Life cycle considerations in assessing alternatives to substitute hazardous chemicals in consumer products

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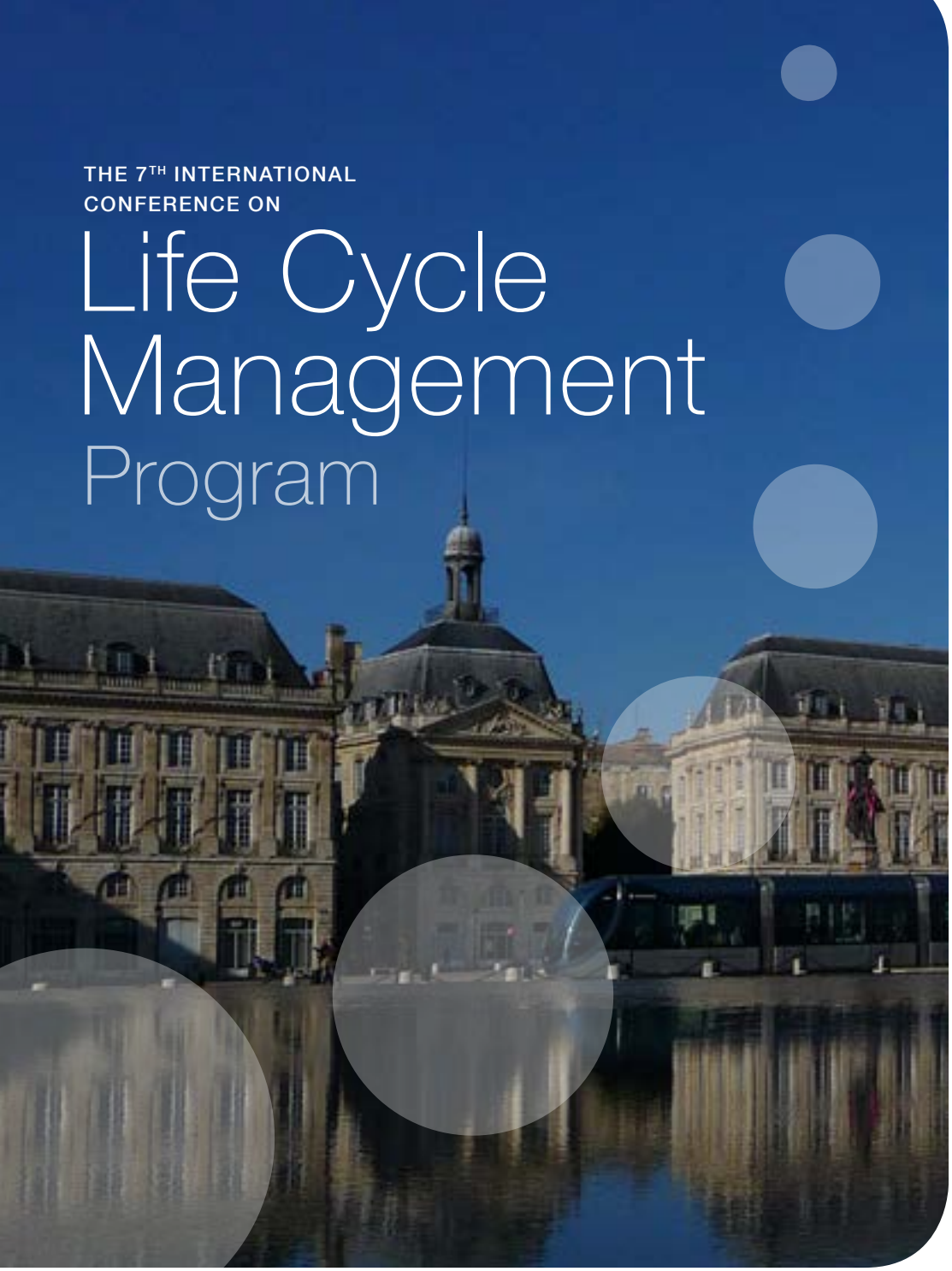

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chemicals that are not emitted.

In this session we explore opportunities to share chemical and material input and output data from unit processes and product life cycle stages for use in both life cycle assessment and toxicity assessment. We also explore the opportunity to enhance the comprehensiveness and quality of toxicity data associated with chemicals and materials across the life cycle.

