

Preliminary Program

(April 17, 2022)

WasteLCA_3 Life Cycle Assessment for Waste Management and Resource Optimization

June 5 -10, 2022

**Grand Hotel San Michele
Cetraro (Calabria), Italy**

Conference Chairs

Umberto Arena

University of Campania "Luigi Vanvitelli", Italy

Thomas Astrup

Denmark Technical University, Denmark

Honorary Chair

Morton Barlaz

North Carolina State University, USA



Engineering Conferences International

32 Broadway, Suite 314 - New York, NY 10004, USA

Phone: 1 - 212 - 514 - 6760

www.engconfintl.org – info@engconfintl.org

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IMPORTANT NOTES

- *All contributions have ten minutes for oral presentation (and five minutes for questions and discussion) and more time for further discussion at the poster session in the evening. This will allow intensive discussion of the technical materials presented.*
- *Speakers: Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before), and please leave at least five minutes for questions and discussion.*
- *Posters: Please put your posters on the poster boards in the dedicated area in the morning of the day of your presentation and remove them at the end of the evening discussion session.*
- *Audiotaping, videotaping and photography of presentations are prohibited.*
- *Please do not smoke at any conference functions.*
- *Turn your cellular telephones to vibrate or off during technical sessions.*
- *Lunches of Tuesday, Wednesday and Thursday are organized in the restaurant of the Hotel and in that of the Hotel private beach. Please give your choice at the registration desk during the coffee break.*
- *Coffee breaks are organized in the terrace of the Hotel while the afternoon refreshments in the Hotel lobby.*
- *A technical visit to an anaerobic plant with biogas upgrading unit for biomethane production. A possible alternative is a visit to the beautiful organic farm (44 hectares) of the Grand Hotel San Michele is scheduled on Wednesday afternoon. Guests/accompanying persons may also have the possibility for an excursion by bus to visit interesting sites along the Calabria Tyrrhenian coast.*
- **COVID rules: Attendance at the conference is restricted to those fully vaccinated against Covid-19.** *Registration will not be considered complete until a proof of vaccination is uploaded via the registration portal and verified by ECI staff. Acceptable proof includes copies of a U.S. CDC vaccination card or a certificate/document issued by the relevant health agency in your country of residence along with a government issued photo ID, such as a driver's license or passport. If you have questions about these requirements, please email Kathy@engconfintl.org*

Sunday, June 5, 2022

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|---------------|---|
| 16:30 – 18:30 | Conference Check-in |
| 17:00 – 18:00 | Organizing Committee Meeting |
| 19:15 – 20:00 | Welcome Reception |
| 20:30 – 21:45 | Welcome Dinner (Restaurant of the of Grand Hotel Michele) |

Monday, June 6, 2022

07:30 – 08:30 Breakfast

08:30 – 09:00 Welcome and Conference Overview

PLENARY LECTURE

Chairs: Umberto Arena, University of Campania “Luigi Vanvitelli”, Italy

09:00 – 09:45 **Why do we still need LCA-modelling in waste management?**
Thomas Christensen, Dept. Env. and Res.Engineering., DTU, Denmark

SESSION 1: MUNICIPAL SOLID WASTE MANAGEMENT

Chairs: Umberto Arena, University of Campania “Luigi Vanvitelli”, Italy

09:45 – 10:00 **Collection system's impact on environmental performance of the waste management system**
Kari Anne Lyng, NORSUS, Norway

10:00 – 10:15 **Life cycle assessment of multi-loop recycling: Opportunities and Challenges**
Gloria Moscatelli, Denmark Technical University, Lyngby, Denmark

10:15 – 10:30 **Life-cycle assessment of a U.S. regulatory-compliant municipal solid waste landfill**
James Levis, North Carolina State University, USA

10:30 – 10:45 **Evaluation of the Environmental Feasibility of HTC Applied to the Organic Fraction Mechanically Separated from MSW**
Lidia Lombardi, Niccolò Cusano University, Italy

