

Life Cycle Assessment and Other Assessment Tools for Waste Management and Resource Optimization

An ECI Conference Series Volume 16AL

Cetraro, Italy
5-10 June 2016

Editors:

**Umberto Arena
Thomas Astrup**

Paola Lettieri

ISBN: 978-1-5108-3248-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2016) by Engineering Conferences International
All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact Engineering Conferences International
at the address below.

Engineering Conferences International
32 Broadway, Suite 314
New York, NY 10004
USA

Phone: (212) 514-6760
Fax: (212) 514-6030

info@engconfintl.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Monday, June 6, 2016

07:30 – 08:30	<i>Breakfast</i>
08:45 – 09:15	Welcome and Conference Overview –Conference Chairs and ECI Liaison
09:15 – 10:00	PLENARY LECTURE (Chairman: <u>Prof. Roland Clift</u>) Paulo Ferrão (Instituto Superior Técnico, University of Lisbon, Portugal) Industrial ecology and solid waste management planningN/A

TOPIC 1: Industrial ecology and resource management

	Chairman: <u>Prof. Roland Clift</u>
10:00 – 10:15	Using consequential LCA and optimization to identify the best uses of biomass resources within the energy sector, Daive Tonini , Technical University of Denmark, Denmark1
10:15 – 10:30	Systematic evaluation of critical factors for the climate impact of landfill mining, David Laner , Technical University of Wien, Austria2
10:30 – 11:15	<i>Coffee Break (Terrace of Grand Hotel San Michele)</i>
	Chairman: <u>Prof. Anders Damgaard</u>
11:15 – 11:30	Decreasing ore grades in global metallic mining, a theoretical issue or a global reality?, Guiomar Calvo , Research Centre for Energy Resources and Consumption (CIRCE), Spain3
11:30 – 11:45	Assessment of waste to energy as a resource recovery intervention using system dynamics: A case study of New South Wales, Australia, Ben Madden , University of Technology Sydney, Australia4
11:45 – 12:00	Valorization of energetic material from ammunition in civil explosives, Fausto Freire , University of Coimbra, Portugal5
12:00 – 12:15	Development of a database of Material Flow Analysis for agro-food processing craft villages in Red River Delta of Vietnam, Nguyet Tran , Leibniz University, Germany6
13:00 – 14:00	<i>Lunch (Restaurant of Grand Hotel San Michele)</i>
14:00 – 17:00	Free time / <i>ad hoc</i> sessions
17:00 – 17:30	<i>Afternoon Refreshments (Hotel lobby)</i>

TOPIC 2: Life Cycle Engineering and Sustainable Manufacturing

	Chairman: <u>Prof. Franco Berruti</u>
17:30 – 17:45	Resource optimization and sustainable manufacturing in the development of a self-chilling beverage can, Noemi Arena , University of Surrey, United Kingdom13
17:45 – 18:00	Environmental assessment of light weighting solutions for automotive components: results, trade-off and challenges from real case studies, Silvia Maltese , Magneti Marelli, Italy14

Monday, June 6, 2016 (continued)

18:00 – 18:15	Life Cycle Assessment as a tool for resource optimisation of continuous basalt fibre production in Iceland, Kamal Azrague , SINTEF, Norway22
18:15 – 18:30	Stock in use in the urban mobility system. An exergy approach, Abel Ortego , Research Centre for Energy Resources and Consumption (CIRCE), Spain32
18:30 – 18:45	LCA to start and perform green public procurement for funeral products, Francesco Baldoni , Esalex srl, Italy33
20:00 – 21:30	<i>Dinner (Restaurant of the Hotel): Calabrian event</i>
21:30 – 22:30	Poster session with social hour

Tuesday, June 7, 2016

07:30 – 08:30	<i>Breakfast</i>
08:30 – 09:15	PLENARY LECTURE (Chairman: <u>Prof. Umberto Arena</u>) Morton Barlaz (North Carolina State University, USA) The Application of Life-Cycle Assessment to Solid Waste Management: Applications, Challenges and Modeling Techniques40

