraged to attach a label to the garments declaring them "free of hazardous substances". This label should be awarded by an independent research institute which is recognized at least in the EU to cover a substantial part of the global markets.
- However, this **advertising policy** could and should be **supported by fees** from those manufacturers, who continue to apply certain potentially hazardous chemicals. This, of course, requires a declaration of those chemicals, again supervised by an independent institution.
- The revenue from this "Pigou tax" should be used to support relevant research institutes and to finance further research regarding these issues.



The incentives associated with this policy approach to chemicals and additives in textiles are as follows:

- Health-conscious consumers in industrialized countries with a presumably high environmental awareness will learn quickly about this label and adapt their demand. As their health could be affected by their purchases, the "Tragedy of the Commons" is therefore turned off or at least significantly weakened.
- The decision-making of the consumers is influenced by relatively higher prices of "polluted" textiles due to fees charged for these garments.
- It is the duty of the independent institute to propose appropriate fees which compensate "clean" manufacturers for temporarily higher production costs.
- This demand effect will motivate manufacturers to switch at least gradually – to cleaner, or even clean production technologies, to DfE in the context considered here.
- Such a **policy is holistic** in the sense that it **considers signals from various parts of the product chain and links them** by appropriate tools



- Central issue: link signals from the whole product chain!
- The difficulties with this kind of EPR policies in general (WEEE policies in particular) are hidden in the interactions between the economic agents: with consumers, producers, and in some cases with recycling companies.
- Some of these agents are not located in the same country; this creates additional difficulties, which is even more relevant for environmental issues of **potentially hazardous chemicals in textiles**: Producers are typically located in developing countries and consumers in industrialized ones requires special attention (can only be partially addressed by feasible policies)
- As textiles are not separately collected after use, signals from the afterconsumption phase can only incompletely be incorporated into a holistic approach.
- Holistic approaches to environmental policy have to consider the concrete situation of a particular problem: there is **no general approach**!
- The solution of the allocation problems depends on the given situation.



Prof. Dr. Hans Wiesmeth & Dr. Dennis Häckl

Faculty of Business and Economics Chair of Allocation Theory, TU Dresden 01062 Dresden, Germany

hans.wiesmeth@tu-dresden.de dennis.haeckl@tu-dresden.de



COMMISSION



SEVENTH FRAMEWORI

About the 1st WORKSHOP at Hanoi **University of Science (HUS)** VIETNAM RISKCYCLE

Prof. Dr. Nguyen Thi Diem Trang

Hanoi University of Science, 19 Le Thanh Tong, Hanoi, Vietnam

Dresden, 7th -10th May 2012





The 1st Workshop of RISKCYCLE was organized at HUS from 3rd - 6th May 2010

The topic was "Risk-based Management of Chemicals and Products in a Circular Economy at a Global Scale"





The workshop was attractive to the local society

- Risk-based management of chemical from recycled products was rather new aspect
- Journalists of 23 newspapers and television have come to the workshop
- Project Manager of RISKCYCLE Prof. B. Bilitewski was interviewed by the national television channel. It was broadcasted on television VTV1 on the 4th May 2010





Waste management issue becomes attractive through this event

- WM is a realistic problem, that every country have to face to it on the way of development. Look at it as inevitable problems of each country

- One effective solution is to become a member of an international network like RISKCYCLE, where related results can be disseminated





Waste management issue becomes attractive through this event because of following RISKCYCLE presentations:

- Problems due to plastic recycling processes
- Design and management of a database of chemical additives: application to the lubricants sectors
- Environmental risk associated to textile materials: preliminary considerations
- Reuse potential of chemical sludge a hazardous waste in textile drying process
- E-waste management in India focusing on recycling

The environmental management of Vietnam has been raising awareness through this information





Local presentations may have brought useful information to the RISKCYCLE participants with following theme:

- Problems in paper recycling

European Commission

RESEARCH

- E-waste Management and Recycling in Vietnam and
- Classical and Emerging Hazardous Environmental Pollutants in South Eastern Asia: The case study in Vietnam

as well as general picture about Vietnam WM and related rules on this area from the two chief officials of Ministry of Resource and Environment







The 1st **RISKCYCLE** workshop could have achieved success through the field trip

- With that field trip to a recycling village, some one said that without activity of **RISKCYCLE** project it is hardly to touch to the reality of a recycling unit like this
- It may built-up idea to foreign colleagues to the on-going of RISKCYCLE?