10:45 – 11:15 Coffee Break (Terrace of Grand Hotel Michele)

SESSION 1: MUNICIPAL SOLID WASTE MANAGEMENT

Chairs: Anders Damgaard, Technical University of Denmark, Denmark

11:30 – 11:45 **The environmental impact of wasting recoverable nutrients from treated sewage sludge for agricultural use: A Life cycle assessment for a circular economy**
Esra Aleisa, Kuwait University, Kuwait

11:45 – 12:00 **LCA-assisted conception of a digestate recovery by micro-algae production**
Jean-Romain Bautista Angeli, INRAE, France

12:00 – 12:15 **Life cycle environmental impact assessment of sludge treatment technologies based on uncertainty analysis**
Huimin Chang, Beijing Normal University, China

12:15 – 12:30 **Life cycle impact assessment of alternative scenarios for integrated municipal solid waste management in small island states: The case of Aruba**
Colleen Weekes, KU Leuven, Belgium

Monday, June 6, 2022 (Continued)

- 12:45 – 13:00 **Data quality of organic waste characteristics in life cycle assessment of waste management: a review**
Nomena Ravoahangy, Polytechnique Montréal, CIRAIG, Canada
- 13:00 – 14:00 Lunch (Restaurant of Grand Hotel San Michele)
- 14:00 – 16:45 Free time /ad hoc sessions
- 16:45 – 17:15 Afternoon Refreshments (Hotel lobby)
- SESSION 2: PLASTICS WASTE CIRCULARITY**
Chairs: TBD
- 17:15 – 17:30 **Challenges of implementing new technologies in future waste management – example of chemical recycling**
Martyna Solis, Denmark Technical University, Lyngby, Denmark
- 17:30 – 17:45 **Methodological focus points for LCA of chemical recycling technologies**
Florian Keller, TU Bergakademie Freiberg, Germany
- 17:45 – 18:00 **Technical and environmental performances of alternative thermochemical treatments for mixed plastics waste**
Filomena Ardolino, University of Campania, Italy
- 18:00 – 18:15 **Potential Circularity of Plastic in Europe – Dynamic MFA of PET, PE & PP Flows**
Marie K. Eriksen, Denmark Technical University, Lyngby, Denmark
- 18:15 – 18:30 **Analysis of plastic waste circularity through LCA**
Oksana Horodytska, Universidad de Alicante, Spain
- 18:30 – 18:45 **Analysing the environmental performance and improvement factors of plastic packaging recycling systems**
Peter Callewaert, NORSUS, Norway
- 20:00 – 21:30 Dinner (Restaurant of the Grand Hotel San Michele): Calabrian event
- 21:30 – 22:30 **Poster session with social hour**

Tuesday, June 7, 2022

07:30 – 08:30 Breakfast

PLENARY LECTURE

Chairs: Thomas Astrup, Denmark Technical University, Denmark

08:30 – 09:15 **Economic e valuation of externalities in waste management LCC studies: state-of-art, perspective and open issues**
Antonio Massarutto, University of Udine, Italy

SESSION 3: NEW ASSESSMENT TOOLS FOR WASTE AND RESOURCE MANAGEMENT AND PLANNING

Chairs: Thomas Astrup, Denmark Technical University, Denmark

09:15 – 09:30 **Improving the Representation of Solid Waste Management in the Ecoinvent Database**
Avraam Symeonidis, Ecoinvent, Switzerland

09:30 – 09:45 **Indicators for selecting between alternatives in comparative LCA of waste management systems**
Valentina Bisinella, Denmark Technical University, Lyngby, Denmark

09:45 – 10:00 **An LCA-based performance indicator for plastic packaging waste management systems**
Sarah Schmidt, University of Kassel, Germany

10:00 – 10:15 **Development of a regionalized recycling LCA collaborative tool**
Arianne Provost-Savard, Polytechnique Montréal, Canada