TOPIC 3: LCA and other assessment tools for Waste and Resource Management and Planning

	Chairman: <u>Prof. Umberto Arena</u>
09:15 – 09:30	Choice of sewage sludge thermochemical disposal methods from multi-perspective analysis, Dezhen Chen , Tongji University, China67
09:30 – 09:45	Combining MFA, LCA and optimization techniques to improve MSW management in Switzerland, Melanie Haupt , ETH Zurich, Switzerland.....84
09:45 – 10:00	Quality assessment and estimation of substitution ratios for recycled plastic, Marie Kampmann Eriksen , Technical University of Denmark, Denmark91
10:00 – 10:15	Complementing LCA with qualitative organisational study for improving waste management governance – illustrated by a comparative case on metal packaging, Mathias Lindkvist , Chalmers University of Technology, Sweden ..92
10:15 – 11:00	<i>Coffee Break (Terrace of Grand Hotel Michele)</i>
	Chairman: <u>Prof. Lidia Lombardi</u>
11:00 – 11:15	Optimizing resource and energy recovery for municipal solid waste Management, Susan Thorneloe , US-EPA, USA114
11:15 – 11:30	Optimization of waste disposal method in urban functional zone based on multiple model evaluation: a case study of an urban sub-domain planning, Lijie Yin , Tongji University, China115
11:30 – 11:45	Life Cycle Assessment of MSW kerbside separate collection system applied to small communities, Giovanni De Feo , University of Salerno, Italy116
11:45 – 12:00	Quantifying waste prevention with LCA to motivate holistic resource management, Petra Hutner , University of Augsburg, Germany128
12:00 – 12:15	Life cycle assessment of waste prevention, Line Brogaard , Technical University of Denmark, Denmark129
12:15 – 12:30	The effects of changes in consumption composition and growth in recycling on decoupling household consumption from its waste footprint, Antoine Beylot , BRGM, France130
13:00 – 14:00	<i>Lunch (Hotel private beach or restaurant of the Hotel)</i>
14:00 – 17:00	Free time / <i>ad hoc</i> sessions
17:00 – 17:30	<i>Afternoon Refreshments (Hotel lobby)</i>

Tuesday, June 7, 2016 (continued)

TOPIC 3: LCA and other assessment tools for Waste and Resource Management and Planning

	Chairman: <u>Ms. Susan Thorneloe</u>
17:30 – 17:45	Optimization of municipal solid waste management using externality costs, Veronica Martinez-Sanchez , Technical University of Denmark, Denmark137
17:45 – 18:00	Municipal solid waste collection evaluation tool as basis for LCA of MSW Management, Dirk Weichgrebe , Leibniz Universität Hannover, Germany ...138
18:00 – 18:15	LCA of municipal solid waste incineration in France: from comprehensive site-specific data to Life Cycle Inventory modeling, Antoine Beylot , BRGM, France.....150
18:15 – 18:30	Life Cycle Assessment and economic evaluation of the recovery of materials in an urban waste management system, Giovanni De Feo , University of Salerno, Italy159
18:30 – 18:45	Assessing carbon-based materials of Belo Horizonte municipal solid waste management, Maryegli Fuss , KIT-ITAS, Germany171
18:45 – 19:00	MSW derived syngas utilization in combination with distributed energy supply system: mode selection and evaluation, Ming Chen , Tongji University, China179
20:00 – 21:15	<i>Dinner (Restaurant of the Hotel)</i>
21:15 – 22:30	Poster Session with Social Hour

Wednesday, June 8, 2016

07:30 – 08:30	<i>Breakfast</i>
08:30 – 09:15	PLENARY LECTURE (Chairman: <u>Prof. Paola Lettieri</u>) Mary Stewart (Energetics, Sydney, Australia) Energy from Waste in a 2° world: LCA and Australian Carbon Policy180

