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ENVIRONMENT DIRECTORATE
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Working Party on Resource Productivity and Waste

OECD Workshop: Design of 'Sustainable Plastics' From a Chemicals Perspective

13-14 June 2017

This document provides the draft agenda for a workshop on the sustainable design of plastics. It reflects the current discussions in an expert group that was set-up across WPRPW and the Chemicals Committee to support the organisation of this workshop. The document is provided to delegates for information.

For further information please contact:
Peter Börkey, Principal Administrator, Environment Directorate
Email: peter.borkey@oecd.org ; Tel: +33 (0)1 45 24 13 85

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OECD Workshop: Design of 'Sustainable Plastics' From a Chemicals Perspective

1. Scope, venue and stakeholders

1. **Scope:** The workshop will focus on the design stage of a plastic product and how chemical selection considerations influence the overall environmental and health impacts from chemicals at various stages of the product manufacture, use and end-of-life. Improvements in design can minimise these impacts and lead to more sustainable plastics. This will also include how chemical selection can influence the 'circularity' of a product, for example with respect to the ability to recycle or recover material.

2. **Possible dates:** In late May/early June 2018 in Denmark.

3. **Who:** The Joint Meeting of the Chemicals Committee and Working Party on Chemicals, Pesticides and Biotechnology (Joint Meeting) with collaboration from the Working Party on Resource Productivity and Waste (WPRPW).

4. **Organising group:** Issue Team on Sustainable Chemistry (with experts nominated by the Joint Meeting) and Experts nominated by the WPRPW.

5. **Workshop participants:** Country delegates nominated via the Joint Meeting and WPRPW, industry, NGOs, invited experts.

2. OECD Context

6. Following a series of discussions on plastics the Joint Meeting included a workshop on the 'Design of Sustainable Plastics from a Chemical Perspective' in its 2017-2018 Programme of Work and Budget (PWB). Noting the implications and interface with waste, the Joint Meeting expressed interest in ensuring input from the WPRPW which has also held several discussions on plastics and included work on the chemicals/waste interface in its 2017-18 PWB.

3. Background

7. Plastics are an essential part of modern life. They are used in diverse applications across sectors. They can be rigid, flexible, fibres, films, coatings etc. In 2014, global plastic production reached 311 million metric tons (PlasticsEurope, 2015). In the US, the value of plastics manufacturing shipments were USD 309 billion in 2014 (SPI, 2015). Plastics are synthetic materials composed of polymers, and various additives that alter the properties of the polymer (e.g. colorants, plasticizers, stabilizers, flame retardants, blowing agents, fillers, biocides etc.). There are commonly two broad types of plastics: thermoplastics, which can be re-melted and reused, and thermosets, that due to cross-linking in the creation of the initial object cannot be re-melted for reuse.

8. From a chemicals perspective, there is increasing awareness of the potential impact of chemical components of plastic on human health and the environment. In the indoor environment, a number of plastic additives migrating from household products have been found in house dust, increasing the potential human exposure to these chemicals. Concerns have been raised about the potential migration of some plastic additives from toys and food contact material. Also, certain plastic additives are considered to have led to long-term environmental contamination due to their persistence and bioaccumulation in the environment. The presence of hazardous substances in recycled plastics that is used to manufacture new products might lead to further exposure.