10:15 – 10:30 **Supporting a circular economy strategy in South Tyrol, Italy: Integrated life-cycle energy and greenhouse gas analysis**
Antonello Durante, Eurac Research, Italy

10:30 – 11:15 Coffee Break (Terrace of Grand Hotel Michele)

SESSION 3: NEW ASSESSMENT TOOLS FOR WASTE AND RESOURCE MANAGEMENT AND PLANNING

Chairs: Anders Damgaard, Technical University of Denmark

11:15 – 11:30 **The solid waste optimization life-cycle framework in Python (SwolfPy)**
James Levis, North Carolina State University, USA

11:30 – 11:45 **Evaluation of the cross-media effects of new emission limit values for waste-to-energy plants via a combination of process modelling and life cycle assessment**
Alessandro Dal Pozzo, University of Bologna, Italy

11:45 – 12:00 **Measuring Recycling and Recycled Content Benefits in LCA - Implications for Policy Design**
Sofia Carvalho, 3drivers – Engineering, Innovation and Environment; Instituto Superior Técnico de Lisboa, Portugal

12:00 – 12:15 **Tools to measure SMM: waste LCA models and their place in waste decision making**
Malak Anshassi, Florida Polytechnic University, Florida

Tuesday, June 7, 2022 (Continued)

13:00 – 14:00 Lunch (Hotel private beach or restaurant of the Grand Hotel San Michele)

14:00 – 17:00 Free time /ad hoc sessions

17:00 – 17:30 Afternoon Refreshments (Hotel lobby)

SESSION 4: MSW MANAGEMENT PLANNING

Chairs: TBD

17:15 – 17:30 **Climate change impact of the development in household waste management in China**
Thomas H. Christensen, Denmark Technical University, Lyngby, Denmark

17:30 – 17:45 **Evaluating Waste Conversion Technologies to Current Solid Waste Management Technology**
Susan Thorneloe, US EPA, USA

17:45 – 18:00 **System Level Life Cycle Assessment Models for EU and National Waste Management**
Josefine H. Sund, Denmark Technical University, Lyngby, Denmark

18:00 – 18:15 **The influence of energy output and substitution on the environmental impact of waste-to-energy operations**
Lizzie Boakes, KU Leuven, Belgium

18:15 – 18:30 **Municipal Waste Thermochemical Conversion Technologies: Environmental and Economic Sustainability**
Lidia Lombardi, Niccolò Cusano University, Italy

18:30 – 18:45 **LCT as Lever to Overcome Barriers in Areas Suffering from NIMBY Syndrome: The Case Study of Campania Region in Southern Italy**
Giovanni De Feo, University of Salerno, Italy

18:45 – 19:00 **Identifying the main design challenges for a closed-loop recyclable product with an environmentally sustainable approach**
Torsten Hummen, Robert Bosch GmbH, Switzerland

20:00 – 21:30 Dinner (Restaurant of the Grand Hotel San Michele): Calabrian event

21:30 – 22:30 **Poster session with social hour**

Wednesday, June 8, 2022

07:30 – 08:30 Breakfast

PLENARY LECTURE

Chairs: Roland Clift, University of Surrey, UK

08:30 – 09:15 **Social LCA to formal and informal recycling sector**
Marzia Traverso, RWTH Aachen University, Germany

SESSION 5: SOCIAL AND SUSTAINABILITY LIFE CYCLE ASSESSMENT

Chairs: Antonio Massarutto, University of Udine, Italy

09:15 – 09:30 **Using SLCA to assess the social impacts of the recycling system in the city of Cuenca, Ecuador**
Dolores Sucozhanay, University of Cuenca, Ecuador

09:30 – 09:45 **Assessing social implications of circular economy by integrating circularity in S-LCA**
Anna Luthin, RWTH Aachen University, Germany