TOPIC 4 Case studies of LCA for specific waste management options

	Chairman: <u>Prof. Paola Lettieri</u>
09:15 – 09:30	The link between data choices and reality in life cycle assessment modelling of waste management technologies, Anders Damgaard , Technical University of Denmark, Denmark196
09:30 – 09:45	Main factors affecting climate change, acidification and eutrophication in MSW management systems, Lidia Lombardi , Cusano University, Italy197
09:45 – 10:00	The application of Consequential LCA in WEEE management, Bin Lu , Chinese Academy of Sciences, China198
10:00 – 10:15	Evaluation of the environmental sustainability of different waste-to-energy plant configurations, Lidia Lombardi , Cusano University, Italy199
10:15 – 11:00	<i>Coffee Break (Terrace of Grand Hotel Michele)</i>
	Chairman: <u>Prof. Dezhen Chen</u>
11:00 – 11:15	An analysis of developing energy systems: an overview, Carla Tagliaferri , University College London, United Kingdom200
11:15 – 11:30	Resource recovery and life cycle assessment in co-treatment of organic waste substrates for biogas versus incineration value chains in Poland and Norway, Simon A. Saxegård , Østfoldforskning, Norway201
11:30 – 11:45	Environmental impacts of a material recovery facility in a Life Cycle Perspective, Filomena Ardolino , Second University of Naples, Italy202
11:45 – 12:00	LCA of mechanical biological treatment of residual MSW in the city of Rome: current practices vs. alternative strategies, Giulia Costa , University of Rome "Tor Vergata", Italy203
12:00 – 12:15	Environmental sustainability of two biological treatments for the organic wet fraction of municipal solid waste, Filomena Ardolino , Second University of Naples, Italy204
12:15 – 12:30	LCA as a supporting tool for supermarket food waste management - A case study in a Swedish supermarket, Pedro Brancoli , Swedish Centre for Resource Recovery, University of Borås, Sweden205
12:30 – 12:45	Integrated environmental analysis of urban waste separate collection in the Sorrento peninsula, in Italy, Giovanni De Feo , University of Salerno, Italy206
12:45 – 13:00	Assessment of the environmental sustainability of a treatment aimed at soil reuse in a Brownfield regeneration context, Giulia Costa , University of Rome "Tor Vergata", Italy219
13:00 – 14:00	<i>Lunch (Hotel private beach or restaurant of the Hotel)</i>
14:00 – 16:00	Free time / <i>ad hoc</i> sessions

Wednesday, June 8, 2016 (continued)

16:00 – 19:30	<i>Visit to the San Michele organic farm, guided by Ms. Ornella Peiser. Degustation of wines and local products.</i>
20:00 – 21:15	<i>Dinner (Restaurant of the Hotel): Pizza event</i>
21:15 – 22:30	Poster Session with Social Hour

Thursday, June 9, 2016

07:30 – 08:30	<i>Breakfast</i>
08:30 – 09:15	PLENARY LECTURE (Chairman: <u>Prof. Thomas Astrup</u>) Maria Ljunggren Söderman (Chalmers University, Göteborg, Sweden) Managing material resources: the challenge of complex productsN/A

