

CIRCULAR ECONOMY, ENERGY EFFICIENCY AND ENVIRONMENTAL SAFETY IN CHEMICAL INDUSTRY

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Climate change, as well as smog/haze, are crucial environmental challenges of our time. Carbon emissions footprint is a key environmental accounting tool for business managers, policy makers and non-governmental organisations attempting to identify mitigation measures that reduce the threat of climate change. The society is increasingly engaged in carbon emissions footprint as a part of policy development and product design. The present plenary lecture discusses the key issues and tools for the integrated environmental and business performance of the industry, starting from footprints. They have reached worldwide popularity, and the environmental issues they are addressing become increasingly diverse, as climate change and smog/haze issues (Greenhouse gas including Carbon Emissions footprint), freshwater use (water footprint), land use (land footprint), material use (material footprint). Footprints are an essential tool for the development and assessment of the circular economy. They are invaluable for measuring and managing the industry's contribution to the achievement of sustainable development. They help meet the challenge of providing competitive results and products in the short term while trying to protect and preserve natural and human resources in the long term. The lecture further discusses crucial issues as chemical industry waste and emissions, waste avoidance based on circular economy principles as well as environmentally responsible behaviour. Biomass management, both dedicated (energy crops) and residual, is challenging. The entire life cycle needs to be taken into consideration for decision making, and the biogenic emission is yet to be defined. This is applied to either biomass for energy or green chemical as a molecule of CO₂ emitted has the same impact on radiative forcing whether it comes from other resources/feedstock or biomass. The feasibility of biomass utilisation/management needs consider different footprints (beyond GHG), and it is essential to include the temporal dimension in the assessment. The presentation concludes by underlining the need for human society to develop a strategy that fulfils its responsibility towards the living conditions and the environment both in regional and worldwide level. There are specific challenges to be overcome by science on the way to providing tools to practitioners and decision makers. In terms of methodology, it is vital to appropriately integrate the footprint indicators into the overall system models and evaluation procedures.