09:45 – 10:00 **A preliminary social assessment of innovative management options for mixed and hazardous plastics waste**
Filomena Ardolino, University of Campania, Italy

10:00 – 10:15 **The Biofactory: Life Cycle Sustainability Assessment for Promoting Circular Economies in Wastewater Treatment**
Madelin Furness, University of Canterbury, United Kingdom

10:15 – 10:30 **An environmental, economic, and social evaluation of the production of animal feed from food waste: A Life Cycle Assessment**
Alla Alsaleh, Kuwait University, Kuwait

10:30 – 11:15 Coffee Break (Terrace of Grand Hotel Michele)

SESSION 6: RESOURCE OPTIMIZATION

Chairs: TBD

11:15 – 11:30 **Prospective dynamic resource assessment of circular economy solutions: the case of batteries in the mining sector**
Harald Helander, Chalmers University of Technology, Sweden

11:30 – 11:45 **Life Cycle Assessment of Infrastructure Materials Designed with Self-healing Technologies**
Noemi Arena, Arup, United Kingdom

11:45 – 12:00 **Insights from applying different assessment methods for metals resource use**
Maria Ljunggren Söderman, Chalmers University of Technology, Sweden

12:00 – 12:15 **Life Cycle Assessment of Alkali Activated Cement compared to Ordinary Portland Cement**
Anna Alfocea-Roig, University of Barcelona, Spain

Wednesday, June 8, 2022 (Continued)

- 12:15 – 12:30 **Repair for high-voltage electric motors: energy efficiency vs resource use?**
Adeline Jerome, Chalmers University of Technology, Sweden
- 12:30 – 12:45 **Life Cycle Assessment of Palladium Recovery from wastewater**
Gema Amaya Santos, University College London, United Kingdom
- 13:00 – 14:30 Lunch (Hotel private beach or restaurant of the Grand Hotel San Michele)
- 15:00 – 19:00 Technical visit to an anaerobic plant with biogas upgrading unit for biomethane production. In alternative, it will be organized a visit to the San Michele organic farm with degustation of wine and local products.
- 20:00 – 21:15 Dinner (Restaurant of the Grand Hotel San Michele): Pizza event
- 21:15 – 22:30 **Poster session with social hour**

Thursday, June 9, 2022

07:00 – 08:30 Breakfast

PLENARY LECTURE

Chairs: Morton Barlaz, North Carolina State University, USA

08:30 – 09:15 **The Economics and Thermodynamics of Waste**
Roland Clift, Canada and University of Surrey, UK

**SESSION 7: AGRICULTURAL, FOOD AND FORESTRY WASTE
MANAGEMENT**

Chairs: Morton Barlaz, North Carolina State University, USA

09:15 – 09:30 **Forestry Waste in British Columbia - overcoming bad habits and perverse
life cycle accounting**
Roland Clift, British Columbia, Canada and University of Surrey, UK

09:30 – 09:45 **Evaluating carbon balance of wood cascading – the need for accounting
storage period and rate of carbon uptake**
Kranti Navare, KU Leuven, Belgium

09:45 – 10:00 **Environmental and economic sustainability of agricultural waste collection
and valorization**
Giuseppe Vignali, University of Parma, Italy

10:00 – 10:15 **LCA of food waste management in Italy, with a special focus on the effect
of the bags used for the collection**
Mario Grosso, Milan Polytechnic, Italy

10:15 – 10:30 **Life cycle environmental analysis of the anaerobic digestion of agri-food
wastes in an Italian company**
Marianna Cosenza, University of Palermo, Italy

10:30 – 11:15 Coffee Break (Terrace of Grand Hotel Michele)

SESSION 8: BIOREFINERY SECTOR

Chairs: Massimiliano Materazzi, University College London, UK

11:15 – 11:30 **Assessment of technologies and scenarios for biogas management in
Denmark**
Anna Sofie Varling, Denmark Technical University, Lyngby, Denmark