Are the additional impact categories human toxicity, particulate matter formation and ionising radiation ready for uptake in the CEN standards EN 15804 and EN 15978? Presentation of the evaluation framework and intermediate evaluation results

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The European standards developed by CEN TC350 for assessing the sustainability of construction products (EN15804) and buildings (EN15978), consider 7 environmental impact categories. But, when looking at the categories and pathways covered by commonly used Life Cycle Impact Assessment (LCIA) methods (e.g. IMPACT 2002+ and ReCiPe) 6 main impact categories can be identified that contribute to human health (HH) damage. Of those 6, 3 categories are included in the CEN TC350 standards, i.e. global warming, ozone depletion and photochemical ozone creation. The 3 other categories (human toxicity, particulate matter and ionising radiation) are not included. Also, several scientific studies indicate the necessity to consider these categories. Thus, it can be concluded that assessing HH impacts of construction works by only declaring the 7 CEN TC350 impact categories is not sufficient.

The above indicates the need for a broader environmental perspective; so, a new work item proposal within CEN TC350 has been approved for drafting a CEN Technical Report (TR) containing an overview and evaluation of additional impact categories, on top of the 7 current categories in EN15804 and EN15978. Human toxicity, particulate matter and ionising radiation form a part of the categories that are being evaluated for the TR. The goal of the TR is to collect information on these additional categories that can be used as input for further discussions on the need for updating the standards. The final draft TR will be finalised on 3-11-2015 on basis of literature study and feedback from consultation of experts, like the Joint Research Centre of the European Commission.

Though the work is still ongoing, the most up-to-date preliminary results of the evaluation in the context of the CEN TC350 TR can be presented at LCM 2015. Regarding human toxicity, there are recent developments on toxicity-related models that will include new and improved aspects like indoor air pollutants and impacts of metals. Particulate matter has an important share on the total HH damage and is one of the best-understood HH impact categories. A clear guidance on how to consistently include HH effects from particulate matter exposure in LCA practice is missing though, but initiatives are taken to change that. Lastly, the impact category ionising radiation is mainly related to the share of nuclear energy in electricity mix. The lack of LCIA methods and research on this indicator is a shortcoming for a proper evaluation.

Life cycle considerations in assessing alternatives to substitute hazardous chemicals in consumer products

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Several hazardous chemicals in consumer products are subject to binding or voluntary phase-out agreements. To facilitate the phasing out process, alternatives assessment is commonly applied by companies and other stakeholders as emerging approach to identify less harmful chemical and non-chemical alternatives. Such alternatives assessments combine hazard and risk assessment elements with economic and technical feasibility and ideally also include life cycle thinking and social justice. However, there are currently various challenges in assessing and evaluating chemical and non-chemical alternatives for hazardous in-product substances. Challenges in assessing chemical alternatives are mainly related to similarity in chemical structures and, hence, similar hazard profiles between phase-out and substitute chemicals, economic challenges for non-established or newly designed chemicals compared with widely marketed chemicals. Challenges in assessing both chemical and non-chemical alternatives are further related to (a) lack of consistency and harmonization of integrated assessment approaches, assumptions and data, (b) lack of decision criteria rules to align scientific assessment aspects with subjective stakeholder choices, (c) lack of life cycle considerations and associated potential burden shifting, (d) lack of implementing Green Chemistry principles in chemicals design, and (e) lack of Sustainable Chemistry aspects in industrial processes design. The various challenges in the process of phasing out and successfully substituting hazardous chemicals in consumer products are illustrated and possible solutions to address these challenges are explored. An integrated approach of all stakeholders involved toward more fundamental and function-based substitution by greener and more sustainable chemical and non-chemical alternatives is proposed. This approach needs to systematically include life cycle thinking in alternatives assessment practice to ensure a more sustainable production process of the various consumer goods.

ProScale - A proposal of new human toxicity indicator based on REACH data and applicable within life cycle management

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Potential toxicological and eco-toxicological impacts of chemical products in different sectors are insufficiently characterised today. There are no meaningful indicator(s) for a comparative ranking to assist selection, evaluation and assessment of decisions for alternative systems. At least at present, characterisation models like USEtox have serious limitations to adequately describe potential toxicological and eco-toxicological impacts for a complex life cycle chemicals and substances with heterogeneous