



## Characterizing health impacts from indoor and outdoor exposure to fine particulates

Vigon, Bruce; Fantke, Peter; McKone, Thomas E; Jolliet, Olivier

*Published in:*

Society of Environmental Toxicology and chemistry Asia/Pacific 2016 Conference

*Publication date:*

2016

[Link back to DTU Orbit](#)

*Citation (APA):*

Vigon, B., Fantke, P., McKone, T. E., & Jolliet, O. (2016). Characterizing health impacts from indoor and outdoor exposure to fine particulates. In *Society of Environmental Toxicology and chemistry Asia/Pacific 2016 Conference*

---

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



# Society of Environmental Toxicology and Chemistry Asia/Pacific 2016 Conference

16 –19 September 2016  
National University of Singapore

Managing Environmental Quality  
in the Asian Century

Programme Book



# Abstracts – Oral Presentation

## 4B. AIRBORNE PARTICULATE MATTER AND PUBLIC HEALTH

### 4B.1

#### CHARACTERIZING HEALTH IMPACTS IN LIFE CYCLE ASSESSMENT FROM EXPOSURE TO FINE PARTICULATES

Bruce Vigon<sup>1,\*</sup>, Peter Fantke<sup>2</sup>, Thomas McKone<sup>3</sup> and Olivier Jolliet<sup>4</sup>

<sup>1</sup> *Society of Environmental Toxicology and Chemistry (SETAC), 229 S. Baylen St., Pensacola FL 32502 USA, email: bruce.vigon@setac.org*

<sup>2</sup> *Technical University of Denmark, Produktionstorvet 426, Kgs. Lyngby, Capital Region, 2800 Denmark, email: pefan@dtu.dk*

<sup>3</sup> *University of California, 50 University Hall, #7360, Berkeley, CA 94720-7360 USA, email: temckone@lbl.gov*

<sup>4</sup> *University of Michigan, 3890 Tremont Place, Ann Arbor, MI 48105 USA, email: ojolliet@umich.edu*

Exposure to fine particulate matter (PM<sub>2.5</sub>) pollution is a major contributor to human disease burden as continuously shown in the Global Burden of Disease study series. Exposures to PM<sub>2.5</sub> concentration outdoors and indoors contribute almost equally to this burden. Despite the importance, health impacts from exposure to PM<sub>2.5</sub> are often excluded from life cycle impact assessment (LCIA) characterization profiles. This is in large part because of the lack of well-vetted harmonized guidance about how to consistently assess the exposures and impacts of indoor and outdoor emissions of PM<sub>2.5</sub> and its precursors. We present a framework for calculating characterization factors for indoor and outdoor emissions of primary PM<sub>2.5</sub> and secondary PM<sub>2.5</sub> precursors, and a roadmap for further refining this modelling framework for operational use in LCIA. The framework was developed over the last three years by a task force convened under SETAC/UNEP auspices.

A recent SETAC Pellston Workshop® was convened to formalize guidance and methods for estimating the health impacts associated with PM<sub>2.5</sub> exposure and to recommend PM<sub>2.5</sub> characterization factors for application in life cycle assessment. The framework involves three stages – analyzing PM<sub>2.5</sub> fate and exposure (including indoor and outdoor urban/rural environments), modeling exposure-response, and the integration of exposure-response and PM<sub>2.5</sub> exposure reflecting population and location characteristics. Our exposure model is organized as a mass balance matrix that tracks the global fate of primary PM<sub>2.5</sub> and secondary PM<sub>2.5</sub> precursor emissions (both indoors and outdoors) as an embedded system of compartments including urban environments, rural environments, and indoor environments within urban and rural areas. After presenting the model structure, we will review initial results and will present geographic variability, discuss key uncertainties, and evaluate our model using results from other models and concentration measurements.

Keywords: 1) Life cycle assessment, 2) particulate matter, 3) health effects, 4) PM<sub>2.5</sub>, 5) impact assessment, 6) air pollution