TOPIC 5 Case studies of LCA in the construction sector and some specific sectors

	Chairman: <u>Prof. Thomas Astrup</u>
09:15 – 09:30	Retrofit design of energy efficient buildings using Life Cycle Assessment case study on research institute building, Feresheteh Aramoun , Sharif University of Technology, Iran220
09:30 – 09:45	LCA for a residential Italian multifamily building: a case study, Pierluca Vitale , Second University of Naples, Italy234
09:45 – 10:00	Life cycle assessment of low cost retrofit options of educational building considering renewable and non-renewable energies, Feresheteh Aramoun , Sharif University of Technology, Iran235
10:00 – 10:15	LCA modelling of cement concrete waste management, Marjan Mousavi , University of Nantes, France247
10:15 – 11:00	<i>Coffee Break (Terrace of Grand Hotel Michele)</i>
	Chairman: <u>Dr. David Laner</u>
11:00 – 11:15	Predictive resource planning: coupling construction needs with demolition waste forecasts, Elisabeth Keijzer , TNO, Netherlands248
11:15 – 11:30	LCA applied to residual organic fertilizing materials - An overview of substitution methodological options and quantitative substitution rates, Claire Déchaux , Irstea, France255
11:30 – 11:45	LCA applied to residual organic fertilizing materials - An overview of emission inventory data at the spreading operation, Claire Déchaux , Irstea, France ..261
11:45 – 12:00	Life-Cycle Assessment of olive oil addressing alternative production systems: how to deal with olive pomace valorization?, Fausto Freire , ADAI/LAETA, University of Coimbra, Portugal267
12:00 – 12:15	Life Cycle Assessment problems and prospects in Bangladesh: a case study of healthcare waste management of Chittagong Metropolitan city, Ohidul Alam , Tongji University, China268
13:00 – 14:00	<i>Lunch (Hotel private beach or restaurant of the Hotel)</i>
14:00 – 17:00	Free time/ <i>ad hoc</i> sessions
17:00 – 17:30	<i>Afternoon Refreshments (Hotel lobby)</i>

Thursday, June 9, 2016 (continued)

TOPIC 5 Case studies of LCA in the construction sector and some specific sectors

	Chairman: <u>Prof. Giovanni De Feo</u>
17:30 – 17:45	Challenges and framework of life cycle management of small WEEE in China, Jianxin Yang , Chinese Academy of Sciences, China269
17:45 – 18:00	The challenges of nuclear waste management from a life cycle perspective, Andrea Paulillo , University College London, United Kingdom270
18:00 – 18:15	Scenario estimates of rare earth recycling potentials from NdFeB magnet material, Rita Schulze , Oeko-Institut, Germany281
18:15 – 18:30	Life Cycle Assessment of ship recycling: metals recovery, Fabio Magrassi , University of Genoa, Italy282
18:30 – 19:30	Poster Session with Social Hour
20:30 – 22:30	<i>Banquet at the Hotel Swimming Pool</i>

Friday, June 10, 2016

08:00 – 09:00	<i>Breakfast on the terrace of Grand Hotel San Michele</i>
---------------	--

TOPIC 6 Design for environment, Environmental Footprint, Industrial Symbiosis

	Chairman: <u>Prof. Maria Ljunggren Söderman</u>
09:00 – 09:15	Life cycle assessment modelling considering impurities in recyclable materials, Giorgia Faraca , Technical University of Denmark, Denmark283
09:15 – 09:30	Assessing energy benefits of operating anaerobic digesters at low temperature with solids pre-ozonation, Zeinab Bakhshi , McGill University, Canada284
09:30 – 09:45	Study on an eco-design method of industrial solid waste reused products: a case study of mullite produced from fly ash, Qiang Li , Chinese Academy of Sciences, China285
09:45 – 10:00	Mapping the content and fates of scarce metals in discarded cars, Magnus Andersson , Chalmers University of Technology, Sweden286
10:00 – 10:15	Technologies for harvesting microalgae for biodiesel production: a comparative LCA study, Pascale Champagne , Queen's University, Canada ..287
10:15 – 11:00	<i>Coffee Break (Terrace of Grand Hotel Michele)</i>
11:00 – 11:15	Analysis on solid waste emission and management in the development of Beijing City, Chenye Wang , Institute of Process Engineering, Chinese Academy of Sciences, China288
11:15 – 11:30	Waste management of flame retardant textiles: an alternate end-of-life design for flame retardant textile products, Sohail Yasin , Politecnico di Torino, Italy289
11:30 – 12:30	Poster Session
12:30 – 13:00	OVERALL DISCUSSION, FEEDBACK, WHAT IS NEXT?, CONCLUDING REMARKS AND CLOSING OF CONFERENCE
13:00 – 14:00	<i>Lunch at the restaurant of the Hotel and Departure</i>