11:30 – 11:45 **BBCircle – Life Cycle Assessment for innovative biorefinery process
evaluation**
Lidia Lombardi, Niccolò Cusano University, Italy

11:45 – 12:00 **Environmental assessment of different integrated biorefinery scenarios
using walnut shells as a source for lignin production**
Beatriz Santiago, CRETUS Institute, Spain

12:00 – 12:15 **Environmental assessment framework for bio-based methane production
via anaerobic digestion, gasification, and gas upgrading**
Concetta Lodato, Denmark Technical University, Lyngby, Denmark

Thursday, June 9, 2022 (Continued)

- 12:15 – 12:30 **Critical review on life cycle assessment of bio-based platform molecules: sustainability metrics of novel technologies**
Jorge Blanco, Rey Juan Carlos University, Spain
- 13:00 – 14:30 Lunch (Hotel private beach or restaurant of the Hotel)
- 14:00 – 17:00 Free time /ad hoc sessions
- SESSION 9: EMERGING TECHNOLOGIES**
Chairs: TBD
- 17:15 – 17:30 **Life cycle analysis of different biochar production processes for simultaneous waste management and carbon capture credits**
Katie Soulliere, ICFAR/Western University, Canada
- 17:30 – 17:45 **Advanced Thermochemical Conversion of Various Waste Feedstocks with CCS for Clean Hydrogen Production - a Life Cycle Assessment**
Suviti Chari, University College London, United Kingdom
- 17:45 – 18:00 **An alternative management scheme for plastics from construction & demolition waste**
Filomena Ardolino, University of Campania, Italy
- 18:00 – 18:15 **Life cycle impacts of WEEE plastics recycling within the PLAST2bCLEANED project**
Spela Ferjan, TNO, Netherlands
- 18:15 – 18:30 **LCA for emerging waste treatment technologies: theoretical approach and practical application**
Christina Tsouti, DRAXIS Environmental SA, Greece
- 20:00 – 21:15 Gala Dinner (Restaurant of the Grand Hotel San Michele)
- 21:15 – 22:30 **Poster session with social hour**

Friday, June 10, 2022

08:00 – 09:00 Breakfast

SESSION 10: INDUSTRIAL WASTE

Chairs: Maria Ljunggren Söderman, Chalmers University of Technology, Sweden

09:00 – 09:15 **Environmental and economic analysis to evaluate the valorization process of metallurgical waste and by-products**
Andrea Di Maria, KU Leuven, Belgium

09:15 – 09:30 **The environmental benefits of circular economy strategies in the nuclear industry: a Life Cycle Assessment study**
Andrea Paulillo, University College London, United Kingdom

09:30 – 09:45 **Development of an LCA spreadsheet model applied to recycling processes for automotive lithium ion battery to evaluate climate change impact category**
Rosario Tolomeo, University of Salerno, Italy

09:45 – 10:00 **Evaluating by LCA the environmental impact savings related to the use of waste incineration bottom ash in porcelain tiles manufacturing: The role of metals recovery**
Giulia Costa, University of Rome "Tor Vergata", Italy

10:00 – 10:15 **Critical choices in Waste LCA – A case study on the treatment of PAH-rich road debris**
David Laner, University of Kassel, Germany

10:15 – 11:00 Coffee Break (Terrace of Grand Hotel Michele)

11:00 – 11:15 **Prospective life cycle assessment for nickel slag valorization by mineral carbonation**
Eva Quéheille, Gustave Eiffel University, France

11:15 – 11:30 **The final disposal of equipment for food industry: an environmental assessment of different end of life scenarios**
Roberta Stefanini, University of Parma, Italy

11:30 – 12:30 **Poster Session**

12:30 – 13:15 **OVERALL DISCUSSION, FEEDBACK, WHAT IS NEXT?, CONCLUDING REMARKS AND CLOSING OF CONFERENCE**

13:15 – 14:00 Lunch at the restaurant of the Hotel and Departure