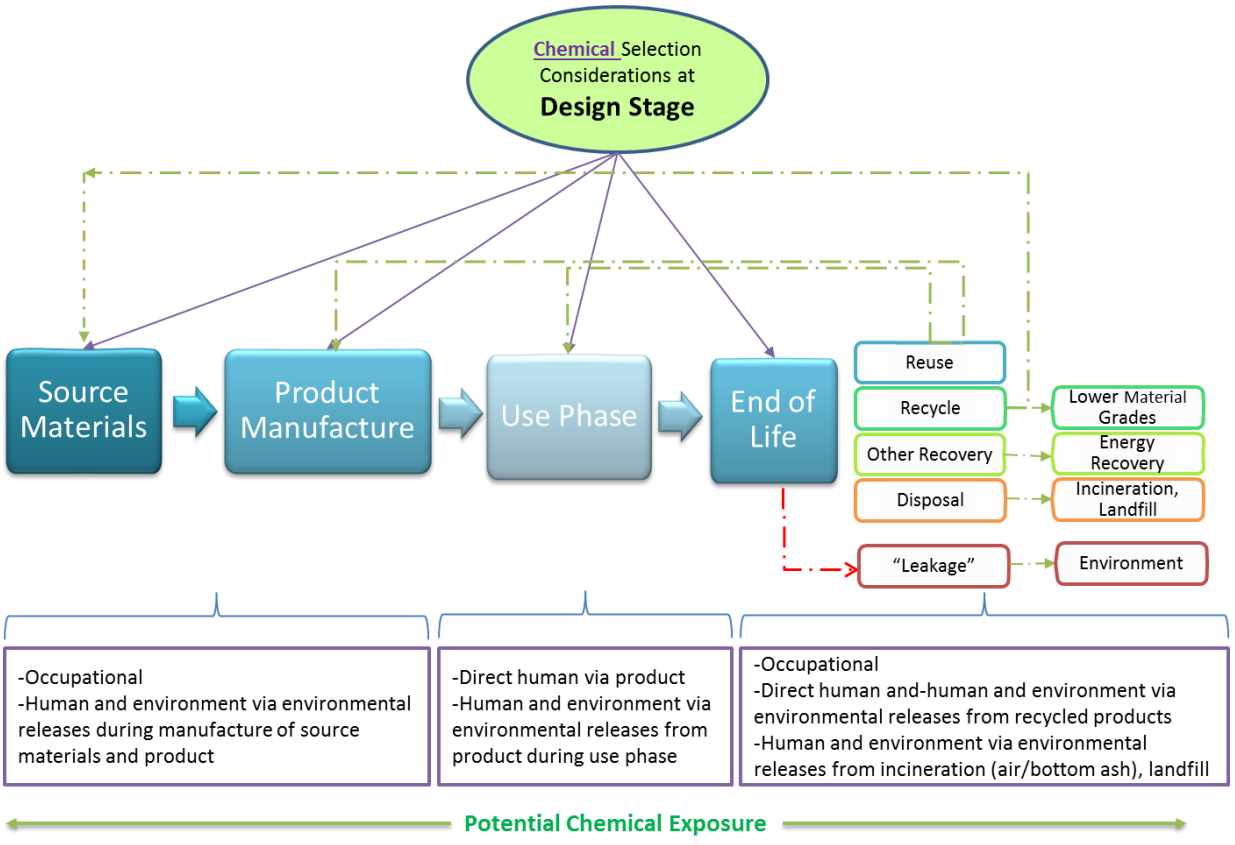
9. There is an increasing recognition of the importance of the role of sound chemicals management within the context of other life-cycle and circular-economy considerations for plastic (e.g. resource use, waste management/material recovery, continued re-introduction of hazardous chemicals). Figure 3.1 aims to summarise potential chemical exposure pathways through a high level overview of plastics' life-cycle.