European Commission



You may remember

QUẢN LÌ RÙI RO DO HỎA CHẤT TRONG SẢN PHẨM Ở NẾN KINH TẾ QUAY VÔNG CHẤT THẢI TRÊN PHẠM VI TOÀN CẦU Risk-based management of chemicals and products in a circular economy at a global scale







Community Research

SEVENTH FRAMEWORK PROGRAMME

RISKCYCLE

Hanoi University of Science, 334 Nguyen Trai / 19 Le Thanh Tong, Hanoi, Vietnam







OUTCOMES AND RESULTS OF THE 4 RISKCYCLE WORKSHPS

Prof. Claudio Mahler Federal University of Rio de Janeiro



REPORT III RISKCYCLE

Occurred May, 02 to 05, 2011 in Rio de Janeiro City, Brazil.

- 80 persons were at the workshop
- 19 from other countries
- 23 presentations in power point in two complete days.
- Two days internal meeting and visit to a Separation Centre and a Recycling Centre
- First Day Visit to the Federal University of Rio de Janeiro and meeting with the Fundação COPPETEC substitute
- Superintendent
- Last Day Visit to collection and recycling of waste institutions

OUTCOMES AND RESULTS

- Students (new)
- Professors (new contacts)
- Specialists (new contacts)
- Companies (made contact)
- Environment State Secretary
- Ministry of Environment
- Scientific partnerships
- Publications
- Contacts
- Meeting in India



NEW THEMES

- Life Cycle Analysis
- Recycling Program at the University
- Composting
- Potential energy from waste
- Zero waste
- Unresolved issues regarding the management of waste
- Book



SOLID WASTE WHAT YOU STILL DO NOT KNOW ABOUT THE SUBJECT

- 1. Characteristics of Solid Waste and Calorific Value
- 2. Composting
- 3. Classification of municipal solid waste in accordance with environmental liabilities
- 4. The use of barrier capillary as coverage of waste landfills
- 5. The use of vegetation in the recovery of solid waste landfill



6. Potential energy waste organic Brazilian

7. Potential Energy Utilization of municipal solid waste in Brazil
8. In search of zero waste: an experiment in progress



Claudio Fernando Mahler COPPE/UFRJ Federal University of Rio de Janeiro WWW.getres.ufrj.br Group of Waste Treatment Studies







EUROPEAN

COMMISSION



Community Research

SEVENTH FRAMEWORI PROGRAMME

Outcome and results of India workshop

RISKCYCLE

Sustainable Waste Management of Additives in Products: A Global Challenge

12th – 13th October 2011 New Delhi





Workshop objectives

To exchange experience and share knowledge on additives and the risk on the human health and environment

Sectors include

European Commission

RESEARCH

- Leather
- E-waste
- Paper
- Textile
- Plastics





Participants profile

Government

European Commission

RESEARCH

- International and national research community (research institutes and universities)
- NGOs
- Industry



European Commission

RESEARCH



Topics covered (1)

- RISKCYCLE A new paradigm in waste assessment and management
- CiP The Chemicals in Products project Activities and outcomes to date
- Proposed Master Plan for disposal of used mercury based lamps in India
- Fate and global risk of nano-materials in the environment and recycling wastes
- Chemical Management in the Leather Industry – A case study from Europe



European Commission

RESEARCH



Topics covered (2)

- Living in a cleaner environment in India: A strategic analysis and assessment
- Risk assessment of chemical additives, ending up in waste water treatment plants
- South of China e-waste recycling processes Health Risk assessment of Lead released, by using 2FUN Tool
- Development of a multi-compartmental pharmacokinetic model for human health risk assessment. Application for PFOS and PFOA
- LCA case study Cushion Vinyl Floor Covering and DEHP
- LCA case studies Textile and printed matter (paper)





Outcome of deliberations

- Enhanced knowledge regarding risk posed by chemical additives
- Exposure to Government's policies and programmes
- Exposure to International State-of-the-Art on the subject
 - LCA as a tool

European Commission

RESEARCH

- Risk assessment methodologies
- Identification of knowledge and research gaps for future research activities



European Commission

RESEARCH



India's position (1)

Rotterdam Convention on PIC

- Party to Convention in January 2006
- Re-elected to continue its membership in the Chemical Review Committee (CRC) of the Convention
- Stockholm Convention on PoPs
 - Ratified in January 2006
 - Developed NIP April 2011
 - Active research programme on sound management and disposal of PCBs





India's position (2)

Strategic Approach to International Chemical Management (SAICM)

- ICCM-2 to focus on following new emerging issues
 - □lead in paint,

European Commission

RESEARCH

- nanotechnology and nanomaterials,
- Use of chemicals in electrical and electronic products
- Inventory of heavy metals in paints, distempers and pigment has been initiated





Thank you