

# ABSTRACT BOOK

## SETAC Europe 28<sup>th</sup> Annual Meeting

### TABLE OF CONTENTS

Keynote abstracts: 1  
Platform abstracts: 2  
Poster abstracts: 145  
Poster corner abstracts: 491  
Keyword Index: 506  
Author Index: 512

This book compiles the abstracts from the platform and poster session presentations at the 28<sup>th</sup> Annual Meeting of the Society of Environmental Toxicology and Chemistry- Europe (SETAC Europe), conducted at the Rome Convention Centre La Nuvola, Rome, Italy, from 13 – 17 May 2018.

The abstracts are reproduced as submitted by the author and accepted by the Scientific Committee. They appear in order of abstract code and alphabetical order per presentation type. The poster spotlight abstracts are included in the list of poster abstracts. The presenting author of each abstract is underlined.

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### SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY

In the 1970s, no forum existed for interdisciplinary communication among environmental scientists, biologists, chemists, toxicologists, managers, engineers or others interested in environmental issues. The Society of Environmental Toxicology and Chemistry (SETAC) was founded in North America in 1979 to fill the void, and quickly saw dynamic growth in the Society's membership, meeting attendance and publications.

A unique strength of SETAC is its commitment to balance the scientific interests of government, academia and business. The Society by-laws mandate equal representation from these three sectors for officers of the World Council and Geographic Unit Boards of Directors and Councils, and in the composition of committees and other society activities. The proportion of members from each of the three sectors has remained nearly equal over the years.

The Society is concerned about global environmental issues. Its members are committed to Environmental Quality Through Science®, to timely and effective communication of

few information regarding the environmental impacts connected to the life cycle of the charging infrastructures to operate the EVs, and, in particular, regarding the environmental performance of charging station for e-bicycles. This study aims to evaluate, through the application of the LCA method, the environmental burdens of a stand-alone charging station for electric bicycles manufactured in Italy, assuming its installation and utilisation in Italy with a lifetime of 15 years. The investigated stand-alone charging station is composed of eight designated positions for charging the e-bicycles' battery and of two wind-solar modular systems that are respectively equipped with one photovoltaic (PV) module and three low profile vertical axis wind turbines. The structure is also geared with a system connected to the conventional electricity grid which allows to provide energy when the wind and solar conditions are insufficient. The analysis also includes the whole life cycle of eight e-bicycles, as well as the potential avoided production of conventional electricity which may be replaced by the electricity surplus produced by the wind-solar system. The functional unit (FU) adopted to perform the analysis is one charging station installed in Italy and used for a lifetime of 15 years. System boundaries follows a cradle-to-grave approach and include four main phases: 1) production phase, 2) installation phase, 3) use and maintenance phase, and 4) end of life phase. The results underscore that the Climate Change impact related to the whole life cycle of the investigated charging station is 13,816.5 kg CO<sub>2</sub> eq per FU. The main environmental impacts are due to the production phase and, in particular, are connected to the production of the e-bicycles, while higher environmental benefits are connected to the replacement of conventional electricity with the energy surplus produced by the wind-solar modular system installed on the charging station.

625

#### **Raw materials requirements scenarios for the electric mobility penetration in the Italian urban vehicle fleet: a life cycle thinking approach combined with raw materials assessment**

L. Cutaia, C. Chiavetta, P. Porta, ENEA; M. La Monica, C. Scagliarino, CINIGeo. The automotive fleet is gradually changing from internal combustion to hybrid and electric engines. This is fostered by the European policies concerning the need of reduction in pollutant emissions and in the improving of urban air quality. Currently most of the analyses carried out focus on the comparison of the emissions related to the different typologies of cars and on the CO<sub>2</sub> emission cut generated by the consumption of electricity produced from renewable sources in the use phase of the car. The proposed approach wants to investigate the need of raw materials in future scenarios of electric technology penetration in the urban vehicle fleet. Focusing on the Italian urban vehicle situation and considering the current technology used for the electric batteries and the recharging systems, the study account for the raw materials needed for different penetration scenarios of the electric mobility, adopting a Life Cycle Thinking perspective. The authors have been beyond a mere quantification of the primary materials required for the progressive electrification of the urban fleet, evaluating the raw materials availability from a market perspective and defining the limiting factor among three basic material of the current electric technologies (lithium, graphite and manganese). Therefore this work, starting from an evaluation of the material needed for different electric mobility penetration scenarios in the Italian urban fleet, wants to highlight the market dynamics especially for 3 primary materials widely required in the electric mobility focusing also on the possibility offered by a transition to a circular economy, investigating the green mining potential available for these materials both for their recovering in the same technology and in others fields.