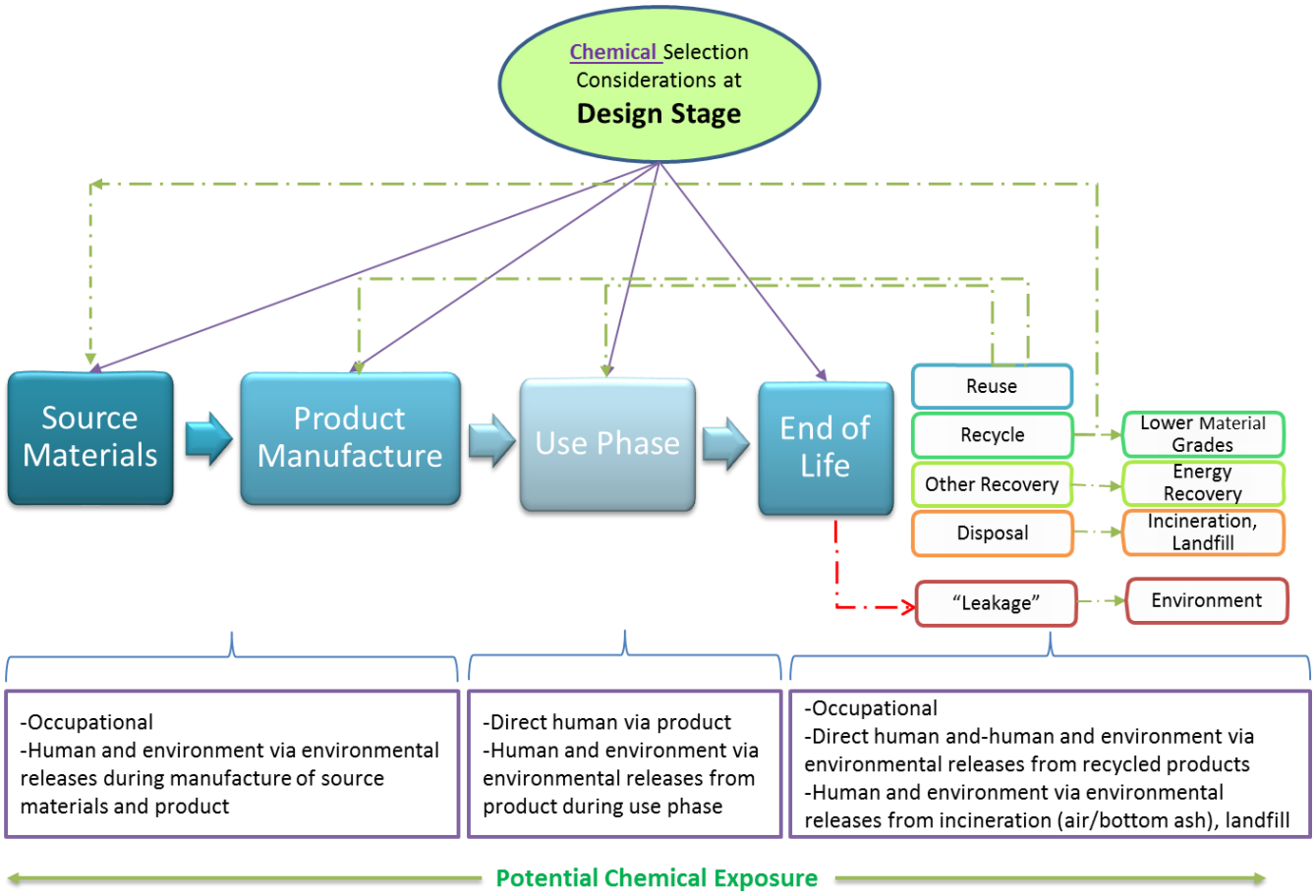
10. The type of chemicals chosen to manufacture the plastic product at the design stage influences exposure sources and potentially risks from chemicals from both the resourcing and production stages, during the use of the product and the end-of-life options with their associated potential to lead to chemical exposures. In particular, at the end-of-life stage, as the level of complexity of the plastic product increases (different material types and additives), the ability to recycle decreases due to the difficulty to efficiently separate material streams. Also, the presence of hazardous chemicals limits the types of products that the recycled material can be used for. Therefore, there is a need to reduce these or to have a process for decontamination of waste before recycling, which

can be very difficult for plastics, in order to expand the types of uses of the recycled material.

11. Focusing on the design stage of a plastic product and explicitly considering how the choice of polymer and additives influences the overall environmental and health impacts of chemicals from the manufacture, use and end-of-life of a particular plastic provides an opportunity to improve design to minimise these impacts and lead to more sustainable plastics.

Figure 3.1. Overview of plastics' life cycle





4. Workshop main topics

Topic 1: What does it mean to be 'sustainable' from a chemicals perspective throughout the life-cycle (including end-of-life), and how to evaluate claims of sustainability?

Topic 2: Identification of available technical tools for use at the design stage of a plastic product to consider how the choice of polymer and selection of additives influences the overall environmental and health impacts of chemicals at various stages of the product manufacture, use and end-of-life.

Topic 3: Approaches that are in place across various OECD jurisdictions, private sector and civil society to incentify, at the design stage, the use of more benign and recyclable materials.

5. Proposed workshop structure

Day 1

Introduction: OECD plus possibly host country

Morning Session: **Setting the scene**

Objective: The objective of this session is to provide a common knowledge base over which to frame the discussions during the workshop. It would aim to provide an overview of the role of plastics for sustainable development, of the key polymers and additives that are currently in use, as well as the key challenges that occur at the design stage from a sustainability point of view and that affect different life-cycle stages, including end-of-life.

Who: 4 speakers, panel discussion and Q&A

Topics:

- Broader Aspects of Sustainability and Their Application to Plastics
  - Benefits and concerns
- Primer on Plastics from a Chemicals Perspective
  - Main types of polymers and additives
    - For which uses?
    - What do we know about hazard, exposure and risks
- What are the challenges to achieving more sustainable plastic design and the tradeoffs?
  - Functional
  - Technological
  - Economic
  - Regulatory
- Key challenges at the end-of-life
  - Impact of polymer/chemical selection at the design stage on:
    - End-of-life options

– Use of recycled material

Afternoon Session: **Sustainable plastics design in practice**

Objective: The objective of this session is to highlight examples from companies who have addressed a particular challenge with respect to chemicals/polymers and plastics by targeting the design stage. The examples will highlight how chemical/polymer choice at the design stage influences aspects along the life-cycle. The presentations will highlight what solution was found or is being worked on and presenters will also share their definition of 'sustainability' from a chemicals perspective as well as the criteria that they use to inform decision-making at the design stage.

Who: 4-6 speakers with panel discussions and Q&A

Topics: A range of examples covering different aspects of sustainability, for example:

- Substitution of chemicals
- Making the product more recyclable
- Use of different source material (virgin, recycled, renewable/non-renewable feedstocks)

Day 2

Morning Session: **Criteria for defining 'sustainability' from a chemicals perspective**

Objective: The objective of this session will be to discuss what it means to be 'sustainable' from a chemicals perspective and how to evaluate claims of sustainability

Who: Introductory session, followed by break-out discussions and plenary session summary

Note: A background document outlining potential considerations will be prepared prior to the workshop, supplemented through the break-out discussions and then the considerations published as an outcome of the workshop.

Topics: What are the various types of criteria that could define 'sustainable' plastics from a chemicals perspective? These types of considerations would help those selecting chemicals at the design stage as well as those evaluating sustainability claims.

- Hazard considerations
- Exposure considerations

- Product longevity and degradability considerations (in the context of selecting particular polymer/resin and/or additive for use scenario)
- Feedstock source
- Implications for end-of-life of chemical selection and material composition
- What are the key trade-offs to consider?

Afternoon Session: **Technical tools and approaches related to polymer and chemical selection at the design stage of the plastic product**

Objective: This session would seek to identify some of the key tools and approaches that can support sustainable plastics design and are already available, as well as important gaps that would need to be addressed. This would include technical tools, check-lists, as well as consultation mechanisms that aim to support product designers in their decision making about the selection of substances and material composition. The session would also discuss the challenges that exist for considering alternative or new polymers and additives during the product design stage.

Who: 4-6 speakers with panel discussion and Q&A.

Note: An initial compilation of known tools could be prepared prior to the workshop and published as an outcome of the workshop.

Possible tools and mechanisms that could be discussed:

- Plastics Scorecard, Clean Production Action (http://www.bizngo.org/resources/entry/plastics-scorecard-resource)
- PET bottle categorisation tool, WRAP (http://www.wrap.org.uk/content/pet-bottle-categorisation-tool)
- Environmental and health hazard ranking and assessment of plastic polymers based on chemical composition (Lithner et al. 2011)
- ICL-IP tool SAFR for flame retardant plastic additives (http://www.icl-group.com/sustainability/systematic-assessment-for-flame-retardants-safr/)
- Multi-stakeholder consultations in extended producer responsibility systems in France to provide guidance on plastic design
- U.S. EPA's comprehensive procurement guidelines (CPG)
- Standards of the EPEAT program
- Tools that can be used to identify problematic additives in plastics for the recycling line
- Other?

Day 3

Morning Session: **Policy approaches to incentivise sustainable plastic design**

Objective: This session would discuss the policy approaches that are already in place or could be developed to incentivise a shift in sustainable chemistry thinking at the product design stage - 'benign by design'. It would include perspectives from government, the private sector and civil society about the most promising policy initiatives.

Who: 4-6 speakers plus panel discussion and Q&A.

Note: An initial compilation of approaches could be prepared prior to the workshop and published as an outcome of the workshop.

Topics: What are the environmental policy instruments that are being used (or could be used) to incentivise sustainable chemical thinking at the design stage:

- Market-based policies: taxes, fees/charges, tradable permits, subsidies, extended producer responsibility systems
- Non-market-based policies: regulations, permits, standards/specifications, research subsidies
- Other: Information-based instruments, voluntary agreements, procurement policies

13:00 - 13:30: Open discussion on areas for potential further work at the OECD

13:30: Close of Meeting