626

#### **Coupling dynamic carbon accounting and partial-equilibrium economic model for energy policy assessment**

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Energy production and consumption is the main driver for anthropogenic GHG emissions, and in the French context, the transportation sector is the principal emitter accounting for almost one third of these emissions. The growing need to reduce GHG emissions and mitigate climate change demands tapping alternative energy resources, as currently enforced by energy policies (e.g. the French Transition for Green Growth Act). LCA scholars increasingly assess the environmental performance of the advance biofuels, but mainly from a static perspective. Results are therefore limited to linear simplifications, whereby long-term impacts might be neglected or underestimated. New dynamic LCA approaches have been suggested, however no consensus is available on how to treat Cbio sequestration dynamics over different timeframes. This study further addresses the temporal shortcomings of bioenergy systems while considering future outlooks and consequences on the market dynamics. The approach consists of a hybrid-approach combining the MIRET energy systems model with dynamic Cbio accounting models towards dynamic LCA. The former—a prospective techno-economic partial-equilibrium model covering the French energy-transport sector—represents scenario-dependent outputs over a long timeframes (2007 to 2050), exploring optimisation options under no-policy and policy-driven constraints. The latter assesses biomass growth and allometric relations representing the Cbio fixation of a vegetation species per hectare on an annual

basis, and thus the time-dynamic Cbio flows between the atmosphere and the technosphere. The assessed Cbio flows primarily originate from lignocellulosic biomass and their co-products generated from MIRET outputs under business as usual and normative scenarios. The transformed Cbio inventories are then combined with both dynamic and static LCA characterisation factors, towards a comparison of both approaches. The results show that the time factor is an essential component to properly assess long-term Cbio sequestration potentials and climate benefits of lignocellulosic biofuels. The consideration of technological innovation and market dynamics in a transitioning energy system expands the assessment boundaries providing insights into least cost (economic optimisation) and low carbon (Cbio sequestration) options influenced by policy and decision constraints. Future refinements addressing other bioenergy paths are envisaged.

627

**Poster spotlight: TH304, TH309, TH314**

## **Developments in the use of bioassays for chemical and environmental risk assessment (II)**

628

#### **SIMONI: Smart integrated monitoring of the water quality**

R. van der Oost, Waternet / Onderzoek en Advies; G. Sileno, Waternet / Research and Development; M. Thao Nguyen, Waterproef; L. Moria, Waternet / Water Systems

At present, regular water quality assessment is almost exclusively performed by target chemical analysis of substances. Scientific research over the last decades, however, demonstrated that water quality assessment with only chemical analyses is not reliable. Since over 100,000 harmful substances may be present in the aquatic environment, a paradigm shift from 'substances' to 'effects' has to be encouraged in order to implement a more holistic approach in regular monitoring. Therefore, an alternative Smart Integrated Monitoring (SIMONI) strategy has been developed by Dutch water research institutes. The purpose of this 2-tiered strategy is to obtain more reliable information on the chemical water cycle quality without increasing the monitoring costs. Key factors for generating this model were the selection of the most relevant bioassays and the design of effect-based trigger values (EBT). Tier 1 of the strategy combines micropollutant concentration by passive sampling with testing of 15 bioanalytical endpoints. This hazard identification makes the distinction between low, acceptable and increased ecological risks. Only at sites where tier 1 indicates increased ecological risks, a customized tier 2 research is performed to identify the chemicals that cause the bioanalytical effects and to evaluate if observed *in vitro* effects pose a serious *in vivo* threat to the ecosystem. The present paper is focused on demonstrating the field feasibility of the SIMONI strategy. The strategy has been applied and validated in more than 100 Dutch field studies. Results of several of these monitoring studies will be presented in order to demonstrate the field feasibility of the SIMONI strategy for identifying hot-spots of chemical pollution. It appears that highest ecological risks generally occurred at agricultural sites. In addition, increased ecological risks were also observed at waters receiving wwtp effluents, sewage overflows and landfill runoff. A tier 2 approach is the assessment of the mixture toxic pressure on the ecosystem by using chemical analytical results for msPAF determination (potentially affected fraction of water organisms due to multiple substances). At most sites with increased ecological risks due to micropollutants, similar classifications were obtained with bioanalytical and extensive chemical analyses. The tier 2 research at agricultural greenhouse areas identified eight pesticides contributing most to the increased environmental risks.

629

#### **Bioassay battery responses to POCIS and Speedisk passive sampler extracts**

M. de Baat, University of Amsterdam / IBED-FAME; M. Thao Nguyen, Waterproef; R. van der Oost, Waternet / Onderzoek en Advies; W. van den Berg, Waterproef Laboratory, Research and Validation; P. de Voogt, University of Amsterdam / IBED; M. Kraak, University of Amsterdam / IBED-FAME

A large portion of the toxic effects observed in surface waters cannot be explained by compounds that water authorities regularly monitor. Since chemical analysis of the myriad of substances present in the aquatic environment is practically and economically not a viable option, there is a growing interest in effect-based monitoring. Additionally, concentrations of compounds typically vary over time and therefore traditional grab sampling only provides a snapshot of the chemical make-up of a water body. Passive sampling can overcome this limitation by exposing a sorbent to the target environment, accumulating compounds from the water over time. Hence, there is an urgent need for a time-integrated effect-based monitoring strategy that employs a combination of passive sampling and bioassays, thus detecting bioanalytical responses caused by mixtures of all bioavailable compounds. Many pollutants of emerging concern are polar compounds, underlining the need to standardize the employment of polar passive samplers in such monitoring strategies. The aim of the present study was, therefore, to determine bioassay battery responses to extracts of two types of polar passive